Astronomers behind the Iron Curtain:

The First Postwar Generation in Czechoslovakia

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The new director of the Astronomical Institute, Luboš Perek,
is given the congratulatory bumps, 1968
(MÚA, A AV ČR, Luboš Perek collection, photo by Jiří Plechatý)

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Contents

Preface

Astronomy has always had a somewhat privileged position in history, having been practised at the courts of monarchs and the nobility as well as in academic and ecclesiastical settings. There were compelling reasons for this – navigation, mapmaking, the calendar, accurate time keeping and transmission, and initially astrology, none of which could have ever done without astronomy. As a science with state support, astronomy established itself in the 18th and 19th centuries, when state observatories were being established to perform these tasks and to help implement the state's interest in demarcating territory, regulating time and monitoring weather to facilitate economic development. In parallel, however, there was also a growing number of private observatories set up by those who enjoyed observing planets, stars, star clusters and nebulae or searching for comets.

At the same time, it has always been the case that astronomers in Europe – and later on other continents as well – shared the results of their observations and measurements. Until the latter half of the 20th century, individual observatories published their observations and reports in regular publications, which were sent to subscribers and exchanged with astronomical institutions around the world. Moreover, journals were established to publish scientific articles, such as the *Philosophical Transactions of the Royal Society* (since 1665, London), *Monthly Notices of the Royal Astronomical Society* (since 1827, London), *Astronomische Nachrichten* (since 1820, Altona/Hamburg), *Astronomical Journal* (since 1849) and *Astrophysical Journal* (since 1895), both published by the American Astronomical Society. In 1969, the French, Dutch and German journals were merged into the newly established European journal *Astronomy and Astrophysics*, founded by D. Reidel, Dordrecht; after a few years, Italy, Belgium, East Germany, Scandinavia, Poland and Czechoslovakia began contributing to the journal. Czechoslovakia which by then was publishing the *Bulletin of the Astronomical Institutes of Czechoslovakia* (from 1947) was the first of the former Eastern bloc countries to be admitted to a European journal (in 1991).

After our excursion into national and international scientific journals, let us turn our attention to the national observatories established during the 20th century. With the emergence of the successor states after the First

World War and the subsequent dynamic technical and scientific developments, there was an increasing need to modernize astronomy, though few state resources were actually being invested.

There were only three substantial state-owned observatories in Czechoslovakia after the First World War. The historic one in Prague's Klementinum had practically no equipment compatible with modern science, while the originally private observatory at Ondřejov, near Prague, was donated to the state by its founder, Josef Jan Frič, to mark its 10th anniversary for the needs of Charles University, but no significant investments were made there either. Finally, the third observatory, also originally private, at Stará Ďala on the Hungarian-Czechoslovakian border, built and modernized by Count Miklós Konkoly-Thege, became part of the State Observatory during the interwar period.

While the state's concern for modernization faltered, a promising lay interest in astronomy was emerging as both private and collective, i.e. "people's", observatories were being built. In the Czech lands in particular, lay interest in membership in the Czechoslovak Astronomical Society exceeded equivalent interest in many European countries, actually intensifying during the Second World War occupation. The emerging *astroculture* had different faces and different social, political and ideological elements, which started to be channelled in one direction after the Second World War. However, this modern history of Czech and Czechoslovak astronomy and astroculture in the Czech lands and Czechoslovakia has not yet been written. The present book approaches them by analysing the education of the first postwar generation of professional astronomers and their international involvement.

In this context, the Slovak context is not neglected, as the Slovak state lost the aforementioned observatory in Stará Ďala during the Second World War, but thanks to the initiative and lobbying of the Czech astronomer Antonín Bečvář, a high-altitude observatory and meteorological station was actually constructed at Skalnaté pleso.

After the end of the Second World War, space sciences saw rapid advances in theory and technology worldwide. The radar technology developed during the war was now declassified, and antennas could be pointed at radio sources in outer space. This new field – radio astronomy – found favourable conditions even in small countries such as the Netherlands, though optical astronomy was not being neglected either. In 1949 the telescope on Mt Palomar in the USA, with a mirror diameter of five metres, the largest telescope in the world at that time, was brought into operation, along with the large Schmidt camera, which made it possible to take previously unimaginable pictures of the starry sky (the Palomar Photographic Atlas was compiled with its assistance).

In some respects, all astronomers had the same starting conditions after the Second World War when it came to discovering new objects in space. The young generation of astronomers, to whom this book is dedicated, was well aware of the necessity of obtaining data by making observations with large, modern instruments, which, however, were lacking in Czechoslovakia. What the generation of that time concentrated on might be called science of modest means, i.e. projects of global importance that were not financially demanding. It is a matter of debate to what extent they stand up in discussions of big science and comparisons with other scientific disciplines.

The book we are presenting to readers seeks to map out the turbulent history of astronomy in Czechoslovakia after the Second World War. Despite various reorganizations, political and economic obstacles, and the not always peaceful backdrop of interpersonal relations, astronomy emerged victorious from this period. Czechoslovak astronomers gained scientific prominence, held elected positions in international organizations and participated in international scientific projects. This culminated in 1967 in the 13th General Assembly of the International Astronomical Union held in Prague, accompanied by the inauguration of a two-metre reflecting telescope at the Ondřejov Observatory.

The circumstances of the Cold War meant that the Congress did not take place again in the geopolitical space of Central and Eastern Europe until the IAU General Assembly was held for the second time in Prague in 2006, confirming the unprecedentedly important position of the otherwise minority Czech astronomical community. The lion's share of this success is due to Luboš Perek, to whom this book is primarily dedicated.

As the oldest member of the team of authors, I was an eyewitness of the last years of this period, I met the individuals involved and heard many of their reminiscences, sometimes very personal. For years I have wished for this history to be preserved, which has now come to pass thanks to the support of the Czech Science Foundation. This historical research has been greatly aided by the two co-authors, who have made extensive use of the archive holdings at the Astronomical Institute's Ondřejov Observatory, as well as other archive collections. Using the oral history method, they have made and processed recordings of the memories of the experts, the last living astronomers of Perek's generation. The authors would like to express their gratitude to their colleagues who supported them as they wrote this book. Without their kind help and inspirational conversations, it would not have come into being.

Hopefully, this book, which openly presents both the bright and the dark sides of the development of astronomy in this country, will be of interest not only to historians of science but also to the public at large.

Luboš Perek (left) as a consultant at the UN,
sitting next to the ambassador Peter Jankowitsch, COPUOS Preparatory Committee,
24.6.1980 (photo by M. Grant, MÚA, A AV ČR, Luboš Perek collection, photo catalogue No. 314)

Introduction

> *"The golden atmosphere during the Cold War! There, the United Nations made it important for states to cooperate and to formulate international laws [about space]. And every state was invited to accept it."* (Luboš Perek)[1]

The opening quotation was formulated by the expert on astronomy and space law who came from socialist Czechoslovakia, and who in the 1970s discovered how, during the Cold War, the two superpowers of the time, along with the United Nations (UN) and other international human rights and scientific organizations, needed to engage scientific consultants from small socialist states. They were acceptable to both the USSR and the USA and, at the same time, achieved scientific acknowledgment by the international community of astronomers and astronauts. The author of the quotation belonged to the generation of scientists whose studies were interrupted by WWII. We believe that the uncertainty of life and the future profession created a bitter mental legacy which, together with the efforts to catch up with the surrounding scientific world and the lost years of a scholarly career, represents the factors that co-created the Cold War.

The historical experience of experts

This book asks how, from this postwar legacy, astronomers in Czechoslovakia become experts in demand on international platforms. After the launch of Sputnik 1 and the landing of the first man on the Moon, mankind followed the conquest of space with great interest. What other astronomical research has society valued and used? The aim of the book is a) to trace the various sources from which the importance of the field of astronomy for international politics grew, b) to bring closer the knowledge of astronomers, which cannot be reduced only to issues of the peaceful use of space or only to the results of one of the most successful experts, and c) to point to the deeper contexts of the education of the whole collective – i.e., the first postwar generation, which carried out this research diligently, often without respite.

1 Interview with Luboš Perek by Tomáš W. Pavlíček, 10 January 2016.

The focus of our research was therefore the experience of the war and the period of study (the 1940s and 1950s), after which astronomers all over the world were witnesses of and actors in new and in some ways unrepeatable research. This epoch begins with the launch of the first artificial satellite in 1957 and in a way remains open to this day. However, it is partially closed by the grid of the Cold War. As we would like to convince the reader, the dynamic development of astronomy was far from being only related to the human conquest of the cosmos; in the same era, it involved the production of new observation instruments and the application of innovative technologies, methods and theories (atomic clocks, radio astronomy, research of the high atmosphere, the discovery of quasars, pulsars, and gravitational lensing).

In our binocular viewfinder, the focus is mainly on the 1960s and 1970s. It was then that the first postwar generation began to determine the direction of research in astronomy, astrophysics, cosmology and other fields. The next generation of their pupils was entering these new conditions, which were already largely tied to the pre-created environment. But these connections, as well as other developments since the 1980s and 1990s, require future research.

Finally, the same distinction and, to some extent, the unique position of the first postwar generation of astronomers, can also be defined on the platform of astroculture, from both sides of the historical study. Astroculture did not lack futurological visions and socialist ideas, but with its presence – the entry of a human step into outer space or onto the lunar surface – it also revealed the limits of human skill and planetary security.

For several decades, the author of the opening quotation, Czech astronomer Luboš Perek, coordinated the research on the Galaxy and stars, built two telescopes, and chaired several non-governmental international astronomy and space organizations. When he became director of the Outer Space Affairs Division (OSAD) at the UN in 1970, he moved from the network of astronomers in socialist Czechoslovakia to the global community of scientists, where he watched space diplomacy during the Cold War as a socialist expert. An overview of the interesting life of one astronomer would be the aim of a biography. This book rather takes a closer look at the formation of the scholarly knowledge of the whole generation of scholars in postwar Czechoslovakia to explain the specific as well as globally important role of the scientific knowledge produced by a collective of astronomers, which one can define as minor scholars or scientists from a minor Central-Eastern European state.

The context of the research

As mentioned above, the main goal is to explain the development of the community of astronomers in Czechoslovakia in the context of the **education, knowledge and internal cohesion** of this group. Although one can achieve an interesting view on the 20th century history of disciplines, academies of sciences, and scholarly institutes (astronomical institutes were minor among other disciplines), this book takes a special look at the first postwar generation of astronomers and their results.

According to current knowledge, historiography indicates that the Iron Curtain did not have the strict east-west opposition. Czechoslovakia, East Germany and Poland had a peripheral position from the Soviet perspective. The natural sciences in particular (more than the humanities) were able to be involved in international networks, where knowledge flowed across the Iron Curtain.[2] However, the focus of this book is not primarily on the history of global policy or diplomacy; local political conditions for travelling and scholar interconnectedness naturally differed in every individual state.[3] The various and complicated system of agreeing to cooperation and individual scholar strategies can be called **entanglements**.[4]

The period of the 1970s and 1980s (the so-called normalization after the oppression of the Prague Spring in Czechoslovakia) in particular is currently one of the most discussed topics in Czech historiography.[5] One of our tasks is to monitor the position of astronomy and the **relevance of the political impact** on scholars' research. The unpredictability of the system was not defined only politically, but was also affected due to the strict planning and funding rules of the state research programme.[6]

2 Christopher Hollings, *Mathematics Across the Iron Curtain. A History of the Algebraic Theory of Semigroups* (Providence, Rhode Island: American Mathematical Society, 2010); Christopher Hollings, *Scientific Communication Across the Iron Curtain* (Berlin: Springer, 2016); Dora Vargha, *Polio Across the Iron Curtain: Hungary's Cold War with an Epidemic* (Cambridge: Cambridge University Press, 2018).

3 In Czechoslovakia, justification for a trip abroad had to be provided along with a passport application. Cf. Jan Hálek, *Ve znamení "bdělosti a ostražitosti". Zahraniční styky a emigrace pracovníků ČSAV v dobových dokumentech (1953–1971)* Praha: MÚA AV ČR, 2011, 10.

4 John Krige, ed., *How Knowledge Moves: Writing the Transnational History of Science and Technology* (Chicago: The University of Chicago Press, 2019).

5 Michal Pullmann and Pavel Kolář, *Co byla normalizace? Studie o pozdním socialismu* (Praha: NLN – ÚSTR, 2016); Kamil Činátl, Jan Mervart, and Jaroslav Najbert, eds., *Podoby československé normalizace. Dějiny v diskuzi* (Praha: NLN, 2017).

6 Sandrine Kott, ed., *Planning in Cold War Europe. Competition, Cooperation, Circulations (1950s–1970s)* (Berlin: De Gruyter, 2018).

Czechoslovak astronomy participated in the socialist programme Interkosmos and had a number of excellent results, which found acknowledgment among Eastern and Western scholars. Indeed, after cosmonauts from the USA and the USSR, the Czechoslovak cosmonaut Vladimír Remek (born 1948) was the next person in space.[7] The detection of the deep relevance of socialist science bring us to the assumption that astronomy is much more closely related to the topic of **expert cultures**, as Vítězslav Sommer analyses them for Czechoslovakia.[8] More on expert cultures and their futurologist visions were studied by Frank Fischer.[9]

There is also another **debate in Cold War historiography** over the extent to which the experts were dependent on the decisions and finances of a political establishment, which also pursued state security and military interests. Naomi Oreskes and John Krige emphasized that astronomy was **strongly dependent on state funding**.[10] We want to enter this discussion and examine how Czechoslovakian astronomical research with global results could be provided with minimal resources. Although astronomers were loyal to the communist state, the question is how deep this loyalty went when the technical conditions for the experts' work did not improve.

Krige doubts that the intensifying transnational transfers diminished the power of the state and believes the knowledge still depended on state boundaries and nationalism.[11] Certainly, the knowledge circulation during the Cold War was regulated. But we would like to draw attention to two phenomena: the point of view, and the aim of scholars to organize their epistemic communities. Both are worth considering, because it was Czechoslovak astronomy that had its experts in the UN offices and that played a prominent role in the Eastern European socialist space programme Interkosmos.

On the topic of **the interconnectedness of the East and West**,[12] we asked how balanced the two-way foreign cooperation was when the Czechoslovak

7 Karel Pacner, *Češi v kosmu* (Praha: Academia, 2011), 93–101.

8 Vítězslav Sommer et al., *Řídit socialismus jako firmu. Technokratické vládnutí v Československu, 1956–1989* (Praha: Nakladatelství Lidové noviny, 2019).

9 Frank Fischer, *Technocracy and the Politics of Expertise* (California: Sage Newbury Park, 1990).

10 Naomi Oreskes and John Krige, eds., *Science and Technology in the Global Cold War, Transformations: Studies in the History of Science and Technology* (Cambridge, Mass. – London: MIT Press, 2014), 431–39.

11 John Krige, ed., *Knowledge Flows in a Global Age. A Transnational Approach* (Chicago – London: The University of Chicago Press, 2022), 1–30.

12 Jan Surman, "Re-Connecting Central European Science: An Introduction," in *Knowledge Interconnected: German-Polish Scholarly Entanglements in Modern History*, ed. Jan Surman et al. (Marburg: Verlag Herder Institut, 2022), 1–36.

astronomers' membership in the International Astronomical Union (IAU) was linked to trips to the West, while space research, artificial satellites, and the dynamic development of solar physics created a visible network of contacts with scientists in the Eastern bloc. Another problem is the decisive position of the Presidium of the Czechoslovak Academy of Sciences (CSAS), which supported research programmes on cosmic rays (e.g., the Joint Institute for Nuclear Research in Dubna in the USSR) and on the other side limited particular scholars in foreign exchanges, even though the proposed **"big science" projects** (particle accelerators or tokamaks being developed to produce controlled thermonuclear fusion power) did not have the visible or practical results that minor disciplines had.[13]

In this connection, however, the question arises as to what extent astronomers were able to assert their own observational interests after the state built telescopes and radars for them. As the authors of the monograph on 100 years of the IAU show, during the Cold War, military instruments were originally often used for purely astronomical observations, for example for turning the radars of satellites in orbit from the Earth into space.[14] Could armaments during the Cold War have had a secondary positive impact on the technological development of astronomy?

Against Krige's slightly pessimistic view of astronomy tied to the global Cold War, another American historian, Alexander Geppert, points to the social importance of astronomy for the **astroculture** born in the 1960s. He defines it as "a heterogeneous array of images and artifacts, media and practices that all aim to ascribe meaning to outer space while stirring both the individual and the collective imagination".[15] He brought a fresh, non-philosophical view of astrofuturism. Instead of human rights debates, which each politics has adapted for itself, astroculture turns its attention to the planet and the climate. How objectively can people themselves observe processes in nature? What do they fear and what do they hope for? In addition to its aspect of environmental history, this perspective is important in the context of decolonization processes and global history, as it brings back into play European scientists (from both sides of the Iron

13 Jan Hladký, *Paměti kosmika Fyzikálního ústavu ČSAV* (Praha: Academia, 2018), 283–309.

14 Johannes Andersen, David Baneke, and Claus Madsen, *The International Astronomical Union. Uniting the Community for 100 Years* (Cham: Springer, 2019), 29–35.

15 Alexander Geppert, ed., *Imagining Outer Space: European Astroculture in the Twentieth Century* (London: Plagrave Macmillan, 2012), 8.

Curtain) who were increasingly overlooked by astronomy cultivated in the USA and the USSR.[16] Historians of science have also unfairly overlooked this phenomenon.

At the same time, the involvement of experts from small socialist states obviously had great political potential, as can be seen in the Perek example mentioned at the beginning. The interest in the activities of experts and their involvement in non-governmental organizations has opened up space in historiography for the study of scholar networks. Their importance in international politics was elaborated by Peter Haas when he collectively referred to them as **epistemic communities**.[17] He was inspired by Thomas Kuhn, who explored the links between individuals within scientific communities – a shared paradigm. According to Kuhn, these are shared sets of scientific research results that these scientists believe will be able to model problems and propose solutions.[18]

To what extent did Czechoslovak scientists present themselves in the international community of astronomers, which still defined itself non-politically, as representatives of a socialist state? To what extent could they benefit from their position? And didn't they need to somehow retroactively reformulate it as a result of the transformation and fall of the Iron Curtain? The use of this approach, in conjunction with oral history, reinforces the argument that studying international contacts of the Cold War period "from below" is a more effective method than starting from imposed political norms.

Methods in the historiography of science

The "from below" perspective could also be appreciated by historians of science and historians of university education. We propose a short schedule of traditional methods. The history of natural sciences in the Czech lands has a relatively rich tradition and is orientated toward disciplines and institutions.[19] It is also a part of the research on the history of the

16 Benjamin W. Goossen, "Europe's Final Frontier: Astroculture and Planetary Power since 1945," *Contemporary European History* 32, no. 3 (2023): 475–88.

17 Peter M. Haas, "Epistemic Communities and International Policy Coordination: Introduction," *International Organization* 46, no. 1 (1992): 1–35.

18 Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1970), 10.

19 Luboš Nový, ed., *Dějiny exaktních věd v českých zemích do konce 19. století* (Praha: NČSAV, 1961); Ivo Kraus, ed., *Věda v českých zemích. Dějiny fyziky, geografie, geologie, chemie a matematiky* (Praha: Česká technika – nakladatelství ČVUT, 2019); Břetislav Fajkus, "Přírodovědecká fakulta: Vývoj fakulty 1945–1990. Obory a osobnosti poválečného vývoje," in *Dějiny Univerzity Karlovy IV: 1918–1990* eds. Jan Havránek and Zdeněk Pousta

CSAS.[20] The effort of some historians to interpret specifics on the habitus of Czech scientists showed permanent continuities of their everyday lives. On the other side the dynamic, the transformation of the entire academic field after the war brought deep changes for the coming generation. That is why the classical dispositive between power and knowledge was reconstituted, which has a certain consequence for the classical understanding of habitus by Bourdieu.[21]

As mentioned above, astronomy in the Czechoslovak Republic in the 20th century had a direct link to the **history of ideas and the history of atheism**. So far, more has been published about the philosophical secularization of religion or even about the Marxist-Christian dialogue.[22] In connection with the construction of public observatories and utopian socialist visions about popular astronomy, the only biography of a female Czech astronomer was published, although she was primarily a feminist politician rather than a professional scholar.[23] For other disciplines to which astronomy (and cosmology) was similar, the transfer of knowledge from scientists to the social consciousness is evident, as shown by Doubravka Olšáková or Jan Mervart.[24] However, natural scientists and technical intelligence have so far remained outside the focus of cultural history.

In comparison to the "from below" perspective, one should add that the history of knowledge, which was promisingly developed for early modern astronomy by Zdeněk Horský (1929–1988) in the 1970s and 1980s, is missing nowadays.[25] The development of scientific thinking, its

(Praha: Karolinum, 1998), 473–93; Milan Gelnar and Zuzana Jayasundera, eds. *Dějiny psané přírodovědci. Vývoj vědních oborů na Přírodovědecké fakultě Masarykovy univerzity* (Brno: Munipress, 2022).

20 Věra Dvořáčková and Martin Franc, eds., *Dějiny Československé akademie věd, I. díl* (Praha: Academia, 2020).

21 Tomáš Gecko and Tomáš Pavlíček, "Kariérní postup vědce, vztah učitele se žákem a vytváření vědeckých škol," in *Habitus českých vědců 1918–1968. Příklad dvou generací*, ed. Martin Franc (Praha: MÚA AV ČR, 2021), 63–118.

22 Jan Tesař, *The History of Scientific Atheism: A Comparative Study of Czechoslovakia and Soviet Union (1954–1991)* (Göttingen: Vandenhoeck & Ruprecht, 2019); Jan Mevart and Ivan Landa, eds., *Proměny marxisticko-křesťanského dialogu v Československu* (Praha: Filosofia, 2017).

23 Stanislav Holubec, *Nešťastná revolucionářka. Myšlenkový svět a každodennost Luisy Landové-Štychové (1885–1969)* (Praha: NLN, 2021).

24 Doubravka Olšáková, *Věda jde k lidu! Československá společnost pro šíření politických a vědeckých znalostí a popularizace věd v Československu ve 20. století* (Praha: Academia, 2014); Jan Mervart and Jiří Růžička, *„Rehabilitovat Marxe!" Československá stranická inteligence a myšlení post-stalinské modernity* (Praha: NLN, 2020).

25 Vojtěch Hladký, ed., *KOPERNÍK, Mikuláš. O obězích nebeských sfér. První kniha. Překlad, úvod a komentář Zdeněk Horský* (Praha – Červený Kostelec: Ústav pro soudobé dějiny

structure, and the detection of mistakes accompanies the recognition of new knowledge, which can grow into a scientific revolution, as characterized by Thomas Kuhn. He, together with John Heilborn, Paul Forman, and eventually their secretary, Lini Allen, led the project "Sources for History of Quantum Physics" (1961–64) and interviewed many physicists who participated in the Manhattan Project, especially Niels Bohr. They did not work as oral historian researchers, but their questions concerned the processes of knowledge, the development of quantum physics, the construction of atom models, and cooperation during research.[26] The revolutionary development in astronomy and astrophysics in the 1960s rightfully encourages us to follow a similar path and not to pursue only the study of the Czechoslovak environment.

As Sven Dupré and Geert Somsen argue, the history of knowledge is not a mere expansion of the history of science, but can "ask new questions about the boundaries, hierarchies, and mutual constitution of different types of knowledge as well as the role and assessment of failure and ignorance in making knowledge."[27]

The question is, how much astronomical research was a matter for the individual observer and which disciplines were established and transformed after WWII? How quickly did education change when astronomy rapidly moved from (manual) mathematical calculations of optically observed phenomena to radio observation and astrophysical interpretation of captured rays? To what extent is an observatory or a telescope a main actor in the history of knowledge? We know there was a certain tradition of the circulation of observers on instruments and the international sharing of photographed data.[28] A globally written history of astronomy by Michael Hoskin shows how observations provided by individual scholars changed to team research with some limits on sharing.[29]

AV ČR, v.v.i. – Pavel Mervart, 2016); Jaroslav Kolár, "Vědec a přítel Zdeněk Horský," *Dějiny věd a techniky* 44 (2011): 117–22.

26 Kuhn, *The Structure of Scientific Revolutions*; Anke te Heesen, *Revolutionäre im Interview. Thomas Kuhn, Quantenphysik und Oral History* (Berlin: Wagenbach, 2022).

27 Sven Dupré and Geert Somsen, "The History of Knowledge and the Future of Knowledge Societies," *Berichte zur Wissenschaftsgeschichte* 42, no. 2–3 (2019): 186–99.

28 Gudrun Wolfschmidt, ed., *Kometen, Sterne, Galaxien. Astronomie in der Hamburger Sternwarte. Zum 100jährigen Jubiläum der Hamburger Sternwarte in Bergedorf* (Hamburg: Tredition, 2014).

29 Michael Hoskin, ed., *The Cambridge Concise History of Astronomy* (Cambridge: Cambridge University Press, 1999).

The structure of the book and novel methods

To summarize these questions, we argue that there is a certain lack of interconnectedness between the history of a discipline (astronomy), the history of science (circulation of knowledge), the history of institutes (universities, academies of sciences) and the history of the idea of popular astronomy (the perspective of a socialist state and education).

Our research questions can be reorganized chronologically in four directions, which also set the basis of the book:

- the generation as a research category and a collective memory,
- the experience of WWII and the transformation of higher education,
- the organization of astronomical research and the socialist utopian vision of popular astronomy,
- the growth of expert cultures in socialist Czechoslovakia and the involvement of scientists in international networks.

On these four axes, related topics of particular chapters are rasterized and preserved in a chronological structure. Like a crimson ribbon, the life story of Luboš Perek (1919–2020), the oldest member of the first Czechoslovak postwar generation, runs throughout the book, with preludes in every chapter.

I. The history of astronomical education in Czechoslovakia

The first chapter – **Teachers** – includes the institutional overview of observatories in the Czech lands or Czechoslovakia, as well as the tradition of astronomical research and the organization of studies at both Czech and German universities. Within the collective of teachers, certain limits regarding instruments and scholar positions in the interwar generation are visible, as well as knowledge backwardness in the tuition of astronomy. Regardless, the Czechoslovak Astronomical Society (CAS, 1917) attracted public attention. Its beginning and conclusive socialist ideas were greatly recognized by the occasion of the 50th anniversary of its foundation.[30]

In the Czech historiography, there is a certain split between the traditional prosopography of the history of universities,[31] and a rather

30 Jiří Grygar and Miroslav Plavec, eds., "[issue dedicated to the 50th anniversary of CAS, with contributions of 17 authors]," *Kosmické rozhledy* 5, no. 4 (1967).

31 Havránek and Pousta, eds., *Dějiny Univerzity Karlovy. IV. 1918–1990*; Michal Svatoš, ed., *100 let Přírodovědecké fakulty Univerzity Karlovy* (Praha: Přírodovědecká fakulta UK, 2020).

innovative view on the university as a concept for the circulation of knowledge, with the scientist as a main actor in cultural history.[32] Such a contemporary approach was chosen by Lukáš Fasora and Jiří Hanuš at Masaryk University (MU).[33] Other authors concentrated instead on particular legislative questions and on the transformation of studies after WWII.[34] Prosopographical attention is given to the memory of scientists of Jewish origin and the fate of German science in the Czech lands, as well as to Czechoslovak emigration.[35] We concentrated on the main teachers of the postwar generation, who are also mentioned with structured biograms, which represent a traditional source for the history of science.

II. The history of education from the perspective of the WWII experience

The second chapter – **Students** – enters with a totally different view. While biographies of scientists usually consist of a full synopsis of the educational background concluding with a doctorate, the formation of the first postwar generation was different. The war and the closure of the Czech universities changed the earlier plans of students, and many of them could not return to finish their studies after the liberation. This point should be taken into account, considering the postwar reopening of universities and the transformation of academia. The traditional historiography of universities has not yet paid attention to gaps in the lists of prewar students and postwar graduates and the mental transformation of the youth.

Previously, scientists confirmed their professional qualifications through similarly structured careers, as is usually evident from their resumes. But the biographies of the first postwar generation of students, future successful scientists, had their youth and scholarly beginnings

32 Jan Surman, *Universities in Imperial Austria 1848–1918. A Social History of a Multilingual Space* (West Lafayette, Indiana: Purdue University Press, 2018).

33 Jiří Hanuš and Lukáš Fasora, *Mýty a tradice středoevropské univerzitní kultury* (Brno: Masarykova univerzita, 2019); Jiří Hanuš and Lukáš Fasora, *Masarykova univerzita v Brně. Příběh vzdělání a vědy ve střední Evropě* (Brno: Munipress, 2009).

34 Pavel Urbášek, ed., *Kapitoly z dějin univerzitního školství na Moravě v letech 1945–1990* (Olomouc: Univerzita Palackého, 2003); Pavel Urbášek and Jiří Pulec, *Vysokoškolský vzdělávací systém v letech 1945–1969* (Olomouc: Univerzita Palackého v Olomouci, 2012); Jakub Jareš, "Akademické milieu v časech prověrek – vysoké školy v letech 1948–1956. Poválečná reforma českého vysokého školství a její kořeny" (PhD thesis, Praha, Filozofická fakulta UK, 2016); Jakub Jareš and Martin Franc, *Mezi konkurencí a spoluprací: Univerzita Karlova a Československá akademie věd 1945–1969* (Praha: Karolinum, 2018).

35 Michal Šimůnek and Antonín Kostlán, eds., *Disappeared Science: Biographical Dictionary of Jewish Scholars from Bohemia and Moravia – Victims of Nazism, 1939–1945* (Praha – Červený Kostelec: Pavel Mervart, 2013); Antonín Kostlán and Soňa Štrbáňová, "Czech Scholars in Exile, 1948–1989," *Proceedings of the British Academy* 169 (2011): 239–56.

peculiarly skewed by the war and the value of liberty. That is why the second chapter begins with a passage about the liberation in May of 1945 from the diary of a future astronomer and his wife. We chose an anthropological approach there, because egodocuments and oral history sources testify to shared experience.

The young generation called for a socially justified reform of university studies and wanted to safeguard the democratization of education by demanding student participation on the faculty board. Although the victims of the war were commemorated, the younger generation also took on the positions left open by the war victims, the Jews, and the displaced Germans. Rather, the narrative of the generation focuses on the derailment and delay of one's own career. The mental legacy of the war, the need to catch up with the outside world and to work scientifically without respite – these are the factors that co-created the Cold War. Similarly, Julia Fürst defined Stalin's specific last generation in the USSR. Unfortunately, the previous historiography does not reflect that "youth in late Stalinism continuously challenged the state's vision of a Soviet youth (which in itself experienced several adjustments, especially in the light of the emerging Cold War rivalry with the West)."[36]

Why is the stage of adolescence so important for the creation of generational self-awareness? The answer is provided in an essay by Michael Corsten, who, for this purpose, introduces "the concept of the social construction of the institutionalized and standardized modern life course."[37] The life course is institutionalized by the following: 1) life transformations take place in a certain order and are regulated by the education system and determined by age (e.g. legal adulthood), 2) life stages are culturally defined (secondary school student – university student – graduate).

III. The scholar experience studied using the oral history method

The third chapter – **For society** – examines the phenomena of amateurs and the outreach of astronomy, which is a recognized area of research.[38] Under what historical circumstances (war) and field contexts (astronomy) was the knowledge of young amateurs shaped in a special way, even before they began their studies? The postwar generation remembers it fondly. Looking from below, however, one must ask why they critically evaluated

36 Juliane Fürst, *Stalin's Last Generation. Soviet Post-War Youth and the Emergence of Mature Socialism* (Oxford: Oxford University Press, 2010), 3.

37 Michael Corsten, "The Time of Generations," *Time & Society* 8, no. 2–3 (1999): 263.

38 Olšáková, *Věda jde k lidu!*, 272–285.

their teachers and at the same time distanced themselves in their memories from the possibilities provided by the socialist construction of the public observatories. The goal of our interviews was therefore not only informational.

That is why we ask how generational experience reflects the relation between students and their supervisors. This is a key question for the history of science. The generation as a research category shows how generational self-awareness solidifies. For the formation of this experience, two prerequisites are necessary: the generational context must have priority and the young have to define their life situation similarly. The astronomers read similar textbooks and shared their amateur observations, as well as their ideas of youth. Their experience with war and their studies closed them into one generational unit, too. For the community of Czech astronomers, it is characteristic that they cooperate, publish and meet together after the productive phase of life. The prosopographical book on the 100th anniversary of the Ondřejov Observatory is an important example.[39]

The innovative contribution of this book is supported by fragments from interviews with experts. Using the oral history method, we managed to conduct interviews with several scholars of this generation and evaluate their life stories, memories, gender aspect, networking, and circulation of knowledge, as well as its limits. In the Czech academic milieu, oral history has a noticeably clear acceptance and methodology.[40] Some studies also dealt with the history of science, concerning rather selective research questions.[41] That is why oral history articles on scientists in the US research system should not be omitted.[42]

Conducting interviews with experts in their native language offers a deeper understanding of historical processes and allows us to shift the focus from a linear description to a reconstruction of past experience with

39 Petr Hadrava, ed., *Ondřejovská hvězdárna 1898–1998.* (Praha: Vesmír, 1998).

40 Miroslav Vaněk and Pavel Mücke, *Třetí strana trojúhelníku: teorie a praxe orální historie* (Praha: Fakulta humanitních studií UK v Praze, 2011).

41 Lenka Krátká, Jana Wohlmuth Markupová, and Miroslav Vaněk, *(K)lidová věda. Proměny a konstanty v práci i životě vědců a vědkyň v letech 1968–2008* (Praha: Fakulta humanitních studií UK v Praze, 2018); Milena Josefovičová, ed., *Z Československé akademie věd do exilu. S vědci o vědě.* (Praha: MÚA AV ČR, 2011); Jindřich Schwippel and Jan Boháček, "Pamětníci a spolutvůrci dějin ČSAV. Sbírka rozhovorů v Archivu Akademie věd ČR," *Práce z dějin Československé akademie věd* 3, no. 1 (2011): 53–86.

42 Richard E. Doel, "Oral History of American Science: A Forty-Year Review," *History of Science* 41 (2003): 349–78; Charles Weiner, "Oral History of Science: A Mushrooming Cloud?", *The Journal of American History* 75, no. 2 (1988): 548–59.

the captured emotions.[43] This memory is captured by cultural patterns and can be distinguished on a basic level between a collective memory and a communicative memory.[44] The collective memory is shaped by an autobiographical account of a shared past and serves to identify a subject. The communicative memory is in principle oral and transfers knowledge between generations, especially within families, closed relationships and working collectives.[45] In contrast to written archives minutes, oral history sources open up a larger spectrum of interpretative perspectives and do not concern only famous and leading representatives who are the definitive main authors of written sources.[46] When talking, the "witnesses of science" remembered the old memory traces, which are long-lasting and hardly affected by later layers of memory and are thus easier to reproduce. Some cases involving scientists have been recently published.[47]

This approach opened up a productive way for us to consider how astronomers brought their knowledge into society using the public observatories as places for the promotion of atheism and modern scientific knowledge. Similarly, Denisa Nečasová has taken an interest in the concept

43 Paul Thompson, "The Voice of the Past. Oral History," in *The Oral History Reader*, ed. Alistair Thomson and Robert Perks (New York – London: Routledge, 2003), 21–22.

44 Jan Assmann, "Communicative and Cultural Memory," in *Cultural Memory Studies. An International and Interdisciplinary Handbook*, eds. Astrid Erll and Ansggar Nünning (Berlin – New York: De Gruyter, 2008), 109–18.

45 Magdalena Saryusz-Wolska, "Pamięć komunikacyjna," in *Modi memorandi. Leksykon kultury pamięci*, eds. Magdalena Saryusz-Wolska and Robert Traba (Warszawa: Scholar, 2014), 335.

46 Paula Hamilton and Linda Shoeps, "Building Partnerships between Oral History and Memory Studies," in *Oral History and Public Memories*, eds. Paula Hamilton and Linda Shoeps (Philadelphia: Temple University Press, 2008), vii–xvii; Alistair Thomson, "Four Paradigm Transformations in Oral History," *Oral History Review* 34, no. 1 (2006): 49–70.

47 Tomáš W. Pavlíček, "Rozhovor s astronomem Lubošem Perkem. Rozbor generačního vědomí," *Práce z dějin Akademie věd* 14, no. 1 (2022): 45–96, https://doi.org/10.54681/AV.2022.1.3; Barbora Kulawiaková and Tomáš W. Pavlíček, "The Training of the Czech Mathematician Jaroslav Kurzweil with Władysław Orlicz in Poland," *Antiquitates Mathematicae* 15, no. 2 (2021): 188–206, https://doi.org/10.14708/am.v15i1.7078; Barbora Kulawiaková and Tomáš W. Pavlíček, "Andrzej Sołtysiak: 'The Best Way for You Is to Study Math, You Just Put Some Chalk in Your Pocket, Go to the Classroom and Don't Care.' Choosing the Field of Studies – the Entangled Cooperation between Polish and Czech Mathematicians," *Wrocławski Rocznik Historii Mówionej* 13 (2023): 198–222, https://doi.org/10.26774/wrhm.372. Other transcripts are in the author's archive.

of the new socialist man and woman.[48] Partial monographs, collective books and contextual histories of academies of sciences open up an inspiring path even for the history of science in socialist Czechoslovakia.[49]

IV. The emanation of knowledge and the formation of experts

The fourth chapter – **Institutes** – focuses on the origin of the new astronomical institute as a field of emanation of scientific knowledge, which is the main attribute for further experts. Our objective is to critically examine the traditional perspective of "captive universities" and "chained academies" in Central and Eastern Europe after 1945.[50] Agatha Zysiak shows – in the case of the first postwar socialist university in Poland – that there were many scientists led to believe they were involved in a broader process of social transformation and technological revolution.[51]

Anthropological attempts present methodological possibilities of writing the history of universities from below, i.e., through the eyes of students. Who among astronomers felt like a member of the postwar community, and who was expelled from studies and academia? It is evident that the totalitarian thinking was present in the discourse right after the war.[52] Researching generational consciousness help to clarify the sense of belonging among peers, including the younger generation who started studying in 1945.

Because of the Czech universities being closed during the war, students from two units (one has an age interval of 5–8 years) shared a similar historical context. The age interval of both groups is quite broad. Luboš Perek (born in 1919) and his classmates took the matriculation exam in the late 1930s or early 1940s but completed their studies after 1945. Jiří Grygar, the youngest astronomer of our group (born in 1936), and his older classmates started studying shortly before and after the reform of university studies in 1950. How strong was this broad generational consciousness? Or was it rather cohesion based on shared narratives (war, revolution, amateur

48 Denisa Nečasová, *Nový socialistický člověk: Československo 1948–1956* (Brno: Host, 2017).

49 Johannes Feichtinger and Johannes Heidemarie Ul, eds., *Die Akademien der Wissenschaften in Zentraleuropa im kalten Krieg: Transformationsprozesse im Spanngsfeld von Abgrenzung und Annäherung* (Wien: Verlag der ÖAW, 2018); Vargha, *Polio Across*.

50 John Connelly, *Captive University. The Sovietization of East German, Czech, and Polish Higher Education, 1945–1956* (Chapel Hill – London: University of North Carolina Press, 2000).

51 Agata Zysiak, *Punkty za pochodzenie. Powojenna modernizacja i uniwersytet w robotniczym mieście* (Kraków: Nomos, 2016).

52 Christiane Brenner, *Mezi Východem a Západem: České politické diskurzy 1945–1948* (Praha: Argo, 2015), 337–41.

observations)? According to Shmuel Eisenstadt, common history and shared social conditions stabilize the system.[53] That is why we focused on the cooperation among those astronomers and the position of the CSAS Astronomical Institute in this chapter. Instead of institutional history, we study new instruments and observation methods which circulated among different departments of the institute. Last but not least, the formation of experts also depends on the employment opportunities of men and women. In order to overcome borders, however, it is necessary to reflect on gender imbalance too, as shown in the German-Polish network of female academics.[54]

V. Astronomy studied through the history of knowledge

German technologies became key in the realm of **New instruments** – the topic of the fifth chapter. Regarding the building and construction of the 2m mirror reflector – the biggest telescope in Czechoslovakia – we stressed the importance of international contacts and the circulation of knowledge, how and where to build such a telescope (later named the Luboš Perek Telescope), and how to conduct efficient research while observing stars with it.

Even after WWII, the IAU considered the construction of new telescopes that would serve the entire international community.[55] This provides a picture of the observatory and its instruments, which are ecumenically available to all astronomers throughout the world. Although it was in the interest of the observatories to publish their astronomical yearbooks with observation data and information about foreign scholars' stays, the Cold War caused a certain uncertainty. For whom and in what year would it be possible to secure visas and money for a research stay?

In the case of postwar Czechoslovak astronomy, we would draw attention to a certain disproportion of Slovak scientists. We concentrate on different positions and research possibilities between the CSAS and the Slovak Academy of Sciences (SAS) and their main observatories – Ondřejov in Bohemia and Skalnaté pleso in the Tatra mountains.[56]

53 Samuel N. Eisenstadt, *Von Generation zu Generation: Altersgruppen und Sozialstruktur* (München: Juventa Verlag, 1966).

54 Iwona Dadej, *Beruf und Berufung transnational. Deutsche und polnische Akademikerinnen in der Zwischenkriegszeit* (Osnabrück: fibre Verlag, 2019).

55 Andersen, Baneke, and Madsen, *The International Astronomical Union*, 39.

56 Dušan Kováč, ed., *Dejiny Slovenskej Akadémie vied* (Bratislava: Veda, 2014).

VI. The expert cultures and the importance of epistemic communities

The last chapter – **International contacts** – and the last of the research questions, arranged chronologically, represents de facto the Iron Curtain, and the east-west opposition. The methodological approach was mentioned in the beginning of this study. In the final chapter, we examine both **visible and invisible networks**, as they were present during the 13th IAU General Assembly in Prague in 1967. This congress was something of a milestone for Czechoslovak astronomy. The socialist cooperation had promised continuity after the Prague Spring in 1968 (as shown with the Hvar project). Czechoslovak astronomy participated in the socialist programme Interkosmos and found acknowledgment among Eastern and Western scholars and at the global level of the UN.

The first postwar student cohort was composed of several generational units.[57] Formally, our book is neither a collective biography of important scientists nor a history of a famous observatory. The book examines the making of astronomical knowledge and captures the extraordinary moment after WWII when astronomical observation fundamentally changed. Utopist dreams and popular ideas about space were transformed into a concrete form of **astroculture**. After Sputnik 1 was successfully launched and placed into a low elliptical orbit in 1957, two superpowers entered a race to conquer space. At the same time, they needed peaceful international cooperation to be achieved. The world, politically divided with the Iron Curtain, could not be bound for astronomical observations which should be provided at different latitudes and longitudes all over the planet. The global data from observations had to be shared, otherwise it lacked meaning and benefit. The first postwar generation of astronomers grew into experts important for international politics. But at the same time, many of them became experts in the construction of modern instruments and innovative observation methods.

Therefore, this generation is presented not as a national collective established within the system of postwar science, but as a community of scholars from a small, socialist European state. Czechoslovakia was definitely successful with its achievements in the internationalization of astronomy within the Eastern bloc. Czechoslovak astronomy became an equal socialist partner in international cooperation, similar to other Western European states. This is also why the IAU tried to remain politically

57 Michael Corsten defined a generational unit as a group of peers with an age range of 4–7 years with the same experience. Corsten, "The Time of Generations," 261–65.

neutral, so as not to be dependent on Soviet or American research. Even some astronomers in both these states have had a tendency to overlook other minor scholars from Europe.[58]

Within this context, we ask how generational discourse and educational practices make graduate students successful and contribute to the creation of a scientific institution from below. This history of science anchored in generational and educational forms has the ambition to capture the disciplinary and social context of the development of astronomy, which was highlighted during the communist era. It will also make it possible to explain the significant representation of Czech astronomers in the fields of astronautics and space law.[59] Communism ushered in the vision of a New Man, and advances in scientific discovery and technology injected some hope into this dream.[60]

Archive sources and oral history sources

As was already mentioned, the Czech (and Slovak) astronomical community pays a lot of attention to the popularization and history of its own discipline and the digitization of journals and photographs. But the primary sources for our book were in archives. The research into the personal collections of astronomers in the Masaryk Institute and Archives of the Czech Academy of Sciences showed a remarkable practice within the community. When an astronomer from the CSAS Astronomical Institute passed away, his texts and correspondence were usually sorted and correctly marked by a close colleague, before releasing the material to the archive. Other personal collections outside of the institute archived in other institutions have been studied recently.[61]

Documents on students and on the organization of education (protocols of professors' board assemblies, communication with the Astronomical Institute of Charles University), are deposited in the Archive of Charles University, in the Faculty of Science collection,[62] where astronomy belonged until the shift of those classes to the new Faculty of Mathematics and Physics (1953/54). Similarly, the collections are located in the Archive

58 Goossen, "Europe's Final".

59 Pacner, *Češi v kosmu*, 24, 157–165.

60 Nečasová, *Nový socialistický*, 27–34.

61 Státní oblastní archiv v Hradci Králové, Státní okresní archiv Svitavy se sídlem v Litomyšli (hereinafter SOkA Litomyšl), Zdeněk Kopal collection; Zemský archiv v Opavě, Státní okresní archiv Olomouc (hereinafter SOkA Olomouc), Karel Morav collection.

62 Archiv Univerzity Karlovy (AUK), collection Přírodovědecká fakulta.

of Masaryk University in Brno, where astronomy remained at the Faculty of Science.[63] The execution of studentocracy in 1948 and of reformed studies in 1950 are mentioned in the collection of the Action Committee.

For the organization of astronomical research and the registration of instruments in the first phase after WWII, the minutes in these collections are available: the State Observatory, the CSAS Astrophysical Observatory, and the Czechoslovak Astronomical Society under CSAS. Other key sources for astronomical research are deposited in the CSAS Astronomical Institute collection.[64] This core and most relevant collection has not been sorted yet, which is why the orientation of the researcher with regard to minutes is limited. At the same time, the collection is gradually being expanded by the handover of materials from earlier periods of the Institute. However, as it turned out, the period 1975–89 of Director Václav Bumba (1925–2018) also included documentation of various research projects from the 1960s, when Bumba was the head of the solar department.

In the 20th century, photographs were still a key source for an astronomer on how to study, sort and archive the data from observations. These pictures remain in the CSAS Astronomical Institute, but there are very interesting collections of photographs from particular scientific expeditions, internships at observatories, and conferences in the MÚA.[65] A semantic analysis of these photographic images would perhaps show how the visits of foreigner astronomers, especially astronauts, were photographed and presented for the public in Czechoslovakia. The care given to the pictures is similar to the photographing of meteorites. They also confirm the development of astroculture since the 1960s.

In conclusion, it is appropriate to mention the personal archive collection of Luboš Perek, who is a key component of this book. His decision to hand over this collection to the MÚA in 2015 and his permission to study these sources led me to ask him for an interview. In the end, several interviews took place, and some of them were dedicated to sorting his photos. The implication of the oral history method led us to the conducting of interviews with further scientists, although the realization was limited

63 Archiv Masarykovy univerzity (A MUNI), collections: Rektorát, Přírodovědecká fakulta, Akční výbor Přírodovědecké fakulty MU Brno.

64 Masarykův ústav a Archiv AV ČR, v. v. i. (MÚA, A AV ČR), collections: Státní hvězdárna, Astrofyzikální observatoř ČSAV, Československá astronomická společnost, Astronomický ústav ČSAV. Other complementary sources are collections: I. Sekce ČSAV [I Section of CSAS], Sbírka základních dokumentů pracovišť ČSAV [Collection of Basic Documents for CSAS Institutes].

65 The first catalogue of photographs from Luboš Perek's personal archive collection was prepared by Barbora Kulawiaková and Tomáš W. Pavlíček.

due to the COVID-19 pandemic. Petra Hyklová also carried out several interviews with astronomers. Instead of an oral interview, Martin Šolc received one written memory (cf. list of interviews).

The preparation and conducting of interviews and their subsequent evaluation is a relatively demanding procedure for interpretation. Talking in the native language of the speaker has definitely proven to be effective.[66] At the same time, a comparison of our interviews with a tribute book on Luboš Perek clearly showed to what extent a repeatedly told narrative is a firmly fixed memory trace, which can hardly be elaborated on in a subsequent interview.[67] In any case, the intelligence of the scientists and their willingness to contribute to the oral history of a science project was evident. When they were asked questions related to the experience of war and totalitarianism, they evaluated them bitterly based on their life experiences; though only in some cases was the scholar not allowed to continue in their academic position. When I asked them questions about educational practices, scientific methods, and limits of research cooperation and internationalization, they spoke about their institutions, scientific communities, and the circulation of knowledge in the socialist era with recognition and gratitude.

The proposal for the research project as well as the idea for this book were born from studying archive documents and conducting interviews with Luboš Perek.

66 Cf. the Czech Physics Oral History Project provided by Dr. Paul Burnett, who conducted interviews with Martin Černohorský and Jiří Grygar: https://archive.org/details/cernohorsky-martin-life-history-transcript-2020-a-4-mirrored-1-inch-margin.

67 Libuše Koubská, *Hvězdář diplomat: životní příběh doyena české astronomie Luboše Perka* (Praha: Academia, 2011).

Meeting and lecture hall of the Štefánik People's Observatory, 1930s
(photo by Josef Klepešta, MÚA, A AV ČR, collection Astronomický ústav ČSAV, unsorted)

Chapter I

Teachers: the interwar scholarly tradition

Introduction

This chapter focuses on the generation of astronomers who studied and graduated in the first half of the 20th century and, together with scholarly institutions, amateur astronomer communities, observatories and astronomical instruments, were significant actors in setting the stage for the first postwar generation of astronomers. To understand this generation of astronomers, we need to explore the institutional conditions of astronomy education and research that shaped their careers both positively and negatively. These conditions are inextricably linked to the development of university education and the political situation in the Czech lands.

From the late 19th century up until World War II, education in astronomy took place at universities' faculties of arts, and later at faculties of science or at technical universities. University students enrolled in courses at their discretion, and study plans did not appear at Charles-Ferdinand University (CFU), for example, until the late 1930s.[68] After four years, students could finish their studies with teacher qualification exams, doctoral degrees or both. Thus, aspiring scientists could pass teacher qualification exams and find employment as secondary school teachers while working for their university as unpaid assistants or Privatdozents as they waited for vacancies in systemized positions.

As part of the Austro-Hungarian Empire, the Bohemian lands were considered a province and Prague universities or polytechnics only peripheral universities compared to Vienna, the capital of Cisleithania, with a large, well-funded university and a sizable new university observatory. German-speaking scholars from outside the Bohemian lands considered Prague scholarly institutions to be only a temporary posting before they found a more prestigious position. Czech university education emerged

68 *Seznam přednášek, které se budou konati na Universitě Karlově v Praze* [List of lectures to be held at the Charles University in Prague], Praha: nákladem Akademického senátu University Karlovy v Praze. From years 1935–39.

during the national revival, accompanied by national tensions.[69] This led to the division of two major Bohemian universities in the second half of the 19th century into Czech and German parts.[70]

Another significant change came after the empire's dissolution and the Czechoslovak Republic's establishment in 1918. New faculties of science were created by separating from the faculties of arts of the CFU and in Brno the MU was founded. International cooperation in astronomy was reorganized soon after the war, and the IAU was founded in 1919 in Brussels. Czechoslovak astronomers renewed old foreign cooperation after the Great War, pursued new collaboration, and sought active participation in the organization of the unions.[71]

In the following sections, we will discuss the respective institutions that provided astronomical education and facilities for research, beginning with the CAS, which played an essential role in educating a new generation of astronomers and developing scientific institutions.

Part 1: Astronomical associations

The Czech Astronomical Society

Amateur astronomers began to play a more prominent role in astronomy research towards the end of the 19th century, particularly with the emergence of variable star observation.[72] The Czech amateur astronomy community underwent significant development, and even during the era of the Austro-Hungarian Empire, they founded a national society. This platform enabled the closer cooperation of scholars and amateurs on time-consuming research tasks (e.g., variable star observation).

69 Miloslav Čedík, "Národnostní otázka a rozdělení pražské univerzity", *Acta Universitatis Carolinae Historia Universitatis Carolinae Pragensis* 22, no. 1 (1982): 15–25.

70 The Czech Prague Technical University (Czech PTU), and the German Prague Technical University (German PTU) in 1869; the Czech Charles-Ferdinand University (Czech CFU), and the German Charles-Ferdinand University (German CFU) in 1882. Cf. Surman, *Universities in Imperial,* 87, 104. The Brno Technical University remained with German-language education, until the Czech Brno Technical University was founded in 1899.

71 Petra Hyklová, "The Presence of Czech Astronomers at International Conferences", in *Science Overcoming Borders*, eds. Věra Dvořáčková and Martin Franc (Praha: MÚA, 2018), 123–44.

72 Edward C. Pickering, "A Plan for Securing Observations of the Variable Stars", *The Observatory* 6 (1 February 1883): 46–51.

The process of establishing the CAS began with a series of ten lectures on astronomy held by Jaroslav Štych[73] at the Worker's Academy in Prague in 1915. These lectures attracted other astronomy enthusiasts, and the following year, they founded the Astronomy Club. On this platform, the establishment of the CAS and its goals were negotiated. During this process, different actors with various ideas contributed to the future concept. The negotiators could rely on the existence of astronomical societies abroad – in particular, the Vienna Urania and the French Astronomical Society.[74]

The concept of an amateur astronomy society is closely associated with the concept of a public observatory. Apart from the research observatory, the location of which is intended to provide the best conditions for observation,[75] the public observatory's key role is outreach. They should be accessible to the general public and thus be located in cities and towns. The first public observatory in the Bohemian lands was founded by Baron Artur Kraus[76] in Pardubice in 1912.[77] This People's Observatory, in addition to a time service and a programme of solar observations, offered free public observations and literature for those interested in astronomy.[78] Kraus, as the brother of a high-ranking viceregency official, was able to acquire official permission to found the CAS.

Štych and his wife Luisa[79] engaged in the workers' movement and were closely associated with anarchism, monism, atheism, Marxism and the Social Democrats.[80] Štych promoted the idea of workers' education in cities, to which other actors were not opposed, but it was not their primary goal.

73 Jaroslav Štych (1881–1941). Amateur astronomer and building engineer. Born in Prague, studied at the Czech PTU. Popularizer of astronomy since 1910. Cofounder and first executive director of the CAS. Holubec, *Nešťastná revolucionářka*, 33.

74 Founded by Camille Flammarion (1842–1925) in 1887.

75 During the industrial development, cities proved to be unsuitable for astronomical observations due to light and dust pollution and vibrations from transport. New observatories were constructed outside cities, in the high mountains if possible (a good example is Skalnaté pleso Observatory in the Tatras).

76 Artur Kraus (1854–1930). Amateur astronomer and popularizer. Studied in France with astronomer Flammarion. Built the first private observatory in Pardubice in 1895 and a second, public observatory in 1912. Engaged in outreach, education and information for the general public. In 1912–30, he extended his network of observers and correspondants to about 2,000 people. Pioneer of sports, cycling, aviation and motor vehicles.

77 Štěpán Ivan Kovář, *Místa astronomické vzdělanosti 1918–1945* (Praha: ALE, 2000), 10.

78 The observatory closed after Kraus's death in the 1930s because neither his heirs nor Pardubice city council were interested in continuing its operation.

79 Luisa Landová-Štychová (1885–1969). Politican and popularizer of science. Attended business and acting courses. Member of Parliament of Czechoslovakia 1918–23, 1925–29. Vice-Chair of CAS from 1945–59.

80 Holubec, *Nešťastná revolucionářka*, 46–53.

In the beginning, the CAS was intended as a purely amateur society, but with support from professional astronomers. František Nušl,[81] the administrator of the State Observatory (Klementinum), provided a room there for the CAS's temporary observatory for two years.

The first location considered for a permanent public observatory, in 1921, was the grotto in Havlíčkovy sady.[82] Due to its unsuitable conditions, this observatory was closed in 1923,[83] and the decision to build an observatory on Petřín Hill was made. This observatory was to be named after astronomer and diplomat Milan Rastislav Štefánik,[84] who died in a plane crash when returning to his homeland in 1919 and was widely celebrated as a fallen national hero in the era of the First Czechoslovak Republic.[85] The Štefánik People's Observatory was opened to the public in 1928.

81 František Nušl (1867–1951). Born in Jindřichův Hradec, studied at the local grammar school 1879–88, at Czech CFU 1888–93. Amateur astronomer since childhood, research assistant at the Astronomical Institute of Czech CFU during his studies. Secondary school teacher in Hradec Králové 1894–1901, in Prague 1901–09. Cooperated with Josef Jan Frič on construction of geodetic instruments from 1901; together they invented the circumzenithal telescope and built the Ondřejov Observatory. Nušl was its director from 1906–38. In 1905 he finished his postgraduate studies and habilitated for practical astronomy at Czech CFU; from 1910 he substituted for Professor of Astronomy Gustav Gruss. Nušl was professor of mathematics at the Czech PTU from 1908, professor of practical astronomy at CU from 1926. Administrator of the State Observatory 1918–38. Retired in 1938.

82 Josef Hraše, "Prozatímní hvězdárna České astronomické společnosti", *Říše hvězd* 3, no. 5 (1922): 83–84.

83 Kovář, *Místa astronomické*, 16.

84 Milan Rastislav Štefánik (1880–1919). Solar astronomer and Slovak politician. Born in Košariská, studied construction engineering at the Czech PTU 1898–1900 and astronomy at Czech CFU 1900–04 (doctoral degree in 1904), Zürich in 1902. Researcher at Paris Meudon Observatory 1904–07. Janssen Prize in 1907. Participated in solar eclipse expeditions from 1905. Halley's comet transit (note: unobservable due to the very small size of the cometary nucleus) and solar eclipse observation expedition to Tahiti 1910–11. Diplomatic service for France from 1910. Improved Quito Observatory, organized meteorological and telegraphic system in Ecuador 1913–14 (unfinished for policital reasons). Military pilot in France from 1915. Joined Czechoslovak resistance in Paris in 1915 and cofounded Czechoslovak National Council. Organized Czechoslovak legions in France, Italy, USA and Russia from 1916. Minister of Warfare of Czechoslovakia from 1918. In the following years, celebrated as newly discovered national hero by many memorials and statues.

85 Elena Kovalčíková, *Štefánik v literatuře a proměny jeho vnímání v letech 1919–2009* (Praha: Univerzita Karlova, bachelor thesis, 2009).

In the late 1920s, other local astronomical associations, clubs, and CAS branches followed in České Budějovice[86] (1928), Uzhgorod[87] (1928), Hradec Králové[88] (1929), Valašské Meziříčí[89] (1929) and Plzeň[90] (1930s).[91] They organized outreach lectures, public observations, debates, and astrophotography and compiled specialized libraries. Several of them undertook the larger projects of constructing observatories in Plzeň,[92] Brandýs nad Labem,[93] České Budějovice[94] and Tábor,[95] which were opened to the public before 1945.

86 Jihočeská astronomická společnost (JAS; South Bohemian Astronomical Society) was founded to popularize astronomy and build a public observatory. Mk., "Jihočeská astronomická společnost", *Říše hvězd* 10, no. 5 (May 1929): 102–3. Built a public observatory 1931–37. During Nazi occupation JAS lost access to the observatory and had to limit their activities. In 1950 JAS was integrated into CAS.

87 Podkarpatská astronomická společnost (Carpatho-Ukrainian Astronomical Society) was founded by František Pešta (1905–1982). Ceased activity after Pešta was relocated to Tiachiv in 1930, officially dissolved in 1931. Petr Bartoš, "Podkarpatská astronomická společnost v Užhorodě", in *90 let astronomických společností*, eds. Petr Bartoš and Štěpán Ivan Kovář (Sezimovo Ústí: Hvězdárna Františka Pešty, 2019), 6–11.

88 Independent branch of CAS, Astronomická společnost v Hradci Králové founded by the Hradec Králové amateur astronomy community. Began building an observatory in 1947. In 1950 forcibly integrated into CAS. Josef Klepešta, "Astronomická společnost v Hradci Králové", *Říše hvězd* 10, no. 5 (May 1929): 103; Martin Cholasta, "Astronomická společnost v Hradci Králové", in *90 let*, 44–56.

89 Community formed in early 1920s around Antonín Ballner (1900–1972), owner of a private wooden observatory. Suppressed in 1942 by Nazi regime. Resumed soon after the end of the war. In 1955, a new observatory was built next to the wooden house. Kovář, *Místa astronomické*, 36.

90 Astronomical department of the People's Jan Hus University.

91 Bartoš, "Podkarpatská astronomická"; Cholasta, "Astronomická společnost"; Bohumil Polesný, "Epizody z historie Jihočeské astronomické společnosti a jejích následovníků", in *90 let*, 14–33; Kovář, *Místa astronomické*, 24.

92 Constructed in 1936 in a school building. Occupied by German army during WWII. After the war, the building was converted into a hospital and the observatory was never reopened to the public. In 1957 the community attempted to build a new observatory, but in 1948 the construction was stopped. Kovář, *Místa astronomické*, 26.

93 Constructed by Antonín Bečvář and Brandýs Astronomical Association in 1927. Focused on meteor observation. Closed in 1937, when Bečvář moved to the Tatry. Antonín Bečvář, "O naší observatoři", *Říše hvězd* 10, no. 8 (1929): 149–52; Kovář, *Místa astronomické*, 22.

94 Constructed by JAS from 1931–37. In 1939–45 occupied by Nazi air force and damaged. Repaired after WWII. In 1955 the observatory had its first permanent employees. In 1956, Kleť Observatory was founded as a branch due to increasing light pollution in České Budějovice. Refurbished in 1971. Currently Hvězdárna a planetárium České Budějovice.

95 Built at Lidový dům (People's House) from initiative of Astronomical Club in Tábor and opened to the public in 1940. Later in WWII the observatory had to limit its activities. Reopened in autumn 1945.

The emerging network of public observatories played a significant role in the unofficial education of young astronomers from 1939–45, a period during which the Nazi occupational regime had closed all Czech higher education institutions.[96] Štefánik People's Observatory held unofficial lectures on astronomy for students as outreach lectures. Therefore, these students whose studies were interrupted by the closure of Czech higher education institutions in 1939 were able to continue their studies and officially graduate soon after the war ended.[97]

Towards the end of WWII, the western part of the observatory was occupied by the Luftwaffe. During the Prague Uprising in 1945, its building and some instruments were damaged. Soon after the war, the CAS managed to collect financing from its members for the Observatory Restoration Fund. The observatory was repaired from 1945–50, and in 1953 it was transferred to the Central National Committee in Prague as an outreach institute. The CAS was restructured as the expert headquarters for the network of outreach activities such as public observatories, other CAS branches and astronomy clubs. In the postwar period, this network's growth was supported by the socialist government for ideological reasons. During the restructuring of the system of science in Czechoslovakia in order to follow the model of the Soviet Academy of Sciences, the CAS was incorporated into the CSAS in 1959.

The State Observatory

Until the late 19th century, there were only two entry-level scholar positions for newly graduated astronomers in Bohemia. Both were assistant positions at the State Observatory.

The State Observatory was originally founded as a Jesuit university observatory in the mid-18th century. It was constructed in the Mathematical (Astronomical) Tower in the Klementinum, the complex of buildings of the Jesuit university in Prague. The tower was erected in 1722 and

96 Kovář, *Místa astronomické*.

97 Czech universities opened in summer 1945 with an extraordinary summer term. A high number of students enrolled. According to the author's research in student catalogues of the Czech Technical University's archives, the number of enrolments in astronomy and related fields was three times higher than in ordinary years, but most of the students did not complete more than three terms. Petra Hyklová, *Research and Education at Astronomical Institutes of the Czech and German Universities in Prague in the Years 1882–1945* (Praha: Univerzita Karlova, dissertation, 2022).

reconstructed in 1752. The observatory was accompanied by a Musaeum mathematicum[98] and took regular meteorological observation from 1775 (the Klementinum series).

After the dissolution of the order in 1773, the observatory was secularized and moved under the government's jurisdiction. Officially it was neither a part of the university nor an educational institution. However, the observatory was de facto connected to the university by the person of the director, by whom the university's professor of astronomy was traditionally appointed. When the Jesuit order was renewed in 1814, the status of the observatory remained unchanged. The State Observatory quarters consisted of the Astronomical Tower, rooms on two floors underneath it, and the director's government quarters. Apart from a director and some assistants, it employed an adjunct and a mechanician. Students interested in astronomy helped with computations and observations.

The observatory provided time service. The importance of the knowledge of the exact time increased with the development of modern society, with its transportation timetables and theatre programmes. Before 1842, Prague's noontime was determined by the shadow cast by the Marian column on the local meridian marked by the pavement in Old Town Square. From 1842 onward, noontime was determined in the Klementinum by the image of the Sun cast by a slit in the wall, which fell on a meridian string stretched on the floor corrected to the mean time.[99] Noon was signaled by waving a flag[100] from the Astronomical Tower, which was the signal for ringing church bells in central Prague. In 1891, noontime being announced by a shot from a cannon in Letná was introduced. It was abolished during World War I and briefly renewed in 1919. From 1925 onward, the noon sign from the Klementinum was given by radio and the noon flag was discontinued. From 1926, a time signal was given via radio broadcast at 22:00.[101]

The scientific function of the State Observatory was limited to the computations of the orbits of asteroids and comets. Due to its position in the city centre, the observatory itself had no importance for practical astronomy, as light pollution and noise from the expanding city and vibrations

98 Petra Hyklová, "Dědictví klementinských exaktních věd a druhý život ‚Matematického muzea' v 19. a 20. století," *Acta Universitatis Carolinae Historia Universitatis Carolinae Pragensis* 57, no. 2 (2017): 45–62.

99 The instrument, including the original window, is still exhibited on the second floor of the Astronomical Tower.

100 From 1842–83, the flag had the red and white colours of the Kingdom of Bohemia. From 1883–1918, a flag in black and yellow, the colours of the Austro-Hungarian Empire, was used.

101 R., "Časový rozhlas v naší republice," *Říše hvězd* 7, no. 1–2 (1926): 27–28.

and dust from traffic prevented any possible research in observational astronomy.[102] Regular astronomical (time service, planets, asteroids, comets, occultations), magnetic (the measurement of magnetic declination, which was a common practice of observatories and exploration expeditions in the 19th century), and meteorological observations were made. Unlike many other old state observatories in European capitals, the State Observatory in Prague was not conserved as a museum, but rather its quarters were used even when research moved outside the city.

The role of the observatory was somewhat more symbolic than that of an actual observatory. It was important for both the Czech and German astronomical communities, who were becoming a subject of legal disputes, the proverbial "bone of contention".[103] When the Austro-Hungarian Empire dissolved and the Czechoslovak Republic was established, the State Observatory's personnel initially reflected the political changes: on 28 October 1918, when giving the noon sign from the Klementinum with a flag, the assistant used a white flag instead of the imperial black and yellow. In the following days, the red and white flag was used.[104]

The State Observatory was legally transferred under the jurisdiction of the new republic. Nušl argued that the observatory and its director were distinctly separate from the university's educational function and should have been neutralized like the university library.[105] Unlike the university botanical garden,[106] the State Observatory was indivisible.

In November 1918, CAS initiated a request for the observatory takeover and submitted it to the National Committee.[107] The request was soon accepted. The German professor of astronomy, Adalbert Prey,[108] was allowed to continue living in the director's quarters until he found new accom-

102 Bohuslav Zemek, "Několik poznámek o přístrojích hvězdárny v Klementinu", *Říše hvězd* 1, no. 2 (1920): 30–33.

103 Hyklová, *Research and Education.*

104 Josef Klepešta, *Dvacet let mezi přáteli astronomie* (Praha: Česká astronomická společnost, 1937).

105 MÚA, A AV ČR, collection Státní hvězdárna, box 1, Inv. No. 13, František Nušl, *Memorandum vzhledem k historickým podkladům, významu a nejbližším důsledkům převzetí pražské hvězdárny do státní správy československé*, Praha: 1919, manuscript.

106 Lucie Čermáková, "Nová, hezká, německá a česká: dělení pražské univerzitní botanické zahrady (1882–1898)," *Dějiny věd a techniky* 49, no. 2 (2016): 61–86.

107 Heny Zíková, "Jak šel čas v ČAS," *Kosmické rozhledy*, no. 3 (2002): 20–21.

108 Adalbert Prey (1873–1949). Theoretical astronomer. Born in Vienna, studied at the Vienna University in 1892–96. Assistant at Vienna University Observatory 1896–99. Adjunct of the Gradmessungbüro 1901–09. Habilitated for astronomy at Vienna University (1902) and Technische Hochschule (1906). Extraordinary professor of astronomy in Innsbruck 1909, full professor 1911. Professor of astronomy at the German University in Prague 1917–30, director of the Geographical Institute of the Germany University in Prague 1924–26,

modation. He lived there until 1930 when he was appointed a professor in Vienna and left Prague.[109] Nušl took the position of temporary director with the intent to adapt the institute into a centre for processing materials from the new Ondřejov Observatory 35 km from Prague. In the early 1920s, a photo laboratory for processing negatives from Ondřejov was built in Klementinum.[110] The State Observatory soon became a meeting point for Czechoslovak astronomers.[111]

As Nušl spent most of his time outside of Prague, working on the private observatory of the Frič brothers[112] in Ondřejov, he asked for his pupil Otto Seydl[113] to be appointed his deputy in the early 1920s. Seydl managed the entire administration of the State Observatory. He was a high-ranking Freemason and organized Freemason meetings in the Klementinum, and on this platform, astronomers interacted with politicians.[114] Seydl later faced difficulties from the Nazi regime and after the communist coup d'etat in 1948.

In 1940, the Nazi occupational government evicted the State Observatory from the Klementinum. The institution moved to a flat at Vinohrady, Budečská 6. The time signal was transmitted from this new location.

director of the State Observatory 1917–18. Professor of theoretical astronomy in Vienna 1930–39. In 1939 retired and appointed honorary professor; during WWII substituted for the director of the observatory.

109 *Seznam přednášek,* from years 1918–30.

110 Josef Klepešta, "Věž staré pražské hvězdárny," *Říše hvězd* 53, no. 12 (1972): 226–27.

111 Jan-Matěj Rak, "Astronom Dr. Otto Seydl," 2010, see http://www.planetary.cz/2010/12/astronom-dr-otto-seydl/ (accessed on 30 June 2023).

112 Josef Alexander Frič (1861–1945). Born in Paris, studied zoology and palaeontology at the Czech CFU. In 1884 cofounded a precision mechanical workshop with his brother Jan Ludvík Frič (1863–1897). After Jan's death Josef began using the name Josef Jan Frič. In 1898 founded Ondřejov Observatory. Awarded Doctor of Technology honoris causa from Czech PTU in 1927, RNDr. honoris causa at CU in 1931. In 1928 donated his observatory to the Czechoslovak Republic. Jan Ludvík Frič. Born in Paris, studied chemistry at the Czech PTU. Assistant of Professor of Technical Physics Karel Zenger 1882–87.

113 Otto Seydl (1884–1959). Astronomer. Born in Merklín near Přeštice. Studied at the Czech PTU 1903-04, and at the Czech CFU 1904–07. Teacher qualification 1908, doctoral degree 1924. Teacher at Czech Business Academy in České Budějovice 1909–20. Deputy administrator of the State Observatory 1921–39, 1945–47, director 1947–48. From 1930 organized the archive of the State Observatory and focused on the history of astronomy. Editor of astronomical magazine *Říše hvězd* 1926–34. In 1948 forcibly retired, but continued his historical research.

114 Rak, "Astronom Dr. Otto Seydl".

Part 2: Universities

The split of the Charles-Ferdinand University in Prague

In 1882, the Charles-Ferdinand University in Prague was split into German and Czech parts. The two new parts were named Czech Charles-Ferdinand University (Charles University, CU since 1920) and German Charles-Ferdinand University (German University in Prague from 1920, proclaimed Reichsuniversität in 1939, discontinued in 1945).

The German CFU was declared the heir to the tradition of historical Universitas Carolinae, and the Czech CFU was regarded as the new one. In the eyes of the public, the positions were different; while the German CFU was a provincial Austrian-Hungarian university, the Czech CFU became the only university that offered education in the Czech language. Prague was the capital of the Kingdom of Bohemia, with a predominantly Czech population and declining numbers in the German minority.

The division of both parts of CFU was still in progress and brought nationalist tension even in the interwar period. Generally, it was not considered a positive solution. After 1882, departments passed to the possession of the university, which its directors decided to join. Most institutes and properties, including the Astronomical Institute, were effectively transferred to the German part. For Czech scientists, this meant that in addition to writing Czech textbooks and establishing Czech research traditions, they had to negotiate the founding and financing of new institutes and arrange for their equipment, including scientific libraries, often with insufficient rooms and funding.

Other problems emerged after the reorganization of both universities in 1920 when the new Faculties of Science separated from Faculties of Arts. Many departments resided in temporary quarters and lecture rooms from the time of split in 1882, and, in addition, negotiations on the reconstruction of the building from the 1880s were still ongoing.[115]

115 Národní archiv, collection Ministerstvo školství 1918–1949, box 1095, sign. 4 II 5 a, záležitosti týkající se zejména prostor a budov Německé univerzity [Matters relating in particular to premises and buildings of the German University].

The Astronomical Institute of the German Charles-Ferdinand University

After the university was split, the German Astronomical Institute continued to operate with unchanged institutional conditions because its director, Karl Hornstein,[116] chose to join the German CFU. The Astronomical Institute and its quarters and property were all allocated to the German CFU.

Shortly after the split in 1882, Hornstein died. His successor was Ladislaus Weinek.[117] Weinek played a significant role in the development of Bohemian astronomy and the new cosmic physics (a field comprised of astrophysics, geophysics, climatology and meteorology). His adjuncts and collaborators were Gustav Gruss,[118] later the second director of the Astronomical Institute of the Czech CFU, and Rudolf Spitaler,[119] later the founder of the German Institute for Cosmic Physics. However, Weinek did not have a direct successor at the German Astronomical Institute. After he died in 1913, the director position was vacant for four years until Prey arrived in Prague in 1917.

In 1911–12 Albert Einstein briefly stayed in Prague as the Professor of Theoretical Physics at the Faculty of Arts of the German CFU. Einstein was

116 Karl Hornstein (1824–1882). Studied in Vienna from 1840. Assistant at the Vienna University Observatory from 1843–47. Temporary adjunct at the Kraków Observatory 1847–48. Substitute teacher at the Akademisches Gymnasium in Vienna 1848. Doctor of Philosophy in 1849. Assistant at Vienna University Observatory 1849–51, adjunct 1851–62. Privatdozent of Vienna University from 1850. Professor of mathematics in Graz in 1862, at CU in Prague 1863–82. Director of the State Observatory 1868–82, Professor of astronomy at CU 1869–82.

117 László (Ladislaus) Weinek (1848–1913). Born in Ofen. Studied in Vienna 1865–69, graduated 1870. Assistant at Berlin University Observatory 1870–71. Studied at Leipzig University from 1871. Researcher at Schwerin photographic observatories 1873–74. Deputy leader and observer of Venus transit expedition 1874–75. Leading observer at Leipzig University 1875–83. Doctoral degree 1879. Professor of astronomy and director of Astronomical Institute at the German CFU 1883–1913. Published first photo of a meteor in 1885, first photographic lunar atlas in 1897–1900.

118 Gustav Gruss (1854–1922). Born in Jičín. Studied in Prague. Assistant at Astronomical Institute of CFU 1875–77. Assistant for higher geodesy and spherical astronomy at the Technische Universität Wien 1878–79. Adjunct of State Observatory in Prague 1881–91. Extraordinary professor of astronomy (full 1897) and director of Astronomical Institute of Czech CFU 1892–1915. Retired 1915. Author of textbooks *Základové theoretické astronomie* (1897–99) and *Z říše hvězd* (1896).

119 Rudolf Spitaler (1865–1946). Born in Bleiberg. Studied in Vienna 1879–84 (doctoral degree). Observer at Vienna University Observatory 1884–92. Adjunct of State Observatory in Prague 1893–1901. Habilitated for cosmic physics at German CFU 1895, meteorology and climatology 1901, full professor 1908, honorary associate professor at German PTU 1908. Director of meteorological observatory on Milešovka 1905–29. Founded Institute for Cosmic Physics 1908, director 1908–29. Retired 1929. After WWII expulsed from Czechoslovakia.

acquainted with Leo Wenzel Pollak[120] from the Institute of Cosmic Physics. Though they were at the same faculty and even Czech physicists reflected Einstein's work in their papers,[121] we have no record of Weinek making any comments on the special theory of relativity. Einstein revisited Prague in 1921 as a celebrated scientist to give a public talk at Prague Urania.[122]

In 1918, the German Astronomical Institute was evicted from the State Observatory. From 1918–20, it was temporarily located at Viničná 4 (building of the Faculty of Science) and consisted only of Professor Prey. The first observatory for German astronomers was built in 1924. It was an observation station for a refractor, constructed near Telnice.[123] In 1929, the *Vereinigung der Freunde der Sternwarte der Deutschen Universität zu Prag* was founded by German manufacturers. The association bought a larger piece of land, bought several instruments, and built a brick-and-mortar observatory with a cellar for magnetic phenomena observation.[124] Two assistants maintained the observations and lived in the nearby village. In the records from the observatory, there is no mention of any commuting students.

Professor Prey, who remained in Prague, led the Institute of Geography for several years, in addition to the Astronomical Institute. In 1930 Prey left for a professor position in Vienna. In the subsequent years, the director position was vacant. In early 1937, Erwin Freundlich[125] came to Prague and

120 Leo Wenzel Pollak (1888–1964). Geophysicist, meteorologist, and pioneer in scientific data processing. Born in Prague. Studied at German CTU (doctoral degree 1912), worked at the German Astronomical Institute 1911–39. Habilitated 1922, extraordinary professor 1927, full 1929. Emigrated to Ireland in 1939. Meteorological Officer of Irish Meteorological Office 1939–47, professor at Dublin Institute for Advanced Studies 1948. Friedrich W. Kistermann, "Leo Wenzel Pollak (1888–1964): Czechoslovakian Pioneer in Scientific Data Processing", *IEEE Annals of the History of Computing* 21, no. 4 (1999): 62–68.

121 Professors at Czech CFU August Žáček and Arnošt Dittrich in 1912. Jiří Bičák, ed., *Einstein a Praha: k stému výročí narození Alberta Einsteina* (Praha: JČSMF, 1979).

122 Michael D. Gordin, *Einstein in Bohemia* (Princeton – Oxford: Princeton University Press, 2020).

123 Telnice in the Ore Mountains near Ústí nad Labem, ca. 100 km northwest of Prague.

124 Karl A. F. Fischer and Peter Hibst, "Die deutsche Astronomie in Böhmen und Mähren in den letzten hundert Jahren", *Bohemia* 24, no. 2 (1983): 275–94.

125 Erwin Freundlich (later Erwin Finlay-Freundlich, 1885–1964). Born in Biebrich, graduated grammar school in 1903. Studied naval architecture at Technische Hochschule in Charlottenburg from 1903, had to pause due to health reasons, then studied astronomy at University of Göttingen, graduated 1910. Assistant at Berlin Observatory 1910–18. Led the first, unsuccessful expedition to observe gravitational deflection of light during solar eclipse in 1914. Built solar observatory in Potsdam, observer 1910, director 1921–33. Professor of astrophysics in Potsdam 1922. Professor of astronomy in Istanbul 1933–36, founder and director of first university observatory in Istanbul. Professor of astronomy at the German University in Prague 1937–38. Emigrated after Nazi occupation of

became the director and professor of astronomy. Freundlich was Einstein's friend and colleague; they had been introduced by Pollak during Einstein's stay in Prague.[126] Soon after his departure, Freundlich established contact with the community of Czech astronomers and astronomy amateurs. After the Munich Agreement was concluded, Prague scientific staff Freundlich and Alter emigrated from Czechoslovakia.

In 1940, the vacated institute was taken over by Werner Schaub,[127] previously associate professor of astronomy in Berlin. After he returned from the front due to injury, Schaub was appointed professor of astronomy at the German University in Prague. The Telnice Observatory was obsolete, and Schaub tried to procure its reconstruction and the installation of new instruments. Telnice Observatory underwent renovations and gained access to electricity. Schaub later turned his attention to the larger and more modern Ondřejov Observatory, had it occupied, and stayed there until the end of the war.

When the German University in Prague was discontinued by the decree of President Edvard Beneš[128] in October 1945, the Astronomical Institute in Prague was vacated again, and its equipment and property were allocated to the CU. The assistant Josef Mrazek lived in Telnice until he died in 1946. The observatory building was never used for purposes of astronomy again. It was later demolished due to instability.

The Astronomical Institute of the Czech Charles-Ferdinand University

The Czech Astronomical Institute (hereinafter CU Astronomical Institute) was officially founded in 1887, five years after the split. Until 1889 it existed only formally, and for many decades, its settings were considered temporary. The Czech professor of astronomy and director of the institute,

Czechoslovakia. Associate professor at University of St. Andrews 1938, Napier Professor 1951–55. Retired 1955. Moved to Wiesbaden and became honorary professor at Johannes Guttenberg-Universität Mainz in 1957.

126 Gordin, *Einstein in Bohemia*, 2020.

127 Werner Schaub (1901–1959). Born in Ferndorf, Germany. Studied astronomy in Bonn and Munich. Doctor of Philosophy 1927. Extraordinary assistant at Bonn University Observatory 1927–30. Second assistant at Leipzig University Observatory 1930–36. Observer at Copernicus Institute Berlin 1936. Dr. Phil. habilitatus 1936. Associate professor at University of Berlin 1937–39. Professor of astronomy and director of Astronomical Institute at the German University in Prague 1939–45. Deported to Germany in 1945.

128 No. 122/1945 of the Act in the Collection of Laws, *Decree of the President concerning the abolition of the German University in Prague*. Retroactively effective as of November 17, 1939, which means that academic degrees gained there after that date weren't recognized in Czechoslovakia.

August Seydler,[129] planned for the new university observatory to be located in the upper parts of Bubeneč park. However, his funding proposal to the Cisleithanian government was rejected because the German Astronomical Institute requested funding for a new observatory simultaneously. At this time, there were eight universities and five technical universities in Cisleithania with four astronomical observatories,[130] including the large observatory in Vienna that was completed in 1879.[131] The imperial government could not finance two new observatories in the Bohemian lands and rejected both requests.

In 1889 Seydler negotiated the lease of a villa at Ovenecká 80 in Letná for ten years. A wooden observatory was built in the 1890s and was equipped with instruments bought from government funding and Seydler's savings.[132] The villa provided the possibility to offer accommodation for staff and students who were helping at the observatory. This was important, as the capacity of student dormitories in Prague was insufficient, and students had to rent private rooms. The rents gradually rose, and in the 1920s, the situation even resulted in the construction of a wooden student colony in Letná.

In 1900, the institute moved to a villa at Smíchov No. 635 (today, Švédská Street). The building was divided into the director's quarters, one classroom for approximately ten students, and rooms for collections and teaching aids. Rooms for staff were also provided. The temporary observatory was built on the back side of the garden. The conditions for research and education were considered temporary rather than sufficient. The lecture room had two desks for students, and "students in the first row could write on the board sitting down," as Šolc reminisces from his student days in the late 1960s.[133]

The Smíchov industrial zone developed and worsened the conditions for observation, and there were repeated attempts to find a new location.

129 August Seydler (1849–1891). Born in Žamberk, grew up in Prague, studied at Piarist grammar school, graduated 1867, doctoral degree 1871. Studied at CFU 1867–70. Assistant at physics laboratory 1868–69. Assistant at State Observatory 1869–72, adjunct 1872–82. Habilitated 1871 for mathematical physics at CFU, extraordinary professor of theoretical physics 1881. Full professor of mathematical physics and theoretical astronomy at the Czech CFU in 1885. Founder and director of Astronomical Institute of the CFU 1887–91.

130 University observatories in Vienna, Prague, Kraków and Graz.

131 Surman, *Universities in Imperial Austria*.

132 Martin Šolc, "A Note to the Astrographic Camera of the Astronomical Institute of the K. k. Bohemian University in Prague," *Acta Universitatis Carolinae. Mathematica et Physica* 46, no. 3 (2005): 239–48.

133 Interview with Martin Šolc by Tomáš W. Pavlíček, 14 October 2021.

However, they were unsuccessful. The institute struggled with the necessary maintenance of the building due to a deficiency in funding from both the Austrian and the new Czechoslovak governments.[134]

Because of the prolonged construction of the institute's quarters, it had only one systemized director position until 1891. The director and professor of astronomy, Seydler, was a professor of theoretical physics simultaneously. The first assistant was employed in 1891. Only in 1911 was the staff expanded by an adjunct, but this position was discontinued after its occupant, Jiří Kaván,[135] left for the observatory in Stará Ďala. Since the early 1920s, a demonstrator and a mechanician have worked at the institute. The observatory had one or two unpaid assistants, usually students or graduates.[136]

After Seydler's death in 1891, his position as chair was split into three – one for theoretical physics and two for astronomy. Physicist František Koláček[137] was appointed the professor of theoretical physics. The two new professors of astronomy were Vojtěch Šafařík,[138] an amateur astronomer and professor of chemistry, and Gruss, formerly the adjunct of the State Observatory. Due to Šafařík's age, Gruss took the director position. Gruss fell ill in 1910. His lectures were substituted by Nušl and Vladimír Václav

134 Vladimír Václav Heinrich, *Astronomický ústav Karlovy university a můj tak zvaný disciplinární případ. Stíny autonomie* (Praha: self-published, 1935).

135 Jiří Kaván (1877–1933). Born in Prague, studied at the Czech CFU, doctoral degree 1902. Assistant and observer at the Astronomical Institute of the Czech CFU 1901–02, adjunct 1902–19. Director of the State Astrophysical Observatory in Stará Ďala 1919–28. Superintendent of the State Observatory in Prague 1928–33.

136 *Seznam osob a ústavů české University Karlovy v Praze* (Praha: nákladem Akademického senátu České university, 1885–1939).

137 František Koláček (1851–1913). Born in Slavkov u Brna. Studied at CFU (teacher qualification 1872, doctoral degree 1877). Teacher at grammar schools in Brno 1872–1891. Habilitated at German Technical College in Brno in 1882. Professor at Czech CFU 1891. Retired in 1909.

138 Vojtěch Šafařík (1829–1902). Born in Novi Sad, studied chemistry in Prague, Berlin and Göttingen. Teacher at Realschule in Prague 1851–56, business academy in Vienna 1859–61. Scriptor at Prague polytechnics from 1865, professor of chemistry 1869, the Czech CFU 1882. Professor of astronomy at the Czech CFU 1892. Retired 1896. Author of first Czech university textbook on chemistry (1860). Observed variable stars from his private observatory in Vinohrady. Mentor of Frič brothers.

Heinrich.[139] After Gruss retired in 1915, the institute was led by Bohumil Kučera,[140] a temporary director and professor of physics, for the following four years. In 1919, Heinrich became the new director.

In 1925, the chair of astronomy at the CU was split into chairs of theoretical and practical astronomy, and the following year two new professors were appointed – Heinrich, Professor of Theoretical Astronomy, and Nušl, Professor of Practical Astronomy "at the Ondřejov Observatory". The Ministry of Education approved this change because Nušl, being employed at the State Observatory, was paid from state funds.[141]

Nušl had been focused on practical astronomy and astronomical instruments since his youth. At the lower grammar school in Jindřichův Hradec, he met his classmate Bohuslav Mašek,[142] and together they built small telescopes of spectacle glass and made astronomical observations. Later, Nušl and Mašek cooperated with the Frič brothers in the construction of the Ondřejov Observatory and eventually worked there. Nušl, who was associated with the Ondřejov Observatory, often had to take leave from the university due to his busy schedule. Unlike Heinrich, who concentrated on communicating with foreign colleagues in the field and never entered the CAS, Nušl supported the community of amateur astronomers.

Heinrich and Nušl began to represent two very different approaches. Nušl emphasized science outreach, while Heinrich regarded it as unnecessary. While Heinrich maintained international contacts as part of his focus on the three-body problem, Nušl focused on broader cooperation in the Czech astronomical community. Both stepped aside from the uni-

139 Vladimír Václav Heinrich (1884–1965). Born in Peruc, studied at Realschule and grammar school in Příbram 1895–1903, mathematics and physics at the Czech CFU 1903–07. Doctor of Philosophy 1908. International stays at observatories in Strasbourg 1908–09, Heidelerg 1909, Königstuhl 1910. Teacher qualification exam 1910. Substitute teacher at grammar school 1910–19. Habilitated for theoretical astronomy in 1913, assistant at the Astronomical Institute of the Czech CFU 1916–19, director 1919–34. Extraordinary professor of astronomy 1923, full professor of spherical and theoretical astronomy 1926. Focused on theoretical astronomy, mainly restricted three-body problem. Retired 1957.

140 Bohumil Kučera (1874–1921). Born in Semily, studied at Czech CFU (doctoral degree 1898), researcher in Zurich and Darmstadt 1889–1908. Extraordinary professor of experimental physics 1908, full 1912.

141 AUK, collection Přírodovědecká fakulta, box 14, Inv. No. 102, Notification of appointment as full professor of 29 March 1926.

142 Bohuslav Mašek (1868–1955). Born in Hradec Králové. Studied at grammar school in Jindřichův Hradec and Prague, Czech CFU (teacher qualification 1892, doctoral degree 1896). Assistant at Physics Institute of the Czech CFU 1888–93. Assistant at the State Observatory 1890–94. Substitute teacher in Prague and Plzeň 1892–97, Hradec Králové 1897–1901, Realschule in Prague 1901–18. Researcher at the State Observatory 1918, vice-director of Ondřejov Observatory 1918–40. Founder and editor of Czech ephemerides *Hvězdářská ročenka* 1921–40. Retired 1940.

versity professoriate. During the 1930s, disagreements escalated between Heinrich and the Faculty of Science due to organizational problems. The disputes resulted in Heinrich's dismissal from the position of director.

Echoes of this situation are still evident in the astronomical community from interviews with their contemporaries and informal conversations between astronomers. From the outside, Zdeněk Kopal[143] believes there are basically no astrophysics studies in Prague, which supported many astronomers from the first postwar generation, including Perek and Grygar, in telling their experience that it was worthless.[144] In contrast, others, including Pavel Mayer (1932–2018), appreciated Heinrich's efforts to equip the institute with instruments and modern lectures based on new scientific papers.[145]

From the 1920s onward, Heinrich faced protracted difficulties in the organizational and administrative affairs of the institute, including delays in renovations of the building and disputes with its owner over maintenance, as well as with a former assistant who refused to move out of the government flat. His relations with the professoriate also worsened. These problems escalated in the early 1930s in a controversy that included anonymous articles in newspapers and the media's involvement.[146] In 1934, Heinrich was removed from the director position, and in the following years, he unsuccessfully sued the university. The institute was handed over to Professor of Physics Viktor Trkal, who held the temporary director position up until WWII. Trkal planned to use the institute's great double telescope for measurements of binaries and photometry of close binaries, and a new observation house was constructed in the garden. The double telescope was one of the instruments reconstructed by mechanician Jindřich Brejla.[147] However, while some equipment was refurbished in the 1920s, other items were obsolete. Many problems which Trkal had inherited from the previous administration were not resolved.

143 Zdeněk Kopal (1914–1993). Born in Litomyšl. Active member of CAS from the age of 15, chair of Section for Variable Stars from 16. Studied at CU from 1933–37 (doctoral degree 1937). Research fellow at Harvard Observatory 1938–40, research associate 1940–46. Lecturer at MIT from 1942, associate professor 1947, extraordinary professor of numerical analysis in 1948, full professor 1951. Head of astronomy department at Victoria University in Manchester 1951–81. Head of NASA lunar mapping project from 1959. Retired in 1981.

144 Interview with Luboš Perek by Petra Hyklová, 4 April 2017; Interview with Jiří Grygar by Tomáš W. Pavlíček, Petra Hyklová, and Kateřina Kočí, 14 June 2019.

145 Interview with Pavel Mayer by Petra Hyklová, 4 February 2015.

146 Heinrich, *Astronomický ústav,* 17–19.

147 Jiří Brejla (1897–1982). Born in Budapest. Precision mechanician of Frič workshop, 1921–59 at CU Astronomical Institute. Retired in 1959.

Both Nušl and Heinrich, even though not associated closely with the Švédská institute, continued giving lectures on astronomy at CU. Many young astronomers worked in assistant positions, including Bohumil Šternberk,[148] Vincenc Nechvíle,[149] Josef Mikuláš Mohr,[150] Emil Buchar,[151] and Hubert Slouka.[152] This generation included many other astronomers who did not work in systemized positions and are not mentioned in offi-

148 Bohumil Šternberk (1897–1983). Born in Chrudim. Studied at Czech CFU 1916–21 (doctoral degree 1924). Drafted 1917–18. Assistant at CU Astronomical Institute 1918–21, 1923–27. Studied at Humboldt University of Berlin and worked at the Berlin-Babelsberg Observatory 1921–23. Researcher at State Astrophysical Observatory in Stará Ďala 1927–38, director 1936–38. Researcher at State Observatory in Prague from 1938, founded Department of Astronomical Chronometry. Head of Laboratory of Chronometry 1953–73. Director of CSAS Astronomical Institute 1954–68. Retired in 1973.

149 Vincenc Nechvíle (1890–1964). Studied at the Czech CFU, teacher qualification exam 1913, doctoral degree 1918. Assistant at Astronomical Institute of the Czech CFU from 1913. Teacher at business academy in Prague and researcher at Ondřejov Observatory from 1920. International stay at Paris Observatory 1922–24. Awarded Lalande Prize in 1927. Studied at Institut d'Optique Théorique et Appliquée in Paris 1927–28, doctor of mathematical sciences 1928, ingenieur opticien 1928. Researcher at the State Observatory in Prague 1928–42, administrator 1942–45, deputy director 1945–48. Lecturer at the CU Faculty of Science: Privatdozent for astrophysics from 1936, extraordinary professor 1939. Retired in 1948, continued to lecture at CU.

150 Josef Mikuláš Mohr (1901–1979). Born in Prague. Studied mechanical engineering at the CTU 1919–20, astronomy at CU 1920–23, Sorbonne 1923–25. Acquired doctoral degree at CU in 1925. Assistant at French State Observatory 1927–28. Assistant at Faculty of Medicine of Comenius University in Bratislava 1928–33. Habilitated for astronomy at CU in 1934, at MU in 1946. Assistant at CU Astronomical Institute 1934–45. Founder and director of the MU Astronomical Institute 1946–53. Director of the CU Department of Astronomy and Meteorology 1953–75. He focused his research on stellar statistics.

151 Emil Buchar (1901–1979). Born in Horní Nová Ves. Studied at CU 1921–27. International stay at Algiers Observatory. Demonstrator at CU Astronomical Institute 1923–27, assistant 1927–28. Civil astronomer at Military Cartographic Institute 1928–39, Geographical Institute of Ministry of the Interior 1939–45. Habilitated for geodetical astronomy at CTU in 1945, professor of higher geodesy 1948, director of CTU Astronomical Institute 1945–50, director of Department of Higher Geodesy, Astronomy and Fundamentals of Geophysics from 1950. Built astronomical observatory at CTU. First Czech astronomer who discovered a minor planet in 1925 (1055 Tynka, named after his mother).

152 Hubert Slouka (1903–1973). Born in Brno. Studied at CU 1921–25 (teacher qualification 1925, doctoral degree 1931). Demonstrator at CU Astronomical Institute 1928–29, assistant 1929–35. Research assistant at Ondřejov Observatory 1936–41, director of outreach department 1945–48. Petřín People's Observatory since 1948, organized demonstrator training. Cofounder of Ďáblice People's Observatory (built 1955–58, opened to the public 1956).

cial university personnel lists. Due to the lack of positions, they tried to find short-term foreign internships and positions at other observatories. Examples include František Link[153] and Vladimír Guth.[154]

In November 1939, Czech universities were closed by the Nazi occupational government "for three years." The CU Astronomical Institute, located in Smíchov outside the buildings of the Faculty of Science, was overlooked by the occupants and was never closed, but it could not provide any formal education in astronomy. After World War II, the education was renewed there, but the last observations were made in 1949. It was only in 1997 that the Institute was moved to more suitable modern premises on the Troja campus.

Astronomy at technical universities and Masaryk University

In 1920 the Czech Prague Technical University was transformed into the Czech Technical University (CTU, *České vysoké učení technické*) which consisted of seven separate colleges (polytechnics), while the German Prague Technical University retained the same status. In the interwar period, astronomy education was established only at CTU and Czech Brno Technical University (Czech BTU).

In the early 1920s, Jindřich Svoboda[155] was appointed the first professor of astronomy at the College of Special Sciences at CTU. Practical training was provided by the Ondřejov Observatory before the five small observatory houses on the roof of the main CTU building at Karlovo náměstí were built in 1924.[156] Svoboda constructed many instruments himself. He

153 František Link (1906–1984). Born in Brno. Studied at MU (doctoral degree 1930). Teacher at secondary school. Habilitated for astronomy at CU 1936. Founded the Computative Section of CAS during WWII. Reseacher at Ondřejov Observatory from 1943, head of department of solar physics from 1945, director 1948–52. Emigrated to France in 1970, worked for Institut d'Astrophysique in Paris 1970–84.

154 Vladimír Guth (1905–1980). Born in Vrchlabí. Studied at CU. Doctoral degree 1929. Scientific assistant at CTU 1925–28, the State Observatory and Ondřejov Observatory 1928–50. Habilitated for astronomy at MU 1949. Director of Skalnaté pleso Observatory 1951–56. Head of Interplanetary Matter Department at CSAS Astronomical Institute in Ondřejov 1956. Professor of astronomy at CU 1966. Focused on observation of comets, meteors and the Sun.

155 Jindřich Svoboda (1884–1941). Born in Volyně. Studied at Czech CFU 1903–08 (doctoral degree 1908). Assistant at department of mathematics at CTU from 1910, Privatdozent 1919, extraordinary professor of astronomy 1920, full professor 1924. Member of Czech resistance during Nazi occupation, arrested and jailed in 1940. František Jáchim, "Astronom a geodet Jindřich Svoboda," *Pokroky matematiky, fyziky a astronomie* 37, no. 1 (1992): 59–62.

156 Kovář, *Místa astronomické*, 20.

brought Russian émigré astronomer V. V. Stratonov,[157] who had lived in Czechoslovakia since the early 1920s and engaged in astronomy outreach, to the department at CTU. Svoboda died in 1941 after being jailed for participation in anti-Nazi resistance. In 1945, Buchar was appointed extraordinary professor. He founded a university observatory in the postwar period. After the restructuring of studies at CTU in 1950, Buchar, as the head of the Geodetic, Geophysical, and Astronomical Institute, moved to the Surveying Faculty of CTU (1953) and later to the Faculty of Civil Engineering of CTU (1959).

The situation was very different for technical universities in Brno. The Brno Technical University (founded 1849) was never divided. In 1899, the new Czech BTU was founded as an independent university. In 1921, Bohumil Kladivo[158] was appointed extraordinary professor of higher geodesy and spherical astronomy at Czech BTU. There was a small observatory, built in 1911 on the roof of the Faculty of Civil Engineering of Czech BTU. At the same time, the new university (MU) was founded in Brno, including an astronomical institute. Initially, the institute existed only on paper and Kladivo was appointer its manager. The institute's equipment was installed at the Czech BTU Observatory.[159] During World War II, the observatory's inventory was returned to the MU or lost.

157 Vsevolod Viktorovich Stratonov (1869–1938). Born in Odessa. Studied at Odessa University. Worked at observatories in Odessa (1891–92), Pulkovo (1893–95) and Tashkent (1895–1905). Left astronomy research after eye disease in 1905. Full professor at Moscow State University 1917. Founded Main State Astrophysical Observatory in 1920. Forced to emigrate from USSR in 1922. Lecturer at CTU 1924–38, at CU Faculty of Science 1936–38. Extraordinary professor of descriptive and practical astronomy at CTU 1936. Author of many successful astronomy outreach books, including *Astronomie* (1927).

158 Bohumil Kladivo (1888–1943). Born in Křtiny, studied at Czech CFU in Prague (doctoral degree 1912). Assistant of Institute of Geodesy at Czech Brno Technical University (Czech BTU) from 1912. Extraordinary professor of higher geodesy and spherical astronomy at Czech BTU in 1921, lecturer at MU from 1922. Joined the resistance during Nazi occupation. Died after multiple imprisonments.

159 Josef Mikuláš Mohr, "Čtyřicet let československé astronomie", *Říše hvězd* 39, no. 10 (1958): 217–21.

Part 3: Observatories

The Frič Brothers Observatory in Ondřejov

In the 19th century, the traditional old observatories in cities or even city centres proved insufficient for modern astronomical and astrophysical research. New observatories were built in the mountains outside of cities. The land for a private observatory of the Frič brothers was bought in 1898 in Ondřejov in Central Bohemia. The observatory was named after two Czech amateur astronomers and entrepreneurs, who ran the precision mechanics workshop in Prague: *Josef a Jan Frič – dílna pro přesnou mechaniku*. They produced, among other things, original instruments for astronomy. The brothers met Professor Šafařík, who lived near their workshop and became their mentor and associate. Jan Frič died unexpectedly in 1897, and one year after his death, Josef Frič commemorated him by founding the observatory *Žalov* ("žal" is the Czech word for "grief") on the Mandina Hůra, a hill near Ondřejov. After Šafařík died in 1902, his widow, Pavlína Šafaříková, donated his astronomical equipment, library and memorabilia to the new observatory.

From 1900–30, it continually grew from one observation station and a wooden hut into a modern scientific institute. The architectural plans for the construction were designed by Czech architect Josef Fanta (1856–1954). On 1 August 1906, the first observation was performed. At that time, the observatory consisted of a study with a clock cellar, four observation houses with collapsible roofs, and a residential house for the gardener. An astrograph was installed in the western dome in 1920, and Šafařík's telescope with a high-quality Clark objective lens was installed in the central dome in 1922.[160] The first mechanical workshop was built in 1923.

The Ondřejov Observatory was connected to the university by Nušl, who came to Prague in 1901 and soon began cooperating with Frič. Nušl became the first director of the observatory and an associate professor of astronomy at Czech CFU in 1905. Nušl and Frič constructed their circumzenithal telescope and its five subsequent models.

On 28 October 1928, Frič donated the observatory and its lands, buildings, instruments and library to the Czechoslovak Republic for the purposes of CU.[161] The donation had several conditions, including independent

160 Cyril Polášek, *Jednoapůlstoletý osmipalcový objektiv Alvana Clarka hvězdárny Astronomického ústavu Akademie věd České republiky v Ondřejově u Prahy: Historická astrooptická studie věnovaná 145. výročí vzniku objektivu v Bostonu, USA, i Clarkovu objevu podvojnosti 99Her*, 3rd ed. (Ondřejov: Astronomický ústav AV ČR, 2006).

161 Its full name was *Žalov, the Charles University Observatory of the Frič brothers* (Žalov, hvězdárna bratří Josefa a Jana Friče při Universitě Karlově).

administration, the appointment of Nušl as the director, and the privilege of the Frič family to use several rooms in the observatory buildings. The observatory was formally joined with the State Observatory in the Klementinum, which subsequently served as its administrative and computation centre. The process was finished in 1933, and as the observatory and its scientific activities grew, it was able to provide several positions for newly graduated astronomers. Even before the donation, the observatory employed seven astronomers and offered practical training for students, who commuted there and helped with calculations.

Until the postwar period, the observatory was relatively isolated. There were no telephone lines and no railway stations in the vicinity, and connection to Prague was provided by one car. The observatory was not known to the general public because amateur astronomers and their popularization activities were focused on public observatories.

Even the German astronomers, who came to the German University in 1940, did not know about the Ondřejov Observatory's existence until 1942. Then Professor Schaub negotiated with the Reichsprotektor Karl H. Frank (1898–1946) and enforced the occupation of the Ondřejov Observatory. This was officially realized in November 1943. Later, Schaub and his staff moved to the observatory.[162] During his stay, he published several papers on binaries. Schaub got on well with the Czech personnel at the observatory.[163] They continued with their research, which included atmospheric absorption, lunar eclipse photometry, and meteor observation.

In May 1945, in the final days of the war, conflicts arose between Czech and German astronomers at the observatory.[164] Schaub left for Prague and was later deported to Germany. The observatory was guarded by Czech staff and survived the end of the war and the postwar period without any damage.[165]

162 Fischer and Hibst, "Die deutsche Astronomie".

163 Tomáš W. Pavlíček and Martin Šolc, "Cesty československých astronomů k mezinárodnímu uznání v dobách totalitního řízení vědy," in *Ne-svoboda, despocie a totalitarismus v kultuře a kulturních dějinách*, ed. Radomír Vlček (Praha: Česká společnost pro slavistická, balkanistická a byzantologická studia – Historický ústav AV ČR – Slovanský ústav AV ČR, 2021), 490–520, here 493.

164 Fischer and Hibst, "Die deutsche Astronomie"; Zdeněk Kopal, „Ondřejovská hvězdárna za druhé světové války," in *Ondřejovská hvězdárna*, 130–34.

165 Kopal, "Ondřejovská hvězdárna".

The Astrophysical Observatory in Stará Ďala

Another state observatory, which was initially private and was later donated to the state, was the observatory of Baron Miklós Konkoly-Thege[166] in Stará Ďala,[167] built in 1871–74 as a modern scientific institute and as the first astrophysical observatory in the entire Austro-Hungarian Empire.[168]

Towards the end of the 19th century, the observatory was fully financed by Konkoly-Thege and had nine domes, several pavilions for meteorological observations and geophysics, and several large buildings. Its instruments included a 254mm Merz-Konkoly refractor and a 162mm Merz refractor. When Baron Konkoly-Thege ran into financial difficulties, he donated the observatory to the state in 1899 with the condition that he remain its director until his death, which occurred in 1916.[169]

After the Austro-Hungarian Empire dissolved in 1918, the observatory was transferred to the Czechoslovak Republic. The meteorological observatory was joined with the State Meteorological Institute. The astrophysical and geophysical observatories were merged with the State Astrophysical Observatory in Stará Ďala. Kaván, the adjunct of the CU Astronomical Institute, accepted the position of its director. The Hungarian staff left the observatory in 1920, and a portion of its equipment was transferred to a new observatory in Svábhegyi, near Budapest.

In the 1920s, the observatory was equipped with a 60cm Zeiss reflector, a large instrument from a top manufacturer of astronomical instruments at that time. The instrument had to wait for the arrival of Carl Zeiss employees and Šternberk. Šternberk had experience with large instruments from his studies in Babelsberg and from the installation of the König telescope at the Štefánik People's Observatory in Prague.[170]

The observatory was in the Hungarian occupation zone during the Vienna Arbitration. On 13 October 1938, the evacuation of the institute was ordered.

166 Miklós (Nicolaus) Konkoly-Thege (1842–1916), descendant of an old noble family from Stará Ďala. Studied law, physics, and meteorology at the universities of Pest and Berlin. Travelled to a number of observatories in Europe and gained the necessary knowledge and contacts for future scientific work and instrument design. Director of the Meteorological Service from 1890.

167 O'Gyalla in Hungarian. Today, Hurbanovo in Slovakia.

168 Martin Kalina, „Matematika a fyzika na Slovensku, JČMF a JSMF," *Pokroky matematiky, fyziky a astronomie* 57, no. 1 (2012): 3–11; Stanislav Šišulák and Ladislav Pastorek, "Instrumentation and Observations at the Astronomical Observatory in Hurbanovo in 1871–1918," *Journal for the History of Astronomy* 53, no. 4 (November 1, 2022): 475–96.

169 Šišulák and Pastorek, "Instrumentation and Observations".

170 Mohr, "Čtyřicet let"; Bohumil Šternberk, "Vzpomínky na minulost," *Říše hvězd* 59, no. 12 (1978): 245–58.

The war ends and Luboš Perek (right) and his peers leave forced employment at Junkers to return to their studies, Prague, April 1945
(MÚA, A AV ČR, Luboš Perek collection, photo album WWII)

Chapter II

Students: the first postwar generation

Part 1: The long-awaited liberation

Saturday 5.5.1945

Luboš Perek: Vlasta and I went out at around half past two. Sokol members and legionaries in costume are already on the streets along with soldiers in uniform. The street public address system announces a proclamation by the [Czech] National Council under the Commander-in-Chief of the Czechoslovak troops in Prague. [...] We heard an appeal on the PA for students to go down to Klementinum. When we got there, they sent me across the street to the Crusader Knights [of the Cross Monastery], where the Todt organization had its headquarters, to get weapons. [...] I was put on duty as liaison around Jiří [z Poděbrad] Square and the Švehla dormitory. I had to report what was going on in the area every half hour. I asked if Vlasta had also reported in there, but they didn't know anything about her. [...]

Vlasta Perková: I waited a while to see if Luboš might come back. One student stood on the barricade at Klementinum and said that those who didn't have weapons should leave the building and report to Jindřišská 5. This applied to the girls in particular.

I immediately went over there [to help as a volunteer nurse]. There was shooting at Ovocný trh, and a procession of people surrounding an SS [officer] made a very unpleasant impression on me. His face and hands were bleeding, and people were beating him badly. I actually felt sorry for him. [...]

Sunday 6.5.1945

Luboš: [...] We put the clothes and washing in the cellar. [...]

Monday 7.5.1945

[...] Artillery can be heard. [...]

> Tuesday 8.5.1945
>
> *The radio reports that the first American tanks passed through Wenceslas Square tonight. […] At three o'clock Churchill spoke on London Radio and officially announced the end of the war. […]*
>
> Wednesday 9.5.1945
>
> *[…] The radio reports […] at 11:15: Russian tanks drove through Vítězné náměstí, wiped out a unit of German bandits at Klárov, and occupied the Parliament, Old Town Square, and Wenceslas Square. […]*
>
> *Vlasta and I wrote this little diary to remind us how we lived through those days.*
>
> (Diary of liberation by Luboš and Vlasta Perek, 03–09 May 1945. MÚA, A AV ČR, Luboš Perek collection, unsorted, box 2, sign. Ic)

An astronomer in the Prague Uprising

Aided only by his spatial bearings, radio and daytime and nighttime news broadcasts, a young astronomer, who was a member of the National Student Committee, became involved as a liaison officer ("03 hláska") in the Prague Uprising, which initially attempted to capture an arms depot.[171] Due to the dramatic situation on the streets of Prague, his wife Vlasta was afraid for him. For the rest of their lives the fortunes of this married couple, which we follow in every chapter of this book, were to be characterized by their mutual respect, equality and consideration for each other's interests and careers.

Biographies of scientists usually consist of full synopses of their educational background rounded off with a doctorate. This was also the case with the astronomers in the first chapter on teachers. But the formation of the first postwar generation was different. The war and the closure of the Czech universities changed the students' earlier plans, and many of them could not return to complete their studies after the liberation. The influence of parents on their choice of profession and the general conditions for obtaining research positions had also changed. More than the education data, the egodocuments and oral history sources testify to their common experience.

171 MÚA, A AV ČR, Luboš Perek collection, unsorted, box 1, sign. Ia, personal documents. The militia warehouse of the Todt working organization on Jezerka. Weapons were transferred to Klementinum. Cf. Stanislav Kokoška, *Praha v květnu 1945: Historie jednoho povstání* (Praha: NLN, 2005), 113–123.

That is why I chose the anthropological approach, to capture the radical change. The diary of the astronomer and his wife from the liberation period in 1945 is of particular informative value with regard to his decision to become a scientist. Why did they actually type out and then preserve this diary? It could have made utilitarian sense to preserve this kind of national activity, as was expected at the end of the war.

Luboš Perek (born on 26 July 1919) could have graduated earlier. He longed for an end to the war, wishing for a profound transformation in society, although his family had an elite bourgeois background. Both his father and grandfather were lawyers. His grandfather Václav Perek (1859–1940) had been involved in the politics of the Young-Czech Party as a deputy of the Moravian Landtag. It was obvious that young Luboš should study law, but he was more interested in astronomy, and his grandfather, who raised him after his parents' divorce, encouraged his independent choice of studies. Luboš had begun to study mathematics and astronomy at the CU Faculty of Science in 1937, passing his first state examination before November 1939, when the Germans closed down the Czech universities.

On 15 November 1939, the funeral took place of medical student Jan Opletal (1915–1939) wounded by German troops as they dispersed people celebrating the anniversary of Czechoslovakia on October 28. Perek also attended the funeral and the student demonstration. The very next day Adolf Hitler announced the closure of Czech universities for three years. Perek ran to the Faculty to copy down the requirements for the second state examination.[172] He wanted to prepare himself to finish his studies quickly and he was even considering the option of going to Germany: "Just to be sure, I ran to see a professor — I won't say his name, but he was a very decent one — and I asked him, 'Professor, look, the universities are open in Slovakia, there are universities in Germany too. How would you see it if I went to study there?'

And he said, 'Well, you know, I could understand your situation, but I can't vouch for my colleagues.'

So I got the idea that it wasn't on, that it was simply not possible. I had to stick it out at home."[173]

It was Professor of Mathematics Vojtěch Jarník (1897–1970) who correctly predicted the situation.

The young generation felt strongly deprived of the opportunity to study and to make their own choices over their future. The grown-up world urged

172 Koubská, *Hvězdář diplomat*, 17.

173 Pavlíček, "Rozhovor s astronomem", 74–75.

them to be patient with humdrum life under the Protectorate, to do the compulsory labour in the factories and to carefully avoid any reckless activity, especially after the post-Heydrich reprisals in 1942. Sociologists informed us that this generation faced the task of rebuilding the state and ensuring society's continuity, even when prospects of the war's end were not yet in sight.[174] Similarly, commitments were made to the young generation in the Soviet Union, which after the Battle of Stalingrad had turned into a total war economy, with youth and adolescents in the rear being assigned the positions of the adult men and women who had been sent to the front. Within this context, Julia Fürst has revealed the agitation with which "Stalin's last generation" was going to define itself and maintain its influence in the public sphere after the war. Because it had too strong a desire for the freedoms of youth and Western fashion and culture, Stalin feared a revolt among these youngsters and emphasized the sacrifices of the Great Patriotic War and the dangers of imperialism.[175] Fürst has thus opened up a debate over the extent to which the Cold War emerged from the internal generational tensions in Russian society. Any answer depends on interpretation of the everyday experience.

Similar questions can be raised over the wartime experience of Czech youth in the Protectorate. The news of American tanks in Prague that the Pereks heard on the radio on 8 May 1945 proved baseless — it was just a small convoy of vehicles that was meant to convey the German surrender message to Central Army Command, while the victory of the Prague Uprising was then sealed for many decades to come by the arrival of Soviet tanks the following day.

Czech youth in the Protectorate had been exposed to similar pressure to that felt by Soviet youth to behave responsibly. The bombing intensified these appeals, which did not mean that all youth respected them. The young Luboš was made aware of the effect of this caution on his partner, whom he met during the war while he was attending courses in German, shorthand and typing at the German Business Academy. At their meetings, Vlasta never allowed for invitations to cafes. At the beginning of the relationship, she evidently did not wish to commit herself immediately, but to

174 However, not everyone was able to have children as a result of the trauma, which constituted a similar taboo as when women became pregnant as a result of rape during the liberation. For research on taboos see Barbara Klich-Kluczewska, *Rodzina, tabu i komunizm w Polsce. 1956–1989* (Kraków: Libron, 2015), 31–40; Jakub Gałęziowski, *Niedopowiedziane biografie. Polskie dzieci urodzone z powodu wojny* (Warszawa: Krytyka polityczna, 2022).

175 Fürst, *Stalin's Last Generation*, 2–7, 200–17.

get to know her partner well first. Perhaps her mother had recommended reading the "Advisors", who had set out the ethics behind relationships during her own youth.[176]

"We had about a thousand dates together, but I could never ever get her to sit down at a cafe. That was outside the realm of her existence, so she never allowed it. Hot or cold, we always just marched round Prague."[177] After the theatres were closed down on 1 September 1944, there was nothing else for it but to rendezvous, i.e. meet up outside.

Anthropologists show that young people were also uncertain about getting married and planning a family. Vlasta (née Straková, 1921–2007) knew that the German authorities were looking on grimly as other young couples hastily married or planned pregnancies just to avoid Totaleinsatz deployment.[178] To the younger generational unit (born in 1924), there was a serious threat that they would be married off to Germans based on racial laws in the Reich. I mention this context because it had its effect on all future scientists of their generation.

After three years of going out together, Vlasta and Luboš decided not to wait until the end of the war and got married in the spring of 1945. When this was discovered by Luboš's father, notary Zdeněk Perek (1891–1970), who lived alone outside Prague, he persuaded his son to postpone the wedding until more peaceful times. Due to the war, the young generation was already independent of their parents. The wedding took place on 7 April 1945, after which the newlyweds moved to Žižkov, with one month of the war still remaining.

Every year the wait for the universities to reopen and for liberation was suffered by increasing numbers of youngsters, who instead of studying were assigned to work in factories, though not in the Reich if they had any luck and connections, as is recalled by mathematician Jaroslav Kurzweil (1926–2022), a final-year pupil in 1944/45 at the Prague Gymnasium, whose class did not actually get to see the final exams in May.[179] The last weeks

176 *Tajemník lásky, aneb Dvorný společník. Navedení důležité zejména pro lidi mladé, jak se slušně chovati mají vůbec a zvláště v lásce* (Praha – Karlín: Emil Šolc, 1917).

177 Pavlíček, "Rozhovor s astronomem", 75.

178 Hence they rapidly did away with the original loophole that had been in effect since early 1942. Detlef Brandes, *Češi pod německým Protektorátem. Okupační politika, kolaborace a odboj 1939–1945* (Praha: Prostor, 2019), 375–77, 504.

179 Tomáš W. Pavlíček, "Rozhovor s prof. Jaroslavem Kurzweilem," *Pokroky matematiky, fyziky a astronomie* 65, no. 2 (2020): 90–117. Similar Boris Valníček, *Špatné časy pro život* (Třebíč: Akcent, 2012), 124–125.

of the war were full of bombings and life-threatening situations. This traumatic experience left some young couples infertile, as was the case with the Pereks.[180]

The students' defence of the Klementinum during the Prague Uprising in 1945 was reminiscent of the revolution and student barricades of 1848. The Czech National Council (CNC) echoed the National Committee of 1848, and members of the intelligentsia again saw themselves as the standard-bearers of freedom. Their aim was to prevent the Germans from destroying the historical buildings, particularly the Klementinum, its library and valuable collections and the State Observatory, occupied by the Germans since 1940.[181] At the end of the war, the student resistance formed the National Student Committee, which was represented in the CNC. As evidenced by the Pereks' diary, this Committee met as early as 5 May 1945 at the Klementinum, and after being recruited into the Student Legion, the members joined the uprising in intelligence roles. These students then guarded the university buildings and laboratories. The National Student Committee was established at the CU Faculty of Arts, and its left-wing members started setting up Revolutionary Action Committees at their faculties. These took care of "cleansing committees" and securing the students' social conditions. A large student assembly was held at the Lucerna on 30 May, attended by Minister of Education and National Enlightenment Zdeněk Nejedlý (1878–1962), who initiated the extraordinary 1945 summer semester.[182]

In memory of the wartime victims

Before the studies could begin, two questions remained to be resolved. First, who did not return to university? Many Jewish students rejected at the end of the 1930s, wartime victims generally, and those who had devoted themeselves to another profession. The recent experience of the end of the war and the memory of the scientists who fell victim during the war formed the impetus behind their colleagues' efforts to rebuild the world within new structures. How did these losses create an awareness of the commitment to continuity in academic work, the need to push for reforms and the establishment of new institutes and laboratories? For example,

180 Małgorzata Fidelis et al., *Kobiety w Polsce 1945–1989: Nowoczesność – Równouprawnienie – Komunizm* (Kraków: Universitas, 2020).

181 The Time Service, led by Seydel, was evicted to Budečská street in Prague. Cf. Pavlíček and Šolc, "Cesty československých".

182 Blanka Zilynská, "Poválečná obnova a zápas o charakter Univerzity," in *Dějiny Univerzity Karlovy IV*, 239–44.

a black memorial plaque with the names of the murdered professors and associate professors from MU in Brno, set in stone in front of the entrance to the Faculty of Science, appeals to the academic community in Czech (and Latin) "By the excellence of their lives and by their deaths, they have brought honour to the university and set an example for the future. Let us be grateful to them and remember them always."[183] This was a research stimulation. On the other hand, have not such commitments become an obstacle to the formulation of new paradigms of scientific knowledge?

Among intellectuals, within the confines of the Brno branch of the Union of Czech Mathematicians and Physicists (UCMP) alone, four mathematicians had died.[184] Of the remaining mathematicians, Otakar Borůvka (1899–1995) took these losses seriously and actually redirected his professional focus to the field of differential equations, which developed rapidly after the war. On the other hand, Eduard Čech (1893–1960), Vladimír Knichal (1908–1974) and Josef Novák (1905–1999) took advantage of career opportunities in Prague and left Brno.[185] It was Kladivo and Hrudička who had patronized astronomy in Brno, so their deaths had inhibited the more dynamic reintroduction of the field in astronomy education.

The memory of these scientist victims inspired efforts to fill vacant positions and thus to ensure continuity in research and education. The CU lost almost 20% of its qualified teachers (70 out of 381) during the war. Many at the Science Faculty were involved in fellow botanist Vladimír Krajina's (1905–1993) resistance organization. Six professors and other staff lost their lives. Many others were imprisoned or interned in concentration camps.[186] After the war CU had a noticeable shortage of assistants and associate professors, who had had to find other civilian jobs after 1939.

183 On the establishment of the memorial plaque, see Jan Špaček, "Vzpomínka na umučené učitele Přírodovědecké Fakulty MU," *Univerzitní noviny*, no. 5 (1995): 21.

184 Josef Klíma (1887–1943), Vladimír Novák (1869–1944), Bedřich Pospíšil (1912–1944), and Konstantin Hladký (1895–1945, of Russian origin).

185 Efforts to maintain continuity can also be observed in other disciplines at the MU and the Czech Brno TU. Meteorologist Bohuslav Hrudička (1904–1942), physicist Josef Sahánek (1896–1942), physical chemist Antonín Šimek (1887–1942), surveyor Kladivo and assistants Jaroslav Mrkos (1901–1942) and Jaroslav Potoček (1906–1942) had perished during the war. Cf. Rostislav Košťál, *Vznik a vývoj pobočky JČMF v Brně* (Praha: JČSMF, 1968), 72–73.

186 Tomáš W. Pavlíček, "Memento obětí totalitních režimů jako motor kariéry, nebo závazek kontinuity vědecké práce," *Kultúrne dejiny* 13, no. Supplementum (2022): 128–52. Colleagues from the Professor Krajina's resistance group: mineralogist Radim Nováček (1905–1942), mineralogist František Ulrich (1899–1941), zoologist Jaroslav Štorkán (1890–1942), anthropogeographer Jan Auerhan (1880–1942), and further collaborators of the National Museum: paleontologist Jaroslav Šulc (1903–1943), and mineralogist Ludmila Slavíková (1890–1943), wife of Professor František Slavík. Cf. Vladimír Krajina, *Vysoká hra. Vzpomínky* (Praha: Eva – Milan Nevole, 1994), 257, 264.

Hence retired professors were recalled, while the Deans' Council pressed for the appointment of new professors, so that during the first three semesters of 1945/46, 63 habilitations took place and 73 new professors were appointed. The Ministry, headed by Nejedlý, endeavoured to recruit left-leaning professors by establishing new chairs.[187] Some departments took tactical advantage of this to establish institutions for new disciplines, in order to place their own people in the academic field, as evidenced by the habilitation colloquia topics approved in 1946–47.[188] František Link as an external student completed his habilitation at the CU Astronomical Institute, but the standard of astronomy teaching and the discipline itself were not changed. The situation appeared to vary. Some mathematicians (Čech, Jarník and Katětov) were committed to Communism, but without infringing ideologically onto their professional topics, which cannot be said of the Marxist philosophers. Finally, one can find examples of astronomers or geologists who, without a political orientation, made use of the significance of their discipline to help change postwar industry (e.g. Buchar, Šternberk, or Radim Kettner, 1891–1967).

The Ministry created the conditions under which the new positions were regularized by means of a Presidential Decree of 18 October 1945, which legalized the abolition of German higher education, already carried out by the CNC on 5 May: the German University in Prague and both German polytechnics in Prague and Brno were abolished as "institutes hostile to the Czech nation", retroactively to 17 November 1939.[189] Unfortunately, these nationalistic grounds presented by Minister Nejedlý made it impossible for anti-fascist German professors or German scholars of Jewish origin to return to Czech institutes.

Such a case happened to the bilingual astronomer Georg Alter.[190] From 1930 he was practically the administrator of the Astronomical Institute of

187 Zilynská, "Poválečná obnova", 235–39.

188 AUK, collection Přírodovědecká fakulta, box 3, Inv. No. 19–21, box 4, Inv. No. 22, the Professorial Board minutes 1946–47.

189 Karel Jech and Karel Kaplan, eds., *Dekrety prezidenta Republiky 1940–1945* (Praha: Ústav pro soudobé dějiny AV ČR, 1995), 470.

190 Georg (Jiří) Alter (1891–1972). Astronomer. Born in Luže. Grew up in a bilingual family of Jewish origin in Eastern Bohemia. Studies interrupted by WWI. Wounded in war. Journalist, musician. He liked Schönberg music and played violin. From 1924–28 studied astronomy at the German university in Prague. External associate of Astronomical Institute of the German University in Prague from 1926, assistant 1930. In 1938 he emigrated with his wife and daughter to Great Britain. Researcher at Norman Lockyer Observatory 1939–45. His older son emigrated to Israel, but the younger son perished in a concentration camp. In 1945 returned to Prague, wrote popular articles on history of astronomy, until he got a job at the Petřín People's Observatory in 1949. After retirement in 1953 he co-published the *Catalogue of Star Clusters and Associations* (1958).

the German University in Prague and collaborated with Einstein's friend Professor Freundlich after he came to Prague in 1937. In autumn of the following year both of them emigrated to the Great Britain. Alter stayed at the Norman Lockyer Observatory in Sidmouth. In 1945 he returned to Prague, but Czech astronomers accused him of being of German and Jewish origin. Seydl, in particular, was afraid that if he was allowed a place at the People's Observatory, he would soon get to the State Observatory.[191]

The CU representatives also insisted on preserving the national character of the university. In most cases, Germans (even those of Jewish origin) returning from concentration camps had to find employment outside the university sphere, if they were not actually deported. For this method of commemorating the war victims, only Czech scientists were deemed appropriate. In the first wave of habilitations and professorships in 1945, implementation began quickly and was dated retroactively to 1 January 1940, which had economic significance due to the number of years worked and the amount of old-age pension. The narrative spoke of the lost years of interrupted careers due to the war, and in order not to appear too utilitarian, professorial titles were awarded in memoriam to some fallen scientists, of course with Czech nationality.

Viktor Trkal (1888–1956), a professor of theoretical physics and administrator of the CU Astronomical Institute, took exceptional care to commemorate the victims of the war, especially remembering his murdered colleague and former mentor, Professor of Theoretical Physics František Záviška (1879–1945), a supporter of Einstein's theory of relativity. Einstein had followers among Czechs and Germans, but for the latter there was no more academic acceptance. During the war, Záviška headed the UCMP, in which astronomers were also members. Because of his activities in the resistance, he was arrested on 21 January 1944 and imprisoned in the Osterode concentration camp in the Harz region. Forced from there onto a death march, he died of exhaustion on 17 April 1945 near the town of Gifhorn. On the first anniversary of the May Uprising, a memorial service was held for Záviška and other academics who perished. Those who were the first and last to die during the war were the most prominent victims commemorated. In addition to the funeral, memorial plaques, and the naming of lecture halls (e.g. the Záviška Reading Room for Theoretical Physics in 1949), the Professorial Board sought to express solidarity with

Active participant at IAU congresses. Czech academia changed its attitude, when the I Section of CSAS published his 78-page booklet *Two Renaissance Astronomers. David Gans, Joseph Delmedigo* (1958). Moved to Israel in 1965.

191 Gad Freudenthal and Jan Roubinek, "Georg (Jiří) Alter (1891–1972). Astronomer, Historian of Astronomy, and Musician," *Aleph* 11, no. 1 (2011): 115–55.

the survivors by forming a committee to propose the appointment of executed members of the staff as full professors.[192] This helped to improve the social conditions of the widows to at least some extent.

Trkal, who was also the Secretary of the Czech Academy of Sciences and Arts (CASA), made use of the victims to dispense revolutionary justice, as well as to rebuild the Faculty of Science facilities. It is true that its buildings and equipment were the most extensively damaged during the war. The Dean's Office even had to be temporarily housed in the Faculty of Arts. In all the faculties, the first meetings of the Professorial Boards were convened by the last deans of 1939, but from June onwards, those appointed by the Ministry took over as deans, even though this limited the university's autonomy. At the Faculty of Science, Trkal took up his academic position. Hitherto the renewal and organization of teaching at CU was dealt with by Deans' meetings (instead of the Senate), and these subsequently continued to deal with the reform of higher education institutes under discussion. During the first stage, the Deans' conference entered into a dispute over the free elections of the rector and deans with the Ministry, which insisted on appointed individuals. Elections respecting the Ministry's terms were held in August 1945 and in the end all remained in office, except for Trkal, who resigned, plainly disappointed that his proclamation of revolutionary freedom had not been accepted by all.[193]

Cleansing Committees

Even before academic activities were fully resumed, the ethical issues surrounding those scientists who had collaborated with the Germans or who had been given a suspiciously large number of opportunities to continue their own research during the war were to be investigated. The call for revolutionary justice rang out throughout the national state of the Czechs and Slovaks. The Košice government programme now spoke of the need to punish collaboration and betrayal. From a legal standpoint, however, there was a difference between how the special People's Courts retrospectively assessed the collaborationist actions of the population in occupied countries (e.g. the Czech lands) as anti-state, while in German satellite states with their own sovereign status (Slovakia) wartime studies were not contested.[194]

192 AUK, collection Přírodovědecká fakulta, box 3, Inv. No. 20, the Professorial Board minutes of 21 March 1946. The nomination was made on 4 April 1946.

193 Ibidem. Professor František A. Novák was elected dean.

194 Jan Rychlík, *Československo v období socialismu. 1945–1989* (Praha: Vyšehrad, 2020).

After the war, students and teachers had great enthusiasm and motivation for improving everything. University activity resumed under Government Decree No. 9 of 25 May 1945, whereby employers were to meet the needs of former students and give them a year's unpaid leave of absence. However, in order for them to be allowed to return to their studies, the Faculty Cleansing Committees had to assess who was deserving. Instructions from the Ministry of Education and National Enlightenment of 7 June 1945 excluded those who had been shown to have studied at German, Slovak and Hungarian schools for their own benefit from returning to university. Individual cases in which young people started studying for social and family reasons were considered sympathetically. The Ministry's decree of 12 June 1945 stated that semesters completed during the war outside Czech schools would not be counted and foreign diplomas would not be nostrified. An exception was eventually made for Slovaks.[195] The procedure for assessing individual cases was amenable to pressure from political parties, especially the National Socialists and Communists, who, using the argument of class injustice, accused the entire bourgeoisie of collaboration. In the atmosphere of the Protectorate government ministers' trial in July 1945, accusations were also raised against lower-level scientists by the respective Cleansing Committees at the universities, which had been set up during the summer, although it was not until 4 October 1945 that a decree was issued to investigate the activities of teachers and a court of honour was established.

At the first meeting of the CU Faculty of Science Professorial Board, Dean Trkal accused his colleagues Jaroslav Heyrovský (1890–1967), Karel Domin (1882–1953), and Otto Jírovec (1907–1972) of collaboration and summoned them before the Faculty's Cleansing Committee.[196] The minutes make it clear that in the euphoria of this sweeping, indiscriminately applied revolutionary justice, he was unable (or unwilling) to distinguish between the protagonists' varying contexts and experiences.

During the war Jírovec only ran the parasitology laboratory at the (Protectorate) State Institute of Health, whereas Domin was politically involved in such Czech fascist organizations as Vlajka. During the national cleansing process, Trkal failed to accept that the committees needed time to gather evidence and witness statements and that their decisions could not be anticipated. It was in the case of the physical chemist Heyrovský that upon his summons he unleashed uncompromising pressure on him

195 Zilynská, "Poválečná obnova", 239–44.

196 AUK, collection Přírodovědecká fakulta, box 3, Inv. No. 19, the Professorial Board minutes of 28 June 1945.

because even after the Germans occupied the Czech Institute of Physics and Chemistry, he took advantage of the benevolence of a colleague from the German University in Prague, Prof. Johann Böhm (1895–1952), to carry on coming in to his laboratory. Trkal referred to the Revolutionary Guards' ban, which on 15 May 1945 prevented Heyrovský from returning to the institute, but his proof of Heyrovský's cooperation with German science was rather flimsy. Trkal did not take it into account that while mathematicians and theoretical physicists could transfer the writing of scientific texts to their home offices, others, such as astronomers, were inevitably reliant upon their instruments.[197] Trkal did not take into account the fact that Heyrovský had been cooperating with an anti-fascist who had refused German citizenship in the 1930s. He himself saw resistance in terms of declaring the Institute of Theoretical Physics equipment to be his own property after the universities were closed down and taking it to his apartment.[198]

However, those actually involved in the domestic resistance were also to address the accusations raised. The most active organizer among the Prague scientists, Cleansing Committee Chairman Professor Krajina, prefaces its activities in his memoirs with a laconic remark about granting a generous pardon to both Heyrovský and Domin.[199] He refused to dramatize the cases, as Trkal's accusations had made Heyrovský take medical leave; he refused to attend the committee meeting and even gave up his CASA membership, so his colleagues had to persuade him to retract this. As for Domin, the Professorial Board recommended retirement.[200]

Strangely enough, in the Professorial Board minutes, Trkal did not mention physical chemist Václav Dolejšek (1895–1945), who was arrested for resistance activities. The reason was that Dolejšek's X-ray research,

197 Jiří Jindra, "Jaroslav Heyrovský a Jan (Johann) Böhm," *Chemické listy* 103 (2009): 894–97. Trkal insisted on banning access to the building until Heyrovský's guilt was decided, and on 21 June 1945 he ordered him to hand over the keys from the laboratory.

198 Miroslav Brdička, "Profesor PhDr. Viktor Trkal," *Pokroky matematiky, fyziky a astronomie* 46, no. 1 (2001): 52–64, here 56. It should be added that Trkal's son Viktor junior as a student also participated in the Prague Uprising. Viktor Trkal jun., "Vzpomínky na květen 1945," *Pokroky matematiky, fyziky a astronomie* 58, no. 3 (2013): 251.

199 Krajina, *Vysoká hra*. The commission did not close the case until January 1946. All academic staff were then pictured together on a tableau photograph, with which the Faculty could present itself as a unified body: *Tableau učitelského sboru Přírodovědecké fakulty University Karlovy* (Langhans, 1946). MÚA, A AV ČR, František Novák collection, unsorted, sign. V, photo album.

200 Michal Šimůnek, Václav Petříček, and Antonín Kostlán, "Kauza Karel Domin. Případová studie k politicky motivovaným změnám ve složení akademické obce v letech 1945–1948," *Acta Universitatis Carolinae – Historia Universitatis Carolinae Pragensis* 59, no. 2 (2009): 69–88.

performed at the Spectroscopy Institute and financed by the Škoda works in Plzeň, also carried on to some extent in the Protectorate, and Trkal had his own interest in utilizing it for atomic physics. The fact that Dolejšek had died in Terezín led to some recognition for his assistant Adéla Kochanovská (1907–1985), who obtained her habilitation (but was not allowed to be a member of the Faculty) and after the Škoda Works Physical Research Centre was incorporated into the CSAS worked at the academic institute, where she made a name for herself in radiocrystallography and she also gained fame as an instructor among the younger generation.

Ideas on the transformation of science in Czechoslovakia

Trkal was also occupied by the question of how to transform the scientific societies, whose merger had been discussed. At the very first CASA general assembly he recalled the victims of November 1939.[201] During the war the Academy had become a refuge for professors from the closed universities. It created jobs for 43 students and brought out over 300 publications. Trkal's speech is characterized by a certain revolutionary glorification of Czech scientific work: "The Academy was administered in Czech, and only occasionally did it use the German language alongside Czech in its compulsory contacts with the German authorities. It joins the Republic with its honour intact."

That is why he also thanks the politicians who were CASA members: President Edvard Beneš, Minister Nejedlý, CNC Chairman Albert Pražák "and above all our gratitude, thanks and admiration go to Generalissimo Stalin." In the proposal to elect the Big Three as honorary members of the Academy, he reverses their order at the last minute to Stalin, Churchill and Truman.[202]

I also mention Trkal's revolutionary directive because of the discussion over the term totalitarianism, which, as Christiane Brenner points out, is often limited to 1945 and the period from 1948, while the "wild" period of liberation took place in the spirit of the "national revolution" with its procedure that had to be applied in a uniform (hence totalitarian) manner.[203] This was in line with the emphasis on Czech scientific commemorations. On the other hand the sufferings of ethnic minorities such as the

201 MÚA, A AV ČR, Viktor Trkal collection, unsorted, sign. III c, speech at the CASA meeting, manuscript. He was elected CASA general secretary on 20 November 1942.

202 Ibidem. Cf. Jan Gebhart and Jan Kuklík, "Vědci a domácí rezistence," in *Věda v českých zemích za druhé světové války*, ed. Hana Barvíková (Praha: A AV ČR, 1998), 353–60.

203 Brenner drew attention to the continued popularity of the paradigm of totalitarianism in Eastern Europe. See Christiane Brenner, "Koncept totalitarismu – Studená válka v teorii?,"

Jews were being overshadowed, as the Holocaust narrative was at that time very generalized and superficial, and the idea of national minorities did not fit in with the concept of a liberated national state of Czechs and Slovaks.[204] Even Jewish organizations feared that the removal of the German population would also affect Jews who had declared German to be their language in the 1930 census.[205] This is precisely what happened to a Privatdozent for geography of Jewish heritage, Julie Moschelesová (1892–1956), when she inquired about the possibility of returning to Prague. The Faculty of Science Professorial Board responded sceptically to her request and postponed the matter until it was clarified whether she had declared German nationality in 1930.[206] The all-male staff was thinking more in terms of securing positions for its own assistants. But this was not an exception based on gender. At the time of these postwar accusations, it was not generally remembered that back during the Munich crisis of 1938, the Professorial Boards had expelled the majority of Jewish teachers.

The autonomy of the Professorial Boards could in a certain respect be of service, as we know from older animosities at the CU Astronomical Institute. Due to years of internal disputes, Trkal had taken over its management in 1936, and he intended to keep it after the war too.

In view of the persistence of the organizationally inept Professor of Astronomy Heinrich, the Faculty could not regularize the position of another full professor.[207] For many years, the Faculty preferred not to appoint Heinrich as a member of the habilitation commissions with astronomy-related work, because the professors of physics and mathematics were not eager to work with him. At the same time, astronomy (with its unsuitable building in Švédská Street and inadequate equipment) was overshadowed by physics. Trkal also had complaints against the younger generation. He sent the Privatdozent Mohr before the Cleansing Committee, because

in *Proměny diskursu české marxistické historiografie: kapitoly z historiografie 20. století*, ed. Bohumil Jiroušek (České Budějovice: Jihočeská univerzita, Filozofická fakulta, 2008), 27–39, here 27.

204 Maryla Hopfinger and Tomasz Żukowski, eds., *Lata cztyrdzieste. Początki polskiej narracji o zagładzie* (Warszawa: Instytut Badań Literackich PAN, 2019).

205 AUK, collection Přírodovědecká fakulta, box 3, Inv. No. 20/2, the Professorial Board minutes of 8 May 1946, the question of Privatdozent J. Moschelesová for the possible return to the faculty was postponed until the recognition of her nationality in the 1930 census, the request was rejected on 27 June 1946.

206 Ota Konrád, "Die (ehemaligen) tschechoslowakischen Hochschulen in den Jahren 1938–1945," *Acta Universitatis Carolinae – Studia Territorialia* 11, no. 3–4 (2011): 81–88.

207 Brdička, "Profesor PhDr. Viktor Trkal".

during the war he had sent his children to German schools; the works council also had comments on this. Hence Mohr welcomed the opportunity to leave Prague all the more when he obtained a professorship in Brno.

Otherwise Trkal can be credited with organizing the positions for assistants. He regularly proposed the appointment of assistant professors and ancillary scientific staff to the Professorial Board not only in the interests of the Institute for Theoretical Physics, but also for the Astronomical Institute (often at the suggestion of Link), thus shaping the emerging generation of astronomers.[208] However, before he became familiar with Link's work at Ondřejov under the supervision of the German Professor Schaub, Trkal distrusted him to some extent. In the meantime, a proposal concerning Link's position at the Faculty had twice been taken off the Professorial Board agenda.[209] Trkal was also involved in astronomy because he had theoretical and quantum physics covered thanks to his students Miroslav Brdička (1913–2007) and Václav Votruba (1909–1990), and he was increasingly involved in the atomic physics. However, his judgements and criticisms sometimes disregarded the results achieved by Link and other scientists.

The students came before the Cleansing Committees with even more trepidation than their teachers. The process itself deprived some of the desire to return to complete their studies, especially since their completed semesters were not being recognized. The remainder received an unpleasant dent in their cadre evaluations for the future as in the case of physicist Martin Černohorský.

Part 2: Back to the lecture halls

> *However, I did not stay at that technical college until the end of the war, because Darmstadt was occupied by the Americans in late March of 1945. In this situation, I could have gone home immediately, but I decided otherwise. I made myself available to the Americans in the camp where the labourers were brought from the east, including the Protectorate.*
>
> Did you work as an interpreter there?
>
> *Yes, an interpreter. The Americans only spoke English, so I was able to help them with Czech and German. […] I was involved in organizing repatriation and I stayed until they managed to get everybody home. I myself left on the last train.*

208 Pavlíček, "Memento obětí", 135–136.

209 AUK, collection Přírodovědecká fakulta, box 3, Inv. No. 20, the Professorial Board minutes of 24 January, and 8 May 1946.

> **Did you apply directly to Masaryk University? There must have been a rush, because the universities and colleges had already reopened in May 1945, and several years of students were returning to their studies.**
>
> *With the higher education institutes closed, people couldn't take exams. And in order to sign up for a state exam, you had to have studied for a minimum number of semesters and so on. And this was all organized so that faculty committees could competently judge those students who gotten ahead through self-study. The committee was supposed to evaluate this and, if necessary, allow the student to finish his studies quickly. So there were all sorts of concessions. When I was in front of that committee, because I had to be there, I didn't want any concessions. But for those who had studied in Germany — in those cases, the faculty committee wasn't competent, and so the ministry set up courts of honor in Prague and Brno to find out what the motives were for the study. In the overwhelming majority of cases, the students simply wanted to get ahead. But that wasn't the case with me.*
>
> (Interview with Martin Černohorský by Tomáš W. Pavlíček, 12 August 2020)

Professor Martin Černohorský (born in 1923) is remembered by the generations of Czech astronomers who took a basic physics course with him at MU in Brno. They appreciated his didactic approach based on tutorial exercises. He made great demands not only on his students, but also on himself. He refused privileges that would have enabled him to achieve recognition of his studies after the war and to graduate more quickly. This practice was also common in Prague and the number of students had to be reduced. Students who had enrolled before 1939 came to enrol in the extremely shortened summer term of 1945, and after the summer, students from the six graduating classes enrolled. In June 1945, 1,849 students returned to the CU Faculty of Science, including Perek.[210]

The Ministry ordered that the Cleansing Committees should make a fair distinction between students who had been disadvantaged by the war and those who had unfairly arranged to complete their studies in schools in Germany or Slovakia. The only exception was made for the medical students, since the population needs medical services in any situation and doubly so in wartime.

210 Fajkus, "Přírodovědecká fakulta", 473–93. In the summer semester 1945, a total of 12,500 students were enrolled at CU (almost half of all university students in the Czech lands), of which 7,500 enrolled the 1st year (graduates from 1940–1944), a third were women.

At the CU Faculty of Science, lectures started on 18 June and the summer semester ended on 7 September. After a short vacation, graduation ceremonies started on 27 September, in which 672 students graduated (from 2281 at CU as a whole) and the first viva voce examination was held at the same time. On 19 July the University Students Union organized a rally in support of the students' academic and economic demands, demonstrating its role in uniting the student body. The event made a great impression in Prague, both with speeches in front of the Faculty of Law and with a procession of students to the bombed-out ČKD works (Českomoravská Kolben-Daněk company), where they took part in the reclamation work (the rector took the first wheelbarrow of rubble).[211]

The return to the university lecture halls in Czechoslovakia, like in Poland and other liberated countries, was marked by collective work and celebrations of a peaceful future, as well as by the desire to build a new world and not to be deprived of inclusion in its direction.[212]

The impact of war on enrolled students

Students did not understand the return to studies automatically. They were confronted with a commitment to study to help society and at the same time they wanted to get rid of the impression of being disadvantaged because the closure of universities had slowed down their careers. The physicist Čestmír Šimáně (1919–2012) recalled how after the war "studies were rapidly completed" at the TU in Brno: "At the same time I enrolled at the Masaryk University Faculty of Science as an extraordinary student, I attended lectures in mathematics, theoretical physics and experimental physics, where I was also an assistant... Well, it was all go — you didn't even get an hour of rest. My mother wanted me to be a mechanical engineer, preferably at Škoda, but I'd had enough mechanical engineering from Industrial School."[213]

After the war, he was also able to use his knowledge from the Industrial School, which he had joined during the war and where university professors taught, in his exams at the TU. He pursued his field of study,

211 Zilynská, "Poválečná obnova", 246–50.

212 Connelly, *Captive University*, 111–125.

213 Interview with Čestmír Šimáně, *Od krystalky k mikroprocesorům – rozhovor s prof. Čestmírem Šimáněm, jedním ze zakladatelů české jaderné fyziky*, 23 February 2011, https://atominfo.cz/2011/02/od-krystalky-k-mikroprocesorum-rozhovor-s-prof-cestmirem-simanem-jednim-ze-zakladatelu-ceske-jaderne-fyziky/ (accessed on 30 June 2023).

but in full knowledge of the commitment he had to make to all that was involved. Before that could happen, however, students and teachers alike underwent a national purge to see if they would be worthy of such tasks.

The first postwar student cohort was composed of several generational units.[214] The first students included had enrolled between 1935 and 1939. As a result of the events of 28 October and 15 November 1939, many were murdered or arrested. The closure of the Czech universities, at first declared temporary for three years, confronted others with the choice to pursue other activities (language studies, business academies, internships and the like) or to complete their studies in Slovakia, at German schools in the Protectorate or in the Reich, which after 1942 might have seemed justified, in view of the failure to keep that promise.

The second unit consisted of school leavers from 1940 to 1945 (in the last year of the war, the school-leaving exams did not take place though the completion of studies was recognized). The waiting, disappointment, unfulfilled plans and fear of being deployed to work in Germany transformed their strategies. As I have shown, they were naturally involved in the Prague Uprising and the application of revolutionary justice. Their freedom was not to be devalued by those who had collaborated during the war or who wanted to smooth their career path at the expense of their peers.

All those who had applied to complete their studies outside the Czech lands during the war (there were about 5,000 of them) were summoned before the Faculty Committees, and those who had embarked on courses (about 1,200) were summoned to the Cleansing Courts (in Prague and Brno). The Faculty Committees also considered requests from pre-war students for recognition of their partial attestations, so that they could quickly take the state examinations. However, the stress associated with this "cleansing" while they were attempting to complete their studies also discouraged some. When asked how many classmates returned to the Faculty after the war, astronomer Perek said, "About half. The other half had already made a different life for themselves during those six years."[215] They had found jobs and started families.

Here I would like to draw attention to an interesting point in the study of this totalitarian period, in which historical time ticks faster and differently than astronomical time. The attitudes and decisions taken during the six war years 1939–45 were subsequently weighed up at a meeting of

214 Corsten defined a generational unit as a group of peers with an age of 4–7 years with the same experience. Corsten, "The Time of Generations", 261–65.

215 Pavlíček, "Rozhovor s astronomem", 77.

the Cleansing Committee. The national and political background checks on professors and students were terminated in 1947, but they had (various) consequences during the post-February 1948 period. They had foreshadowed the new regime and subsequently came to serve as its instrument. Hence certain authoritarian elements were also present in the Third Czechoslovak Republic (1945–48). Time was an important factor in the transformation of the academic field. It helped in the accumulation of symbolic capital and the deployment of new career paths.[216]

Changes in science from the students' perspective

After the war, students were in a markedly different position to that of their professors. What were their chances of employment if they had not completed their studies? They were quite considerable actually, because they could have used the time to work their way up in different sectors. The very placement of students in factories at the end of the war (the propaganda phase of the Blitz-Sieg) was carried out in such a way that students were assigned to companies based on "who had connections where, so they got stuck somewhere", the mathematician Kurzweil recalled.[217]

After the war similar experiences of social inequality led to a demand by the student body, which abolished tuition fees on 20 July 1945, to make courses accessible to different social classes. At the same time, the academic community was moving towards the implementation of university reforms that would tighten up matriculation and regulate the influx of students through admission tests and grading in the first year.[218]

This academic field is highly individualistic; only the most talented individuals who have acquired the complete range of scientific skills will find employment as ancillary researchers, doctorands or assistants. Here I would recall, however, that in the natural sciences, engineering, and law, the most capable graduates often went into development, manufacturing and the liberal professions. This made it possible for scientists without a suitable cadre party profile to be employed in science faculties after February 1948.

216 Pierre Bourdieu, *Homo Academicus* (Stanford: Stanford University Press, 1988), 87.

217 Pavlíček, "Rozhovor s prof. Jaroslavem Kurzweilem", 98. Kurzweil is a representative of the second generational unit. During the war, as a grammar school pupil, he was interested in theoretical physics in addition to mathematics, he specifically remembered the book by František Záviška, *Einsteinův princip relativnosti a teorie gravitační* (Praha 1925).

218 Urbášek, *Kapitoly z dějin*, 49–50.

One interesting piece of testimony on this process was given by Černohorský, who after the war participated as a student ancillary staff member in the introduction of reformed physics studies at MU in Brno, but he first had to appear before the Court of Honour because he had studied mathematics at the TU in Darmstadt during the war. With all the calls for revolutionary justice, could this have been described as opportunist? In the interview, Černohorský outlined his personal position and the objective reasons behind his decision: "I was a senior in 1942, matriculating at the critical time immediately following the assassination of Reinhard Heydrich. [...] Like many others at that time, I had tried to get into a school leaver's course at the Business Academy. It turned out to be possible in practice, but only for a select few, who were well-connected — I wasn't one of them. This was a very difficult situation for me, not only personally, but family-wise, because, as we have already discussed, my earnings were essential for my family. So I had a particular interest in avoiding being posted to Germany to work, which would have meant no earnings and no contact with my family."[219]

The passage makes it clear just how much attitudes towards education and Nazism were shaped in the given social situation and in the absence of connections. Černohorský grew up in a poor broken home in Brno. The divorced mother and sister were dependent on his private tuition earnings. In order not to be deployed in the Reich, where he would have remained without earnings, he enrolled to study mathematics at the TU in Darmstadt. Initially, however, his strategy was not to go to Germany. He aimed to compete with his well-connected, wealthier peers, who were able to arrange for placements in the Protectorate.

He anticipated that with just a grammar school diploma — without descriptive geometry — he would not be accepted at the illustious technical university. In the meantime, he would be able to make a living from private tuition and thus to gain time — from secretly listening to foreign radio stations he knew about the battles outside Moscow and at Stalingrad. However, the TU was apparently not interested in the Cisleithanian regulations on descriptive geometry, and Černohorský was admitted to Darmstadt. He consulted his professors, who had insight into his complicated family situation. His class tutor Rostislav Košťál (1905–1980), also acting as a Privatdozent of physics at the Institute of Experimental Physics of the MU Faculty of Science, recommended him to go to Darmstadt. Then immediately after Černohorský's return to Brno in June 1945, he got him to study at the university and engaged him as a student ancillary staff

219 Interview with Martin Černohorský by Tomáš W. Pavlíček, 12 August 2020.

member at the Institute of Experimental Physics. So the mathematician became a physicist. The fate of this student shows that the university pedagogues gave him the opposite recommendation to the one Perek received in an equivalent situation in Prague.

To have his wartime stance assessed, Černohorský first had to appear before a Faculty Committee, where his former class tutor Košťál explained his complicated family situation.[220] This was enough for the Committee, but the young applicant insisted on complying with the Ministry of Education's regulations and went before the Court of Honour (for those who had started their studies in Germany). He defended himself in the light of his family situation. This step proved to be prudent after February 1948, as the Action Committees took up the idea of applying revolutionary justice, but their implementation method did not take into account the students' social situations, and they wished to intimidate through mass terror to attain the desired number of expelled professors and students.[221] In the case of Černohorský, however, no one could question the decision of the Court of Honour in Prague. Through strict compliance with the regulations, the budding scientist had learned to find his own path as a university teacher who, despite the complex reforms of the university structure during the Stalinist period, managed to pedagogically reform the study of physics. Nevertheless, this German episode froze his career progress for the next decades.

With regard to the attitudes of scientists during the war, a debate rages nowadays over how consistently the denazification of German scientists was actually carried out. Unfortunately, even here, the habitual local practices and traditions in this academic field are sometimes lacking.[222]

220 Some members of the Commission (e.g. Dean Vladimír Úlehla, physicist Bohuslav Hostinský, mathematician Borůvka) also participated in the creation and unveiling of the aforementioned memorial plaque of martyred professors. See Špaček, "Vzpomínka na umučené", 21.

221 A MUNI, collection Akční výbor Přírodovědecké fakulty MU, Inv. No. 10, provision against students, Inv. No. 20, expulsion from studies, 1948.

222 Filip Grygar, "Ke zrodu a pádu legendy o německých atomových vědcích, kteří nechtěli z morálních důvodů sestrojit jaderné zbraně pro nacistické Německo," *Dějiny vědy a techniky* 45, no. 4 (2012): 251–70.

Part 3: Research into the history of astronomy from below

Supposedly you got into astronomy as a 13-year-old boy. You read an article in České slovo by Associate Professor Link about Jupiter being visible in the sky. Now tell me honestly, is this just a tale, or can one article really change someone's life?

You are right, and sometimes I am amazed how one single thing can completely change a person's life, but that is indeed the case here. I'm not exaggerating anything. When I was thirteen, I was interested in everything, especially history and geography. I didn't even think about astronomy, but I opened the Sunday České slovo in August 1938 and found an article by Associate Professor Link entitled, "What's New in the Sky." I read it, and in the evening I went out to see if I could spot Jupiter, but I couldn't, because it was overcast in the east. The next day it was clear, and I was then so taken by astronomy that a few months later, when an official questionnaire asked what I wanted to be, I declared clearly that I wanted to be an astronomer, and I was extremely, extremely lucky in my life that I succeeded.

You were born in Sedlčany. When the Germans cleared out the region during WWII, you asked your mother to move to Ondřejov. So was that already your destination? Did you already know you wanted to help out at the Astronomy Institute there?

Yes, yes. Well, I should add that my poor father was arrested by the Germans, taken to a concentration camp and died six months later. That left my mother and me alone with my younger brother, so I more or less became the head of the family. And when the Germans ordered that Sedlčany and its surrounding area were to be completely evacuated, I… I immediately got the idea that we should try to move to Ondřejov, where there was an observatory run by Professors Link and Guth, with whom I had been corresponding, so it was a purposeful move, and my mother agreed to it.

From Ondřejov you then went to Prague because you studied at the Charles University Faculty of Science. But you say bluntly that the standard of astronomy teaching was deplorable. Why?

Well, yes, it's true. I mean, astronomy was rather looked down upon. Physics was very good, mathematics was very good — although there were some semi-divine individuals who I hope are no longer there. But astronomy was so poor because there was just one professor, one full professor, and his specialty was celestial mechanics and planetary motions. And he kept recommending that we study an interesting paper from 1896. Well, you'll admit that can't be considered teaching modern astronomy, so what I actually learned, I learned on my own.

(Interview with Miroslav Plavec by BBC, 22 August 2001)

As can be seen from the interview with Plavec, the historical context and social conditions determined the direction of his further education. He quickly recognized that astronomy teaching in Prague was at a low level. In general, the quality decreased due to overcrowded classes, but this did not apply to astronomy as a minor specialization. The number of students enrolled in the faculties immediately after the war generally doubled, which was a consequence of the interruption or impossibility of studies during the occupation after the closure of the Czech universities. They were catching up on subjects they had missed for state examinations. Perek recalls that supplementary seminars in mathematics were also conducted at that time by budding assistant Miroslav Katětov (1918–1995). He completed his own studies in the summer semester of 1945. He "proved himself" during this period of transformation and soon made rapid career progress: habilitating in 1948, becoming a professor in 1952/53 and first dean of the CU Mathematics and Physics Faculty, soon to become rector. Josef Petráň characterized the first postwar generation of graduates from 1945 to 1948 as pragmatists, as the prospects of rapid career development opened up for them.[223] But this shows the weakness of historiography if it just focuses on an individual's overall biography. Katětov was undoubtedly an outstanding scholar, but at the same time, as a member of the Communist Party, he was actively involved in the 1948 purges as Chairman of the CU Action Committee. His subsequent efforts to harmonize international science and reformist Communism were then swept aside by the postwar developments in Czechoslovakia.[224] A year younger, Perek graduated from Katětov's seminars and in comparison with him his career was much more gradual (he became an associate professor in 1952) because at that time he was not yet a member of the Czechoslovak Communist Party.

The coming of the autodidacts

Both Perek and Plavec were concerned with the need to independently acquire knowledge and observational experience during the war, as the opening passage indicates. In disciplines such as mathematics and astronomy the contribution and importance of the self-taught is greatly appreciated. However, as Bourdieu points out, this academic field is

223 He refers to Professor Václav Černý, who appreciated their mature character and genuine humanity. Josef Petráň, *Filozofové dělají revoluci. Filozofická fakulta Univerzity Karlovy během komunistického experimentu (1948–1968–1989)* (Praha: Karolinum, 2015), 50.

224 Bohuslav Balcar and Petr Simon, "Miroslav Katětov 1918–1995," *Czechoslovak Mathematical Journal* 46, no. 3 (1996): 559–73.

traditionally bound by hierarchical structures,[225] though it is in the first postwar generation of astronomers that we can see how they struggled to break with these structures in their youth and during their professional careers.

During the war, informal education was offered to astronomers at the People's Observatories and unofficially at the State Observatory, so it cannot be assumed that all the laypeople who were interested would have enrolled to study astronomy. After all, the Dean's office at the CU Faculty of Science did not open this field as a separate specialization until 1948. Many of those interested in astronomy had graduated in mathematics or physics and at the same time enrolled in astronomy as a specialization, for which they had individual study plans. The low number of students specializing in astronomy cannot be interpreted as low interest in the field. Quite the reverse, interest was growing exponentially, to the delight of Communist ideologues, who were anticipating (rightly in some respects) a solid argument against the creationist views of the Church (especially the Roman Catholic Church), based on the scientific exposition of the origin of the cosmos, the planets and life.[226] But lay interest in astronomy was rapidly growing quite independently of these discourses. Even in the Protectorate, the number of subscribers to the popularizing magazine *Říše hvězd* (Empire of the Stars) increased sixfold, and the CAS had the largest number of members in the world at that time, about 6000. "So during the war they took it as a kind of escape from the misery of the war and from Nazism," Grygar recalls.[227]

Similarly, Link, author of the then popular book *Potulky vesmírem* (Wanderings through the Universe), pointed out that it was unlikely that any country would be willing to employ more professional astronomers than necessary.[228] It is true that many professional astronomers had to earn a living as climatologists, mathematicians or surveyors. Grygar also noted the author's remark about the community that "this sparse gathering of professional astronomers is in worse shape than the National Theatre Ballet."[229]

225 Michal Pullmann, "Proměny třídních pozic v moderní společnosti. Kulturní sociologie Pierra Bourdieua," in *Historická sociologie. Teorie dlouhodobých vývojových procesů*, ed. Jiří Šubrt (Plzeň: Aleš Čeněk, 2007), 500–4.

226 Tesař, *The History of Scientific Atheism*, 82–93.

227 Interview with Grygar. Similarly Valníček, *Špatné časy*, 88, 141, 184, who co-edited a popular magazine *Algol*.

228 František Link, *Potulky vesmírem* (Praha: Fr. Borový, 1947).

229 Interview with Grygar.

In view of the postwar efforts to find experts from the grassroots, I shall focus on the experience and abilities that the newcomers brought to the study of astronomy at university. In addition to Luboš Perek's biography, I have selected three colleagues from his generational unit – an amateur, a professor, an astrophysicist.

Josef Sadil (1919–1971) became a member of the CAS in 1934 while still at grammar school and soon demonstrated his ability to work independently with a telescope. However, he did not complete his grammar school studies until 1940 and subsequently went through various jobs, including deployment in a factory in Libeň. After the war he enrolled for his desired course of study, but had to interrupt it for financial reasons. He then established himself as an official and thanks to his erudition he became a specialist editor of the *Život a práce* publishing house in 1950. He lectured and published, among other things, *The Guide to the People's Observatory in Prague* (1951) and a comprehensive work titled *The Moon and the Planets* for the London publisher Paul Hamlyn.[230]

Záviš Bochníček (1920–2002) from Prague also became a member of the CAS in 1934, though he had shown his interest in astronomy as early as at the age of seven when he observed a partial solar eclipse in late June 1927. At the age of sixteen he made a naked-eye discovery of one of the brightest novae, CP Lacertae, which was a great rarity on a global level. The young observer was congratulated in writing by astronomers, including Arthur Eddington (1882–1944) and Paul Guthnick (1879–1947); the famous Kopal actually heard this news on board his ship as he was returning from observing the solar eclipse. The young Záviš was even honoured by President Beneš. Like his peers, Záviš also attended the Štefánik People's Observatory while still at grammar school. Soon after his enrolment to study astronomy, the Faculty was closed down and Bochníček was deployed under Totaleinsatz to work in Germany. Thanks to the success of his earlier observations, the physicist G. Joos noticed him there and took him on at his laboratory at Carl Zeiss's optical plant in Jena, where by chance he met Max Planck (1858–1947), who encouraged him to finish his studies after the war, which the young astronomer did, though he did not take up the offer of an American scholarship and returned to Prague. Bochníček could hardly have imagined how the post-revolution-

230 Josef Sadil, biogram, website of Hvězdárna Františka Pešty, accessed on 1 June 2023 (https://www.hvezdarna-fp.eu/products/sadil-josef/).

ary contours of his studies would change. At that time in Czechoslovakia, graduate placements determined a graduate's employment status, and in 1952 Bochníček obtained one as far away as Skalnaté pleso in Slovakia.[231]

He was not the first Czech to be made director of this high-altitude observatory in the High Tatras, as happened in 1956, when he succeeded Guth, who after the war managed to incorporate the observatory into the structure of the Academy of Sciences as the Astronomical Institute of the SAS. Bochníček followed in his footsteps. His career shows how closely intertwined the communities of Czech and Slovak astronomers were even after World War II. The Košice government programme spoke of building a "national state of Czechs and Slovaks", which on the one hand buried the interwar fiction of Czechoslovakism (a single nation with two branches and a common language), while on the other hand there was pressure to re-educate the minorities.[232] When contemporary historiography attempts to trace manifestations of Czech imperialism during the First Republic, it is difficult to apply this conception to the history of science. The state was quite small, so Slovaks took advantage of the opportunity to study in Prague or Brno as well as the opportunity to pursue their careers there. The interest of scientists in sharing the results of observations from different observatories motivated them to cooperate or where these were in short supply to at least take advantage of the experts' knowledgeability at those universities. Bochníček was invited to commute from Skalnaté pleso to lecture at Comenius University in Bratislava, and became a founding member of the Socialist Academy of Slovakia.

The observatory in the High Tatras was a unique place for observing comets and artificial satellites, which Bochníček photographed. His unique photograph of Sputnik 1 (1957) won him recognition from the Astronomical Council of the USSR Academy of Sciences, and his methods of searching for artificial satellites began to be put into practice. He was the first in this country to photograph an American satellite. During the revisionist purges of the late 1950s, he was removed from his position as director of the observatory for reasons of political unreliability, either out of envy or concern over his ability to photograph Soviet and American satellites or because of his collaboration with Slouka, who was on trial (they had jointly written a successful popularizing book: *Starry Evenings* – Hvězdné večery, Praha: Osvěta, 1952).

231 Jiří Grygar, "Vzpomínka na Záviše Bochníčka," *Kosmické rozhledy* 40, no. 4 (2002): 8.
232 Rychlík, *Československo v období*, 46.

He was thus inevitably not allowed to teach students and could not find any employment at all at that time.[233]

For the third astronomer to be selected here, **Miroslav Plavec** (1925–2008), studying at the CU Faculty of Science was also something of a formal matter, as he had acquired a great deal of experience before he began his course. Hence his professional profile should be structured differently than is usually the case in scientific biographies. As is evident from the initial interview, the war developments affected him personally even more than they did his older peers. From 1938 Plavec knew he wanted to be an astronomer. He entered the third year at grammar school in Benešov, but the daily train commute from his native Sedlčany (about 30 kilometres away) brought many difficulties. He often travelled hungry and cold, as there were fewer train services during the war and savings were made on heating costs. Disaster struck when approximately 30,000 people were forcibly relocated when the SS took over an area of 441 km² as a training ground. Due to ensuing protests, the SS deported some of the residents to concentration camps, including Miroslav's father, who died there in the summer of 1942. Miroslav then got his mother to move to Ondřejov, where his desire to become an astronomer took hold. He continued to commute to the grammar school, but that building was soon also occupied by the SS. In October 1944/45, there was no choice but to complete his education through a three-month course held in the train station building. Naturally, he spent more and more time at the Ondřejov Observatory as an assistant.[234] He obtained his certificate of adulthood without taking the final exams (on 15 September 1945).

233 It was only after the relaxation of conditions in the Communist Party of Czechoslovakia in the early 1960s that he was allowed to return to the Department of Astronomy, Geophysics and Mathematics at the Comenius University Faculty of Sciences. He stayed in Bratislava until his retirement in 1985 and continued to be actively involved in the popularization of astronomy throughout Slovakia, educating several generations of Slovak astronomers. He even established a post-secondary astronomy course at the Slovak Central Observatory in Hurbanovo. "Šedesát let Záviše Bochníčka," *Říše hvězd* 61, no. 4 (1980): 82–82.

234 Miroslav Plavec, "Ondřejovská hvězdárna za druhé světové války," in *Ondřejovská hvězdárna*, 130–34.

Plavec graduated in mathematics, physics and astronomy at the CU Faculty of Science in 1949 and after a few months as an assistant at CU[235] and at the CTU Institute of Astronomy and Geophysics he joined the CSAS Astronomical Institute in Ondřejov in 1954.[236]

Experts from among the people?

The first postwar generation of astronomy students had already acquired some crucial experience before arriving at the Faculty, and the structure of their knowledge was not determined either by the immediate consequences of the war or by the transformation of university studies. However, when their enthusiasm, erudition and scientific achievements are compared with the habitus and pedagogical style of their Prague teachers, the standard is outstanding of this young generation of experts, who really did emerge from the people and responded dynamically to the current demands of the scientific field and the needs of the Communist state, without a priori implying a necessary political commitment. In any case, there was to be plenty of room for them and many would make good use of it.[237]

After the war, the CU Astronomical Institute continued to have three regularized positions: Professor Heinrich, Associate Professor Nechvíle, skilled but rather slow mechanic Brejla.[238] Link and Guth worked as external lecturers.

It was clear that such arrangements did not allow for further development. Meanwhile, the other members of the professorial staff were doing everything they could to increase the number of regularized positions within their disciplines, both by arguing for the transfer of paid positions from the closed German University in Prague and by simply expanding the new disciplines that were emerging from the established ones. This is clearly in evidence in mathematics, physics and geology.[239] However, the

235 AUK, collection Přírodovědecká fakulta, box 3, Inv. No. 20, 21, the Professorial Board minutes of 14 November 1946 and 19 May 1947. Together with him Bochníček and Jiří Bouška were appointed as student assistants and later demonstrators.

236 He worked on meteor showers and before that on the study of close binaries. He met his wife Zdeňka, a mechanical engineering student, when he was lecturing at the Petřín People's Observatory. In 1969 he and his wife emigrated to the University of California. Plavec also worked at a number of other observatories, organized international symposia and was a member of international scientific societies. Cf. Interview with Plavec.

237 Olšáková, *Věda jde k lidu!*, 273.

238 Interview with Luboš Perek by Tomáš W. Pavlíček, 23 April 2020.

239 Gecko and Pavlíček, "Kariérní postup", 63–118.

CU Astronomical Institute closed itself off. It was clear to the productive generation of interwar astronomers (especially Link, Guth, Slouka and Mohr) that there would be no changes while Heinrich was a professor.

The first postwar graduates also had to look elsewhere for assistantships. Perek spent his first year as an assistant to Václav Hruška (1888–1954), professor of applied mechanics at the CTU. Here, too, a record number of students enrolled for the 1946/47 academic year, until it was feared that there would be a problem finding employment for all the graduates. Consideration was given to tightening up the matriculation examination and keeping the first year as a probationary year. The solution was parallel lectures and tutorials. One of them was held by Perek: "At that time in 1946, about three thousand students entered the first year of the technical university. The classes were taught in three cinema halls, and I was in charge of the exercises in the Flóra cinema."[240] He had already acquired experience of applying Besell's equations during his time at the Junkers engineering company. Perek's first journal article was based on applied mathematics. However, he tried to take advantage of the situation and applied for a position as assistant to Buchar, who was a professor of astronomical geodesy at the CTU. He certainly had many more contacts among astronomers abroad than Heinrich, who, although he also presented at foreign conferences, did not move on to other topics than the three-body problem. When even this option did not work out for Perek, he asked Mohr, whom he had visited at the Institute in Švedská Street in the early years of the war, to continue the observational tasks and measurements he had been assigned. The Privatdozent Mohr was living partly in the institute building at the time and had held the position of assistant since 1936, but even then he was striving to establish and obtain a professorship at MU. After the war he made Perek an offerto take him to the university in Brno as an assistant.[241] The establishment of the Astronomical Institute in Brno as a competing field deserves separate attention.

Final remarks

As can be seen from the third projected memoir by Plavec, in the interwar period the choice of studies and future profession was still a matter influenced to some extent by parents and monitored in particular by the school, which led teenagers to decide to channel their developing interests. The questionnaires served to do just that. Otherwise, there was no

240 Interview with Perek, 23 April 2020.

241 Pavlíček, "Rozhovor s astronomem", 79.

barrier to a gifted youngster (most likely a boy at the time) such as Plavec or Perek skipping a few grades. Speaking of the gifted contemporary psychologists who had graduated before the World War, I pointed out that even a genius would have a poor personality profile and difficulty socializing without the school system. The family history perspective also needs to be taken into account.[242] For family tactics to be drawn up regarding suitable studies and subsequent careers, grammar or higher secondary school studies first had to be completed, and so peers were hired to give private tuition to weaker students. Both Šimáně and Černohorský earned extra money in Brno this way. In general, those who had experience tutoring others found it easier and more natural to navigate the academic field. But this customary practice was ended by World War II, in favour of the democratization of education.[243] Many astronomy students had already trodden this path on their own during the war, but the subsequent developments did not necessarily work in their favour.

The wartime transformation of the state economy, the reform of the universities and the promises made by the first Czechoslovak government based in Košice significantly changed the way the academic community operated, though its structure had first started unravelling immediately after the liberation of the republic on 8 May 1945. Even before the Communist takeover in February 1948, another justice-seeking upheaval had taken place in Czechoslovakia — the national revolution.[244]

There were urgent calls for "just retribution" to be exacted on the Germans and for the conduct of those who had been loyal to them or even collaborated with them to be investigated. Never before had scientists been subjected to such scrutiny, with their knowledge and previous scientific credit taking a back seat. The impatient wait for the stories of those returning from the concentration camps, as well as the news confirming the deaths of others, put a definitive end to hope and called for retribution and compensation for these wartime losses in the field of science. The memory of the victims among the academics turned into a commitment to the continuity of scientific work and into a source of career motivation.[245]

242 If bourgeois society in the first half of the 20th century feared anything, it was mental disorders and illness due to overwork, exhaustion or constant residence in an "unhealthy industrial city". This was certainly a real concern in the working-class milieu, but for the well-heeled it was more of a stereotype inherited or learnt from the late 19th century generations.

243 Jareš, "Akademické milieu"; Zysiak, *Punkty za pochodzenie*, 64.

244 Brenner, *Mezi Východem a Západem*, 180–88.

245 For more on war victims see Kazimierz Bidakowski and Tadeusz Wójcik, eds., *Pamiętniki nauczycieli z obozów i więzień hitlerowskich (1939–1945)* (Warszawa: Czytelnik, 1962).

Nevertheless, the Cleansing Committees and the nationalization of public debate set a precedent for future investigations and processes, which led to clashes between scientists and gave rise to misunderstandings and conflicts over the student generation's expectations.

Career opportunities for habilitated scientists and new postgraduates promised a bright future. The state created new research institutions such as the Central Institute of Mathematics and the Central Astronomical Institute in Ondřejov (both subsequently incorporated into the CSAS), thus invalidating the old notions that the state could not support so many professional astronomers. However, astronomy continued to be overshadowed by physics, which foresaw promising applications in atomic, X-ray and material physics for mining, manufacturing, construction and medicine.[246] Likewise, the technical development of various items such as vacuum tubes, crystals, radios and rays was seen by scientists as a foretaste of the rich possibilities of scientific discovery.

In this context it is useful to consider what ideas scientists actually had about their role in the reconstruction of the national economy and the political push for university reform. These beliefs not only drove research and career advancement, but also to some extent facilitated discussion of reforms to the higher education system and the Academy of Sciences.

The history of science has hitherto only rarely been written in terms of the components that physicists and astronomers had to hand. If we admitted that these objects acquired anthropological significance (perhaps as totems), this would mean that the scientists were commenting politically on ideological and philosophical concepts, as well as from the perspective of their professional hopes placed in these components, atoms and methodological procedures. However, some of them overmanipulated their procedures, as the politics of *postwar reconstruction* also created limits for the discussion over how the academic field was to be reformed. This happened to Professor Trkal when he was preparing the merger of Czech scientific societies into the all-encompassing CSAS, but in the end, he watched on bitterly as he was not appointed one of its members.

246 Cf. the scholarly achievement of Heyrovský, Šimáně, Kochanovská, Černohorský. See Tomáš W. Pavlíček and Barbora Kulawiaková (eds.), *Martin Černohorský. Studenti v centru pozornosti* (Brno: Munipress, 2023).

Collective construction of the People's and University Observatories on Kraví hora in Brno, 1953 (MÚA, A AV ČR, Luboš Perek collection, photo album WWII)

Chapter III

For society: people's observatories – temples of atheism or education?

Part 1: Learning from classmates

> *This was Kouhoutek, who was a year older than me. He came onto the course [in Prague] from Brno for the same reason. […] And then the two of us arrived, I myself being from Brno and my colleague from Prague. That was Zdeněk Sekanina. […]*
>
> *Sekanina had already got deeply involved in comets and in calculating their orbits. […]*
>
> *And now Sekanina came along to the next lecture and said to Associate Professor Nechvíle: "So just imagine, Professor, I've now calculated the orbit of that comet that's just been discovered in Copenhagen." [And this was within 14 days – narrator's note]*
>
> *Vincenc Nechvíle was astonished and said, "Oh, my dear colleague, do tell me how you calculated that." And Sekanina said, "Well, Professor, based on the method you taught us, of course." Now Nechvíle clasped his hands and said, "My dear colleague, I made several mistakes in the equations."*
>
> *And Sekanina said: "I know, Professor, but I corrected them."*
>
> *That's the kind of schooling we had. So if it wasn't for Sekanina and Kohoutek, I wouldn't know anything about astronomy.*
>
> (Interview with Jiří Grygar
> by Tomáš W. Pavlíček, Petra Hyklová, and Kateřina Kočí, 14 June 2019)

An astronomer thanks to his classmates and reading

The author of this memoir, Jiří Grygar (born 1936), the youngest of the astronomers in the generation of postwar students that we have presented here, is also one of the most prominent popularizers of Czech science. As he travelled around lecturing at grammar schools, he encouraged students

interested in a scientific career to find a classmate with whom they shared their passion for science. In his case, it was Kohoutek in Brno and then Sekanina in Prague.

In this chapter I examine how the teaching of astronomy changed in Prague and Brno after the war (again with a detailed individual focus on Perek). I also ask what expectations the socialist vision of education set for science, the universe and the atheistic approach to nature. It is important to note which educational practices teachers chose and what scientific goals and attitudes toward the vision of socialism students adopted. I consider the popular face of astronomy, its popularity among the general public and the question of how it was dealt with by the administration of the CAS.

During his higher education, Grygar was in a position to compare the tuition at Brno and Prague universities. At the MU Faculty of Science, he appreciated the excellent foundations in physics and astronomy laid for him by Černohorský and Perek, but because astronomy disappeared as a specialization in Brno due to lack of personnel, Kohoutek, and a year later Grygar, transferred to the newly opened Faculty of Mathematics and Physics at CU in Prague. The faculty became independent in 1952 when the original CU Faculty of Science divided into three separate sections (including the Faculty of Geography and Geology and the Faculty of Biology). New paid academic positions were created and it was assumed that the quality of teaching and research would be improved.[247] However, the experience of the astronomy students puts this into some perspective. Grygar and older students, such as Plavec and Perek, recalled that "the standard of astronomy tuition was deplorable".[248] The tutors presented information that was outdated, and they did not keep up with the dynamically developing field of astrophysics.

Professor Heinrich had long ground to a halt over just the three-body problem. His course lecture on celestial mechanics, intended for all mathematics and physics students, was a source of amusement more than anything else, as he lectured incoherently and referred to "the latest work" by Félix Tisserand from 1896.[249] In contrast to our narrators, let us mention that the textbook is still sometimes referred to by current writers of books on celestial mechanics.

247 Jindřich Bečvář, "Matematicko-fyzikální fakulta," in *Dějiny Univerzity Karlovy IV*, 495–509.

248 Miroslav Plavec, "Přes překážky ke hvězdám," in *Ondřejovská hvězdárna*, 191–6, here 191.

249 François-Félix Tisserand (1845–1896), French astronomer, 1873 director of the Toulouse Observatory, 1892 director of the Paris Observatory. From 1889–96, he published *Traité de mécanique céleste* (4 vol.). See https://mathshistory.st-andrews.ac.uk/Biographies/Tisserand/ (accessed on 1 June 2023).

However, the situation in Prague was no more favourable with younger tutors. Associate Professor Nechvíle, in charge of teaching astrophysics, wrote out the equations for calculating the paths of comets on the blackboard, but Sekanina had to correct them for his own use first. Nechvíle based his two-semester course on star formation on Emden's 1913 textbook.[250] At the end of the course he mentioned that "there is now some Eddington fellow in Britain who has a terribly interesting book out on star formation," though Nechvíle had not yet actually studied it.[251] The book had come out back in 1923.[252] Assistant Arnošt Dittrich (1878–1959) lectured on the prehistory of astronomy. Professor Link's explanations could be impressive, but his course on the stars only centred on his own observational programme: the influence of the Sun on the Earth and the influence of the Earth's atmosphere on stellar radiation. The university observatory, which made use of Ondřejov, did not have a set observation programme. Assistant Jiří Bouška (1925–2014) alone taught students to observe lunar occultations of stars.[253]

The standard of astronomy tuition did not significantly improve even after new tutors had arrived at the CU Faculty of Mathematics and Physics, where the course had been transformed. Professor Mohr, for whom the chance to transfer from Brno to Prague was a matter of prestige, did not take full advantage of this opportunity. Grygar recalls: "I knew him from Brno, where he was already past his prime".[254] This can be illustrated by Mohr's note in the Guth-Link-Mohr-Šternberk textbook[255] on the observed novelty involving the red shift in galaxies. Mohr explained this revolutionary breakthrough in our understanding of the universe, the discovery of cosmic microwave background radiation in 1965, by stating that it is not

250 Robert Emden (1862–1940), Swiss astrophysicist, 1889 TU Munich, 1907 professor. His famous *Gaskugeln* on stellar structure was first published in 1907.

251 Interview with Grygar.

252 *Mathematical Theory of Relativity* (1923) by Arthur Eddington, astronomer, 1898 scholarship at Owens College, Manchester, 1992 Trinity College, Cambridge (placed as Senior Wrangler), 1905 M.A., 1906 chief assistant at the Royal Greenwich Observatory, 1913 Plumian Professor of Astronomy and Experimental Philosophy, director of Cambridge Observatory.

253 Plavec, "Přes překážky."

254 Interview with Grygar.

255 Vladimír Guth et al., *Astronomie: přehled dnešních vědomostí pro širší vrstvy: sluneční soustava* (Praha: JČMF, 1947).

caused by the expansion of the universe, but by "tired light".[256] It was not until Mohr's assistant **Vladimír Vanýsek**'s arrival that the standard of tuition in Prague improved.[257]

Hence Grygar says that during this class he actually learnt most from his classmates. The aforementioned **Zdeněk Sekanina** (born in 1936) first became interested in astronomy when he read a popular-science book at the age of nine, and a year later he joined the CAS. He established an astronomy club in Mladá Boleslav and commuted to Prague to Štefánik People's Observatory, where he helped out as a demonstrator. When he joined the CU Faculty of Mathematics and Physics (between 1954 and 1959), he engaged in calculating the orbits of comets, making use of the observation records being sent from Copenhagen on correspondence cards comprising the complete set of all six parameters required to calculate the orbits. He published his first five works in the final year of his course. He could not be admitted to the Faculty for an internal postgraduate course for political reasons, so he was assigned to a secondary school in Prague as a teacher while contenting himself with calculation tasks at the Štefánik People's Observatory before he went on a research internship abroad.[258]

Likewise, Kohoutek and Grygar got into astronomy during their childhood. Learning by imitation from classmates is a characteristic feature of this entire generational group from Perek to Grygar. Astronomers in Czechoslovakia followed the research topics of others and rightly presumed they would be enriched more by the research they had begun as amateurs before entering the university than by the faculty staff, as Grygar confirms: "But in astronomy, I have to say it has been common throughout my life that anyone who became interested in it found some place to work."[259] This is how Grygar found a point in common with **Luboš Kohoutek** (1935–2023) in Brno.

256 The hot "big bang" theory of the expanding universe came from the physicist George Gamow and others, who explored the radiation of a black body with a temperature above absolute zero (from 5 to 10 K). The discovery of the relic radiation, confirming Gamow's theory, happened by accident in 1965. Both scientists Arno A. Penzias and Robert W. Wilson won the Nobel Prize (1977).

257 Vladimír Vanýsek (1926–1997). Born in Prague, studied at the MU in Brno, 1950–56 CSAS Astronomical Institute, 1956 CSc. in Prague, 1956–58 MU Astronomical Institute, director, 1958 CU Astronomical Institute, 1960 associate professor, 1968 professor at CU Faculty of Mathematics and Physics, director of institute. Focused on comets, photometry, interstellar material.

258 See https://www.astro.cz/spolecnost/sin-slavy/zdenek-sekanina.html (accessed on 31 July 2023).

259 Interview with Grygar.

Luboš's father, school inspector Hynek Kohoutek (1905–1978), supported his interest in astronomy and bought him a 5 cm lens diameter telescope. Luboš began to observe, or to be precise, draw sunspots at an early age, with the help of an old blackout window blind used during wartime night bombing raids. He inserted his telescope through a hole in the blind and thus was able to accurately sketch out the projected spots in the dark. He sent his results to the specialist popular-science magazine *Říše hvězd*, where Grygar also read about them: "so I got to know Luboš thanks to the fact that I subscribed to *Říše hvězd*, and I knew him before I met him personally, even though we were both from the same city."[260]

Grygar's family moved from Brno to Opava right after the war, but when the Communists took over in February 1948, Grygar's father lost his job as a customs officer in the Financial Guard and returned to Brno. Jiří went to an 11-year-long comprehensive school there, where his teacher turned out to be Luboš's father, whom the Communists had (as in the case of Grygar's father) removed from his previous position (as a school inspector) and sent to teach as a "punishment". As it happened, he turned out to be an excellent teacher, instilling in Grygar's class basic popularization skills, i.e. how to present studied material to others. When he discovered Grygar's interest in astronomy, he invited him home to introduce him to his son, who was a year older. It was a watershed moment (as Grygar saw a real telescope for the first time there) and the start of their tandem observations.

Inspired by reading *Astronomické praktikum*,[261] the two amateurs decided to plot meteor showers. Grygar, whose family could not afford a telescope, then realized that meteor showers could be counted without a telescope. They observed them first from the roof of his tenement block and then from a temporary observation post on Kraví hora, where a people's observatory was about to be built.

They soon found out that without a camera there was no point in plotting the radiants of showers, but only in reporting them to a recorder. They tried to estimate the brightness and path of the meteor and the position of the constellation it was passing through. The name of the female recorder — a friend of theirs — is apparently forgotten, but this collaboration is testament to the general popularity of astronomy after the war. Grygar and Kohoutek made friends with her at the Brno People's Observatory, where she was going out of interest without actually studying

260 Ibidem.

261 Vladimír Guth and František Link, *Astronomické praktikum* (Praha: Přírodovědecké nakladatelství, 1950).

astronomy. Otherwise, Grygar does not recall any female student specializing in astronomy from his studies in Brno or Prague. He only remembers later female colleagues employed at the CSAS Astronomical Institute.

Grygar and Kohoutek had both gained important experience by publishing their first calculations in the Brno Observatory Reports before they even started university. In a sense, these amateur astronomers embody the socialist vision of experts from among the people.[262]

Reforming the education system

Instead of a history of institutions, faculties and astronomical observatories, here I examine the development of the disciplines of mathematics and physics from below – by looking at the education and training of astronomers in Czechoslovakia. The first postwar generation of astronomy students had gained crucial experience before they arrived at the Faculty. The structure of their knowledge was not actually determined by the immediate aftermath of the war or by the transformation of university studies, though both circumstances had influenced them.

Which ideas had crystallized regarding the reform of the higher education system after the war? The scientists involved in justifying this reform had varying political views, but one thing they did agree upon was that they did not want a return to the practices of the prewar First Republic, when students had to pay tuition fees for their courses, which limited the accessibility of education. At the same time, some students were not very efficient in their studies, which they thus prolonged. The number of paid teaching positions was insufficient, and as we have seen, the teaching was not always effective.[263] Hence those who proposed higher education reforms demanded that education be made accessible to everyone. They wanted to enforce binding curricula to streamline education and help graduates contribute to the benefit of the whole. It was not only members of the Communist Party who considered it necessary, in keeping with the example of the USSR, to save time and resources by nurturing collective research work rather than the status of individual researchers.[264] As the historian Jakub Jareš has shown, this reform was discussed by people across the party political spectrum: in the domestic resistance Krajina and

262 Olšáková, *Věda jde k lidu!*, 278.

263 Jareš and Franc, *Mezi konkurencí a spoluprací*, 29–40.

264 Vladimír Haškovec, *30 let sovětské vědy* (Praha, 1947).

others, in London exile František Smetánka (1888–1967) and in Moscow Nejedlý, whose somewhat proclamatory text was ultimately presented in the Košice government programme.[265]

This Communist Education Minister achieved some notoriety for his disruption of postwar education, though in the case of universities, this remained at the level of ideological slogans, while he welcomed the proposals of left-leaning scientists all the more. In February 1946 the Educational Committee of the Communist Party of Czechoslovakia approved a proposal put forward by the mathematician Čech on reforming studies at the CU Faculty of Sciences, as well as a proposal from the physicist Miloslav Valouch (1903–1976) on how to reform the universities overall and bolster their scientific work and connection to applied research.[266] Both young professors were also involved in the Communist Party, but they primarily presented their documents to counter the conservative proposals for university reform put forward by their older colleague, Professor Bohuslav Bydžovský (1880–1969), back in the late 1930s.

Otherwise, the need to bring universities and research institutions closer together and to combine university education with the technical colleges had already been effectively dealt with by the National Socialist regime, but the practical German solutions could not be built upon after the war even on a theoretical level.[267]

Increasing scientific specialization led to the fragmentation of disciplines, so that in addition to the requirement to train experts for the state economy, emphasis was placed on the uniform university model. The initial stages of courses would be uniform, as in the USSR, and then the specializations would follow. Valouch envisaged the establishment of new research institutes as the precursor of a Soviet-style Academy of Sciences. He argued for an increase in the salaries of associate professors and professors and the introduction of stipends in the form of postgraduate scholarships, which would solve the basic problem of financing assistants and private associate professors, whose economic position had been precarious during the interwar period, and who were teaching at secondary schools instead of doing full scientific research as they anticipated university advancement in the future. As union president,

265 Jakub Jareš, "Programy psané do šuplíku? Promýšlení reformy československých vysokých škol za druhé světové války," *AUC-HUCP* 55, no. 1 (2015): 149–66, here 151–63.

266 Jareš and Franc, *Mezi konkurencí a spoluprací*, 78–94.

267 Riccardo Bavaj, *Ambivalenz der Moderne im Nationalsozialismus. Eine Bilanz der Forschung* (München: Oldenbourg, 2003).

Valouch advocated the representation of non-professors and assistant professors in the Professorial Board.[268] After all, the requirements of the students and of international collaboration could not be ignored.

Attempts to internationalize the CU Astronomical Institute and disputes over influence

How did the situation at the CU Astronomical Institute change as the reforms to the education system came under discussion and finally got under way? Mathematicians and physicists were involved in developing the CU Science Faculty's foreign contacts. They welcomed the proposal of the mathematician Bronisław Knaster (1893–1980), who was on a stay in Prague in 1946, to organize a joint Polish-Czechoslovak congress of mathematicians (organized in 1949).[269] In May 1946 Czech professors invited the French mathematician Henri Mineur (1899–1954), who had switched to astronomy in the 1920s and founded the Institute d'Astrophysique in Paris in 1936.[270] On 14 February 1946 Faculty Dean František Novák (1892–1964) even proposed to resolve the critical situation in astronomy tuition by inviting Kopal to become an extraordinary professor of astronomy and astrophysics. Kopal, who had left Czechoslovakia to stay with Freundlich in Cambridge before the war, was now working in the US at the Harvard College Observatory.[271] But he could have hardly withstood the conditions in Prague after the Communist coup and the previous tensions with Professor Heinrich. Later in 1951 Kopal became head of the Astronomy Department at the University of Manchester, where he was able to invite numerous Czechoslovak and Polish astronomers for a stay.

Dean Novák also appointed a commission to clarify the position of the Ondřejov Observatory (which the founder had originally donated to the state for the university's use) regarding whether or not it should be made fully available to the university. The question of where to relocate the CU Astronomical Institute from the inadequate premises on Švédská Street

268 Connelly, *Captive University*, 45–48; Urbášek and Pulec, *Vysokoškolský vzdělávací*.

269 František Veselý, "Práce a úkoly Jednoty československých matematiků a fyziků při budování socialistického státu," in *100 let Jednoty československých matematiků a fyziků* (Praha: SPN, 1962), 98–117, here 109.

270 AUK, collection Přírodovědecká fakulta, box. 3, Inv. No. 20/2, the Professorial Board minutes of 8 May 1946.

271 SOkA Litomyšl, Zdeněk Kopal collection, box 1, Inv. No 9, confirmation from the Ministry of Education and National Education on 1 August 1938, regarding the award of 10,000 Kčs from the Denis Fund. Kopal accepted an assistant position at the Harvard College Observatory, his wife Alena, also an astronomer, was employed as a computing assistant. They left in September 1938 and were supposed to return in June 1939.

and how to raise funds for this remained unresolved. Although a number of postwar students rightly expressed their criticism of the standard of Heinrich's tuition, it must be admitted that on his own initiative he regularly presented proposals for building a new institute to the Professorial Board and considered Ondřejov to be suitable.[272] However, Heinrich did not address any matters involving international cooperation or the creation of opportunities for young astronomers. For example, the astronomers did not respond to the UNESCO offer made through the dean[273] regarding cooperation with UN laboratories and observatories in Australia, North Africa and Arabia, even though the project would have made it possible to transfer observations further south (Bohemia is in the shadow of the Alps) or even to the southern hemisphere. At that time, German astronomers had already taken such steps and installed a reflector from Hamburg in Spain and a meridian circle in Australia.[274]

Starting in 1946 Heinrich proposed the appointment of Private Associate Professor Link as an extraordinary professor several times, but the Professorial Board repeatedly postponed the matter, or asked the committee to add suggestions for other candidates (Trkal had an influence here). Link was actually playing a double game with Heinrich. He usually taught practical exercises during the summer holidays at Ondřejov itself, which was not to the liking of the Ministry (this was also the time for temporary summer jobs).[275] But Link thought more about becoming the director of the observatory, which he eventually did. When the political changes came in 1948, he quickly found his bearings and became involved in drawing up the educational reforms. The fields of study and the former chairs were then merged into departments. The head of the physics department, which included astronomy, was physicist Luděk Pekárek (1924–2018). He tried to push for Link's appointment, but even in the new circumstances he did not succeed. Link then lost Heinrich's support for good when in 1949 he co-proposed a joint master's degree course in astronomy, geophysics and meteorology along with Alois Zátopek (1907–1985) and Stanislav Brandejs

272 AUK, collection Přírodovědecká fakulta, box. 3, Inv. No. 20/2, the Professorial Board minutes of 23 May 1946. Heinrich repeatedly urged his re-appointment as a director of the CU Astronomical Institute (16 October 1947, 13 March 1947). However, this solution would not work.

273 AUK, collection Přírodovědecká fakulta, box. 3, Inv. No. 20/2, the Professorial Board minutes of 13 November 1947.

274 Wolfschmidt, ed., *Kometen, Sterne, Galaxien*, 117.

275 AUK, collection Přírodovědecká fakulta, box. 3, Inv. No. 20/2, the Professorial Board minutes of 27 June 1946.

(1891–1957).[276] After the Professorial Board asked for the preliminary materials to be completed, Heinrich expressed some very critical remarks at their next meeting: "Professor Heinrich declares that the proposed course is inadequate from the astronomical standpoint and that this combination is unnatural."[277] At the same time, this proposal was in keeping with the contemporary trend of shifting attention away from traditional astronomical methods towards astrophysics.

The Professorial Board minutes make it generally clear that at the time the reforms were being carried out, the dean found himself in an increasingly weak position as his dealings with the students worried him more than anything else. Out of inertia the Professorial Board itself maintained a certain internal solidarity, for example with those who were now beyond the pale due to national cleansing. The provisional organization of astronomy tuition and the CU Astronomical Institute's own research activities moved from year to year until the Mathematics and Physics departments (or sections) created a new Faculty in 1952.

In spite of this provisional state of affairs, time spent at the Faculty enabled students and assistants (PhD students then postgraduates) to gain certain positions and contacts. A student assistant Boris Valníček, who will be mentioned below, was involved in committees and commissions. He also used his acquired skills (including those of a political nature) to influence the Faculty's personnel management when decisions were being made about his classmates' workplace assignments, since the only research institution was the Central Astronomical Institute. From the perspective of collective memory, it is significant that politically engaged astronomers tended to downplay their enthusiasm for building a new society in interviews and published memoirs and instead detachedly expressed and aligned themselves with the narrative of those who realistically and critically assessed the social situation as well as the tuition.

As soon as the liberation took place in May 1945, the voice of the students and their representatives could be heard in the public sphere. The first regular academic year (starting on 22 October 1945) was already seeing the admission of school leavers from the wartime period.[278] International contacts among universities were renewed and in November 1945 the First International Student Congress was held in Prague, while commemorative

276 AUK, collection Přírodovědecká fakulta, box. 3, Inv. No. 20/2, the Professorial Board minutes of 17 March 1949.

277 AUK, collection Přírodovědecká fakulta, box. 3, Inv. No. 20/2, the Professorial Board minutes of 12 May 1949.

278 In 1945, 19,000 applicants applied to the CU, of which 5,500 were women. 7,500 people were enrolled to study. Zilynská, "Poválečná obnova", 251–59.

events also took place. Although the first CU Rector after the war, Jan Bělehrádek (1896–1980), initiated the establishment of the Rectors' Council (meeting twice a year from 31 May 1946 until it was abolished in November 1949), the rectors and deans again had to take into account student and union organizations, which did not greatly please the academic elites. Universities were now to become institutions accessible to all social classes. In neighbouring Poland, two competing visions of a reformed or a socialist university even emerged, but the two protagonists, the rectors of the new University of Łódź, sociologists Tadeusz Kotarbiński (1896–1981) and Józef Chałasiński (1904–1979), did not find sympathy with other Polish rectors and resigned.[279]

The negotiation and drafting of the university reforms in Czechoslovakia was somewhat more complicated. As a result of the approaching parliamentary elections in 1946, there was a split and thus the reform debate slowed down. Then on 5 June the new CU Rector, mathematician Bydžovský, was elected.[280] In mid-August 1946, the Second International Student Congress was held in Prague and the International Union of Students was established (Czechoslovak students were prominently represented in both).[281] Politically, however, the students were involved in various parties – just like their professors.

Part 2: Astronomer and socialist

> *Comrades! [...]*
>
> *All of us here are well aware of the enormous importance that knowledge of the natural sciences in general, and astronomy in particular, has for an understanding of the basic ideas behind Marxism. This knowledge is an absolute necessity for the ideological struggle to be waged successfully. […] And this is precisely what still acts as a stumbling block in the work of the society. Although the comrades are aware of the effort required to work as best and as much as possible on popularization, they*

279 Zysiak, *Punkty za pochodzenie*, 81–93.

280 In the following year 1947/48, the well-known economist Karel Engliš (1880–1961) was elected the CU Rector, but he resigned after the Communist coup in February 1948. He was replaced again by Bydžovský, and it seems that the elite of mathematicians, who were members of the Communist Party, managed to exploit the new situation for their field. After the establishment of the CU Faculty of Mathematics and Physics, the young Professor Katětov became dean. The aforementioned Čech led the Central Mathematical Institute.

281 Zilynská, "Poválečná obnova", 251–59.

> *are not Marxists in their work. […] For it is precisely because of these erroneous views, which the ordinary man accepts as a fait accompli and as the result of scientific work, that we still encounter questions galore about the expansion of the universe. […]*
>
> *However, what is less understandable is that during the postwar period, as progressive literature has been made available at least in the Russian original for quite some time, this literature has only been drawn upon to a very limited extent. […] Lastly, our university tutors, who should be the first to adapt, only do so with great difficulty.*
>
> (From a speech by Boris Valníček at a CAS meeting, 1952, MÚA, A AV ČR, collection Československá astronomická společnost, box 17, Inv. No. 22, minutes of CAS meeting in 1952)

Štefánik People's Observatory in Prague

The formation of the first postwar generation of astronomers was influenced not only by the reform of the university education system, but also by the opportunity for them to apply themselves at the amateur level, as we have already seen in the observational results of grammar school students, some of whom were surprised at the backwardness of the presentation standards when they arrived at the university. After the Communists came to power, the CAS sought to exploit the experience of these hard-working amateurs, recasting it in Marxist fashion: "This includes control of the education of young people in astronomy and the work of those institutions responsible for the dissemination of science to the masses, as well as supporting those who would like to do serious work but do not know how,"[282] said **Boris Valníček** (1927–2021), a recent graduate in astronomy and member of the Communist Party of Czechoslovakia. As can be seen from his speech, he criticized the non-Marxist conception of astronomy as erroneous. Specifically, at the time this meant rejecting the thesis of the expansion of the universe, which, on the contrary, many of his peers accepted with interest, as Grygar has stated.[283]

Valníček came from a Czech family of Russian legionaries and during WWII he completed his schooling in Prague, where he joined Ladislav Křivský and the resistance group Vanguard (*Předvoj*). After the war he studied physics and meteorology at the CU Faculty of Science and was involved in the Faculty Action Committee. Immediately after graduation

282 MÚA, A AV ČR, collection Československá astronomická společnost, box 17, Inv. No. 22, minutes of CAS meeting in 1952.

283 Interview with Grygar.

in 1950 he joined the collective of astronomers at Ondřejov Observatory, and in 1953 he defended his dissertation on solar influences in meteorology. From 1967 and for the next 24 years he directed astronomical space research in Czechoslovakia, which was networked in the joint Eastern European programme Interkosmos. He had a secure position in a party cell and in the CAS. Although Valníček was one of the active popularizers of astronomy and cosmonautics, my search for a congratulatory article or biographical profile in the astronomical community's magazines at that time (*Říše hvězd, Kosmické rozhledy, Kozmos*) has been unsuccessful.[284]

What role did the CAS play for amateur and professional astronomers? During the war, the CAS had not only substituted astronomical research after the closure of the universities, but above all offered an alternative form of socialization and leisure-time pursuit in the Protectorate. During the early years in particular (until the post-Heydrich reprisals), hundreds of new members, including not only grammar school pupils, applied to join the CAS. They attended lectures, participated in observations, read the magazine *Říše hvězd* (with a circulation of 1000 copies, although some historical works wrongly relativize this[285]) and published in it. From 839 members in 1938, the number rose to an incredible 2,258 by the end of the war. Up to 12,000 people visited the Prague Observatory annually until Prague was bombed by the Allies in February 1945. Subsequently, the observatory was occupied by the Wehrmacht, and only then did some CAS leadership members become active. Before the end of the war, a former Committee member, amateur astronomer **Jaroslav Vlček**,[286] proposed to set up a revolutionary committee preparing for liberation and invited other Communists, notably Landová-Štychová.[287] What influence did she bring to bear on Czechoslovak astronomy? Until the death of her husband Jaroslav Štych, she was not very involved in astronomy, although she and her husband were among the founding members of the CAS (at a meeting

284 Valníček, *Špatné časy*, 130, 141–142.

285 Lenka Studená, "Štefánikova hvězdárna – posledních 45 let očima jejích pracovníků" (Praha: FHS UK, 2012).

286 Jaroslav Vlček (1918–1991). Born in Chicago in a small businessman's family, 1922 return to Czechoslovakia. From 1936 studied at the CU Faculty of Science, but interrupted due to finances, worked as a clerk and joined the CAS and its resistance activity. Based on the recommendation of Landová-Štychová, he was admitted to the Ministry of Foreign Affairs in 1948, ambassador to Sweden 1954–57, dismissed from the ministry in 1970. Jindřich Dejmek, *Diplomacie Československa, Díl II. Biografický slovník československých diplomatů (1918–1992)* (Praha: Academia, 2013), 653–54.

287 Holubec, *Nešťastná revolucionářka*, 213.

of 50 supporters on 8 December 1917 at the CTU, under the leadership of Professor Nušl), which was founded by both amateurs and professionals with the aim of building a people's observatory in Prague.

Even before World War I, the Astronomy Circle headed by Štych had been working to popularize astronomy and the scientific interpretation of nature. Štych also collaborated with the resistance movement (the Czech Maffie)[288] and was based in the anarchist anti-militarist movement, where he first met Luisa. After their marriage in 1912, they co-founded the Association of Socialist Monists (1913). Luisa stood out more as a political feminist than as an astronomer. She belonged to the Czech anarcho-communist circle and became a deputy representing the National Socialists at the Revolutionary National Assembly in 1918. After disagreements and expulsions, the Štychs became involved in socialist scouting with Luisa belonging to the independent socialists, who were admitted to the Communist Party of Czechoslovakia in 1925.

Štych had long advocated the construction of the Štefánik People's Observatory, which was ultimately achieved thanks to donations. The architectural design was drawn up by one of the CAS members, builder Václav Veselík. It was established in 1928, and opened to the public in 1929 as a memorial to Štefánik, one of the three founders of Czechoslovakia. However, the people's observatory in Prague dropped his name for political reasons in 1940, as well as in 1953–68 and 1974–90.[289]

Štych's intention had been to build people's observatories in other towns in the Czech lands. Luisa promoted her husband's legacy after the end of World War II, as the observatory's postwar director recalled.[290] She was Vice-Chair of the CAS Committee and worked hard to persuade other members to commit themselves to socialist ideas. After the war, the observatory first had to be repaired. The bombing had not only destroyed the library but also the Zeiss astrograph (a large comet finder with a 200 mm diameter lens).

Although Luisa was not an expert in astronomy, as I will later show, she was able to secure financial support from the City of Prague and the Ministry of Education, where she had contacts. She argued not only from an ideological standpoint, but also in light of increasing amateur interest in CAS membership. However, the numbers are sometimes exaggerated, for example observatory Director František Kadavý (1896–1972) refers in his

288 Jan Hálek and Boris Mosković, *Fenomén Maffie. Český (domácí) protirakouský odboj v proměnách 20. století* (Praha: Academia 2020).

289 Jaroslav Soumar, "70 let Štefánikovy hvězdárny na pražském Petříně," *Pokroky matematiky, fyziky a astronomie* 45, no. 1 (2000): 35–47.

290 František Kadavý, "80 let Luisy Landové-Štychové," *Říše hvězd* 46, no. 1 (1965): 16.

Memoirs to 5,000 after the war.[291] At the end of the year there were 2,617 members, but by 1950 this number had increased to 3,789, as stated in the annual report, "Per capita, the CAS is the largest astronomical society in the world, apart from the Soviet Union, of course."[292] This confirmed the huge interest shown by Czech society in popularized science including astronomy across social and political camps, thanks to which generous state funding was obtained. It was also a productive competition with the freethinkers who argued with the old denominational churches but proclaimed their demands for atheism in abstract religious and philosophical terms.[293]

However, the Communist camp also had specific ideological tasks for astronomy. It favoured astronomy as a science of benefit to the people. In this respect, it drew an equals sign between the popular and the amateur, as if the professional were not quite ideologically reliable. This is in line with the points made in Valníček's quoted speech. In his view, the roots of disharmony between the "professionals" and "amateurs" consisted in the petit bourgeois mentality of the amateurs who had just learned to form associations, and the elitist elevation of the professionals over members of the CAS.[294]

Luisa – ideological prophetess of Czechoslovak astronomy

"This can only be achieved by consistently respecting Lenin's words: learn, learn, learn. Even though many of us think we are now too old to learn. [...] We have a fine example in Comrade Štychová, who is younger in spirit than many of those who are physically younger but mentally rigid..." (Boris Valníček)[295]

Luisa Landová-Štychová effectively broadened the CAS's popularization mission throughout the country, as 22 branches had been established by 1950 (including two in Slovakia; actually the first branch was established

291 František Kadavý wrote his memoirs from 1964–73. MÚA, A AV ČR, collection Československá astronomická společnost, box 1, Inv. No. 5, C 90–92, typescript.

292 MÚA, A AV ČR, collection Československá astronomická společnost, box 17, Inv. No 22. The annual report for 1947 gives an overview of the attendance: In 1937, 10,094 people visited the observatory, in 1947 a total of 22,045 people and 25,000 people at the Space exhibition.

293 Tesař, *The History of Scientific Atheism*, 98–111.

294 MÚA, A AV ČR, collection Československá astronomická společnost, box 17, Inv. No. 22. As early as in the annual report for 1948, the Communist members of the Committee tried to recall the prehistory of socialist popularization in astronomy and to emphasize the education of amateurs and professionals.

295 Ibidem, the annual report for 1952.

in 1929 in Hradec Králové). The CAS also raised awareness of astronomy on the Czechoslovak Radio, where it had a twice-monthly programme called *Čtvrthodinka ve vesmíru* (A Quarter Hour in Space). This popularization was highly desirable, as some sympathizers confused astronomy with astrology and spiritualism.[296] In this respect, Landová-Štychová diligently implemented her husband's slogan: "In every town a people's observatory", with the aim of making the population aware of the scientific perspective on nature and the origin of the universe. To this she added a second area of activity, the non-religious movement (the Union of Citizens without Religion, hereafter UCWR), where she promoted compulsory atheist education in primary schools for non-believers and the introduction of a compulsory astronomy subject in secondary schools.[297] In addition to the vision of people's observatories, she planned a special Astrobus campaign. The approximate budget for the PRAGA bus was 987,000 Kčs, of which 520,000 Kčs would be the cost of two portable telescopes and projection equipment. The Astrobus was to travel around the countryside, telling the population to put their trust in scientific knowledge, not parish priests.[298] This way the CAS attracted the interest of the Communist Party Central Committee, but the campaign was not actually implemented until the 1980s, even though such buses had been in operation both in the USSR and the USA since the 1960s.[299]

Evaluating the impact of Landová-Štychová's activities on Czechoslovak astronomy is a complex matter. When the Communists took over in February 1948, she did not wish to stand aside, so despite her illness she initiated the formation of a CAS Action Committee, in which she activated some Communist Party members. She then pushed for changes in the CAS leadership at the Congress. The new chairman was the Communist politician Václav Jaroš (1898–1970, a teacher and cultural executive), while the non-partisan Šternberk remained vice-chairman, and there was

296 Ibidem, the annual report for 1950.

297 From 1953–59, astronomy was taught in the penultimate year of the eleven-year comprehensive school, according to the textbook for Soviet classes, which provided a useful overview of the news, but lacked the basics of astronomy: Boris Aleksandrovič Voroncov-Veljaminov, *Astronomie: učebnice pro 10. třídu sovětských středních škol: pro jedenáctý postupný ročník* (Praha: SPN, 1954), See Jiří Grygar, "Lesk a bída školního vzdělávání v astronomii," *Školská fyzika* 21, no. 6 (2013): 2–6; Radek Kříček, *Souvislost výuky a popularizace astronomie s volbou budoucího studijního zaměření* (Praha, Matematicko-fyzikální fakulta UK, 2019), 21.

298 Studená, "Štefánikova hvězdárna", 43. MÚA, A AV ČR, collection Československá astronomická společnost, box 17, Inv. No. 22, report for the President of Republic, March 3, 1951.

299 Kadavý, "80 let Luisy".

Landová-Štychová and the astronomer Slouka, both Communist Party members. Her aim was not to screen the astronomers, but to transform the CAS from an elite club of professionals into a society-wide organization familiarizing the working class with astronomy. Some of the astronomers (e.g. Nušl and Bochníček) had already consulted her frankly on how to resolve conflicts within the astronomical community (e.g. with Slouka, Link and Pajdušáková).[300]

It should be noted that after the war Luisa took the generational change in the Czechoslovak Communist Party badly. She remained isolated from the leadership of the Communist Party, which was dominated by people from Moscow and those who had returned from the concentration camps. Hence she poured her energies into astronomy and the non-religious movement, thus regaining the attention of the party leadership in the 1950s; she was again prominently written about, as she had previously been when she was a deputy. She became radicalized, but she was not the only one who believed that astronomy would help the nascent socialist society in its struggle against religion (see her pamphlet *Astronomie v boji s Vatikánem* – Astronomy in the Struggle with the Vatican, 1951). This is not surprising for a Communist politician, but it is in the case of a university professor like Mohr, as he was very active in lecturing on the atheistic interpretation of the origin of the universe, as his cadre report from Brno confirms.[301]

Luisa made her anarchist background felt when she fanatically opposed US imperialism after the outbreak of the Korean War in June 1950. She may have naively thought that the pre-WWI pacifist ideas of anarchist socialism might influence the current peace policies of the Czechoslovak Communist Party and the Soviet Communist Party, which was threatening World War III. Indeed, the Bolshevik spread of revolution to the world was not pacifist-motivated.[302] She was also involved in foreign policy, when instead of establishing close scientific cooperation with Polish astronomers, she arranged with Prime Minister Viliam Široký the donation of the Copernicus manuscript *De revolutionibus* to the Polish government in 1956. The manuscript, bought by Comenius in Heidelberg, was supposed to be a manifestation of the brotherly desire for peace between two socialist countries.

300 Holubec, *Nešťastná revolucionářka*, 253–59.

301 A MUNI, collection Přírodovědecká fakulta, kádrové spisy, Josef M. Mohr, A6, box 15/57, No. 0243, cadre report on 29 March 1955 (written by Otto Litzmann).

302 Fürst, *Stalin's Last Generation*, 14.

In any case, her writings make it clear that she did not have a good understanding of astronomy, and one might agree with Vanýsek that she brought its popularization into disrepute.[303] **Antonín Rükl** (1932–2016) also condemned her (in his unpublished memoirs), which may be related to the fact that after 1989 Rükl did not want to admit that he signed the condemnation of Milada Horáková (1901–1950).[304] However, she cannot be denied the credit for obtaining substantial financial support for the construction of the observatories, which was politically supported by Chairman Jaroš, but the construction was organized by Landová-Štychová, together with Vice-Presidents Slouka and Šternberk. In 1949, the Petřín People's Observatory received an extraordinary subsidy of 483,000 Kčs from the city and 160,000 Kčs from the Ministry of Education and Information, which allocated an additional 250,000 Kčs in support to the rural branches. People's observatories sprang up like mushrooms thanks to the unpaid weekend work of "volunteers" (under "Akce Z jako za Zvelebování", i.e. Action D for Development).

The original four observatories before 1939[305] increased to nine after the war (1950) with another 33 built by 1959.[306] Thanks to this dense network of observatories and the high number of CAS members, Czechoslovakia came to be an astronomical great power, with the young generation seeing a promising future in the field and opportunities for employment.[307] This was to be achieved by means of Mathematical or Physics Olympiads and other competitions that would help to discover the hidden genius scientists among the students and workers – the future Einsteins and Marie Skłodowska-Curies. Actually, the first Olympiad after the war was organized by Polish mathematicians, naturally with the required justification for their national intentions, with a competition held in the Soviet Union in the 1930s.[308] In a similar direction, Luisa wanted to find the geniuses among the amateurs: "Who knows whether or not there may be a genius

303 Vladimír Vanýsek, "Případ Antonína Bečváře," *Dějiny věd a techniky* XXIX, no. 1 (1996): 56.

304 Holubec, *Nešťastná revolucionářka*, 247.

305 People's observatories in Praha, České Budějovice (1937), Plzeň, Tábor (1940). Also note Pardubice (1912–30), Holešov in Moravia (1941).

306 See Table 11.

307 The Ministry of Education was looking for a solution together with academic institutes. Cf. MÚA, A AV ČR, collection Astrofyzikální observatoř ČSAV, box 4, Inv. No. 11, invitation from the Ministry of Education to a meeting on the placement of graduates of physics, mathematics, mathematical statistics, meteorology, astronomy, 1953.

308 Kazimierz Kuratowski, *A Half Century of Polish Mathematics. Remembrances and Reflections* (Oxford – New York – Toronto – Sydney – Paris – Frankfurt: Pergamon Press, 1980).

among our rural amateur stargazers, who are going to invent a method of making total use of the Sun's energy in our climate and of accumulating its reserves for the winter."[309]

It should be added that a number of astronomers actually had their talent acknowledged in this way before starting their studies. Luisa recognized and confirmed such talent in Bochníček. Belief in technological progress was not alien even to professional astronomers, whom Luisa considered, along with rocket designers, to be the true elite of socialist society.

The scientists themselves were overjoyed at the discoveries and enthusiastically welcomed the massive funding of the natural sciences that came after February 1948, while many supported the programmatic thesis that through "knowledge of the results of scientific and especially astronomical research, the popular masses are by necessity brought to a Marxist worldview." This was the formulation used by Luisa in the 1950 CAS annual report, but it was also how she characterized her husband's activities and those of her own from the time they founded the Association of Socialist Monists in 1912, which had set itself precisely this task. Luisa wanted to prove that proper Marxist popularization of astronomy was something she and her husband had been concerned with long before the first people's observatory was established, and even before the establishment of the Communist Party. She concluded, "As can be seen [...], CAS norms can primarily be applied with a view to further development as an instrument of the dictatorship of the proletariat."[310]

For these purposes Luisa supported the construction of a larger new people's observatory and planetarium.

Socialist astronomy mass in the temple of atheism

A planetarium — with projection apparatus in a dome-shaped hall for depicting the sky — was to be part of the People's Observatory (from 1948 without the name of Štefánik) on Petřín Hill, which astronomers

309 Holubec, *Nešťastná revolucionářka*, 249–50.

310 MÚA, A AV ČR, collection Československá astronomická společnost, box 17, Inv. No. 22, the report for Ministry of Education of 13 February 1950, typescript „Dosavadní historický vývoj na hospodářsko-politické a třídní základně". Landová-Štychová also recalled the CAS expedition to the USSR in 1936 (Guth, Link, Nováková, Vlček). A separate paper from about 1953 mentioned that the number of 5000 members has been reached and recommended applying the VAGO organizational structure, which has proven itself in the Soviet Academy of Sciences, so that the observations are managed centrally. CAS does this through 16 sections, the paper suggests that all branches will be subjects of CAS.

recommended for reconstruction. The idea of the planetarium was actually launched before 1948 by Minister Václav Kopecký (1897–1961), who had visited the Moscow planetarium during the war and pursued a dedicated transfer of all Soviet innovations. In the early 1950s, however, the project hit a bureaucratic snag when it was transferred from the Ministry of Defence to the Ministry of Information. Officials planned to put the planetarium in Stromovka Park, where public access would be more convenient. On the other hand, Landová-Štychová in concert with such astronomers as Nechvíle and Seydl argued that the planetarium had to be part of an observatory for the idea to make sense. She made a drama out of the entire affair among the politicians, but achieved nothing that way, despite pointing out that the projection equipment bought for four million Kčs from Carl Zeiss in Jena was still lying in crates at the National Technical Museum depository.[311]

The oldest planetarium had been built in Jena in 1923. In Prague, building got under way in Stromovka Park in 1957 and was completed in 1960. The 1953 project by the famous architect Jaroslav Fragner (1898–1967) envisaged a reinforced concrete monolith in Socialist Realist style on a circular temple (tholos) ground plan with blind windows under a helmet roof. However, due to lack of state funding, the original design was scaled back. Fragner was planning to present a pagan temple with columns capped in the antique style and twelve statues depicting workers in the blind window alcoves. The astronomy behind this "temple" is only symbolized from the outside by a lightning rod topped by a ringed planet.

According to Luisa, the planetarium programme was meant to impress visitors more than a church service would. Over the years, however, free discussion over science and faith took place here rather than just Marxist debates, often with the participation of dissidents. An absurd tension also emerged between spiritual and atheistic heavens at other planetariums. At the Nad Hamburkem school in Plzeň, a planetarium with Zeiss equipment was opened in 1958 in the old school chapel. The surveyor and astronomer Bohumil Maleček (1923–2008) recalled how he used to go to the planetarium to talk on atheism in the same room where he once concelebrated Catholic mass as a schoolboy ministrant.[312]

During the early 1950s an effort was made to give the main CAS organ, *Říše hvězd* magazine (with a circulation 5,000), a more revolutionary

311 Holubec, *Nešťastná revolucionářka*, 249–50.

312 Interview with Šolc. Ing. Bohumil Maleček, CSc. mentioned the issue directly to Šolc before 1992, when the planetarium was closed (the dome damaged already in 1983). He was the director in 1958, later in Valašské Meziříčí, and at the beginning of the 1990s again in Plzeň, where he organized post-secondary studies of astronomy.

ideological profile. Luisa wrote articles about science and politics for it, but these appeared rather out of place. As Stanislav Holubec has shown, although Landová-Štychová was the CAS Vice-Chair and Jaroš the Chairman until 1959, both of them were substantially isolated (even politically) after 1953 and no longer actively participated in the running of the society. Luisa found it difficult to bear when the new *Říše hvězd* editorial board refused to publish her articles from 1954 onwards (as the magazine was placed under the Ministry of Enlightenment). The CAS gradually transformed into a purely professional organization, culminating in its transfer under the supervision of the Academy of Sciences in 1959, and CSAS Astronomical Institute Director Šternberk, became its chairman.

Luisa withdrew and she was subsequently dogged during 1953 by difficulties in her own family, which as a leading representative of socialism she found difficult to handle. When her children or grandchildren were subject to mental hardship or were ill-mannered, she considered this a bad testimony to socialism. She herself took a very responsible approach to upbringing, but on the other hand, she advised her niece not to focus on childbearing, pointing out that this task was exhausting for women, indeed for gifted female activists who might otherwise achieve much for socialist society: "you'll find you've lost a chunk of your life for a couple of kids and that you could have been of much more benefit to us all. [...] You're not the only one to have illusions about the family idyll, but you, who are adept at public life, would either soon have it up to here with this idyll or it'd drive you spare! One or the other!"[313]

I mention this quote to recall how, in the spirit of the day, Communist politicians, as well as some scientists, considered themselves to be exceptional individuals and their work or discoveries to be important contributions to progress. The slogan "I serve the people", proclaimed in the army and the workplace, had an air of exclusivity about it, as well as a commitment for those who took the creation of an equal society to heart and imposed strict ethical standards on themselves. Of course, the reality was different, even among Communist Party members. The contrast of the fanatical Luisa, who then saw an orchestrated projection of reaction and imperialism in every rebuff and complication, stands out all the more. Likewise great demands were placed on students and university tutors when the socialist university was established.

313 Luisa Landová-Štychová in a letter to Soňa Vorlíčková-Ontlová, in about 1948/49. Cf. allow to Holubec, *Nešťastná revolucionářka*, 219.

Part 3: Socialist university or competitive field?

> *Mohr was clearly quite fed up in Brno, I would say. He seemed to me to be someone who had failed somewhere along the line. The only thing that really bothered me about him — I don't know if he did it to save himself or what — was that he really came on as a scientific atheist. [...]*
>
> *Perek was a completely different story. I knew him when I was still in secondary school because I attended the so-called extensions. University professors or lecturers had extensions at the university building, which were for laypeople. [...] I didn't miss Perek's lectures. He was the only one who was totally in the picture, who followed everything perfectly.*
>
> (Interview with Jiří Grygar
> by Tomáš W. Pavlíček, Petra Hyklová, and Kateřina Kočí, 14 June 2019)

The field of astronomy in Brno

One development after World War II was that it was now possible to study astronomy at the Masaryk University Faculty of Science, which was a new option alongside Charles University in Prague and the Slovak University in Bratislava.[314] However, the conditions at that time were conducive to the practice whereby ambitious professors and successful graduates often left for Prague at the first possible opportunity, e.g. the Brno mathematics graduate Link, who habilitated in Prague in 1936. As we already know, there was a certain surplus of astronomers among the interwar generation looking for professional opportunities in Prague. This pressure was further exacerbated by Professor Heinrich's quarrelsome nature.

After the war, Brno became a promising place to create a competitive field. At least this is how the cause was taken up by Private Associate Professor Mohr, who had been blocked from becoming a professor at CU. Moreover, he was subjected to unpleasant reproaches in Prague for sending his two children to German schools during the war. Mohr was appointed full professor of astronomy in Brno as of 1 October 1946 and

314 Košťál, *Vznik a vývoj*, 29–35. The Astronomical Institute at the Faculty of Science was established in 1944 at the Slovak University in Bratislava (from 1919–39 and after 1954 the Comenius University).

induced one of the students who had kept coming to the Institute in Švédská Street during the war to carry on his assigned observations of planetary nebulae, namely Luboš Perek, to take the assistant position.[315]

Mohr sent his assistant to the new workplace in late summer 1946, but as his first task, he instructed Perek in a letter on 9 September 1946 to arrange for a piano, curtains, carpets, and furniture for the director's office at the new institute. The loyal but never servile assistant initially accepted the task of playing "practical astronomy from a very broad perspective".[316] He reported to his superior by correspondence, in which he tried to turn attention to real astronomical work, as the reply of 18 September 1946 indicates: "I have now asked about the carpets. One store had nothing at all. Then I went to a factory. The runners are only made of paper... Professor, I am pleased to say that the Institute is now being furnished and I am looking forward to the real work. I saw some NISA calculating machines at the fair, fully-automatic, electrical machines with automatic conversion from the resultant to the machine."[317] Perek wanted to move to exact research and the calculating machines played an essential role in Brno, as I shall show.

Several circumstances favoured the creation of the new MU Astronomical Institute, and each of the participants contributed their share. Perek considered the 1946–56 period to be the finest of his life. In Brno he helped to build the Institute's library and the university observatory, while the Prague Institute remained in an interim state on Švédská Street. Brno, on the other hand, allowed Mohr to create a competitive field. In 1947 he established and ran the publication of the professional journal *Contributions from the Astronomical Institute of the Masaryk University*, though it was actually edited by Perek: "I took care of the publication to make sure it had an international flavour. I sent out letters saying: 'If you have publications from your observatory, we are founding a new institute here in Brno, so be so kind as to send us what you can.' And then the observatories published what later got into the journals."[318]

The exchange of periodicals encouraged the circulation of knowledge. Much astronomical research was then dependent on observational reports

315 Actually, Perek earned his RNDr. title from MU, 28 June 1946. A MUNI, collection A1 Rektorát MU, book 17, Transcripts of diplomas of doctors of the MU Faculty of Science in Brno 1945–53; Ibidem, personal list of J. Mohr, box 122, No. 2470, the oath protocol of the Ordinary Professor Mohr on the MU Rector's Office, 3 October 1946.

316 Pavlíček, "Rozhovor s astronomem", 79.

317 MÚA, A AV ČR, Luboš Perek collection, unsorted, box 2, L. Perek to J. Mohr, letter of 18 September 1946.

318 Pavlíček, "Rozhovor s astronomem", 81.

from other places on the globe. The journals also published lists of who had how many observing nights and who from among the international community of astronomers had spent the previous year on an internship at their observatory. This allowed foreign institutes to learn about the staff and research at institutes in this country. This knowledge would be capitalized upon in the context of trips abroad made by Czech and Slovak astronomers.

Through the exchange of publications, it was possible to gradually build up our own library and to compare data from other research operations when processing our own observations. Perek was again responsible for this equally important contribution: "my task was to contact the libraries of the world's institutes, saying that a new institute was being built here and that we would appreciate it if they could send us their publications, if possible free of charge. So that is how the Brno library was built."[319]

An astronomer on a UNESCO internship in Leiden

Thanks to Perek's efforts, the MU Astronomical Institute established close cooperation with the Leiden University Observatory, which ranks among the oldest in the world — as observations have been made there uninterruptedly since 1633. How did the connection between Brno and Leiden come about? For Perek, the UNESCO internship in Leiden, recommended by Mohr, was a turning point. He went there in December 1948. From Professor **Jan Oort**,[320] Perek received an offer to present what he had worked out in formulae on galactic mass distribution. Oort himself had been working on this for a long time: "Professor Oort had a homogeneous spherical and material point whose attraction was easy to calculate. But from this I found another model, where the mass diminished from the centre outwards, and it had the character of an ellipsoid, and if the ellipsoid was rotating, it could be integrated."[321] Oort's stable model was deliberately simplified so that the Galaxy's evolution could be neglected. However, Perek pointed this out in his presentation, "And that's what I was lecturing about there, and I didn't have enough respect for Professor Oort's very simple model,

319 Ibidem, 79.

320 Jan Hendrik Oort (1900–1992). Professor at the Leiden University from 1935, director of the Observatory since 1945. The IAU President from 1958–61. Focused on the structure of the Galaxy and radio astronomy. He led an expedition looking for a suitable site for the European Southern Observatory in the Atacama desert.

321 Pavlíček, "Rozhovor s astronomem", 82; Luboš Perek, "Distribution of Mass in the Galactic System," *Contributions from the Astronomical Institute of the Masaryk University* 1 (1947): 6.

because I didn't understand at the time that Oort was a genius who had this gift whereby every time he thought something, it was true. Ah, but I was forgiven for that."[322]

Here Perek encountered not only astronomical research using state--of-the-art instrumentation, but also the objectively critical approach of the professor, who graciously overlooked Perek's self-assured but ill-conceived presentation and matter-of-factly pointed him towards evaluating further material on RR Lyrae-type stars,[323] which the Dutch had obtained from observations in South Africa.[324] "But the material was not dense enough, because the stars were quite few and far between. Better material then came from hydrogen decomposition, but that was given to a Dutch student. So maybe because I wasn't respectful enough to Professor Oort at the time, I got somewhat more difficult material than he did. I mean, material from which not much could be derived."[325]

A similar sense that a comparison was being made between "locals" and interns was felt by a number of mathematicians who came from different countries to the famous mathematics seminar in Göttingen.[326] Nevertheless, Perek at least found colleagues and "his professor" in Leiden who were working on a similar topic. He had nobody like that in Brno. Perek's capacity for accommodation is evidenced by the fact that before he left for Leiden he started learning Dutch and later corresponded in that language, especially when he was discussing the construction of the telescope he wanted to build in Brno for the planned university observatory.[327] Oort complied with his request and had copies of the drawings and plans for the assembly of the Zunderman reflector, which Perek had observed in Leiden, sent to Communist Czechoslovakia for him. It was his courtesy and ability to communicate (in Dutch, moreover) that opened doors for Perek, not official state support or favouritism.

322 Pavlíček, "Rozhovor s astronomem", 83. Oort discovered the principle of differential galactic rotation and developed research into the Galaxy, the cloud of icy planetesimals (the Oort cloud), and the use of radio waves, which became a promising method of observation.

323 It is a group of pulsating variable stars (Cepheids) whose light curves have a short maximum period.

324 In South Africa, the Leiden Astronomical Institute used the Transvaal Observatory in Johannesburg (1903) before establishing the more conveniently located Broderstroom Observatory (1954).

325 Pavlíček, "Rozhovor s astronomem", 83.

326 Danuta Ciesielska, Lech Maligranda, and Joanna Zwierzyńska, *W świątyni nauki, mekce matematyków. Studia i badania naukowe polskich matematyków, fizyków i astronomów na Uniwersytecie w Getyndze 1884–1933* (Warszawa: PWN, 2021), 117.

327 MÚA, A AV ČR, Luboš Perek collection, unsorted, box 2, correspondence.

In pursuit of large-scale observation technology

Global trends in astrophysics showed that large optical telescopes could be used to observe the night sky more accurately and to study new celestial objects and stellar structure by means of photographs. Various types of telescope are used for these purposes, and I shall refer to two of the designs here: the mirror reflector with its substantial aperture, and the astrograph, which is adapted for photographing the night sky with its object glass comprising a lens.

After the war there was only one large reflector in the whole of Czechoslovakia at Skalnaté pleso with its 60 cm diameter mirror. Perek showed his skills and experience in technical drawing when he redrew the drawings of the Leiden reflector with a mirror diameter of 50 cm and together with his assistants Vanýsek and **Bedřich Onderlička**[328] in Brno constructed a slightly larger twin, known as the 60 cm reflector (reflector with a mirror diameter of 60 cm, 1954).[329] Perek had the mirror ground in Ostrava by Vilém Gajdušek (1895–1977), an outstanding astronomical optics engineer who had designed numerous telescopes. Brno thus gained a huge lead over Prague, as there was no such telescope even at Ondřejov.

While Perek was still on his doctoral internship in Leiden in 1949, he almost lost his job in Brno. The Faculty's cadre report castigated him not only for his bourgeois family background, but also for obduracy in his scientific work and zero political activity: "He always acts so as not to ruffle feathers, but he pursues his goal with great vigour and recklessness." Mohr defended him, however, and Perek eventually habilitated in Brno. The way scientists were evaluated shows how those screening them sought the easiest solution for themselves. While Perek's erudition and diligence could not be denied, which was, after all, quite laudable in a socialist worker, they considered Perek's organizational skills and single-mindedness to be "reckless" ambition.[330]

Perek was not a party member at that time, while Mohr, originally a Social Democrat, joined the Communist Party in 1948 and quickly became active within it.[331] Since he had stood up for his assistant as Chairman of the MU Faculty Action Committee, this Committee started looking for other candidates to exclude in order to meet the required vetting

328 Bedřich Onderlička (1923–1994) Born in Brno. Studied mathematics, physics, and astronomy at the MU in Brno, assistant there from 1954, later the head of the astrophysics department. Focused on stellar astronomy, he developed the methodology for observing artificial satellites around the Earth.

329 Interview with Perek, 23 April 2020.

330 Pavlíček, "Rozhovor s astronomem", 51.

331 Pavlíček and Kulawiaková, *Martin Černohorský*, 22.

percentage norms. The minutes show that Mohr himself sought out "weak specimens."[332] In Perek's case, he did indeed file away a "denunciation" as a closed matter, but it is clear from Vlasta Perková's correspondence with her husband in Leiden that Mohr's communications frightened her. On his return to Brno, Perek himself had a negative experience when he discovered that Mohr had not arranged for him to claim his salary, but only showed concern for the exchange of his own publications.[333] Promises of a jointly built astronomical institute were shattered as Mohr often tasked Perek with handling correspondence with foreign observatories for the benefit of his own research. He himself liked to sit down at the piano and play his favourite opera arias, or after two days in Brno he would go back home to Rynoltice near Liberec at the other end of the country.

Despite these complications, Luboš and Vlasta Perek made their life together in Brno more pleasant by enrolling in the equestrian club at the Veterinary Faculty. They did not have any children of their own, and regularly enjoyed riding horses around Brno, sometimes even three times a week. Thanks to his father, Luboš had already had experience riding before the war and now it helped him to better endure the substitute military service he was called up for in the summer of 1947. Vlasta endured the months of separation more easily thanks to her friends, Mr Matula and Mrs Matulová, in Brno, where the marriage also took place of her sister, whose two children Vlasta liked to look after.[334]

A socialist university Moravian style

The Masaryk University in Brno combined efforts both to build a university offering affordable education after the war and to influence the traditionally Catholic population of southern Moravia with socialist ideas. The university reforms were being implemented in various ways at the different faculties. While the CU Faculty of Science in Prague was not particularly affected by the 1948 purges, many students and tutors at the Faculty of Arts were affected. Historiography generally considers this to be evidence of the emerging totalitarian regime.[335] It is well-known that the Faculty Action Committees conducted background checks on academic staff and students, but at the MU Faculty of Arts they limited themselves

332 A MUNI, collection Akční výbor Přírodovědecké fakulty MU, box 1, Inv. No. 1, reports of the Faculty Action Committee, 1948.

333 Pavlíček, "Rozhovor s astronomem", 51.

334 Koubská, *Hvězdář diplomat*, 24–27.

335 Urbášek and Pulec, *Vysokoškolský vzdělávací systém*, 125–205.

to the minimum prescribed. The modernization and streamlining of the university was to be achieved by merging related disciplines, with scientific departments being created instead of the existing institutes. The Institute of Theoretical Physics (Prof. Hostinský), the Institute of Experimental Physics (Prof. Zahradníček) and the Astronomical Institute (Prof. Mohr) were merged into the Department of Physics in Brno. Černohorský recalls that at that time he was still a student assistant and worked as a secretary to the departmental head, Hostinský.[336]

When the departments were then transformed into Soviet-style sections in 1950, only members of the Communist Party of Czechoslovakia were allowed to be in charge of them, which neither Hostinský nor Zahradníček were, so Mohr took over. What is clear in his leadership style is how his habitus as a scientist was transformed opportunistically by the war and the Communist takeover. He no longer made his own observations, but poured his energies into party work and training students in an atheistic worldview. Although he initially promised the position of secretary to Černohorský, he quickly realized that he had to find a party member instead, namely Václav Truneček (1919–1997). The Higher Education Act (1950) and the Act on the Czechoslovak Academy of Sciences (1952) had altered the usual career paths of scientists.[337]

At the first opportunity Mohr moved to Prague in 1953, while in Brno, alongside Perek, who was in charge of the MU Astronomical Institute, assistants Onderlička and Karel Lang (1923–1980) remained. This Brno native developed the methodology for monitoring artificial satellites and was instrumental in the construction of the observatory on Kraví hora. When the Brno branch of the CAS began to plan the construction of a people's observatory in the early 1950s, astronomers at the university took advantage of the unique opportunity and expanded the project, within which two domes were built side by side – one for the people's observatory and the other for the university observatory, where the telescope constructed by Perek was located. The synergy between scientific requirements and efforts to popularize astronomy can be described as an attempt to create a truly modern socialist university in Brno. Professional astronomers addressed the public at extension lectures organized by the local CAS

336 Pavlíček and Kulawiaková, *Martin Černohorský*, 22.

337 See Acts No. 58/1950 Coll. and No. 52/1952 Coll. Cf. Jareš, *Akademické milieu*. In the 1950s, in order to start habilitation or professorship proceedings, it was not always necessary to submit a habilitation manuscript. Assistants used to be entrusted with the management of departments (the symbol of power was a favorable cadre report, i.e. the ideological factor).

branch. The focus and level varied. Mohr was fond of adding speeches on the atheistic education of socialist man. Perek focused on topics from Leiden – the study of stars and the Galaxy.

Grygar and Kohoutek got to know Perek when they were still grammar school pupils attending these extension lectures: "I'd been going to those since I was fifteen, I think. That's how I got to know Perek, who often lectured there." The experience encouraged him, so that when he and Kohoutek needed to calculate a large amount of data from their own meteor observations, they approached him and asked if they could use a calculator in his office, "The calculator was electromechanical. It was called the Rheinmetall, came from East Germany and it was a box like a big office typewriter with an electric motor. It made calculations easier because you could divide on it. Only it bounced around on the table and so had to be moved to the left end of the table in time to stop it from falling off. This Perek was absolutely amazing. We were being really cheeky, because we came to the department as grammar school pupils and he normally gave us the institute keys so we could come in after astronomy department hours. They finished at five o'clock. We were back in school by five, so we could come in at six. So from six to nine we were working away."[338]

This memoir shows that Perek was basically implementing the socialist idea of connecting experts with laymen and opening up the horizons of astronomy to young people. Such an approach would have been unimaginable in the interwar period. In Czech astronomy and physics, this calculator is not only an instrument, but also a site of memory. Perek independently recalled the same experience. "There one young student, Jiří Grygar, and his friend Luboš Kohoutek came to see me, and I saw they had a great interest. I was going away for the weekend with some friends, so I gave them the keys and they appreciate it to this day. That's where my friendship with Jirka Grygar began, and it has lasted for over sixty years. And with Luboš Kohoutek I made an atlas of planetary nebulae, which he then took to the next stage, the second edition, which was published in Hamburg."[339]

338 Interview with Grygar.

339 Luboš Perek and Luboš Kohoutek, *Catalogue of Galactic Planetary Nebulae* (Praha: Academia, 1967). Cf. updated version, ed. L. Kohoutek, Hamburg-Bergedorf, 2001.

The provincialization of astronomy tuition

After joining the MU Faculty of Science, Grygar and Kohoutek appreciated the fact that students had an optional lecture by Perek. His knowledge and overview of current discoveries were better than those of Professor Mohr, but with his cadre profile Perek could hardly expect to obtain a professorship. However, Mohr was more concerned about his career and went to Prague. The modern astronomy department in Brno, which was competing over knowledge with the institute in Prague due to its approach to students, laypeople and the people's observatory, started to be internally provincialized, with party affiliation rather than actual scientific work deciding on further advancement. When Perek decided to move to the CSAS Astronomical Institute in 1956, the study of astronomy in Brno ceased to exist as a specialization for several years. Evidence of the provincialization of the MU Faculty of Science is confirmed by the assistant physicist Černohorský, who, unlike the party careerists, was transferred to the CSAS Laboratory for the Study of the Properties of Metals in Brno in 1956, before he was allowed to habilitate (1967). Yet his teaching skills were appreciated by generations of students from Grygar onwards.[340]

In the situation that developed, students of astronomy had to move to Prague, as in the case of Kohoutek and a year later Grygar. Moreover, this was limited by student quotas based on planning of the national economy's requirements at that time, e.g. for ore deposit geology over twenty students a year, while for astronomy usually just one.

The idea that astronomy tuition had been provincialized is not meant geographically, but pedagogically. It was based on the approach of teachers and had a worse impact in Prague than in Brno. Grygar confirmed this by recalling that the standard of lectures was lower at the CU Mathematics and Physics Faculty, while in Brno he met excellent scientists. He also attributed the poor standard of lecturing to Mohr, who had made practically no observations since WWII, while in his publications he only made statistical analyses of the movements of stars in galaxies. When he was still teaching in his final year, he copied a lecture from his 1935 preparatory notes.[341] He did not refer to anything new, which resulted in the internal provincialization of astronomy.

Mohr also had a peculiar attitude towards students. Although he first taught the impressive Grygar in Brno, when they later met in Prague, he reproached Grygar for his student observations. "When I arrived in Prague, Mohr asked me what I'd been doing in Brno. So I told him that I'd been

340 Pavlíček and Kulawiaková, *Martin Černohorský*, 37–51.

341 Interview with Šolc.

observing meteors with Kohoutek. Mohr was sitting across his armchair, dangling his legs over the armrest — I can see it like it's here and now, the laces of his long johns peeking out from under his trousers — and he said, "Well, we'll knock that out of your head here, young man." Mohr was already "past his prime". This experience relativizes the high expectations placed on socialist universities by leftist intellectuals. Hence the memoirist came to see Mohr as "a man who had failed somewhere along the line".[342]

The results of the meteor shower observations were appreciated by the CAS, and Grygar and Kohoutek were rewarded with an excursion to observatories in the USSR during summer in 1957. There they both encountered the realities behind this scientific field in the Eastern bloc.

Final remarks

During the establishment of the socialist universities, some progressive methods were emerging: new studies in Brno as a competition to Prague, cooperation with people's observatories, and Mathematical Olympiad in higher classes of the grammar school (since 1949 in Poland, 1951 in Czechoslovakia). The Olympiad was encouraging pupils to study diligently. Its origins and implementation method made it suitable for the Eastern bloc's socialist education system, which wanted to show its intellectual consistency through exceptionally talented minds. It was popular with scientists and students alike, regardless of the ideological context behind its creation (harking back to Soviet interwar competitions), because it allowed them to engage in solving new puzzles and questions. At the international level, it showcased talents from Communist countries, but also enabled competitors to travel and gain contacts with the West.

The Physics Olympiad was organized at the Brno branch by Košťál.[343] Ultimately, it was also all about getting university teachers involved in collaboration with secondary school teachers. Through the Olympiads, the teachers were able to check how well they were organizing the preparation of their charges. This networking of all those involved was a welcome development during the Communist era.[344]

342 Interview with Grygar.

343 Both Olympiads were organized by the UCMP regional committees. The chairmen were often school inspectors associated with mathematics, e.g. in Brno Vladimír Štefl, father of astronomer Vladimír Štefl jun. (born in 1949). Košťál, *Vznik a vývoj*, 151–58.

344 Otherwise, it is worth remembering that competitions had already been organized in the interwar period, but for university students only. Urbášek and Pulec, *Vysokoškolský vzdělávací systém*, 125–205.

The autonomy of the universities had been disrupted during World War II, and afterwards some of them ceased to exist or were not restored (especially in neighbouring Poland).[345] Comparisons with Poland and the Soviet occupation zone of East Germany reveal some similarities in the way the field was occupied. The complex process of science centralization and university reform reflects both the state's need to capitalize on the potential of experts for the benefit of the postwar economy and the scientists' desire to reestablish academic operations and secure their livelihood and status.

The universities were meant to prepare specialists to build the national economy, while the intended reorganization of learned societies into a unified CSAS was also to train doctoral students more effectively. However, the question of accepting models adopted from the Soviet Union was tainted by the decay of the functional environment of seminars, autonomous professorates and grammar schools dissolving into eleven-year secondary comprehensive schools.[346] Under the new system of studies, the quotas of students in ore deposit geology were set absurdly high because of the search for coal, but the number of astronomers was minimized (one per year at the CU Faculty of Mathematics and Physics). Moreover, as we have seen, the tuition of astronomy was delayed and the quality was declining. The astronomers' own amateur experiences before joining the Faculty were much more fundamental.

At the same time, the reformed system was put in place of assigning graduates to jobs regardless of their interests and qualifications. As we saw in the case of Valníček, the allocation of placements opened up room for wheeling and dealing. How did the academic field change as the universities underwent reforms in the 1950s? Within academic fields there are always particular features, because these fields are never uniform and they distinguish between different departments, interests and methods (sub-fields). The use of Bourdieu's notion of field makes it possible to observe the habitus elements that professors, associate professors and assistants share or revise among themselves. Habitus involves academic skills, cultural conventions and communication skills, but also attitudes towards values, social issues and political convictions.[347]

In the postwar era, the tactic of waiting for professorships to become vacant was initially deployed. Individuals were dismissed to the required

345 Connelly, *Captive University*, 111; Richard Hofstadter, *Academic Freedom in the Age of the College* (New Brunswick – London, 1996), 6–11.

346 Pullmann, "Proměny třídních pozic", 503–4.

347 Ibidem.

extent as early as 1948 (e.g. August Žáček, 1886–1961, professor of experimental physics at the CU Faculty of Science). A significant number of professors took full retirement or were "pushed" into doing so, such as Trkal in Prague in 1953, who defended Žáček and protested against the reforms. Josef Zahradníček (1881–1968), a professor of experimental physics in Brno, was also forced to retire in 1953 on the grounds that, according to his students, "the lectures were not up to the required standard".[348] The new sectional system did not require the section heads to have a professorship.[349] It was de facto a shift towards less privileged and more efficient science management, but subordinated to ideological goals. At the same time, it offered the managers the possibility of obtaining degrees under greatly simplified professional requirements. The solid-state physicist Otto Litzman (1926–2017), for example, habilitated only a year after his postgraduate degree (CSc. 1958) and took over the chair of theoretical physics and astronomy as early as 1961. On the other hand non-party members such as Černohorský had cadre-related difficulties with habilitation.[350] The professors' life paths also diverged. In order to assess the changes within the academic field, a more precise interpretive perspective is required in order to observe subtler differences. With the 1950 reforms, the professoriate also lost its autonomy and virtually only got to approve administrative matters, which were in practice decided by the Dean's office. Hence astronomers increasingly turned their attention to research associated with the CSAS and the people's observatories.

Career opportunities for astronomy graduates were offered by newly created institutes, the CSAS Astrophysics Observatory in Ondřejov and the CSAS Chronometry Laboratory (later merged in 1954 into the CSAS Astronomical Institute). In this context, it is possible to consider what ideas scientists had about their role in the state economy and the university reform. These beliefs not only drove research and provided a career stimulus, but also to some extent allowed for the reform of the higher education system and the reform of the Academy of Sciences to be discussed. However, the politics involved in the *reconstruction in the postwar world* placed limits on the discussion of ways to implement reforms in academia.

348 A MUNI, collection Přírodovědecká fakulta, box 17/6, personal documents of J. Zahradníček.

349 Jareš, *Akademické milieu*, 197.

350 A MUNI, collection Přírodovědecká fakulta, kádrové spisy, A6, box 30/6, cadre report on Martin Černohorský, 1952.

Zdeněk Ceplecha studying the Příbram meteorite, a world “first”, 1959
(Martin Šolc Archive)

Chapter IV

Institutes: new observation techniques

Part 1: The CSAS Astronomical Institute

At that time were there five or six departments at the Astronomical Institute?

There was a large department headed by Guth – meteors [bolides], which was a department that Link had earmarked for closure, though fortunately this never happened. The department makes a great contribution these days, as it has turned to monitoring impacts [of meteorites on the ground]. In my view the people who do that today deserve to be members of the Learned Society.

Do you remember if there was competition between sub-disciplines like meteors, nebulae and chronometry during the 1960s?

At that time, Guth's Meteor Department was under an outstanding student, Ceplecha, who was doing an associate professorship under Mohr in Brno. I was then the second to do the associate professorship there. That department was the main one. Solar observation was always at Ondřejov, even during the war, when it belonged to the Germans. It was supported by Link, though he later moved up and away to the upper atmosphere, while Švestka ran solar. And nowadays I believe the solar people are very productive and deserve some international recognition too.

So there weren't many departments there. There was just Stellar, Solar, Meteoric and Radio – Zdeňka Plavcová and Šimek on the radio waves, with meteor observations more than anything else, and the upper atmosphere, i.e. Link and his two students, Neužil and Zacharov. Link then went off to France, but he made the mistake of coming back, while Zacharov and Neužil were in no mood to serve under Link any more here. So Link then went back to France, became a naturalized Frenchman, François instead of František, though he only had a little support there, arranged for him by Jean-Claude Pecker, my good friend from the International Astronomical Union.

> If we're to compare Link, Šternberk and Mohr, what kind of pedagogues were they in relation to the younger researchers? How did they work with young people, and what opportunities did they give them?
>
> *It was more a matter of what opportunities those youngsters grabbed for themselves. Out of the older ones, Šternberk had studied photographic photometry, which was rather in decline by that time, but he was an outstanding manager who just never managed to comb that curly white hair of his. And he was a decent, good-natured sort who ran the Institute in a very unruffled manner, unlike Link, who was the angry one that Šternberk always had to hold back.*
>
> *Also at those congresses, for example, there was a verbal tussle going on between Mohr and Link, with Link very aggressive and Mohr kind of mollifying, but while keeping Link very much in check. Link didn't know how to behave. But he was good as an astronomer. You know, it's very complicated — there are many aspects that come into play.*
>
> (Interview with Luboš Perek by Tomáš W. Pavlíček, 23 April 2020)

Establishment of the Institute and management procedure

In this interview, Perek described the key individuals and circumstances that he remembered from the first years of the CSAS Astronomical Institute, before he himself became its director in 1968. However, he showed his experience as a leader in the way he assessed the work of individual departments, presenting an evaluation of the achievements and continuity of their research. As if suspecting that the interviewer had studied the details of the organization of work at the departments,[351] he focused on evaluating the departmental heads. The most complicated individual was Link, otherwise a recognized expert. Although Perek does not refer to himself, he and Director Šternberk were the only ones in the Institute's administration who were able to bring Link into line, though Mohr did also sometimes manage to cut him down to size. Upon his arrival in Prague from Brno in 1953, Mohr basically ruled out Link's plans to obtain a professorship at the CU Faculty of Mathematics and Physics.[352] What

351 Hadrava, *Ondřejovská hvězdárna.*

352 MÚA, A AV ČR, collection Astrofyzikální observatoř ČSAV, box 4, Inv. No. 14, documents for the systematization of places, lists of employees, personnel changes, 1953–54. Link was the director from 6 February 1953. In September 1953 the CSAS Presidium was discussing Link's transfer to CU.

tensions had arisen between these scientists in the early days of the CSAS Astronomical Institute? And why did the youngsters have to seize their own opportunities?

This chapter is not only about the history of the Institute and its research departments, but also about tracing the trend from celestial observations to technocracy — and the experts who were able to design the new techniques. As the historical context of the 1960s in Czechoslovakia shows, it is not just about the history of science, but also about the social history of expertise.[353]

There is a debate in historiography as to whether, after overcoming the period of Stalinism, the signs of indecisive politics of democratization emerged as a key factor,[354] or a dynamic aim of building a socialist future.[355] While Soviet Stalinism wanted to overtake the West at all costs, the peripheral states of the Eastern bloc strove to complete the processes started.[356] If professional astronomers in Czechoslovakia broke up with the ideological demands of Landová-Štychová, I am investigating how they participated in the aforementioned Departments in building state socialism? Was it about overcoming the Soviet vision of scientific research, or about trying to organize it better? Some missteps have been revealed in the transformation of postwar academia.

Central Astronomical Institute

The Astronomical Institute was established against the backdrop of the postwar transformation. Primary scientific research, which was of fundamental importance to the state economy and was not represented in existing scientific societies or at the ministries' departmental institutes, was now concentrated in seven new central scientific institutes, one of which came to be the Central Astronomical Institute on 1 July 1950, when it de facto took over the staff, instruments and mission of the State Observatory.[357] Originally there were only four positions, but Link, the Director

353 Sommer, *Řídit socialismus*, 14–18; Gil Eyal, *The Crisis of Expertise* (Cambridge: Polity Press, 2019).

354 Pullmann and Kolář, *Co byla normalizace?*

355 Mervart and Růžička, *„Rehabilitovat Marxe!"*, 9–11.

356 Doubravka Olšáková and Jiří Janáč, *Kult jednoty: stalinský plán přetvoření přírody v Československu 1948–1964* (Praha: Academia, 2018).

357 When the State Observatory [Státní hvězdárna] was transformed into the Central Astronomical Institute [Ústřední ústav astronomický], only Slouka was moved to the Petřín People's Observatory. MÚA, A AV ČR, collection Státní hvězdárna, box 4, Inv. No. 51, list of employees, No. 63–65, State Observatory employees (before 1950), box 7, 8, Inv. No. 74, employees after 1948. Seydl, the last director of the State Observatory, was fired.

from 1948, obtained seven new ones from the Ministry of Education and National Enlightenment, for which he accepted young students, often for blue-collar jobs, which they accepted for fear they would not find appropriate employment: "I was convinced at the time that if I did not accept this offer, I would never be able to work at the observatory again."

When in 1952 the Governmental Commission for CSAS Development was determining which research would be transferred to the Soviet modelled Academy of Sciences, the Central Astronomical Institute was divided into two: the **CSAS Astrophysics Observatory** at Ondřejov (under Director Link) and the **CSAS Chronometry Laboratory** (under Director Šternberk). This stemmed from disagreements between the two astronomers, as well as the practical organization of work at both locations. Likewise a Slovak establishment "drifted over" to the Central Astronomical Institute, namely the Astronomical Observatory at Skalnaté pleso (under Director Guth, 1951–55). It came briefly under CSAS administration, before it was reassigned within the SAS structure.[358]

The new structure of the CSAS, which officially launched its activities on 1 January 1953, thus now included three astronomical establishments, as befitted their importance to socialist society and the direction of their individual research: the Chronometry Service in Budečská Street in Prague, astronomical observation with meteoritics at Ondřejov and a similar agenda in the Tatras, where there were also excellent conditions for observing comets and researching the upper atmosphere. It was difficult to find buildings for the large institutes, while the smaller workplaces already had them. Mathematicians Jarník and Čech and physicist Valouch, who were also Communist Party members, had a decisive say in the Government Commission for CSAS Development. Hence they deliberately made sure that their own disciplines would have the most favourable conditions for scientific development, and they held onto the power to make the decisions about them.[359] Nevertheless, total professional and personal appreciation towards them can be heard in the discourse of the contemporary witnesses on the history of science.[360] Representatives of fields such as geology and astronomy could achieve this without Communist

358 Adam Hudek, "ČSAV a SAV 1952–1956," in Dvořáčková and Franc, eds., *Dějiny Československé akademie věd, I. díl*, 278–91; Adéla Jůnová Macková, "Vládní komise pro vybudování Akademie věd," in Ibidem, 107–53, here 121–22.

359 As written by Professor Jarník, "in a people's democratic state heading towards socialism, the existence of such an institution is simply a historical necessity". Vojtěch Jarník, "Před ustavením Československé akademie věd," *Časopis pro pěstování matematiky* 77, no. 3 (1952): 205–7, here 206.

360 Pavlíček, "Rozhovor s prof. Jaroslavem Kurzweilem."

Party membership, but they were still dependent on the will of such key figures.[361] The Commission's external collaborator Buchar, a professor of geodetic astronomy at the CTU, was conversant with astronomical matters, and he was appointed a corresponding member of the CSAS (as of 1 January 1953), working in its First (Mathematics and Physics) Section, while other astronomers did not gain Czechoslovak Communist Party Central Committee approval to be appointed to the CSAS.[362]

These newly established workplaces enabled the younger generation of astronomers to pursue modern research on an ongoing basis as no domestic institution had ever permitted. It is noteworthy, however, that the Astronomical Institute or Department was managed for the first two decades by members of the interwar generation (Šternberk, Guth, and Link).[363] However, critically to history of CSAS, one can ask whether the interwar generation perceived the incorporation of the Astronomical Institute into the Academy of Sciences as a benefit, or in which areas of research funding was this confirmed?

Replacement of directors and merger of workplaces

However, the initial division of the directors' functions was short-lived. Link was known to have "a complex nature, which often led to strong disagreements both between him and other older generation astronomers, and later disagreements with younger staff".[364] He was even dropped from the nominations for Academy membership (partly because of a critical article he wrote in 1937 after returning from the Soviet Union). His conflict with his subordinates, who complained to the CSAS Presidium about the "authoritarian behaviour" of the Astrophysics Observatory Director, came to be a major stumbling block. A complaint written on 6 May 1953 by thirteen young astronomers concerned over their positions emphasized that the director's rivalry was hampering their initiative and limiting new directions in astrophysics: "Comrade Link is restricting the observatory's work to the fringes of astrophysics, bordering upon geophysics. He has hitherto rejected any hints that purely astrophysical research is to expand.

361 E.g. geologist Radim Kettner. Cf. Gecko and Pavlíček, "Kariérní postup", 101–5.

362 MÚA, A AV ČR, collection Vládní komise pro vybudování ČSAV, box 4, list of proposal members for CSAS, 1952.

363 Dvořáčková and Franc, eds., *Dějiny Československé akademie věd, I. díl*, 223.

364 Miloslav Kopecký, "Ke vzniku Astronomického ústavu ČSAV," in *Reflexe počátků vědecké instituce. První všední dny ČSAV a jejích ústavů v paměti současníků*, ed. Hana Barvíková (Praha: AAV ČR, 2003), 43–47, here 44.

He has such character traits, ways of behaving and an attitude towards this matter that, in our opinion, he would stand in the way of building an Institute with a broader programme."[365]

In order for us to follow the first postwar generation of astronomers, all thirteen signatories should be named here: Milan Blaha, Jiří Bouška, Václav Bumba, Zdeněk Ceplecha, Josip Kleczek, Miloslav Kopecký, Ladislav Křivský, Vojtěch Letfus, Zdeněk Pěkný, Miroslav Plavec, Zdeněk Švestka, Vladimír Vanýsek, and Boris Valníček, who was perhaps most involved in this dispute.

After a tense response, with Link threatening to dismiss the youngsters, he ended up requesting to be released from his position under pressure from the CSAS Presidium. The situation was resolved by a special commission headed by Jarník. The strained relations were exposed, and as the commission put it, Link was displaying "an unhealthy envy that stems from a capitalist upbringing".[366]

This commission entrusted Bumba with temporary administration, and research was supervised by a scientific council led by Buchar. Link tried to obtain a professorship at the CU Astronomical Institute, but in the meantime this position had been filled by Professor Mohr from Brno, and so an Upper Atmosphere Department in the observatory was created for Link, separating off his particular research. At the commission's suggestion, the observatory was merged with the Chronometry Laboratory as of 1 January 1954, thus creating the CSAS Astronomical Institute (with Šternberk as Director from 22 January 1954). A non-party-member took the Communist's place, and the Institute was based in Prague, although the research was focused in Ondřejov.[367] The Deputy Director was now Guth, who had come back to Ondřejov from Slovakia. He had more experience with the current astrophysical research than Šternberk and also his membership in the Communist Party was crucial for the CSAS Presidium.

CSAS Chronometry Laboratory

The operations surrounding the important laboratories and research which the state had an interest in also involved the Chronometry Service. Hitherto it had operated as part of the State Observatory, but after the

365 Ibidem, 46.

366 MÚA, A AV ČR, collection Prezídium ČSAV, minutes of the 16th Presidium meeting, 25 September 1953.

367 Pavlíček and Šolc, "Cesty československých", 497–99.

Klementinum had been occupied by the Germans to serve the German university in 1940, it was transferred to a tenement building in Vinohrady (at No. 6/974 Budečská Street).

The Chronometry Service was run by **Bohumil Šternberk** (1897–1983). After studying at CU in Prague, he completed an internship in Berlin, where he also attended Einstein's and Planck's lectures. Although he himself kept to classical astronomy, he followed and as director ultimately coordinated the ongoing development of astrophysics. He demonstrated his skills in his precise work with measuring instruments at the State Observatory branch at Stará Ďala, where he was sent in 1927 (becoming director from 1936 to 1938). After the occupation of this borderland by Hungary, he returned to Prague and took over the Chronometry Service. For measurements he used an Askania elbow transit telescope and an impersonal micrometre – devices left behind by German University Professor Schaub and his assistant Ullrich Güntzel-Lingner (1914–1979).[368] Hitherto the exact time had been maintained by operating pendulum clocks, which were adjusted in line with signals from Paris and Greenwich. Ambitiously, Šternberk introduced an independent astronomical designation called "Prague Time" (Tempus Pragense, TP) using modern quartz clocks, whose time was compared with that of other European observatories. This was indeed an ambitious step towards international cooperation, as the Prague results were communicated to both Paris and Moscow. However, it was not actually possible to determine the time astronomically from the upper floor of the tenement building, so Šternberk arranged for an elbow transit instrument to be located at the CU Observatory on Švédská Street and placed a micrometre in Ondřejov. Both locations were connected to the Laboratory in Budečská by a special direct telephone line, so that synchronization signals could be transmitted to adjust the clocks.[369]

In line with these ambitions, Šternberk's precision work led him to organize a conference on the standardization and frequency of time pulses in May 1953 at Liblice, which provided important international contacts for the CSAS Astronomical Institute.[370]

368 MÚA, A AV ČR, collection Státní hvězdárna, box 18, Inv. No. 113, report on the forced surrender of clocks and other historical instruments to the German University, box 19, Inv. No. 115, instruments purchases 1947–50 (radio receivers, electric clocks).

369 The pendulum clocks "worked" in pairs, and from 1947 the delivery of the time signal for the Czechoslovak Radio broadcasting was resumed. Vladimír Ptáček, Ludmila Weberová, and Rostislav Weber, "Časová služba," in *Ondřejovská hvězdárna*, 140–49, here 140.

370 MÚA, A AV ČR, collection Astrofyzikální observatoř ČSAV, box 5, Inv. No. 28, report on the first workshop on solar physics, 9 and 10 January 1953.

Observations at Ondřejov

In the 1950s and 1960s, the CSAS Astronomical Institute clearly recorded its greatest successes in astrophysical research into the Sun and meteors, although other research programmes and departments were rapidly coming to the fore, with a total of six: solar, interplanetary matter (meteors), radio astronomy, upper atmosphere, stellar and chronometry. What is interesting about the division process is how it was moulded by human relationships. At first, the Sun and meteors were primarily observed, as Link and Guth had established this programme at Ondřejov during the war. It was a worldwide phenomenon that dynamically developing astrophysics procedures were taking over from classical astronomy.

As a rule only one or two of the ten research assistants (during their postgraduate studies – *aspirantura* from Russian) dealt with classical astronomy or meteorology, while the rest were enrolled in astrophysics. Hence they had to have the knowledge to be able to grasp the details of astronomy, so as not to remain esconced in physics institutes, because sometimes during the defence of doctoral theses (called Candidate of Sciences, CSc.), as in the case of Jan Svatoš (1966), they were met with rebukes from physicist reviewers that their work had now crossed the line into theoretical physics and had to be defended before the appropriate commission (as was the view of Professor Čestmír Muzikář, 1926–1966).

At the time, Professor Mohr spoke unequivocally in favour of the developing field: "Astrophysics is part of the broader field of physics, and the boundary between the two fields cannot be drawn precisely, nor would it make any sense to do so."[371] The scientists from Ondřejov and the CU Mathematics and Physics Faculty stuck together more whenever challenged by the theoretical physicists.

Some breakthrough discoveries and findings were made thanks to the unique international events in which Czechoslovakia was significantly involved. As part of International Geophysical Year (IGY, 1957/58), observatories around the world coordinated observations of the Sun and meteorites (astronomy) and the influence of the Sun on the Earth and the Earth's atmosphere (geophysics). They exchanged telegrams about the phenomena observed and established valuable individual scientific contacts in both the East and the West. Another phenomenon observed round

371 MÚA, A AV ČR, collection Astronomický ústav ČSAV, unsorted, sign. 5, formation of new scientific researchers, 1954–74, letter by J. Mohr to the head of the CSAS Scientific Collegium for Astronomy, Geophysics, Geodesy, and Meteorology (SC AGGM), 24 February 1966.

the world was Sputnik 1, the first artificial satellite to be launched.[372] This was clearly an initiation for the first postwar generation of astronomers and geophysicists, as they participated in several important observations during IGY.[373]

The IGY had its Secretariat in Brussels. Before this global event began on 7 January 1957 the American Vanguard satellite was supposed to be launched for observation by the astronomer and geophysicist communities around the world, but the launch was delayed, and in the meantime the Soviets put Sputnik 1 into Earth orbit on the night of Friday 4 to Saturday 5 October 1957. The satellite was observed and photographed over Czechoslovakia from Petřín (recorded positions were sent to Moscow by telegram). In the following days Sputnik 1 fly-bys were recorded by the Průhonice and Panská Ves ionospheric stations and the Lomnický štít observatory and meteorological station.[374]

It is important to mention just how much of a scientific revolution Sputnik 1 represented for academic structures. A meeting of the CSAS Mathematics and Physics Section was convened on the Monday, dividing up the observational tasks that focused on the upper atmosphere, satellite signals and the Doppler effect, which made itself felt when the radio signal frequency increased as the satellite approached and decreased as it moved away. This effect was immediately measured at Ondřejov and the CSAS Geophysical Institute. In cooperation with the CSAS Institute of Radio Technology and Electronics, a procedure for observing the temporal distortion of satellite signals was to be created, which helped to monitor the propagation of radio waves through the ionosphere. Through Sputnik 1, the Massachusetts Institute of Technology (MIT) came up with the option of creating a reverse reference to determine the position of an observer from a satellite, which the US military used to build GPS.

To make Sputnik 1 observations truly global, the Soviet Union's Astronomical Council telegraphed collaboration requests to many of the world's observatories. In Czechoslovakia, where it sent 60 telescopes for amateurs and professionals, it asked the Director of both Academy observatories and the CSAS Astronomical Commission Chairman, Buchar, to coordinate the observations. Grygar recalls that he and Kohoutek saw the telescopes

372 MÚA, A AV ČR, collection Sbírka základních dokumentů pracovišť ČSAV (hereinafter Sbírka základních), box 4, brief report on the most important results of the activities of the CSAS Astronomical Institute over the years 1952–64.

373 Interview with Jan Hladký by Tomáš W. Pavlíček, 9 March 2021. Link met Hladký during the IGY in the cable car to Lomnický štít.

374 Pavel Ambrož, Václav Bumba, and Zdeněk Švestka, "Sluneční astronomie," in *Ondřejovská hvězdárna*, 172–90.

ready for distribution when they were on a trip to Moscow that summer during a "twinning" tour "as a reward" for their observational results. They understood from this that the launch of the satellite was imminent.[375]

Indeed all the people's observatories in Czechoslovakia came to be actively involved, with thirteen stations telegraphing Moscow regarding fly-bys.[376] However, it was not viable to coordinate such extensive observations over the territory of a small state, so from 1959 they were organized by four professional observatories and coordinated by the newly established CSAS Astronautics Section headed by Rudolf Pešek (1905–1989).

Sputnik 1 also provided geophysicists with some interesting results. The aforementioned Professor Buchar was the first person ever to deduce from the orbit of a Soviet satellite a method for more precisely calculating the extent of the planet's flattening (with an axis 42.8 km shorter than the diameter of the equator). His study was published in *Nature*, while other authors only had to refine the calculation. Satellites and then astronautics reverberated throughout society, but the truly millennial turning point in knowledge of astrophysics was the discovery of quasars, bodies with a spectral red shift higher to that of stars, and pulsars, rotating neutron stars which lighthouse-like, alternate the intensity of their radiation.[377] The only question was whether the astronomers were equipped with the instrumentation for these observations.

Part 2: New instruments – new horizons

> You have mentioned that astronomy was in a bad position [while you were studying]. How did things subsequently turn out? When did the situation improve?
>
> *It seems to me that it was about the time when the great astronomical discoveries started in the 1960s, when I was already out of the faculty and had defended my thesis. Because quasars were discovered in the year I put up that defence [1962]. And that was the first stunner, because it was something no one was expecting, because the quasars were terribly far away, but then suddenly there was an increase in the red*

375 Interview with Grygar.

376 One of the amateurs involved was former officer Karel Morav (1906–1985), a worker at the Olomouc People's Observatory. See his articles in SOkA Litomyšl, Karel Morav collection, box 1, Inv. No. 33, Rakety a umělé družice (mechanika) [Rockets and Artificial Satellites (Mechanics)], 1959, typescript.

377 The received signal disappeared instantaneously so that the quasar must have been a point-like source.

shifts, indicating the distances. For a number of years after that, there were disputes as to whether the red shifts were not caused by something else.[…] In any case, it was now a fact, and then within two years we had relic radiation, which was a real superstunner, and then 1968 saw the pulsars. So as in other fields of human activity, the 1960s were marvellous.

So do you see the main reason to be that there were no great discoveries during your time as a student?

Basically that's right. Astronomy was more or less all optical, meaning that you only saw with instruments what you saw with your eyes. It is true that radio astronomy already existed, but its heyday did not come until 1965 thanks to relict radiation, as that was a discovery involving radio waves. And pulsars also involve radio waves. Quasars were actually discovered the classic way, but again the radio telescope, the Australian one, was involved, as it accurately measured the position of that quasar. Radio astronomers were very inaccurate when determining positions — that's where the sidelobes helped. […] Anyway, it had the advantage that the quasar was occulted by the Moon there, so they found out when the radio signal disappeared. Because you knew where it was by the Moon, so that's where they focused. Those were the big discoveries I was at. When I read this my eyes were as big as tennis balls.

(Interview with Jiří Grygar
by Tomáš W. Pavlíček, Petra Hyklová, and Kateřina Kočí, 14 June 2019)

The physics of meteors (bolides) – Department of Interplanetary Matter

For the first postwar generation of astronomers, there was no change in the way they thought about observational methods until after their dissertations had been defended. They had previously made full use of their previous experience, but now they had to work more intensively on their own development. As we saw in the previous chapter, meteor observation attracted classmates Kohoutek and Grygar in their youth, while Link's popularizing book also played its role.[378] While director, he identified upper-atmospheric and meteor shower research as core tasks, requiring "the acquisition of our own observational material on meteors by objective means".[379]

However, it was departmental head Guth who had the most experience. He had co-designed new visual methods for observing meteors during the interwar period, and after the worldwide success of Klepešta's photo of

378 František Link, *Potulky vesmírem* (Praha: Fr. Borový, 1947).

379 MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1952–64.

a bright bolide flying across the Andromeda nebula (12 September 1923), more were taken regularly at Ondřejov. Guth managed to involve amateurs in the observations and organized expeditions to the Tatras to observe numerous showers of Leonids. In 1951 a new stage began when **Zdeněk Ceplecha** (1929–2009), a bright third-year astronomy student at CU in Prague, was engaged for the Interplanetary Matter Department (although he finished studies in 1952).

While still on his student internship at Ondřejov, he came up with an innovative idea: to set up 32 cameras at two stations 35 km apart (Ondřejov and Mezivrata) to photograph bolides penetrating the atmosphere. When a meteoroid approaches the Earth, it flies through the upper atmosphere (approx. 70 km high), heats up, flares up like a fireball, and then disintegrates or falls to the ground as a meteorite. Ceplecha was counting on the fact that he could calculate the origin and size of the meteoroid as well as the properties of the upper atmosphere from the data on the photographed track (i.e. the length of segments of the meteor trajectory, recorded on the photography). Plavec was also able to clarify the developmental stages of Geminid meteor showers (published a study in *Nature* 1950 and a Meteor Showers monograph of 1956).[380] As a comet brightens, particles are ejected and a meteor shower separates from the parent comet. Thanks to Bumba and Valníček (both from the Solar Department), who had been photographing the spectra of meteors since 1953, Ceplecha was able to determine their predominantly stony composition (only five out of 200 tend to have a predominance of iron). The distance and the number of stations was gradually increased until they were able to monitor half of the visible sky above the territory of the state. By 1965 he had completed a network with twelve stations in Bohemia.[381] That is when close cooperation with both East and West Germany began along with a demand to build up their network. Thanks to the initiative of astronomers from Germany, the European Network for Photographing Bolides was established in 1968, its centre remaining at Ondřejov to this day.

This was thanks to Ceplecha's team, which was the first in the world to accurately calculate bolide paths and thus find meteorites on the ground. It happened on Tuesday, 7 April 1959, after eight o'clock in the evening, that a meteor lit up the sky over Bohemia for about six seconds. The unprecedented brightness captured by ten cameras confirmed that it was an extremely large meteorite and that it had not fallen far away. Ceplecha and calculator Marie Ježková first measured the photos and began the

380 Zdeněk Ceplecha, "Výzkum meteorů," in *Ondřejovská hvězdárna*, 155–64.

381 MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1965.

calculation, now with the help of electric calculators, though it still took them 200 hours. In the following days, the calculation was checked, which made localization of the impact more precise. The meteorite had fallen between four villages near the city of Příbram, from which it acquired its name and world fame. The CSAS Astronomical Institute organized hundreds of volunteers — as the activity of people's observatories was now very useful. The first and heaviest meteorite found weighed 4.5 kg, with the other three smaller pieces totalling 1.3 kg.[382] The expert succeeded in drawing up a pedigree for the meteorite: it was originally a small asteroid, formed some 10–20 million years ago after it left the belt between Mars and Jupiter. Nowadays, the meteorite is kept in the National Museum. The team achieved a world record not only for the number of hours exposed (i.e. recorded), but also for its ability to calculate the exact trajectory of the bolide through the atmosphere (21 km/s, angle 43° to the surface), the moment of its disintegration (into 19 pieces) and its subsequent free fall from a height of 13 km to the Earth's surface at a speed of 21 km/s. This was not only of importance for monitoring the impact of meteorites on the ground, but it was also used in the construction of space probes to determine what physical processes take place in the upper layers of the atmosphere.

Ceplecha received several international awards and was elected chairman of one of the IAU commissions. His group was able to calculate and track the orbits of other meteorites, and the information they processed was then used by NASA — here collaboration was established with Josef Allen Hynek (1910–1986), a descendant of Czech immigrants. The success of the entire discovery shows the organizational independence of the young worker, who in a sense founded a scientific school that has prospered worldwide to this day.[383]

Solar Department

Fastest of all, Czech astronomers came to be world leaders in solar observations. From the outset the group of young astronomers engaged in solar physics was led by **Zdeněk Švestka** (1925–2013), who actually got to Ondřejov (nominally as a gardener) before he graduated.[384] They built their own apparatus for observing the Sun and its influence on the

382 Pacner, *Češi v kosmu*, 28.

383 Cf. calculation of the Chelyabinsk bolide's trail on 15 February 2013. During the Příbram action, Ceplecha's group included: M. Novák. M. Ježková-Nováková, Ladislav Sehnal, N. Lukasová, J. Rajchl.

384 He received his CSc. in 1956 and habilitated in 1965.

Earth – a **dynamic radio spectrograph**.[385] Through a statistical analysis of sunspots (headed by Miloslav Kopecký, 1928–2006), they established that the Sun's eruptive activity peaks in eleven-year cycles, as well as in a physically different period of 80 years. Švestka, a non-party member and the leader from 1956, brilliantly interpreted the physical properties of flares, which was of importance for monitoring space weather and its manifestations on Earth. Ladislav Křivský (1925–2007, then still a party member) discovered signs of proton eruptions, which are accompanied by X-ray and radio radiation from the Sun and affect people, animals and long-distance electricity lines in a certain way.[386]

A much greater danger for cosmonauts in orbit was proton beams. Although *Nature* magazine politely rejected Křivský's study, this issue was published in 1962 in the physics journal *Nuovo Cimento* in Italy. A serious finding was then made in the summer of the following year. Although it was supposed to be a calm year within the solar cycle, our nearest star was extraordinarily turbulent. Astronomers from Ondřejov informed the observatory in Crimea that the radiation around the Earth would intensify. The colleagues there had up-to-date information that Vostok 5 was about to be launched in the Soviet Union, and they immediately alerted the Presidium of the Soviet Academy of Sciences in Moscow to postpone the departure by a few days.[387]

The Solar Department also organized an expedition to near Kislovodsk in the Caucasus for a solar eclipse in July 1954. However, due to the thin layer of clouds (cirrostratus), the photometric results were poor. Although Link had experience of such an expedition (in 1936 in the USSR), Guth was entrusted with the leadership due to their well-known dissension. Together with other groups from Eastern Europe (which went without instruments), this was one of the first scientific expeditions that received an invitation after the war to the Soviet Union, where they visited the repaired Pulkovo Observatory and the Sternberg Institute of Astronomy at the University of Moscow.[388]

385 In operation since October 1965, the only one in Europe, with a range of 50–200 Mc/s, designed by Švestka and Blaha. MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1965.

386 During WWII in the resistance, edited journal *Algol*. Studied cosmic physics and meteorology at CU 1945–48. Later, from 1970, he and Stanislav Gróf began to publish articles on the effects of fluctuations in biorhythms on humans (Rhythmic factors in selected endogenous depressions). In 1969 he had been expelled from the Communist Party.

387 Pacner, *Češi v kosmu*, 26.

388 Ambrož, Bumba, and Švestka, "Sluneční astronomie," 177–78, a giant construction in the style of socialist realism. For Perek, it was the first contact with future collaborators from Ondřejov. Cf. MÚA, A AV ČR, Luboš Perek collection, unsorted, photo album from

It is also worth mentioning the study of the Sun's magnetic poles (headed by Bumba), utilized in laboratory plasma physics and the theory of the formation of solar protuberances from hot coronal plasma (Josip Kleczek, 1923–2014). The Department joined CSSAR (Cooperative Study of Solar Active Regions) where it was awarded the privilege to act as a global collection centre for data from observations of H-alpha line widths in flares.[389] Other key employees at the department included Vojtěch Letfus (1923–2003) and Ludmila Fritzová (later Švestková 1929–2018), with a total of 22 people including observers and assistants (1961).[390] It was important for the evaluation of the Institute that citations of their work abroad significantly exceeded the results of other workers.[391] Švestka was even elected Chairman of the Commission for Solar Activity at the IAU (1964) and together with the Dutch astronomer Cornelis de Jager (1921–2021) founded the important *Solar Physics* journal (1967). Bumba, on the other hand, focused on cooperation "primarily within the framework of agreements with the Academies of Communist states".[392]

Chronometry Service

The success of globalization can best be seen in the standardization of time between individual states during the 20th century. There used to be differences in local times, such as Budapest and Prague time under the Habsburg Empire. States whose time services had achieved high technical precision sent their own generated time signals to the International Time Bureau (Bureau International de l'Heure, BIH) in Paris for comparison. By the 1950s some twenty institutions had attained this level, including Czechoslovakia.[393] However, departmental head Šternberk rejected the

expedition, 1954.

389 MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1965.

390 Ambrož, Bumba, and Švestka, "Sluneční astronomie", 181, photography of the Solar Astronomy Department Letfus was the head of the department from the beginning of the 1970s. Studied at CU 1945–48 (CSc. 1964).

391 Have been cited by Rubashov and Vitinsky (USSR), Mergentaler (Poland), Bray and Loughead (Australia), de Jagger (Netherlands), Giovanelli (Italy), Ringnes (Norway).

392 MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1965. Sayan Solar Observatory near Irkustsk, Simeiz Crimean Observatory, Kislovodsk Mountain Astronomical Station, Sofia University Observatory, Archenhold Observatory in Eastern Berlin. Some of them were leaders in solar physics. But from the very extensive Western research, only B. Howard from Mt Wilson was mentioned.

393 As part of international cooperation, it was necessary to communicate well in all world languages, which was not a problem for Šternberk (centres in Paris, Moscow, Mizusawa, Greenwich, Potsdam). See MÚA, A AV ČR, collection Sbírka základních, box 4, report of

name ***Time Service***, as he did not want his scientific work to be trivialized in this way, wishing to make it clear that his department performed primary and applied research.[394] He thought up his own second-impulse generator in a curious manner. He concluded an agreement with the OIR (Organisation Internationale de Radiodiffusion), International Radio Organization, which had a local station at Vestec, 10 km from Prague, to send signals from the quartz clock pendulum to his establishment in Prague, where there was an electronic second impulse counter — that is, the face of this clock was actually 10 km from the source. Šternberk then harmonized the impulses with astronomical observations and compared them with foreign time signals. Worldwide establishments then provided these to each other. The Prague time signal was broadcast by Czechoslovak Radio. Tables published in the Institute's journal *BAC* and in *Říše hvězd* were used to calculate the deviation to the radio receiver location. This complicated system changed in 1957, when a separate quartz clock from the Institute of Radio Technology and Electronics was moved to Budečská Street. The reliability of this precise timekeeping increased a hundredfold, but efficiency was greatly curtailed by the frequent power outages in Prague and Ondřejov, which astronomers repeatedly complained about.[395]

As part of IGY, the Institute was also involved in recording signals during regular fly-bys made by Sputnik 1, launched into orbit on 4 October 1957. Twelve days later, as this satellite flew past again, its Doppler effect was successfully recorded on tape and the parameters of subsequent fly-bys was evaluated. Oscillographic methods helped to increase the sensitivity of the measurements, which improved the reception of signals on short waves. The Prague establishment was then able to offer its methodology to other services, e.g. in Bucharest. By analysing regular measurements from 1956, the weather department discovered over the course of a decade how the Earth's rotation is slowing and the length of the day is lengthening. Working with an observatory in Tokyo, they demonstrated how long-distance signal propagation times change with season and solar activity.[396] A special signal directed at Japan was sent from the transmitter in Poděbrady in order to experimentally determine the propagation speed

1970, 5–7.

394 Ptáček, Weberová, and Weber, "Časová služba", 141.

395 MÚA, A AV ČR, collection Sbírka základních, box 4, report of years 1956–64.

396 Ibidem, report of 1967. In particular Vladimír Ptáček co-worked with the observatory in Japan (joint publication in 1967).

of radio waves in the ionosphere. The results of the jointly conducted measurements between 1957 and 1967 were published in Japanese and Czech professional journals.[397]

This was of immense importance for determining differences in geographical distances (one of the government's tasks) as well as for harmonizing the exact time between different time zones' aeronautical operations. From 1967 the results were processed on the Minsk 22 institutional computer. That same year the department received a digital clock from the Metro Blansko company, the design of which had included astronomers' ideas.[398] It was at this department that Šternberk trained his high-calibre successors, Vladimír Ptáček[399] and Ludmila Weberová[400].

The upper atmosphere from the standpoint of astronomical research

Creating another department at the Institute meant difficult negotiations over finances with the CSAS Presidium. Based on the rapidly and readily available literature, there was no doubt about the opportunities afforded by the new methods. However, every reduction in the Institute's budget brought with it limits on the existing department, so some scientists deliberately sought counter-arguments, as was the case before the establishment of the Stellar Department (see Chapter V).

However, the Upper Atmosphere Department was created in very peculiar circumstances. Following the rift, František Link was moved upstairs from the Interplanetary Matter Department, so that those who were unhappy with the former director no longer came into contact with him. Technically, it was associated to some extent with meteorology and historical climatology. Link succeeded in finding periodic climate variation

397 Cf. *Annals of the Tokyo Astronomical Observatory*, no. 2 (1967); *BAC* 15, no. 5 (1964).

398 Thanks to them, the Elektročas National Company developed new devices for frequency correlation and time systems. Some companies, such as Chemoprojekt, commissioned expertise in the preparation of equipment for monitoring and temporal harmonization of their production processes – here e.g. pumping liquids in pipelines. MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1952–64.

399 Vladimír Ptáček (1920–2001). Studied at CTU in Prague, constructed first quartz clocks in the Research Institute for Electronic Physics, from 1954 in CSAS Astronomical Institute. CAS honorary member. Together with colleagues from other institutes he created an original method of comparing time standards using television broadcasts. Cf. https://www.hvezdarna-fp.eu/products/ptacek-vladimir/ (accessed on 1 September 2023).

400 Ludmila Weberová (1922–2011). Born in Olomouc, grammar school finished in 1940, after war studied geodesy at CTU in Prague, from 1953–79 CSAS Astronomical Institute, after retirement still co-worker. Jan Vondrák, "Zemřela Ing. Ludmila Weberová, CSc.," *Zákrytový zpravodaj. Hvězdárna v Rokycanech*, no. 6 (2011): 8.

of 400 years based on solar activity. Just as there was a Little Ice Age in the 17th century, Link's forecast predicted a worsening climate in the early 21st century. Nowadays only archaeologists take this half-forgotten forecast into account. Kohoutek's latest book on climate has also remained underappreciated.[401]

Link measured the brightness of the twilight and night sky over the long term and observed lunar eclipses, the influence of the Sun on the Moon and the curvature of its rays in the Earth's gravitational field. Little did he know that this would lay solid foundations for multi-messenger astronomy, which did not actually develop until gravitational lenses were discovered in 1979. The first of his two collaborators, Igor Zacharov (born in 1927), collected aerosols, i.e. captured falling solar dust and meteorites in the upper atmosphere. The second, Luděk Neužil (1928–2017), together with Link, prepared new dioptric tables of the Earth's atmosphere as a tool for observing artificial satellites.[402] As can be seen, the department innovated measurements, whether for twilight phenomena or particles in the atmosphere: photometry from Ondřejov and Lomnický štít, collection of meteor dust by balloons in southern France up to an altitude of 30 km and from an aircraft deck at an altitude of 6 km above Ondřejov.[403] This activity was of benefit to various disciplines in research and production. At the same time, Link managed to explain the given beam-bending phenomena on a theoretical level, as his later monographs demonstrated.[404] Subsequent observations of the upper atmosphere using photometers placed in orbit by satellites were then carried out without him, as in 1970 he decided to remain in France.

Zdeňka Plavcová – the Judith of Czech radio astronomy

"[...] So that's what Communist women were like. But there were also decent ones. I remember Zdeňka Plavcová, Miroslav Plavec's wife — she did radio astronomy. She was a prominent astronomer. She did meteor radar and published a lot until she left for the US. They both emigrated." [405]

This eyewitness only started talking about women in Czechoslovak astronomy when we asked gender-related questions. It should be added,

401 MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1952–64. Luboš Kohoutek, *Unser Lebensraum in Gefahr. Die Atmosphäre der Erde. Sachbuch* (Frankfurt am Main: August von Goethe Literaturverlag, 2009).

402 MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1965.

403 MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1966.

404 František Link, *Eclipse Phenomena in Astronomy* (Berlin: Springer, 1969).

405 Interview with Grygar.

however, that he was readily able to express unrehearsed appreciation for a number of women in Czech astronomy and to differentiate between the pseudo-scientific approach of Landová-Štychová and the professional Plavcová. Perek mentioned her himself when he listed the individual departments at the CSAS Astronomical Institute. However, the question arises: what role have women played in astronomy (many of them had an astronomer husband), how successful have they been (astronomical computations), and to what extent have they been remembered within the field (many have been anonymous)?[406] They are mentioned in individual chapters of historical publications, but none of them have biographies there. Not a single woman has yet acquired the most prestigious František Nušl Award, which has been awarded again since 1999, while numerous men from the first postwar generation have won it. Did the Czech community overlook its female colleagues? Or was it because two female astronomers with complicated character profiles won the prize in the postwar period (Pajdušáková in 1946 and Landová-Štychová in 1949)? Or was there a break in professional contacts because some of the successful female astronomers emigrated after 1968 and not all of them were able to continue their scientific activities? Anthropologists see a particular reason behind the lack of study on the status of women across professions.[407]

In what respect did **Zdeňka Plavcová** (née Baziková, 1930–2023) play her key role, considering she is given the epithet of the biblical Judith? She studied radio engineering at the Faculty of Electrical Engineering of the CTU in Prague and stayed there to complete her CSc. (1953–56) under Professor Josef Stránský (1900–1983), who headed the Department of Theoretical Radio Engineering.[408] During her studies she met her future husband Miroslav Plavec, who was popularizing astronomy as a lecturer at the Petřín People's Observatory. Zdeňka specialized in radio astronomy — a field that was undergoing promising development and attracting the attention of such globally renowned astronomers as Professor Oort in Leiden.

Plavec managed to obtain a work placement in the border region and thanks to Professor Buchar gained a position as a postgraduate assistant

406 Lindsay Smith Zrull, "Women in Glass: Women at the Harvard Observatory during the Era of Astronomical Glass Plate Photography, 1875–1975," *Journal for the History of Astronomy* 52, no. 2 (2021): 115–46, https://doi.org/10.1177/00218286211000470.

407 Dobrochna Kałwa, "Herstoria mówiona w Polsce. Kilka uwag o feministycznych projektach oral history," *Wrocławski Rocznik Historii Mówionej* 11 (2021): 8–21.

408 About the Faculty, which until 1950 was one of six separate colleges within the CTU see Marcela Efmertová and Oldřich Starý, eds., *Fakulta elektrotechnická – historie, současnost, perspektivy. Almanach absolventů 1918–2001* (Praha: Libri, 2001), 8–53.

at the CTU Institute of Geodetic Astronomy, which he joined in January 1950, teaching spherical astronomy. But when, a few years later, he was accepted for a postgraduate position at Ondřejov, both spouses moved there, and Zdeňka obtained a position as a researcher in 1957. The focus of the research programme at that time was meteor observation, which placed restrictions on Miroslav's interest in studying binary stars. His wife, on the other hand, utilized her skills in radio engineering and, as a postgraduate assistant, initiated the construction of a meteor radar in 1955 for observing meteor showers and calculating their trajectories.[409]

Radar had first been deployed during WWII in Britain, where from 1944 they sometimes picked up signals of meteoric origin rather than of fighter planes. At that point the army secretly began "observing" meteors, but the results could not be published until three years after the war.[410] Radar enabled astronomers to observe meteors in new ways, as well as in inclement weather, by moonlight and even during daylight hours.

Plavcová initiated the construction of a device that was built on the basis of the German RZ III (Freya) radar captured at an airport in Pardubice after WWII. Like Judith of the Apocrypha, the young engineer lured her colleagues into radio astronomy with this booty.

Škoda in Plzeň then adapted the plundered radar with a rotating observation cabin and antenna, a reflective mattress and a transmitter. The completely new indicator section of the device was constructed by Plavcová's colleagues from the CTU Institute of Radio Technology, B. Sokolík and R. Křečan, who were Professor Stránský's assistants. Together with her colleague Miloš Šimek (born in 1933) from Ondřejov, she worked on other radio astronomy components. The entire radar was installed in 1957 and ongoing observations began the following year, when the Perseid meteor shower put in an appearance.[411]

Zdeňka's husband made good use of the experience he had acquired in Britain at a 1954 conference at Jodrell Bank near Manchester. There Professor Thomas Reeve Kaiser (1924–1998), who was interested in the construction of the Czechoslovak radar, helped to design the research programme. In this way a new Radio Astronomy Department was created, headed by Jaromír Budějický (1919–1991), with whom Plavcová wrote the important monograph Radio Astronomy (1962) and a number of other works.

409 Miloš Šimek, "Meteorická radioastronomie," in *Ondřejovská hvězdárna*, 165–71.

410 Hoskin, *The Cambridge Concise*, 315.

411 Šimek, "Meteorická radioastronomie", 166. Šimek studied at CTU, from 1956 at Ondřejov Observatory, 1966–68 stay at the National Research Council in Ottawa.

She also received her doctorate at the CU Faculty of Mathematics and Physics. Miroslav later completed his habilitation there (1968), but before he started lecturing, he went to the USA for an internship in 1969, where his wife and children travelled to join him. The very next year, he received a professorship at the University of California Astronomy Institute in Los Angeles (where he was director between 1975 and 1978). Because Plavcová had experience with computer calculations, she was offered the position of head of the Computer Centre at this institute (running it until 1994).[412] After Zdeňka and Miroslav had left for the USA, their scientific work was no longer spoken of in Czechoslovakia.[413]

Part 3: Cadre education — male and female post-graduates

> *"Under her leadership, a meteor radar was built and put into operation. Engineer Plavcová is a conscientious scientist, perhaps too self-critical of her own work, which leads to the fact that she rarely publishes the results of her work in scientific literature."*
>
> (Fragment of a cadre report. MÚA, A AV ČR, collection Astronomický ústav ČSAV, unsorted, sign. 4, cadre reports, ROH)

> *"She didn't work in America after that — she remained a freelancer there. Then there was Ludmila Fritzová, also a great astronomer, who started out in meteors, then came to the Solar Department and married Švestka. She died last year, but in emigration, in Holland. Then there was Helena Dědičová. She graduated and right after that it was 1968 — she and her husband also left for Canada. After that she only taught there — I mean at high school — she didn't do science anymore. She did her doctorate here.*
>
> (Interview with Jiří Grygar by Tomáš W. Pavlíček, Petra Hyklová, and Kateřina Kočí, 14 June 2019)

With regard to the CSAS Astronomical Institute's complex organizational structure encompassing the scientific departments as well as the technical provision of instruments and data processing, a comparison of the

412 She became member and later director of the Society of Sciences and Arts in Los Angeles.

413 However, the reports from 1970 and 1971 show their publications still under the CSAS Astronomical Institute. MÚA, A AV ČR, collection Sbírka základních, box 4, reports 1970, 1971.

male and female staff offers an important reference point. In the period under assessment, namely 1961, 105 employees worked at the Institute, of whom 27 were researchers, two were postgraduate assistants and six were observers. Of this number, there were five women among the researchers, one postgraduate assistant and one observer. A majority of 70 people held positions as assistants, calculators and technicians, as well as the administration, management and canteen staff (plus gardeners) at the Ondřejov complex.[414]

For women as well as for men, there was a similar imbalance in cadre reports. On the one hand, politically mature and active worker functionaries in the administration or canteens, on the other, professionally cautious, conscientious calculators and scientists, only a few of whom were involved in the Communist Party or in the Revolutionary Trade Union Movement (Revoluční odborové hnutí, hereinafter ROH). The director was aware of who was popular on the team and tried to motivate the conscientious female assistants to get involved in "public life" so as not to spoil their cadre profile.[415]

In research assistant Weberová's report, the Institute Director's empathy is evident as he took her double maternity into account and allowed the deadline for submitting her doctoral thesis to be extended as much as possible (1961, on semi-definite time calculations). She worked in the Chronometry Service for twelve years and "brought chronometry up to an international standard". She was also interested in learning computational methods on computers. Rather than her maternity, it was her religious background that put her at a disadvantage, and during her background check in 1958 she was criticized for not showing interest in public life. Šternberk attempted to help her by having her edit texts on astronautics so that he could smooth over the unfavourable remarks in the report, but maternal and household chores (her husband was a scientist) made her unable to submit the work by the due deadline. For some postgraduate assistants, this would have meant the end of their employment, but from 1962 the director transferred her back to the position known as on-the-job scientific preparation.[416] She did not pass until 10 December 1965.

414 MÚA, A AV ČR, collection Astronomický ústav ČSAV, unsorted, sign. 4, cadre reports and evaluations 1961.

415 A similar disbalance between professional and family life and the lack of public activity was stereotypically mentioned in Polish cadre reports. Fidelis et al., *Kobiety w Polsce 1945–1989*.

416 MÚA, A AV ČR, collection Astronomický ústav ČSAV, unsorted, sign. 4, cadre reports, 1961.

Specific features of female astronomers' research work

As already mentioned, several important female scientists from this generation worked at the Institute, though it is not easy to find a precise correlation between the records in the sources and the traces in collective memory. In any case it is important not to stop considering the gender-related aspects typical of astronomical work. When a scientist couple lived at Ondřejov, they were part of a small community that helped babysit during nighttime observations. At the same time, the village mentality did not always suit some astronomer couples, so that when suitable opportunities presented themselves, they fled to Prague, away from the household and children.[417]

Astronomical observations, evaluation of photographs and calculations requiring great care (before computers were used) opened up a choice between various attitudes towards research. One of these involved the patient work of female calculators and scientists, who did not graduate in astronomy, but who took a professional interest in it while remaining impervious to academic functionary careers. The accelerated careers of individual stargazers, who often travelled around the world to obtain observational material from other parts of the night sky, looked quite different. Thirdly, let us bear in mind that since the 1960s astronomy has transformed increasingly into team research, and scientists have to make huge efforts if they want to remain soloists. The problem indicated by gender analysis lies more in the perspective taken by the history of science, reliant upon the official records of the men heading academia.[418]

In an interview, Grygar first praised a number of female astronomers, distinguishing them from those who did not have any substantial results, and then admitted that there were differences between the men and women in leading positions: "There were still very few female astronomers. We only had one, Eliška Chvojková. I remember her, she was a doctor of science, but I saw when I was at the defence that they pressured her more than they would a man. It was evident there that the older gentlemen were not pleased they had to give her the DrSc. in the end. She made it to the top of astronomy and she was an impeccable woman, very kind. She helped students when they didn't catch on — giving them private tuition.

417 Lenka Krátká, "Life like a swing: Women's perspectives of everyday life in Czechoslovakia seafarers' families under state socialism," *Wrocławski Rocznik Historii Mówionej* 9 (2019): 8–21.

418 Dadej, *Beruf und Berufung*.

And she did great science herself — she dealt with planetary nebulae. This is Czech discipline. That's what Perek does, that's what Kohoutek does. But otherwise, it was weak."[419]

Eliška Chvojková (born in 1914 in Vienna – 1988) after graduating from the CU Science Faculty she was a secondary school teacher and did not join the Institute until 1950, when she focused on astrophysical applications of plasma theory on the magnetic and gravitational fields of the Earth. Her theory on the propagation of radio waves around the Earth was recognized by the International Advisory Council for Radiocommunication at the UN, to whose commission she was appointed between 1956 and 1970.[420] Which necessary contextual parameters have to be included in this gender case study? Doubtless the procedure for awarding scientific degrees, which was not actually carried out by the Institute, but by the relevant CSAS section (AGGM) as well as supervision of postgraduate students at the Institute, the proportion of scientists from the Academy of Sciences in university teaching and cadre and party policies within the Institute.

Cadre matters at the CSAS Astronomical Institute

Employees' cadre reports were carefully monitored from the 1950s and made the work of many scientists more awkward. However, they offer the researcher a valuable way to compare the attitudes of the party organization and the director towards the employees. It is particularly important in the context of the generally strained relations at the CSAS Astronomical Institute, where there was a certain hostility between Ondřejov and the Institute's Prague headquarters.

At the end of the 1960s, the influence of these cadre reports diminished, only to return even more strongly as normalization set in, even though the CSAS Astronomical Institute Director insisted that he would not fire any experts.[421] The same was the case with the growing trend involving authorized internships abroad, in which the Institute's employees participated significantly, thus acquiring the opportunity to obtain observation nights at foreign observatories and, if lucky, breakthrough results. This was due to Ondřejov's unfavourable location in the shadow of the Alps,

419 Interview with Grygar.

420 https://www.hvezdarna-fp.eu/products/chvojkova-eliska/ (accessed on 31 October 2023).

421 MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1967 (first report written during Perek's directorship). Cf. Interview with Perek, 10 January 2016.

which put Czech astronomers in particular at a disadvantage. On the other hand, foreign workers' stays at Ondřejov were approved by the CSAS Chief Scientific Secretary.[422]

With regard to cadre matters, the employees' family circumstances and origins, including their education and qualifications, were monitored. Communist Party members made up 24% of employees. Thus the central authorities repeatedly encouraged the party cell to motivate other employees to join. In the case of the Astronomical Institute, however, a specific network of internal relationships emerged. The Institute was based in Prague, but the majority of the staff worked and lived in a rural village outside Prague. From a cadre policy standpoint, the Institute was able to show a long-term balanced staff structure based on family background, with 46% from working-class families, 9% from peasant stock and 39% from the ranks of the intelligentsia.[423] Several staff members were involved locally in political bodies, in the National Front District Committees, but these arrangements still concealed numerous internal conflicts.[424]

Some of the technical staff at Ondřejov (e.g. the mechanics and optics specialists) were aware of the exclusive status that derived from keeping the expensive instrumentation operating, taking part in calculations (e.g. the observers and calculators) or ensuring the operation of the entire complex (with constant building modifications and maintenance of the extensive gardens and access roads to individual observation posts). Perhaps the fortress metaphor best depicts the network of relationships at the Ondřejov Observatory. The tension between the basic Communist Party and ROH organization and the Director Šternberk, who was not a Party member, emerged quite often, particularly in managerial, as well as organizational and scientific matters. Mixed in with all this was the tension between the "hardcore party members", who knew how to live out among the Communist country folk, and the employees from the big city. Perek was also drawn into the fray. He himself underwent a bitter "grilling" in 1959 after returning from a tour of large telescopes in the USA. At the time the Communists from Ondřejov reproached him for being uncollegial, as he refused to move to Ondřejov due to the construction of the two-metre telescope there.[425] During subsequent years he fully grasped just how entangled relations at the Institute were:

422 Dvořáčková and Franc, eds., *Dějiny Československé akademie věd, I. díl*, 301.

423 MÚA, A AV ČR, collection Astronomický ústav ČSAV, unsorted, sign. 4, cadre reports, 5 December 1961.

424 Karel Kaplan, *Národní fronta 1945–1960* (Praha: Academia, 2012), 205–11.

425 Koubská, *Hvězdář diplomat*, 33.

"At the Institute we had the administrative office in Prague and there were two party organizations, one at Ondřejov and one in Prague. The one in Prague was quite moderate, while the one at Ondřejov, namely Bumba, Valníček, Křivský and a number of others, these were the hard guys, who wanted Prague to go over to Ondřejov. Prague could not go over to Ondřejov. I would not have gone to Ondřejov either, because my wife was employed in Prague, I had family in Prague, and the other people who were at the Prague headquarters were also in a similar situation. And those people from Prague, including the party members, came to me and offered me party membership. This was at the time when I was going for a science doctorate (DrSc.). And so I said to my colleagues here: 'Look, if I joined the party now, they'd all say I joined the party and got my doctorate straight away.' So we put it off, but just for a year unfortunately. They came back a year later and said now you've got the doctorate!"[426]

It is quite possible, however, that in so doing Perek dulled some of the sharp edges and cemented the team of astronomers. In 1960, the party cell at Ondřejov led by Kopecký took full advantage of the official party and government directive on the decentralization of state administration and the transfer of management as close as possible to production, i.e. to Ondřejov, where the development workshops were, thus giving it direct control over the decisive processes. It turned out that such a solution would be extremely impractical due to the need for daily access to the bank, and thus the Institute's headquarters remained in Prague, although some administrative staff (Jaroslav Svoboda) suggested moving the director himself to Ondřejov, as this had "proven quite worthwhile" when Link was there. When the proposal was repeated in 1969, Perek came up with a counter-proposal for a new position as Head of the Observatory to represent it externally, accompany foreign visitors and take care of research organizations.[427]

Collaboration with universities and postgraduate training

The low standard of education in astronomy at CU in Prague, which persisted into the 1950s, subsequently improved, particularly with the arrival of Vanýsek and Mayer at CU Astronomical Institute on Švédská Street in 1960. Students enrolled in the astronomy specialization from the third year, but from Ondřejov, only Professors Guth and Švestka took regular

426 Interview with Perek, 6 December 2015.

427 MÚA, A AV ČR, collection Astronomický ústav ČSAV, unsorted, sign. 1, proposals to change the institutional regulations, 1960, 1969.

part in tuition. However, since the CSAS Presidium called on external experts to support tuition, this need also opened the door for others who were habilitating at that time.[428] Chvojková, who taught several courses in astronomy and geophysics, made the most significant pedagogical impact,[429] while as a rule the others offered an optional course and kept some time free for their own trips abroad, or they supervised theses. At Ondřejov they employed students as ancillary research staff. There was an agreement in force on the operation of the university observatory at Ondřejov and conversely on the placement of the Institute's refracted passage instrument in the garden of Švédská Street in Prague.

The focus of the training of new scientists was on postgraduate education. In the early 1960s two full-time postgraduate researchers and six postgraduate researchers in on-the-job scientific training (1961) were enrolled annually into internal studies, however, their numbers continually increased up to six or seven full-time postgraduate researchers (1964, 1967).[430]

The dynamic development of astrophysics, however, came up against the fact that more people could not be admitted to the internal postgraduate programme unless sufficient jobs were subsequently secured for them. In 1967, three of the six were supposed to complete their work, but "we had to extend their postgraduate studies because we didn't have places for them."[431]

The external postgraduate studies procedure faltered for another reason, as the Institute's administration pointed out: "In the opinion of the supervisors, external post-graduate studies and scientific training did not work because candidates were overloaded with work not directly related to their scientific training."[432] At the same time the director pointed out the shortcomings identified among astrophysics postgraduates in the basics of general astronomy.

Popularization activities and specialist publications

Of course, the extensive popularization activity and connections with people's observatories, where lectures were held, continued to develop. The

428 See Table 7.

429 MÚA, A AV ČR, collection Astronomický ústav ČSAV, unsorted, sign. 2, development of cooperation with universities, Šternberk's report of 24 January 1961.

430 MÚA, A AV ČR, collection Astronomický ústav ČSAV, unsorted, sign. 5, training for new research assistants.

431 MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1967.

432 Ibidem, 9.

magazine *Říše hvězd* enjoyed attention, although its publication was taken over from the CAS by the Ministry of Culture. After Slouka, who was relieved of the position of Editor-in-Chief in 1953, the magazine was ideologically managed by Mohr, while the Executive Editor was Jiří Bouška (1925–2014). However, in 1959 Plavec managed to bring about a change in CAS management, which became more professional, and pushed for the publication of an internal, non-periodical newsletter, thereby legally circumventing censorship. During discussions, Grygar suggested to his supervisor Plavec that the newsletter be called *Kosmické rozhledy* (Cosmic Perspectives), because cosmonautics portended some promising developments in astronomy. The postwar generation came together over its publication[433] in a network centring around Grygar, chairman of the editorial board from 1965 after Plavec. From the outset they also paid attention to the history of astronomy.[434] From 1971 they found strong support in Horský.[435]

Grygar, Horský and Mayer played an important role in popularizing astronomy. Together they wrote the book *Vesmír* (The Universe, 462 pages), which clearly presented cosmology, astrophysics, the history of astronomy and the current state of research. The authors hit on the socialist society's interest in space and presented novel content.[436] In comparison, Landová-Štychová's chapter on Astronomy in Czechoslovakia in a similar book from 1952 comprised repeated complaints about why bourgeois society did not enable astronomy to develop sufficiently. She admonished the postwar generation to "build conscientious socialist popularization" that would confirm the historical contribution of the Czech lands to astronomy and reject idealistic scientists such as Eddington.[437]

However, the young generation formulated the interpretation so conscientiously that instead of national heritage, three authors aroused the interest of socialistic society in globally conceived astroculture. The foreword was also written by Perek as an expert at the UN. The first edition of *Vesmír* (44,000 copies) was followed by a second edition with an

433 The first editorial board: Miroslav Plavec, Pavel Anderle, Helena Dědičová, Jana Kvízová, Jiří Grygar, Luboš Kohoutek, Zdeněk Kvíz, Petr Lála, Pavel Příhoda, Josef Sadil, and Zdeněk Sekanina. Unfortunately after 1968 half of them remained in exile: Plavec, Dědičová, Kvízová, Kohoutek, Kvíz, Sekanina. See https://www.astronom.cz/grygar/ (access on 1 October 2023).

434 Grygar and Plavec, "[issue dedicated to the 50th anniversary]".

435 The activities were organized by the CAS Historical Section as a part of Kepler's anniversary. MÚA, A AV ČR, collection Československá astronomická společnost při ČSAV, box 4, Inv. No. 27, reports on activity, invitations.

436 Jiří Grygar, Zdeněk Horský, and Pavel Mayer, *Vesmír* (Praha: Mladá fronta, 1979).

437 Luisa Landová-Štychová, "Astronomie v Československu," in *Astronomie v Československu od dob nejstarších do dneška*, ed. Hubert Slouka (Praha: Osvěta, 1952), 18–30.

incredible circulation of 100,000 copies (1983). Since 1981, Grygar hosted a popular programme on Czechoslovak television, *Okna vesmíru dokořán* (Windows of Universe Wide Open).

Czechoslovak astronomy has always been rather preoccupied with history. Collaboration of great value to the Institute was established with the Commission for Philosophy and Natural Sciences at the CSAS Historical Institute, which organized the first seminar on the philosophical issues surrounding astronomy in 1964 at Ondřejov. Horský as astronomer, historian and also musicologist, was again the man behind the event.[438] In addition, an important role was played by physicist and musicologist Antonín Špelda (1904–1989) from Plzeň, who organized the first conference on the didactics of teaching astronomy in schools (1965). Subsequently, the CAS pedagogical section was founded.

Clearly, the attention of a progressive Institute was primarily directed towards professional publications and their international outreach, with the Solar Department always outstripping the others in this respect. From 1947 the Institute published the *Bulletin of the Astronomical Institutes of Czechoslovakia* (BAC, usually 200–300 pages in length, plus an appendix in major world languages), where foreign authors also contributed. The importance of journals from European observatories was that they created a network among astronomers. Publishing reports of observations and the reciprocal exchange of publications facilitated the circulation of knowledge, as well as the establishment of personal contacts that could be used to obtain observation internships abroad. The Institute also organized a number of scientific meetings, including both regular stellar seminars in Smolenice in Slovakia and Solar Department conferences in Tatranská Lomnica, where astronomers from Poland, Hungary, the Soviet Union, Romania and East Germany were invited.[439] The portfolio of organizational activities in the mid-1960s shows how the entire Institute concentrated on preparations involving the organization of the 13th IAU General Assembly in Prague in 1967. This indicates the great international reputation of Czechoslovak astronomy, relative to its minor status among the mathematical and physical sciences. Although several important conferences took place in Prague (e.g. the First International Symposium on General Topology, 1960), no international mathematical congress or comparable physics conference was held in Czechoslovakia in those years.

438 MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1964.
439 Ibidem.

Coordinating research and the shortcomings of scientific work

The CSAS Astronomical Institute coordinated the State Astronomy Plan at another six establishments engaged in research in Czechoslovakia,[440] while the CAS supervised the activities of the people's observatories. During the 1960s the Institute also coordinated observations of artificial satellites within the Communist bloc, thanks to the advanced precision instrumentation and techniques at its disposal, which were of interest to the other Communist states too.

On the other hand, admissions of failure and the realization that one's own scientific work has its shortcomings do not make for popular topics, and the history of science often overlooks this fact.[441] The Institute's annual reports rarely contain admissions of the errors made in solar physics, while a self-critical detachment from their own observations appears in the research of galactic structure, immediately suggesting that an alternative was being sought. As for the objective limitations, these included the unfavourable weather, especially for the stellar and meteor physics departments, though radio astronomy helped a lot here. It did not work out well when one scientist was given "responsibility for more than one state plan subtask."[442]

Regarding these shortcomings, however, external complications can be blamed as appropriate, such as the aforementioned power outages in the vicinity of Ondřejov and the lack of instrumentation (e.g. the iris photometer — making it impossible to measure absorption in particular areas of the Milky Way). It was sad to have to wait for the promised laboratories to be built. Reconstruction and moving work was constantly going on at Ondřejov. Sometimes, however, those behind the innovative ideas were not actually invited to take part in their implementation, as the technical-economic administration carried them out in their own way.[443] The resulting arrangements did not work very well in practice.

Astronomers in the 1960s regularly complained about the meagre opportunities they had to gain access to modern telescopes worldwide, so they requested the expansion of foreign relations, comparing the Poles'

440 The SAS Astronomical Institute in Tatranská Lomnice, the CU Astronomical Institute, the MU Department of Theoertical Physics and Astronomy, the CTU Astronomical Observatory, the Astronomical-Geodetical Observatory of polytechnics in Bratislava, the Research Institute for Geodesy, Topography, and Cartography with a geodetical observatory in Pecný.

441 Dupré and Somsen, "The History of Knowledge".

442 MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1964.

443 MÚA, A AV ČR, collection Astronomický ústav ČSAV, unsorted, sign. 4, establishment of subcommissions for building 1961, 1962.

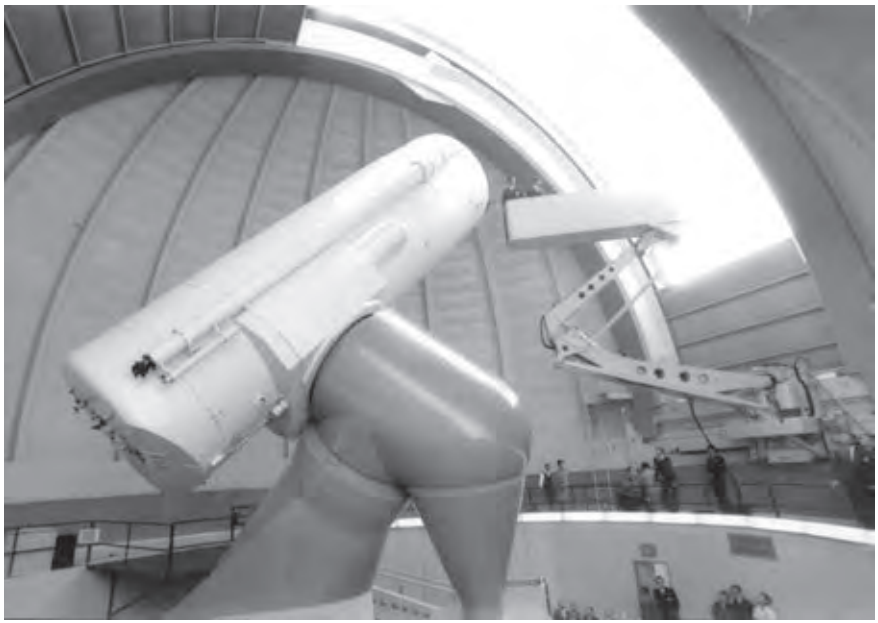
extensive opportunities: "The finances for sending scientists abroad are too small, so IAU symposia cannot be properly attended. We request to be informed of cultural agreements with Western countries and that astronomers can be involved in their implementation."[444] The availability of foreign journals and books, which did arrive at the Institute, but with a long delay, was thus also lacking in comparison with Poland.

Final remarks

Whereas at the beginning of the period under consideration the Institute's departments were run by the celebrities of the interwar generation (with the exception of the younger Perek, who came from Brno), the postwar generation of graduates managed to establish themselves in international research to such an extent during the 1950s that by 1968 they had taken over the administration of the department and the coordination of key projects, or obtained their habilitation and helped to train the younger postgraduates, whom they involved in research and joint publications. A dynamic research-based team had seemingly emerged of its own accord, though it had actually been mentored internally, and its results had a significant impact on several industries. This is confirmed by the number of those who were appointed as heads of particular IAU commissions (including Ceplecha and Švestka).

This is also of importance with regard to the growth of expert culture in Czechoslovakia and to interactions with observatories abroad. The question arises how astronomical expertise in Czechoslovakia became involved in public affairs and presented its knowledge.

444 MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1964, 8.



Two-metre diameter mirror telescope, Ondřejov, 1967
(MÚA, A AV ČR, Václav Bumba collection, unsorted)

Chapter V

New instruments

Part 1: Luboš Perek Telescope

I myself was helped on my way to the Stellar Department by chance. I have been interested in astronomy since I was six or seven years old, but for a long time I did not know what I had to do to be able to devote myself to astronomy for real. In the spring of 1959, as the school-leaving examination loomed at my 11-year grammar school in Kolín, science editor Ivo Budil organized the 23rd Radio University competition Into Space Near and Far. I entered and by and by managed to get through to the finals. There, one of the examiners, Miroslav Plavec from the Stellar Department at Ondřejov, approached us during the break and offered advice to those of us who might be seriously interested in astronomy. I wrote to him the very next day, and he replied very cordially, recommending variable star observations and summer training at Ondřejov. […]

During this training, I checked the calculations of the minima of the occulting binary RZ Cas on a mechanical calculator amongst other things, and in the evenings I went along with Dr. Plavec and a small portable telescope to measure the scintillation at three selected sites to find out where the best atmospheric conditions were for the future two-metre telescope. [...]

The head of the Stellar Department at that time was Associate Professor Perek. However, he was based in the Prague section of the Institute on Budečská Street and only occasionally travelled to Ondřejov, so in practice the department was headed by Dr. Plavec. […]

After the occupation of Czechoslovakia in 1968, Dr. Plavec took the opportunity to travel with his family to America, and when it later became clear that he did not intend to come back, Dr. Kříž was appointed the new head of the Stellar Department. It has to be said that the period when Dr. Plavec was in charge of the department was typified by him, as an older man, in contrast to the rest of us, basically determining what all the work was and wanting to be there for everything, not out of suspicion, but because of his passion for the cause. This put the rest of us in a rather passive position. I remember that at that time we were not very interested in making observations with

> *the two-metre telescope, and when it clouded over if anything we were quite pleased. In the evening Dr. Plavec used to walk his sheepdog Wolf Plavec (probably the only sheepdog in Europe with a surname) to the two-metre telescope and always made sure we were already making observations. Only Jiří Grygar and Sváťa Kříž, who were both a bit older than the rest of us, gradually established independent positions to some extent. Hence paradoxically, Dr. Plavec's departure from the department had its positive side. In the uncertain times following the Soviet occupation, we all felt the need to defend our existence and so were compelled to take an active interest in new research subjects. Sváťa Kříž realized it was essential that the department started to make active use of the two-metre telescope.*
>
> (Petr Harmanec, *Stelární oddělení Astronomického ústavu ČSAV do roku 1970*, autobiographical notes, partly similar to Petr Harmanec, "Stelární oddělení," in *Ondřejovská hvězdárna*, 303–7)

This reminiscence confirms how an inborn childhood interest in astronomy was also evident in the second postwar generation. This interest was fed by their curiosity over the latest observations and the first artificial satellites. Scientists like Plavec, who had once been professionally mentored, seem to have repeated that practice. Popularization no longer solely involved lectures at the Petřín People's Observatory, but took the form of competitions organized by Czechoslovak Radio. Those who were interested in studying astronomy could enrol in this specialization from the third year, though the guideline figure at the CU Faculty of Mathematics and Physics was usually just one or two students per year. It was Plavec who motivated Petr Harmanec (born 1942) to go and study there. The contemporary witnesses all say that during the summer internships at Ondřejov not only was there social entertainment of various kinds, but the students also learned to perform calculations, familiarized themselves with the instruments and collected material for their own thesis.[445]

The research at Ondřejov was clearly quite rigorous. Plavec was familiar with the latest trend in astrophysics – binary stars – and he was directing the work of others. During our oral history research we repeatedly heard from the scientists how supervisors often placed conditions on the topics of doctoral theses in mathematics, physics and astronomy. The same experience was confirmed by a number of mathematicians in Poland.[446]

445 Interview with Zdeněk Mikulášek by Tomáš W. Pavlíček and Barbora Kulawiaková, 10 December 2021.

446 Kulawiaková and Pavlíček, "Andrzej Sołtysiak", 198–222.

It was not the choice of the topic, but their directive behaviour and its consequences that Harmanec has so invaluably depicted, as it led younger scientists to a certain passivity and impassivity. Plavec's excessive initiative made some tasks redundant, duplicated others and so forth.

I present the context behind this transfer of knowledge from senior staff to postgraduate newcomers because the traditional narrative on post-1968 emigration and the limitations placed on science under normalization is in some cases coming undone.[447] The memoirist saw how the atmosphere in the department loosened up after Plavec left. The realization that those in the department had to achieve some reputable results in their stellar observations using the new two-metre telescope came to be a natural stimulus for their activity.

"In spite of the hostile political climate, we could talk about everything including politics quite openly with each other, and we had a lot of fun in the evenings in the operations building, but we also did a lot of useful work. I don't wish to be immodest, but the department's scientific output was definitely above average at the Institute during those years."[448]

So how did stellar observation develop in Czechoslovakia? What did stellar astronomy achieve with the construction of the two-metre telescope? How can we correlate the experience of the international astronomical congress in Prague in 1967 with that of the Prague Spring and the onset of normalization on the one hand and the active implementation of scientific results on the other? It should be recalled that no less important than the reverberating political turbulence was the way the teamwork developed among those studying the stars. This perspective requires a more careful distinction to be drawn between the experiences of the people in different roles, so that more can be said about the importance of expert cultures in Czechoslovakia.[449]

Stellar Department

"Salvation came, as Christianity once did, from Moravia. In the summer of 1956 Associate Professor Luboš Perek transferred from Brno to Budečská Street, where he set up a group studying stellar dynamics." (Miroslav Plavec)[450]

447 Kostlán and Štrbáňová, "Czech Scholars in Exile".

448 Petr Harmanec, *Stelární oddělení Astronomického ústavu ČSAV do roku 1970*, autobiographical notes.

449 Sommer, *Řídit socialismus*, 39–42.

450 Plavec, "Přes překážky", 193.

The arrival of Perek from Brno at the CSAS Astronomical Institute provided impetus for greater attention to be paid there to astrophysical observations of stars and the establishment of the Stellar Department. The creation of this new department was not to be taken for granted, because the number of scientific jobs was fixed, and the other departments (particularly Interplanetary Matter and Solar) reserved them for when their students graduated. However, Perek had a recognized track record abroad on the distribution of matter in the Galaxy, which he had been working on since his time with Professor Mohr and his internship with Professor Oort in Leiden.

The decision to establish a new department also stemmed from the establishment of this new field. Plavec quickly took advantage of this to inform Perek of his interest in becoming an assistant in the new department. He found out that under a new law, the stipends of postgraduate assistants were to be increased. "However, even if everything had remained the same, I don't think I would have lost much [...]"[451]

Astronomer František Janák from Brno showed the same enthusiastic interest when he heard that Vanýsek had changed his mind about Perek's offer. Vanýsek (originally an postgraduate assistant at Ondřejov) "justified his decision by referring to his difficulties at Ondřejov during that time," by which he meant the demands and strained relations between the astronomers there.[452] Onderlička, an assistant from Brno, sent all these messages to his former boss Perek and also considered Janák's move to be hasty and unfair on Miroslav Vetešník (born 1933), who had long been interested in stellar astronomy: "I have learned that the two of them have had a falling-out over this." The context of this message indicates that Perek originally wanted to create "his department" out of Brno colleagues.

More important, however, are Onderlička's expert insights. The people in the Stellar Department were not satisfied with the statistical analysis that Professor Mohr had performed so far, though they had to be capable observers and master photometry (which Janák was not interested in). The correspondence between astronomers is characterized by their exchange of information about their own observing and publication plans. It was clear to the addressee that he should respect the intentions communi-

451 MÚA, A AV ČR, Luboš Perek collection, unsorted, box 6, correspondence, M. Plavec to L. Perek, 5 June 1957. He was transferred to the department in 1958 from the Interplanetary Matter Department.

452 MÚA, A AV ČR, Luboš Perek collection, unsorted, box 6, correspondence, B. Onderlička to L. Perek, 17 November 1958.

cated by his colleague, while the assignment of the state research plan among institutions in Czechoslovakia only confirmed this traditional research practice.

Spectrum-aided telescopic observations

Perek built a dynamic model of our Galaxy, shaped like a flattened spheroid. He studied the stars and the speeds at which they move within the Galaxy.[453] Astronomers had known since Edmond Halley (1718) that the stars were moving inside the Galaxy, but to make an informed estimate they needed to find historical observations in the archives (e.g. Besell's 1818 catalogue of the position of stars around 1755) or Ephemerides – tables of the positions of celestial bodies, which were published regularly from 1679 in the Parisian journal *La Connoissance des Temps*.

Moreover, two phenomena had to be taken into account in the calculations. The position of the star in the sky is dependent on the fact that the observer is on a rotating Earth (referred to as the diurnal aberration) and that the Earth's axis slightly wobbles (nutation).[454] In the 19th-century history of their field, astronomers learned from the experience of William Herschel (1738–1822), who, using a giant reflector (with a 6.1 metre tube), proved that even a single researcher can record small changes in something as large as a planetary nebula over the course of a lifetime. Another rather well-to-do researcher, William Parsons (1800–1867), Lord of Rosse in Ireland, observed that the well-known galaxy designated M51 (known as the Whirlpool) has a spiral structure, using a telescope that he had built himself with a 180 cm mirror. With its focal length of 16 metres this was for a long time the largest in the world.[455]

The Czechs also wanted to have their own Leviathan, unique at least within Central Europe. The existing two 60 cm telescopes in Czechoslovakia "were not enough to satisfy the needs of young astronomers who, after the six-year closure of universities from 1939 to 1945, longed for contact with the world and wanted to match their colleagues abroad in observing capabilities." This is how Perek expressed the mobility and enthusiasm of the young.[456]

453 Luboš Perek, "Hvězdná dynamika," in *Ondřejovská hvězdárna*, 213–15.

454 Hoskin, *The Cambridge Concise*, 173.

455 Ibidem, 201, 214–18.

456 Luboš Perek, "Dvoumetrový dalekohled. Část I. Projekt, stavba, inaugurace, aneb Prvních jedenáct let," in *Ondřejovská hvězdárna*, 197.

Excerpts from contemporary correspondence confirm this central message of the memoir. The Stellar Department showed unprecedented initiative in justifying a project to build a two-metre reflector to match observations in the climate north of the Alps.

It was primarily thanks to Perek that this idea, originally conceived by Plavec, was discussed at a conference of Czechoslovak astronomers in November 1956, where the state research plan for the next ten years was being formulated. The two astronomers rapidly gathered up the experience of other observatories all over the world and discussed the idea with Professor Rudolph Minkowski (1895–1976) at the 10th IAU General Assembly in Moscow (1958), in order to submit the investment project with all its details to the government for approval (which was granted in April 1959). The enthusiasm with which Plavec spoke about the telescope at a public meeting attended by government representatives made its mark. Evidently, the Minister of Culture Kopecký, was highly impressed as he looked around the observatory at Ondřejov.[457] That calmed down Director Šternberk.

"So Šternberk accepted the decision of the conference (and the government) that it should be a large reflector and that all three focal points should have the opportunity to develop, that is, the primary focus, which is at the upper end of the tube, the Cassegrain focus, which is on the lower side, and the coudé focus, which is led by an optical path to the basement," Perek explained the design principle of the two-metre telescope.

"Well, Šternberk entrusted me to take care of the scientific side, while he also entrusted the economic side to Rajský, a rather characterless man, though in this two-metre episode he did exercise due diligence, and the architect Pavel Procházka was in charge of the construction side. So Procházka, Rajský and Perek were in Jena fifty times, and had about the same number of visits by Jena staff from Carl Zeiss in Prague, and during those hundred meetings we now had this editing method whereby we always had to put the resolution of one meeting in the right box, so that we wouldn't be discussing the same thing like a year later."[458]

The East German company VEB Carl Zeiss in Jena had a long tradition and shortly before, they had built a reflector with a two-metre diameter primary mirror for the Tautenburg Observatory.[459] But it took them eight years to construct this telescope for Czechoslovakia and the only reason

457 Jana Pávová, *Demagog ve službách strany: portrét komunistického politika a ideologa Václava Kopeckého* (Praha: ÚSTR, 2008).

458 Interview with Perek, 6 December 2015.

459 Perek, "Dvoumetrový dalekohled", 197.

they completed it was that the 13th IAU General Assembly was taking place in Prague in 1967,[460] and the company saw its success as an advertisement for expanding exports to the West. It took advantage of an amendment allowing East German firms to set up foreign capital branches, and in 1964 set up the Gemischte Gesellschaft VEB Carl Zeiss in London, keeping 49% of the profits, with 49% going to East Germany and 2% to a Communist lawyer in London,[461] thus a Communist factory actually took part in economic globalization.

In a mirror reflector, the light of the star is observed by the spectrographic method, i.e. utilizing light-ray decomposition with a prism and wavelength-based colour spectrum bars. It is then observed with the naked eye, as had been done by Joseph von Fraunhofer (1814), Gustav Kirchhoff and Robert Bunsen (1860), or the spectrum is recorded on a photographic plate, on which the distances are then measured. Astronomers have found it worthwhile to develop their photographic skills, and since the 1980s electronic CCD (Charged Coupled Device) detectors have been used.

Individual chemical elements can be identified in the spectrum because they have spectral lines at certain wavelengths. This finding opened the door to astrophysics. When William Huggins (1824–1910) attached a spectroscope to his telescope in 1860, he found that the lines of hydrogen in the Sirius spectrum had somewhat shifted relative to the lines of the hydrogen discharge that allowed comparison on the spectroscope. He interpreted this as the Doppler effect relating to the radial component of the velocity of a moving star (1868), which subsequently gave rise to countless applications. Czech astronomers always find any mention of a Doppler line shift to be pleasing to the ear, since the Professor of Mathematics Christian Doppler (1803–1853) discovered this phenomenon during his time in Prague (in 1842).[462]

Although the subsequent development of the spectrographic method could not avoid a few culs-de-sac, it clearly ran a dynamic course throughout the 20th century. The credit goes to the German astronomer Walter Baade (1893–1960), who taught astronomers to use giant telescopes to observe how stars change and age. After his emigration to the USA in 1931, he encouraged Charles Donald Shane (1895–1983), Director of

460 Koubská, *Hvězdář diplomat*, 36.

461 Lena Senoner, "Cooperation, Competition, and Control: The Founding and the Development of the 'Gemischte Gesellschaft' of the VEB Carl Zeiss Jena in London (1964–1989)," *Střed/Centre* 14, no. 2 (2022): 34–50.

462 Martin Šolc, "Cesta Dopplerova principu zpět do astrofyziky," *Pokroky matematiky, fyziky a astronomie* 38, no. 6 (1993): 318–30.

the Lick Observatory, to count galaxies and nebulae. He pushed for the fourth largest telescope at Mount Palomar to be completed, while himself obtaining a position at Mount Wilson Observatory. He distinguished two types of stars in the centre of the M31 galaxy. Those of the second generation (he called them "second population") do not move in circular but elliptical orbits. As for the estimation of intergalactic distances, he found some discrepancies, which he reported at the 8th IAU General Assembly in 1952 in Rome.[463] From the end of the war he collaborated intensively with Professor Oort – during the war they had only corresponded.

Making contacts abroad

Assistant Luboš Perek was not allowed to travel to Rome, but we still have his reply to Buchar, who was the only other Czechoslovak delegate approved beside Guth. Perek took advantage of Buchar's offer to take messages to Rome and pass on greetings to his professors from Leiden, Oort and Pieter Oosterhoff (1904–1978). He expressed regret for not being able to meet them, and his letter is also important because of his interest in "news from the stellar astronomy and photometry section",[464] which was just being established. And Perek had no idea what important findings Baade would present at the congress.

Oort, who was a frequent facilitator of contacts between European astronomers and the USA (where he himself had stayed in his youth), remembered his former intern from Brno well. He recommended him to go to the Stockholm IAU Symposium on Galactic Structure in 1957, where Baade would be giving a lecture. There the famous astronomer invited Perek to propose his own observation programme.

"In Stockholm there was some kind of final supper, and I had one or two snifters so my tongue was loosened, and I went on about what I would do on the big telescope, which was promptly followed by an invitation from Baade to America.[465] What had earned him observation time on the giant American telescopes? He had proposed photographing planetary nebulae and calculating their distances. An IAU grant secured him a residency at the National University of Mexico, where he stayed from February to March 1959 at the Tonantzintla Observatory, before he went on to California. While in Mexico he discovered several new planetary nebulae and, using

463 Donald E. Osterbrock, *Walter Baade. A Life in Astrophysics* (Princeton: Princeton University Press, 2002), 115.

464 MÚA, A AV ČR, Luboš Perek collection, unsorted, box 6, correspondence, E. Buchar to L. Perek, August 27, 1952.

465 Interview with Perek, 6 December 2015.

the Schmidt camera, photographed the entire southern Milky Way. When he arrived at Mount Wilson, Baade had in the meantime fallen ill, but Minkowski, who had discovered a number of nebulae himself, helped in his place. As if Perek felt beholden to the ailing Baade, he produced some 400 photographic plates during that summer – which was ample material for processing.[466]

Which telescopes did Perek use to collect this material? His experience is valuable amongst other things because he was probably the first person from Czechoslovakia who got to make observations with the giant telescopes in the mountains. The two large telescopes were built in 1909 and 1917 at Mount Wilson near Los Angeles (with 152 cm and 254 cm mirror diameters). Solar astronomer George Ellery Hale (1868–1938), who supported the construction, raised money for four more on Mount Palomar. These were a 102 cm diameter refractor, 152 cm and 254 cm diameter mirror reflectors and finally the largest 5.1 m reflector (the 200 inch Hale Telescope).

Baade in the USA proposed how to convert observations on the large Palomar telescope from 200 inches to a smaller 48 inch corrector – known as the Schmidt camera and referred to in Germany as the "coma-free reflector", constructed by the outstanding optics expert, Estonian-born Bernhard Schmidt (1879–1935).[467] Although Americans did not like to mention the Germans after the war, Baade referred to this corrector everywhere as the Schmidt camera, until the name gained worldwide recognition.[468] Schmidt actually placed another chamber with a convex mirror in the tube of the telescope, which displayed the image captured on the primary mirror on a plane surface, which was then photographed.

Planetary nebulae

In the USA Perek became increasingly experienced in making observations with giant telescopes. In subsequent years, he became familiar with the design of other large telescopes, which he put to good use in negotiations with Zeiss. He also made use of his own skills acquired during the construction of the 60 cm telescope at the Masaryk University Observatory in Brno on Kraví hora.[469] If Perek had not performed his own observations

466 Luboš Perek and Luboš Kohoutek, "Planetární mlhoviny," in *Ondřejovská hvězdárna*, 216–18.

467 Nicholas U. Mayall, "Bernhard Schmidt and His Coma-Free Reflector," *Publications of the Astronomical Society of the Pacific* 58, no. 344 (1946): 282–90.

468 Osterbrock, *Walter Baade*, 128.

469 Pavlíček, "Rozhovor s astronomem", 45–96.

in the USA, he would not have obtained some important photographs at all: "A few years later, I knew that Kohoutek and I were going to make an atlas of planetary nebulae, and I had access to all of Professor Minkowski's drawers, so I knew about all of his plates, and I knew that he had photographs of known planetary nebulae, so I contacted him to see if he would agree to publish those photographs in our catalogue. And he wouldn't give permission – he wanted to keep them to himself."[470]

Baade might well have given Perek permission. Thanks to the *Catalogue of Planetary Nebulae* Perek recruited his first postgraduate assistant Kohoutek. Each of them discovered new nebulae. Reference works of this kind have a worldwide reach, so Perek presented the plan for its publication at the Sydney Symposium on Galactic Structure in 1963. He subsequently obtained a visiting professorship at the Dearborn Observatory in Evanston, near Chicago, where astronaut Karl Henize (1926–1993) was very helpful, making available a number of his photographs of planetesimals from observations in southern Africa. Photographs of the southern sky were still of great value at that time. As the catalogue was internationally renowned, Henize readily agreed to have his photographs published. Perek made further use of the time and grant, and set off alone in a car he had bought to other West Coast observatories to collect more photographs of nebulae (Las Cruces, Kitt Peak, Mount Palomar and Mount Wilson).

Meanwhile Kohoutek measured known nebulae and discovered some new ones during his internships, during which he very much appreciated the opportunities for making contacts abroad and the availability of literature. First he went to Tautenburg near Jena in East Germany: "And I had to go there, to another Communist country, before I could come here to Hamburg for the first time. [...] My first trip to Hamburg was in 1964. Actually, this was also the result of work done by Associate Professor Perek; he met the Director of the Hamburg Observatory, who expressed an interest in having someone from Prague. It was a study trip associated with the 1964 International Astronomical Union Congress held in Hamburg."[471]

The catalogue authors devised a way to categorize the distribution of nebulae based on the galactic equator (galactic longitude). When the Prague publishing house Academia wanted to withdraw from the contract for this expensive book full of large photographs, Perek deployed all his family's skills as lawyers to compel Academia to have the catalogue printed by the IAU Congress in Prague, and though the printers were unable to

470 Interview with Perek, 6 December 2015.

471 Josefovičová, *Z Československé akademie věd do exilu*, 73–74.

make it by the start of the Congress in August 1967, a separate symposium on planetary nebulae in Tatranská Lomnica soon followed, where the authors presented their catalogue.[472]

Construction of the two-metre telescope

Regular discussions needed to be held with Zeiss, and design checks had to be carried out. During this stage Perek made the most of his experience from the Haute Province Observatory in France, where in the 1960s a telescope with a 1.9 m diameter mirror was put into operation, and he discussed various methods of observation, the ventilation of the instrument and the like with Zeiss. During the years he was supervising the construction of the two-metre telescope, Perek collected observational material for star research and experience on how to use the large telescope. A classic parabolic mirror was ultimately selected for the Ondřejov plan.

The extensive construction in Ondřejov was coordinated by the designer Procházka and Deputy Director Rajský. From the project's approval in 1959 until the arrival of the telescope at Ondřejov on 3 November 1966, about thirty meetings took place between the company, the astronomers and the designers. Each individual step required great precision. The concrete ring beam of the 20 m diameter building had to be as straight as possible with a maximum deviation of 4 cm. During assembly, the Zeiss people were amazed to find that the Czechoslovak builders managed to achieve a deviation of just 8 mm. The entire dome had to be insulated so well that the heat and wind in the telescope tube would not create excessive air turbulence, which would diminish the image quality. The pillar on which the telescope stands is isolated from the whole building so that the vibrations of the rotating dome were not transmitted to the instrument. These and other details were supervised by Josef Zicha (born 1939), a mechanic who became an expert and associate professor of precision mechanics and optics at the CTU. For this he completed an internship in Jena to go over everything with the chief designer Alfred Jensch (1912–2000).

Some delay was caused by Nikita Khrushchev (1894–1971) when he visited the Leipzig fair and then Jena, as an order signed by him for the same kind of telescope for the observatory in Shemakha, Azerbaijan, had priority. "Which was good for us, because the errors in the first one

472 Perek and Kohoutek, "Planetární mlhoviny", 217.

had been corrected by the time we got the second, and we had ordered a dome that would come with the telescope, so this way the dome came a year early."[473]

Because the company had produced two almost identical telescopes, Czechoslovakia received accessories that it had no use for and which were something of a technological step backwards (a diffraction grating filter and a gearbox for planetary and lunar observations; although the automatic refraction compensation was actually innovative). The order included a 20 metre diameter dome, an observation platform, three spectrographs (each with a different focus) and a photoelectric photometer.[474]

Some of the accessories could not be put into proper operation either because they did not produce interesting results (especially in the case of direct photography in primary focus), were difficult to handle in all telescopes (the spectrograph in the Cassegrain focus), or unreliable electronics were supplied (in the case of the photoelectric photometer). On the other hand, the coudé spectrograph produced good results. It was just a matter of convincing the authorities that good quality photographs would not be produced with East German ORWO, but only with American KODAK, which was used by astronomers worldwide, so the results could be properly compared.

Some of the components were quite outdated. Although they were switching to semiconductors, the telescope still contained a few electron tubes marked "Wehrmacht-Eigentum". As the spare parts were getting harder to come by, the instrument was completely modernized in 1981.[475]

The location of the building in Kubětiny, north of the historical observatory, was decided by a committee that took into account the geological and climatic context. The access road was constructed so that incoming cars did not dazzle the dome. A transformer station, Stellar Department workspaces, bedrooms, a midnight kitchen and the chief engineer's apartment were all built nearby. The entire project required an investment of 40 million crowns.[476] Perek and Plavec's generation built it, but it took thirteen years to complete. It was up to the following generation to bring it into operation and perform a research programme there.

Hence it is of great value to follow the directions in which Perek guided the observations of the fresh graduates who joined his department over the years: e.g. Grygar, Harmanec, Jiří Horn (1941–1994), Pavel Koubský (born

473 Interview with Perek, 6 December 2015.

474 Perek, "Dvoumetrový dalekohled", 200.

475 Josef Zicha, "Dvoumetrový dalekohled. Část II. Dvoumetrový dalekohled v Ondřejově očima technika," in *Ondřejovská hvězdárna*, 205–9.

476 Perek, "Dvoumetrový dalekohled", 203.

1943) and many others. He recommended some of them to take up research on close binaries, which Plavec had started to do within the department.[477] When asked about the choice of topics for the postgraduate studies and whether it was determined by the director or by the people themselves, Perek said, "I was the head of the Stellar Department, so I was mostly the one who decided what was going to be worthwhile, but I gave everyone a lot of leeway, because if scientific work is to be successful, you have to like doing it."[478]

It was found at this time that binary stars exchange some of their mass, so Czech stellar astronomers collaborated with astronomer Kopal in Manchester on this issue. Kopal had supported the actual construction of the two-metre telescope, and he took part in the inauguration ceremony.[479] However, when observations of the binaries on the two-metre telescope produced results that contradicted Kopal's theory, he curtailed his relations with Ondřejov.

At length the two-metre telescope was renamed the Perek telescope, so that during his lifetime several generations of astronomers could express their gratitude and respect for all the negotiations, preparations and implementation work behind this extraordinary instrument.

Part 2: Czechoslovak astronomy in Slovakia

Moving the 60-cm telescope from the lowlands to the Tatras

Following this thorough introduction to the CSAS Astronomical Institute at Ondřejov, we would like to introduce the observatories in Slovakia. More important than the institute itself is the history of the new instruments, as they are what make the observations possible. And the Czechs take such great credit for their introduction and construction in Slovakia that one wonders to what extent they actually took over this field. Without their contribution, of course, some of the instruments might never have been constructed.

There was already talk of a Zeiss telescope with a mirror diameter of 60 cm (known as the Sixty) at the Stará Ďala Observatory, which Czechoslovakia received as part of war reparations in 1922, but this telescope was not used until Šternberk arrived in 1927 and put it into operation on the tenth anniversary of the Czechoslovak Republic. This made it the largest

477 Koubská, *Hvězdář diplomat*, 106–13.

478 Interview with Perek, 6 December 2015.

479 SOkA Litomyšl, Zdeněk Kopal collection, box 1, Inv. No. 13, invitation, 1967.

telescope in the interwar state.[480] Šternberk used it to become the first person in Europe to take a picture of Pluto on 18 March 1930. Pluto had been discovered by astronomer Clyde W. Tombaugh (1906–1997) on 18 February 1930 at the Percival Lovell Observatory in Arizona, and we will return to it at the end of this book.

Šternberk intended to restore observations to what they were in the days of the observatory builder Konkoly-Thege. He managed to recruit the meteorologist Emil Veselý (1903–1916), the geophysicist Josef Bouška (1913–1957) and Dr. Bohumila Bednářová-Nováková (1904–1985) for astrophysical research. With the latter they started to build a spectrohelioscope, the first of its kind in this country at that time.

When the First Vienna Arbitration on 2 November 1938 decided to cede the areas in the south of Slovakia to the Kingdom of Hungary, Czechoslovakia had to vacate the territory by 10 November. This meant a cruel race against time for the observatory, as all the instruments had to be dismantled, packed, prepared on wagons and transported, which was finally managed at the last moment with the help of the army. The wagon with the 60 cm mirror and the telescope parts was to go with the others to Bohemia, but the mayor of Prešov stepped in, as he intended to build a large observatory in his town, so the consignment went there. The situation was eventually saved by the Czech astronomer Bečvář. He managed to convince Slovak politicians that the planned high-altitude observatory at Skalnaté pleso would have much better conditions for observation than the lowland sites around Prešov. The spectrohelioscope also escaped seizure and was of great assistance in the development of solar physics after WWII.

The abandoned observatory in Stará Ďala was left derelict and it was only when the border was moved again in 1947 that it returned to Slovakia and was renamed Hurbanovo. It was not until its reconstruction in 1962 that astronomical observations started there again – it became the Slovak centre for amateur astronomy, being expanded to include a planetarium.

Skalnaté pleso and Lomnický štít

The second largest Slovak observatory was conceived and to a large extent built by **Antonín Bečvář** (1901–1965). He studied at the Charles University Faculty of Science from 1921, albeit intermittently due to poor health

480 Previously, Jiří Kaván (administrator), secondary school teacher Josef Malíř, Arnošt Dittrich, later associate professor at the CU in Prague, came to work at this branch of the State Observatory.

(a spinal dislocation), and he did not receive his doctorate in meteorology until 1934. From 1937 he worked in the Tatra Mountains as a climatologist for the state spa at Štrbské Pleso, and during this time he started to think about building an astronomical observatory, as he was already making observations with his own telescope.

Ideal conditions for the construction were offered by the use of the cableway from Tatranská Lomnica (903 m) to Skalnaté pleso (1751 m) and from there to Lomnický štít (2634 m). This was put into operation in 1941. From the very outset, it was decided not to link the observatory to the cable car station because of the vibrations, so construction began a little higher above Skalnaté pleso (1786 m) in 1940. It was completed in three years and Bečvář was appointed director. The first observation, a delineation of sunspots, is dated 19 September 1943.[481] Slovak astronomer Ján Svoreň (born 1949) recalls Bečvář's achievements: "It is said that he got the approval for the construction of the observatory at Skalnaté pleso from the ambitious politicians of the then Slovak state by stating that there were only two European countries among the civilized nations that did not have their own professional astronomical observatory: Albania and Slovakia. Even 75 years later, it is not clear how he managed to do this. Just remember that this was achieved under the Slovak state by a Czech during a devastating war. But he pulled it off."[482]

It should be added that the activity of the Slovak Štefánik Astronomical Society, which raised two million crowns in a public collection for the construction, was crucial. The excellent results of the observations totally exceeded expectations. During the construction in 1942, Bečvář took excellent pictures of comet C/1942 C1 Whipple-Bernasconi-Kulin, for which he was awarded the Donohoe Comet Medal by the American Pacific Society. Hence observations began immediately after the observatory was completed with all telescopes, namely of sunspots, meteors, nebulae, variable stars (mainly long-period stars) and occultations of stars by the Moon.

During the first half of 1945, it was impossible to make observations as the Red Army was fighting the retreating Germans. Bečvář described how the observatory was saved from destruction. On Sunday 21 January 1945, German soldiers arrived to start packing up the meteorological

481 Digitized photo documentation of the building is available here: https://www.hvezdarna-fp.eu/digitalni-archiv/skalnate-pleso/ (accessed on 31 October 2023). Albums with photographs from Bečvář's archive were handed over in 2001 to representatives of the SAS Astronomical Institute and the Slovak Astronomical Society during the 60th anniversary celebrations of the opening of the observatory.

482 Ján Svoreň, "Hvezdáreň na Skalnatom plese má 75 rokov," *Pokroky matematiky, fyziky a astronomie* 63, no. 4 (2018): 233–44.

instruments as ordered: "We (especially our mechanic!) were trembling with anger and fear over what else they would find from what we had hastily hidden away. [...] Everything was at stake. We stood in the big dome in front of our great reflector, which appeared to be doomed, my assistant with tears in her eyes and the mechanic with clenched fists behind us."[483]

Anger was building up in the watching employees, and Bečvář tried to talk the soldiers out of their efforts to dismantle in one day the telescope which had taken the professionals six months to assemble. "Well, it all ended with them acknowledging the absurdity of their plan to some extent, promising to report to their headquarters on the difficulty of the task and to postpone the evacuation until further notice. [...]"

At the time there were some seventeen civilians hiding out at the observatory, and most of them had evacuated into the forests. "The last foreigners disappeared, the last journey was made in the cable car, the lights went out, the radio fell silent, all the electrical devices stopped and there was no telephone. That critical night of 26–27 January, massive explosions shook the windows one after the other, each one signifying one building, one bridge, one asset: the professional destroyers were saying goodbye. They rang furiously on the service phone at the cable car, demanding an immediate night ride to Skalnaté pleso; frightened but silent, the employees at the phone listened and did not answer.

Nature came over to our side at a crucial moment: a snow blizzard made it impossible to walk. The explosions rumbled on. One of them meant that the bottom cable car station was instantly in ruins, another that an iron mast carrying the ropes changed its shape beyond recognition. We heard all of them, but we did not know what meant what. Then there was silence again on Skalnaté pleso, as the explosions gradually moved away to the west. A strange, strange silence. The loose ropes of the cable car dangled sadly, but the machinery and the main building at Skalnaté pleso stood intact. And our observatory... The men came back after a week in the forest. A quiet and deep joy spread in our souls, an immense release after the long, exhausting strain. We were afraid to believe in the new reality, for it truly seemed a miracle. And it is so easy nowadays not to believe in miracles. Our work stands as we built it, intact, and it is about to outlast us. "[484]

This is how the climatologist dramatically depicted the weather changes in the high mountains as the war front rolled past. In the memoir, tinged with hints of the contemporary discourse of anti-fascist indignation, the

483 Antonín Bečvář, "Žijeme 1945," *Říše hvězd* 26, no. 3–4 (1945): 33–37.
484 Ibidem.

astronomer's crucial relationship with his instruments is worthy of note. Attention should also be paid to their historical description, as these were what the younger generation subsequently learned to use for observations. As was customary, this generation was also initiated into the history of the instruments on top of their technical training.

New instruments at the SAS Astronomical Institute

The largest telescope in the great dome at Skalnaté pleso was the aforementioned 60 cm reflector, before it was replaced in 1978 by an equally large one made by Carl Zeiss in Jena. The original was acquired by the Modra Observatory in the Malé Karpaty Mountains, a scientific research and educational facility belonging to the Department of Astronomy, Earth Physics and Meteorology in the Faculty of Mathematics, Physics and Informatics at Comenius University in Bratislava. This observatory focuses on the study of asteroids and interplanetary matter.[485]

In 1961 a photoelectric photometer was installed in the Newtonian focus of the 60 cm telescope, which was jointly manufactured and commissioned by Jozef Tremko (1930–2020, SAS Astronomical Institute) and Mayer from CU in Prague.[486] As a result, programmes could now be initiated to monitor unusual variable stars. For the most part these were shown to be binary stars with a third body present or binary stars with an outflow of mass between the component stars.

In the small dome, both of Bečvář's reflectors were originally on a common mounting – 24 cm (f = 1.2 m) and 21 cm (f = 2.1 m) and a 13 cm refractor (f = 1.95 m), which was used for pointing when images were being exposed and for plotting sunspots during the day.

An astrometric programme on the 30 cm astrograph in the small dome started in 1965. This enabled the positions of asteroids and comets to be determined with the precision required for the IAU Asteroid and Comet Database. Between 1965 and 1999 when the programme was discontinued, 1810 precise positions of comets and 2846 positions of asteroids were taken.

The meteor photography station was covered by a retractable roof, underneath was a Binar telescope bought in 1946 from the Somet company in Teplice, Bohemia (25x magnification, 100 mm lens diameter). Five of them were purchased in total. This was a postwar surplus sale because the

485 In 2012, another exchange took place in the large dome, the previous 60 cm telescope was given to the SAS Astronomical Institute in Stará Lesná.

486 The photometer was also in operation on the new 60 cm telescope (constructed in 1978).

Teplice company had made the telescopes for General Rommel's German army in Africa. Until 1950 meteors were photographed every night, then only shower meteors (in some ten thousand images).

The observatory achieved some remarkable, internationally acclaimed results with its comet discoveries. Between 1946 and 1959, a total of 70 comets were discovered worldwide (including those in the southern sky), including 18 comets at Skalnaté pleso and Lomnický štít. The first was C/1946 K1 Pajdušáková – Rotbart – Weber from 30.5.1946, and the last was C/1959 X1 Mrkos, found on 3.12.1959 from Lomnický štít.[487] Internationally the names of the discoverers can be seen in the names of the comets.

Two of the comets – C/1957 P1 Mrkos and C/1955 L1 Mrkos – were discovered by naked-eye observations around the setting sun, while the other discoveries were primarily made with the Somet Binar telescope. Compared to the thirteen discoveries at Mount Palomar and the maximum of five discoveries at other observatories, the advantages of the location of Skalnaté pleso, the third highest observatory in Europe after Jungfraujoch in the Alps and Pic du Midi in the Pyrenees, was very clear. No observatory east of Slovakia as far as Japan had such a favourable location for observing comets. This is also evidenced by the discovery of comet P 45 Honda-Mrkos-Pajdušáková observed on 7 December 1948 both in Japan and in the Tatras. "The eastern slope of the High Tatras is good because you can see another 1° below the horizon, so the entire eastern horizon is accessible to you, and when the weather is fine, the comets are just waiting to be discovered," recalled Perek, who also made observations there after the war.[488]

Of equally key importance was the diligence and experience of the local astronomers at that time, e.g. Antonín Bečvář, Antonín Mrkos (1918–1996), Ľudmila Pajdušáková (1916–1979), Ľubor Kresák (Gärtner, 1927–1994), Margita Vozárová-Kresáková (1927–1994), Anna Antalová (1936–2007) and Milan Antal (1935–1999). Initially the astronomers' offices were in the observatory, but in 1950 the Villa Tatra in Tatranská Lomnica was purchased, and in 1987 solar laboratories were added in Stará Lesná.[489] In the meantime, the institution changed names – in 1950 it became a branch of the Central Astronomical Institute in Prague, and when the SAS was established in

487 Svoreň, "Hvezdáreň na Skalnatom plese má 75 rokov."

488 Interview with Perek, 23 April 2020.

489 Records since 1941 of the Sun's influence on climate see Mikuláš Konček, *Klíma Tatier* (Bratislava: Veda, 1974); Ján Tibenský, *Dejiny vedy a techniky na Slovensku* (Martin: Osveta, 1979), 457.

1953, it became its Astronomical Institute. In 1955 he began publishing a scientific journal entitled *Contributions of the Astronomical Observatory Skalnaté pleso* (CAOSP).

In 1955 a Theoretical Section was added to the Interplanetary Matter Department in Bratislava. This Institute also included a Stellar Department and a Solar Physics Department.

At Lomnický štít there is a coronagraph (1962), a solar spectrograph (1964) and cosmic ray detectors (Guth, Václav Petržílka, 1905–1976), while at Stará Lesná there is a horizontal telescope with a spectrograph (1986).

A world-renowned astronomer at the Slovak observatory

In the first years the director of the observatory was first Czech astronomers Bečvář (1943–51), Guth (1951–56) and Bochníček (1956–58), and then Slovak astronomers Pajdušáková (1958–79), Július Sýkora (1979–89) and Ján Štohl (since 1989). The forced departure of Bochníček has already been mentioned, and Bečvář was removed in a similarly deceitful manner from his directorship in 1951. As there was no personal animosity between him and his successor, Guth, the reasons were rather political. When Bečvář wanted to travel to the 1952 General Assembly in Rome as a member of the IAU, he was forbidden to do so. While in the case of the young Perek the reason was the meagre allocation of funds for travel abroad, in Bečvář's case the recent Stalinist purges were still in the air.

The Congress had originally been meant to take place a year earlier in Leningrad, as promised at the Zurich Assembly (1948), but in the meantime Cold War incidents (the Soviet blockade of Berlin and the Korean War) had occurred, and the Committee postponed the Congress. The IAU wanted to remain neutral and feared that the USSR would cancel its membership. The diplomatically fortunate offer of the Italian IAU Vice-President Giorgio Abetti (1882–1982) to hold the Congress in Rome, where scientists from the Eastern bloc could more easily travel than to the USA, came in handy.[490] Even so, some did not get permission.

Antonín Bečvář initially coordinated not only astronomical and meteorological research, which became independent in 1954, but also organized astronomy tuition. In 1944, he was appointed head of the newly founded Astronomical Institute at the Slovak University Faculty of Science in Bratislava, before the Institute was incorporated into the Department of Astronomy, Geophysics and Meteorology under the administration of Professor Mikuláš Konček in 1952.

490 Andersen, Baneke, and Madsen, *The International Astronomical Union*, 41–44.

Throughout his stay in the Tatras, Bečvář devoted himself to photography and cloud studies. In 1953, together with B. Šimák, he published the *Atlas of Mountain Clouds*, an extraordinary work on the border between scientific and artistic photography. Bečvář was a man with a broad range of interests. He was active in photography, played the piano and violin, and was also active in literature and wrote a novel, *Jediné léto* (The Only Summer), published in 1940. When his health permitted, he went on trips to the mountains, and he published *Vysoké Tatry* (High Tatras) in colour (1948). After his forced departure from Slovakia, he returned to Brandýs nad Labem, completed his observatory and worked on atlases. In 1948 he completed *Atlas coeli Skalnaté pleso 1950.0*, published by CAS. He subsequently compiled a catalogue and three other atlases – Eclipticalis, Borealis and Australis.

Czech visitors to Lomnický štít: fraternal assistance?

As coordinator of the main research plan, the CSAS Astronomical Institute was engaged in direct collaboration with the SAS Astronomical Institute at Skalnaté pleso. This was mutually beneficial, which is not to say that it was without conflict. The research into the upper atmosphere and solar physics in particular could be compared at different altitudes, at Ondřejov (500 m above sea level) and at Skalnaté pleso (1786 m and Lomnický štít 2632 m respectively). However, the history of this establishment and its administration was rather complicated and unclear from the Czech point of view due to strained relations.

Guth promoted his pupil Bochníček as the new director, but all of the Czechs involved, as well as the other Slovak astronomers, were in professional and private contact with the astronomer **Ľudmila Pajdušáková**. In the 1930s she graduated from a teacher training college and worked as a mathematics and physics teacher. During a schoolchildren's excursion to the observatory, she first developed an enthusiasm for astronomy. She started working as a technician at Skalnaté pleso from 1 July 1944, and then married Mrkos, one of the assistants in 1949. Her achievements included the discovery of five comets and numerous meteor photographs. In 1949 she completed her distance course in astronomy in Bratislava, though at the time tensions were rising with the observatory director, Bečvář, who not only rejected her dissertation but "induced Professor Mohr in Brno" to make an unfavourable assessment.[491] But then again at that moment, as

491 MÚA, A AV ČR, Luboš Perek collection, unsorted, box 6, correspondence, A. Mrkos to L. Perek, 23 March 1950.

can be seen, her husband, Mrkos, interceded with Mohr's assistant Perek, who had advised him on how to expose the positions of comets at Skalnaté pleso. Even though the work had lower methodological standards than that of regular science faculty graduates, the conflict was motivated by politics, as Professor Mohr was well aware. But Comrade Pajdušáková was an enthusiastic amateur with visions of progressive astronomy engaged in building socialism, and Mohr was becoming increasingly involved in such activity. "Since Mohr does not know what position to take, the whole matter is at a standstill. I am afraid that it will not end well and that my wife and I will probably leave the observatory soon. Naturally, we will then both have to give up astronomy altogether, which we will find most regrettable."[492]

Written correspondence between astronomers is of great value in that it reveals the close ties within this small professional community. The outcome of the dispute is well enough known. Pajdušáková succeeded politically in getting Bečvář dismissed, though her disputes with the other observatory staff persisted, and her marriage to the scientist did not last long either. Although Mrkos was originally also an amateur astronomer, he came to be a recognized expert invited on Soviet polar expeditions.[493]

At the end of 1953 the new Director, Guth, asked through the SAS Secretary General Dionýz Ilkovič (1907–1980) for the transfer of Comrade Ľudmila to Ondřejov, but the Scientific Council of the CSAS Astronomical Institute expressed a negative view. Moreover, the Chairman of Section I, Prof. Jarník, pointed out in his communication that after the recent crisis "the section itself is not yet sufficiently consolidated".[494]

As a result, Pajdušáková stayed on at Skalnaté pleso. When the Hungarian coup attempt was followed by purges in 1958, she took up the cause energetically and got the then Director Bochníček deposed. Even

492 Ibidem.

493 Mrkos worked at Lomnický štít from 1950. In 1957–59 and 1961–63, he participated in Soviet polar expeditions, in between divorced, 1965 returned to Bohemia as the director of the Kleť Observatory, associate professor of the CU Faculty of Mathematics and Physics. See Cf. MÚA, A AV ČR, collection I. Sekce ČSAV, box 23, Inv. No. 73, approval of the Chairman of the Mathematical-Physical Section, Josef Novák, letter to SAS on 25 October 1961; more: https://www.hvezdarna-fp.eu/products/mrkos-antonin/ (accessed on 1 November 2023).

494 Ibidem, proposals and recommendations for stays in particular socialist states, head of I Section V. Jarník and Secretary S. Kříž to SAS General Secretar D. Ilkovič, 15 January 1954.

the amateur astronomer Landová-Štychová did not know which side to take – having extensively corresponded with both of them until then over popularization and political campaigning matters.[495]

As this case study makes clear, the astronomical community learned the lesson that Skalnaté pleso was to be treated with caution. This is also evident from the correspondence between the two CSAS Astronomical Institute Directors, Šternberk and Perek. Slovak astronomers had the opportunity to stay at Ondřejov on business while some observations of solar flares, the upper atmosphere, meteorites and especially comets were made by Czechs in the Tatras. When it was feasible, Director Perek helped to finance Slovak trips to Ondřejov and responded to reports of conflicts between the staff and the Director at Skalnaté pleso in a matter-of-fact manner with regard to Comrade Pajdušáková.[496] The question of whether she was overlooked by the men in the community, perhaps due to her political involvement, cannot be neglected. It seems, however, that the organizationally capable Pajdušáková acted in such a way that the expert and computational work was performed for her by others. Historian Pavla Horská (1927–2021) has herself mentioned how Pajdušáková made use of her husband Zdeněk Horský's erudition and collegial assistance: "For example, some female astronomer from Slovakia wrote to Zdeněk: 'Sir, please come and do my measurements – I don't know what angle – I'll make you a cherry strudel.' Because there was one thing Zdeněk knew how to do... My husband, he could calculate what the sky looked like at any time in history, when he needed, and even what the constellations looked like in prehistoric times. [...] Slovak women didn't do much in the way of mathematics."[497]

The issue of correct adjustment also arose over some of the modern instruments. For the observatory at Lomnický štít, the Ondřejov workshops built a coronagraph, which made a major contribution to the observation of solar flares and proturberances.[498] However, because it was not well adjusted, the director requested a visit from the Ondřejov expert Valníček. He made an inspection on 11 August 1963 and diagnosed several defects along with their causes and suggested various solutions. At the end of his report, he actually pointed out the disparity between Ondřejov and the SAS observatories. Neither Pajdušáková nor her subordinates had the skill

495 Holubec, *Nešťastná revolucionářka*, 281–84. Pajdušáková was significantly involved in the peace and women's movement (member of the World Peace Council, 1961–63).

496 MÚA, A AV ČR, collection Astronomický ústav ČSAV, unsorted, sign. 2, correspondence with SAS, 1962–74.

497 Interview with Pavla Horská by Tomáš W. Pavlíček and Alice Velková, 24 October 2017.

498 MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1962.

or technical proficiency to set up and operate the instrument: "I think that the main cause of the current difficulties at Lomnický štít is the the local staff's limited know-how, and that it would make sense to get all the help from our institute on this. In particular, it would be advisable that during their visits to Ondřejov the staff from Lomnický štít should always stay at least a few days, not just a few hours as has been usual hitherto, so that more detailed discussions could be held."[499] The Slovaks came to Bohemia regularly, but they were obviously more interested in socializing in Prague than in acquiring technical skills, while the technically experienced Czech astronomers at Skalnaté pleso all left one by one.

499 MÚA, A AV ČR, collection Sbírka základních, box 4, attachment to report of 1963, Boris Valníček, report on visit at Lomnický štít Observatory. Valníček offered to help with the coronagraph again, when he returned from the USSR.

Opening of the 13th IAU General Assembly, Prague, 1967
(photo by Jiří Plechatý, MÚA, A AV ČR, Luboš Perek collection, photo catalogue No. 217)

Chapter VI

International contacts: visible and invisible networks

Part 1: The 13th IAU General Assembly in Prague

> *"Last year saw two of the most significant events in the development of modern Czechoslovak astronomy. The 13th General Assembly of the International Astronomical Union – the most widely attended meeting of astronomers from all over the world to date – and at Ondřejov the two-metre Zeiss reflector – the first world-class telescope in the hands of Czechoslovak astronomers – was put into operation. Both of these events required a lot of time and organizational effort on the part of the CSAS Astronomical Institute staff, and it would thus have been quite understandable if the Institute's scientific output had been substantially reduced last year. It is gratifying to note that this did not happen. Over sixty published original papers and dozens of other papers submitted to the press carry on the Institute's successful tradition to date both in terms of quality and quantity."*
>
> (Ľubor Kresák, report on 6 February 1968. MÚA, A AV ČR, collection Sbírka základních, box 4, proposal for 14th meeting of the SC AGGM on 23.2.1968, paragraph II, original in Slovak language)

Observations of a Slovak astronomer in the Annual Report review

The CSAS Scientific Collegium for Astronomy, Geophysics, Geodesy and Meteorology (SC AGGM) requested an expert review of the CSAS Astronomical Institute Annual Report from an independent staff member from the Slovak part of the country. Although everyone in this small professional community knew each other well, Kresák had worked at the University of Bratislava and so had some detachment from the CSAS. His formulations indicate that he took pains to highlight at least three results of global importance: 1) The description of the source regions of solar proton flares; 2) The identification of bands of carbon molecules in meteors and comets; 3) The astrophysical theory behind the evolution of binary stars.

He appreciated the way the researchers mobilized their observations and efficiently evaluated the data that had been successfully converted for the new MINSK 22 computer. The astronomers had been looking forward to this for quite some time and had developed their programming skills. It was a phenomenon that was also emerging in Europe and the US during the 1960s,[500] though it was not yet available at the Jagellonian University Astronomical Institute in Kraków for example.[501]

The author of the introductory review asserted that the international response was proportional to the intensity of foreign contacts. He mentioned that Perek was elected IAU Secretary General, and that it was not rare for people from Ondřejov to co-publish with foreign authors (which the Slovaks had not managed to do so much). "The number of trips abroad is impressive (i.e. 70 including long stays in the USSR, France, the USA and Canada, plus participation in 28 meetings of international bodies)."[502]

These figures will help to shed light on the extent to which astronomers from Czechoslovakia were able to assert themselves worldwide and (invisibly) engage independently of the Communist state that they were also representing. The state authorities could and did limit them. The figure of 70 trips in 1967 (when the world astronomical community came to Prague) can also be seen in terms of a successful exponential curve.

Thirdly, the reviewer points out the real problem that "as nowadays information lags behind the rapid developments in science", the only way to obtain new methods and results before they were published was to establish regular foreign contacts.[503] The reviewer also revealed the strategy behind Czechoslovak astronomy: "in selected narrower disciplines, to get to the top of world developments and to stay there".[504]

Well-founded, factual arguments could still be used even after the onset of normalization in Czechoslovakia. The aim of this chapter is to investigate whether normalization limited scientific research and the development of astronomy, and if so then in which ways. As the so-called post-January period of the 1968 reforms was beginning, and Kresák complained that astronomers should not have to go through the nonsensical

500 Andersen, Baneke, and Madsen, *The International Astronomical Union*, 59.

501 Interview with Jan Mietelski by Tomáš W. Pavlíček, 17 April 2023.

502 MÚA, A AV ČR, collection Sbírka základních, box 4, proposal for 14th meeting of the SC AGGM, 23 February 1968.

503 Michaela Šmidrkalová, "Czechoslovakia and the International Cooperation of Socialist Countries in the Field of Scientific-Technological Information, 1959–1989," *Dějiny v*ědy a techniky 55, no. 4 (2022), 185–202.

504 MÚA, A AV ČR, collection Sbírka základních, box 4, proposal for 14th meeting of the SC AGGM, 23 February 1968.

administrative hassle of deciding whether to purchase photographic plates of adequate US quality (preferably from KODAK) for two-metre observations, as similar products from Communist states were not of such a high standard. Technical failures and a lack of small parts limited scientific work the most, and informal contacts often had to be called upon in order to obtain them.

Ľubor Kresák (1927–1994) graduated from the CU Faculty of Science in Prague in 1951 before joining Skalnaté pleso, where he came under Guth's influence. After the latter's departure for Prague (1955), Kresák moved to the Bratislava branch of the SAS Astronomical Institute, where he headed the Department of Interplanetary Matter. Soon after his research assistantship finished (1957), he habilitated and in 1967 received his DrSc. He focused on the evolutionary relationships between comets and meteoroids.

The author has openly touched on some long-standing shortcomings in science. There is a debate in Cold War historiography over the extent to which the experts were dependent on the decisions and finances of a political establishment which, in the case of astronomers, also pursued state security and military interests.[505] Although astronomers were loyal to the Communists, the question is how deep this loyalty went when the technical conditions for the experts' work did not improve. Indirect evidence of just how fragile this loyalty was can be found in the fact that the astronomers had to mobilize all their energies and efforts just to gain recognition.

East and West interconnectedness

Just how balanced was the two-way foreign cooperation when the Czechoslovak astronomers' membership in IAU committees was linked to trips to the West, while the dynamic development of solar physics, for example, created a visible network of contacts with scientists in the Eastern bloc? While from 1947 onwards foreign exchanges were undertaken on the basis of bilateral cultural agreements between ministries or through UNESCO fellowships, soon after its establishment the CSAS signed cooperation agreements with other Eastern bloc Academies of Sciences (from 1955). However, the balance was not always even and sometimes the Czechs complained that there were more scientists coming than going.[506] This

505 Oreskes and Krige, *Science and Technology*, 431–39.

506 Alena Míšková and Miroslav Kunštát, "Mezinárodní vědecká spolupráce ČSAV v letech 1957–1962" in Dvořáčková and Franc, eds., *Dějiny Československé akademie věd, I. díl*, 408–29.

should be understood to mean that it was easier to obtain foreign exchange and a passport in Poland, for example, than in Czechoslovakia, where justification for the trip abroad also had to be provided with the passport application.[507]

The financial support for trips was limited and once it was exhausted in any given year, there was no money for further trips in any fields. As the bilateral cooperation protocol for each year was only signed at the end of the previous year, a great deal of flexibility was required in the submission of travel requests. It is evident from CSAS Section I protocols that the broader community of mathematicians and physicists (based at the Centre) were more flexible than the astronomers. Whereas for astronomer Mrkos, who worked as a climatologist at the Hydrometeorological Institute in Tatranská Lomnica, but actually ran the observatory at Lomnický štít, almost 1800 m higher, it was not easy to get all his superiors to allow (i.e. finance) his participation in the Polish Academy of Sciences polar expedition to Spitsbergen in 1957.[508]

Hence the system in place at the CSAS favoured those scientists who had more contacts abroad (e.g. Perek), and the exchange was "mainly confined to the older generation of scientists",[509] but then Mrkos, an astronomer on the periphery of the field, did not go on the expedition from Lomnický štít, and yet was later repeatedly invited by Soviet polar explorers and developed informal ties with them.

During the 1960s the entire administration underwent a "thaw" and the younger generation finally had their chance. This is confirmed by the reminiscences of Perek, who had just become the Institute's Director: "Then came 1968 and the Prague Spring and I found the whole institute started running round the world. Grygar went to Canada, Plavec went somewhere else in America, and well everyone took advantage of the opportunity to be able to travel again."[510] Hence 1968 was the first year in which more scientists left Czechoslovakia for capitalist states (2512) than Communist ones (1826), though this effect had no bearing on the course of political events that year.[511] However, astronomers started to find trips to Czechoslovakia, approved by the CSAS Scientific Secretary, to be more

507 Hálek, *Ve znamení*, 10.

508 MÚA, A AV ČR, collection I. sekce ČSAV, box 23, Inv. No. 73, individual foreign contacts, 1952–1961, answer by CSAS Scientific Secretary J. Bačkovský to A. Mrkos, 15 February 1957.

509 Alena Míšková, "Vytváření mezinárodní vědecké spolupráce ČSAV v letech 1952–1961," *Práce z dějin Československé akademie věd*, 1 (1986): 165–237, here 234.

510 Interview with Perek, 10 January 2016.

511 Hálek, *Ve znamení*, 16.

attractive once the two-metre telescope had been brought into operation, as both foreign guests and Slovak astronomers from Skalnaté pleso were now able to sign up for the observation schedule.

Congress as a visible network

The status of Czechoslovak astronomy within the international community is evident from its participation in the IAU committee and commissions. Nušl was elected Vice-President of the IAU twice (1928, 1932), as were Šternberk (1958, 1961) and Kresák (1979, 1982). Šternberk invited the Executive Committee to Prague in 1960 and on that occasion he also gave them a tour of Ondřejov. Oort was the IAU President, and one of the advisors was the former Secretary General Oosterhoff. Perek also knew him well, as he had stayed with him in Leiden during his internship.[512] The Ondřejov team made a good impression, as several Czech astronomers were appointed to IAU commissions in 1961.[513]

The IAU regularly convened congresses every three years. To prevent the growing community from losing its scientific relevance, like other scientific unions, the IAU Committee decided to convene smaller events: symposia (workshops in the same year and country where the General Assembly took place) from 1952 and colloquia (less formal than symposia) from 1959.[514] Latest research developments were also discussed at the IAU Committee meeting.

It was General Secretary Donald Sadler (1961–1964) who properly organized the activities, making work easier for his successor Jean-Claude Pecker (1964–1967). Moreover, the Committee was looking for an assistant to help him and ultimately replace him after three years. Perek was chosen on Šternberk's recommendation. As the new members were expected to invite the Committee to the place where they worked, Pecker organized Committee meetings in Nice (1965) and Perek in Prague (September 1966). He formally invited the Committee on behalf of CSAS President František Šorm (1913–1980), the main point being to make arrangements for the Congress, which was to take place in Prague within the year. The protracted assembly of the two-metre telescope only benefitted from the fact that the entire Committee visited the new building.[515]

512 Luboš Perek, "Mezinárodní organizace. Část I. Mezinárodní astronomická unie," in *Ondřejovská hvězdárna*, 235–41, here 235.

513 Perek (No. 33, vice-president), Ceplecha (No. 22, member of organizing board), Kleczek (No. 4, president), Švestka (No. 10, member of organizing board).

514 Andersen, Baneke, and Madsen, *The International Astronomical Union*, 62.

515 MÚA, A AV ČR, Luboš Perek collection, unsorted, sign. V, photo album, 1966.

As assistant to the General Secretary, Perek had most organizational concerns with the preparations for the Congress in Prague, but we will present the actual course and impact of the event from other people's perspectives. The 13th IAU General Assembly took place from 22 to 31 August 1967 and was an important turning point in astronomy. After the discovery of quasars, new methods of observation were discussed, and the competition between the USA and the USSR over the conquest of space was also culminating. This Congress was being held in Eastern and Central Europe for the first time (excluding Moscow in 1958), and due to the politics of the Cold War, it turned out to be the only one (none subsequently took place in this region until 2006, again in Prague). With its participation both from East and West, the Congress surpassed the previous one (with over 600 people from the USA and 233 from the USSR). A total of 788 IAU members, 1,047 other participants and 604 guests arrived – i.e. 2,429 people. At that time, the CSAS announced 20 scholarships for young astronomers from the Eastern bloc to participate, the IAU financed another 20 scholarships. Students from Czechoslovakia participated as support staff. Many of them remember it as the occasion when they met foreign scientists for the first time.[516] However, these congresses gradually grew to such an extent that after Brighton in 1970 their organization was entrusted to specialist companies.[517]

Communication in speeches from the Congress opening

What were the ideas behind the opening of the Congress? The prelude was a preview of the Development of Astronomy in Czechoslovakia exhibition, which was opened by a Czech and a Pole, Guth and Rybka,[518] on the evening of 21 August 1967 in Queen Anne's Summer Palace. The Congress itself was ceremonially opened on the second day at the Exhibition Palace near the planetarium. There IAU President Pol Swings (1906–1983) expressed appreciation for CSAS President Šorm's invitation, which had been passed on by Guth as Chairman of the CSAS Astronomical Section at the previous congress in Hamburg. He also recalled how Prague had provided a peace-

516 Interview with Mikulášek.

517 Interview with Perek, 10 January 2016.

518 Eugeniusz Rybka (1898–1988), famous Polish astronomer on photometry. Born in Radzymin. Studies in Kraków. 1923 assistant in Warsaw, 1932–44 professor in Lviv, 1945 moved to Kraków, 1945–58 professor and director of the Wrocław University Observatory, 1958–68 professor and director of the Kraków University Observatory, 1949 stay in Leiden, 1952–58 IAU Vice-President, 1964–70 President of the IAU Commission No. 41 (history of astronomy).

ful backdrop for the work of such scientists as Tycho Brahe, Jan Kepler, Christian Doppler and Albert Einstein. In his speech, Swings mentioned not only the "hospitality of Prague towards foreigners", but also the importance of several Czech IAU members: Nušl, whose 100th birthday was being celebrated, as well as the 70th birthday of his colleague Šternberk, the 70th anniversary of the Ondřejov Observatory and the CAS's 50th anniversary. This reference made an immediate impact: "My friend Luboš Perek, who has been working in an outstanding manner on the Union's Executive Committee for three years now, will surely be carrying out more important and difficult work during the next three years."[519] This praise combines both a personal appreciation of "friend Perek" with his commitment to undertake further work, since it was taken for granted that as assistant to the General Secretary he would be elected to take his place. Moreover, Swings expressed appreciation for the fact that the Congress would take part in the inauguration of the two-metre telescope. In this diplomatic praise of the traditions behind present-day Communist Czechoslovakia's astronomy, the most interesting thing is how the speaker highlighted the importance of Bečvář, who had died two years previously, having been suspended from public activity by the Communist astronomers. Swings now took advantage of the opportunity to recall the world-famous contribution made by the author of *Atlas coeli*. Pointing out his individual IAU membership, he made a further appeal, saying that international cooperation between astronomers was fruitful precisely because "our Union is independent of any political or governmental influence, and this is the real reason why the organization of various international projects has been so successful".[520] As a result, the projects themselves were dependent on state finances, but the speaker took advantage of the opportunity to appeal to politicians: "Competition among nations must be replaced – and indeed is being increasingly replaced – by peaceful cooperation; only in this way can our science continue to develop".[521] He made direct reference to the word ideology when he stated that the IAU was an instrument of compromise and peace between nations of different political development. The tone he adopted was intended to blunt the Cold War's sharp edge, being uttered in the context of the two superpowers'

519 Polydor Swings, "Zahájení XIII. sjezdu Mezinárodní astronomické unie," *Říše hvězd* 48, no. 10 (1967): 185–89, here 185.

520 Ibidem, 187.

521 Ibidem.

rivalry in space, while other states were mere onlookers. The IAU wished to change all that, and the Czechoslovak experts seemed to be suitable agents for bilateral negotiations.[522]

The speech was also instructive in another respect, as Swings noted the shift towards teamwork, but in contrast to the collective research of socialist science, he drew attention to the need to respect the "individualist thinker". He thus correlated the need for "large and expensive telescopes" with support for astronomers "who belong to a less affluent institution and use their brain."[523]

At the time, the IAU was dealing with the question of how to encourage the education of astronomers through summer schools and other programmes. "Training young astronomers and fostering enthusiasm is as honourable a task as the great exploration of cosmic bodies."[524] With these words, he warned against the "bullying of promising young scientists" by senior professors. The Union was trying to help with this. Moreover, astronomers needed observations at different latitudes and longitudes, so they needed to collaborate internationally. He also reminded them that amateur observations should never be taken lightly. Specializing himself in the physics of comets, he recalled how this had been reconfirmed the previous year when comet Ikeya-Seki (1966) was discovered by two Japanese amateurs, Kaoru Ikeya (born 1943) and Cutomu Seki (born 1930).

By looking out into space, the speaker seemed to be pointing out the broader context of such observations, which were not being discussed directly or *visibly*. Amateurs can be the first to observe celestial bodies, while orbiting artificial satellites just silently observe events over the territory of their Cold War opponents, so one ought to behave with consideration here. This somewhat dramatic statement was made in a year when it was not yet clear which superpower would be the first to set foot on the Moon. Politics aside, a similar call was made at the Congress by current Secretary-General Pecker, who pointed out that hiving off new disciplines like solar physics would just weaken everyone, and instead the unity of the astronomical community needed to be bolstered.[525]

CSAS President Šorm's speech went in a different direction. He pointed out that without state-planned collective efforts, "the natural centrifugal tendencies of individuals" came to the fore.[526] He stressed that the CSAS

522 Cf. Andersen, Baneke, and Madsen, *The International Astronomical Union*, 54–55.

523 Swings, "Zahájení XIII. sjezdu", 188.

524 Ibidem, 188.

525 Andersen, Baneke, and Madsen, *The International Astronomical Union*, 61.

526 Jiří Bouška, "Jak probíhal XIII. sjezd Unie," *Říše hvězd* 48, no. 10 (1967): 190–96, here 191.

Presidium constantly encouraged astronomers – just like scientists in other fields – to focus their energies and resources on a small number of topical key scientific issues.[527] However, each of the six departments was convinced that its research was in the ascendant, and Czechoslovak results confirmed this.

Scientific meetings at the Congress and the inauguration of the Perek telescope

A gala reception at the Černín Palace on the first evening was to bring together the large number of guests invited by the Czechoslovak government and the CSAS Presidium. On the second day, an IAU delegation visited the President of the Republic, Antonín Novotný (1904–1975), and ceremonial lectures were held at the Lucerna Palace. They were both social events that also made an important contribution to current questions surrounding stellar structure (Belgian astrophysicist Paul Ledoux, 1914–1988) and lunar exploration based on photographs taken by Soviet lunar probes (Director at Pulkovo Observatory Aleksandr A. Mikhailov, 1888–1983, Exploring the Moon).

A lecture given by British physicist Martin Ryle (1918–1984) and American astronomer Allan Sandage (1926–2010) on quasars (Radio Galaxies and Quasi-stellar Sources I and II) aroused great debate. As can be seen, this involved topical issues in radio astronomy and the planned unmanned fly-by of the Moon, which would have been performed in September 1967 by the Soviet Zond 1967A probe, if its rocket had not failed shortly after take-off. However, the USSR did achieve success with the Venus 4 interplanetary probe, which was launched towards Venus before the Congress. The topics of the lectures matched the scientific meetings. They took place at the CU Law Faculty and there were 150 participants in total. The main topics discussed were:[528]

- New astronautics techniques (space probes and satellites)
- X-raying cosmic bodies (new branches of research in radio astronomy)
- The lithium problem (Reactions in a star‘s core turn lithium into helium. But why is it also manifested in the radiation of a star?)
- Modern-day issues in fundamental astrometry (precession and galactic rotation)

527 Ibidem, 190–91.

528 Ibidem, 192–93.

- Extragalactic radio sources (relations between quasars and radio galaxies)
- Close binaries and stellar evolution (discussion of mass "overflow")

August 23, 1967 was a festive day for Czechoslovak astronomers, as the inauguration of the two-metre telescope got under way, and preparations at Ondřejov came to a head. When the deputy for financial planning Vladimír Rajský found out that the lawn would not grow in time on the recent construction site, he had oats sown in a hurry, so the access road was lined by much greenery, which met with general approval, and excursions to the telescope lasted several more days.[529]

The telescope was ceremonially inaugurated by CSAS President Šorm, IAU President Swings, the Šternberk Institute Director and Carl Zeiss VEB Director Ernst Gallerach (1930–1991). Specialist and technical information about the telescope was presented by Perek and two designers from Jena: Jensch and Hans Beck (1930–2022).[530]

The Congress's specialist programme was finally rounded off by three symposia with broad-ranging discussions. Two took place on 3-9 September 1967 in Tatranská Lomnica. Physics and Dynamics of Meteors was attended by 66 astronomers and Planetary Nebulae by 85 participants,[531] and the newly published Perek and Kohoutek *Catalogue of Galactic Planetary Nebulae* was presented there. The third symposium, Structure and Evolution of Solar Active Regions, was held in Budapest with 130 participants.[532]

From the desegregation of participants to the development of astroculture

The Congress featured an extensive cultural programme that provided opportunities to make invisible and informal contacts. The People's Observatory in Žilina presented an exhibition of Slovak children's drawings entitled *The Universe and Children*. The Americans showed pictures of the far side of the Moon from the Lunar Orbiter as a mosaic on the floor. Photos covered in transparent film with coordinates came to be a big attraction. It should not be forgotten that at least a third of the Congress participants (almost a thousand people) were not astronomers, and the accompanying programme provided them with an experience best described by the term

529 Harmanec, *Stelární oddělení,* autobiographical notes.

530 MÚA, A AV ČR, Luboš Perek collection, unsorted, sign. V, photo album of 2m telescope.

531 Ibidem.

532 Bouška, "Jak probíhal XIII. sjezd", 237.

astroculture.[533] This is also confirmed by Bouška's report: "Anyone who took their shoes off could walk on the Moon at will, or crawl around on their knees, which most of the visitors also did."[534] However, the Americans also boasted of photographs of the far side of the Moon.

Another exhibition *Astronomia Nova 1967* at U Hybernů house presented some modern astronomical instruments. Twelve foreign companies and the Elektročas plant from Czechoslovakia exhibited time-measuring devices. There were also trips, concerts and other astronomers' meetings. Among other things, Kopal besides his lecture was then in Prague for his daughter Zdenka's[535] wedding with American astronomer D. F. Smith at St. Vitus Cathedral. In order to balance academic relations between East and West, Charles University awarded honorary doctorates at the Karolinum to the last two IAU Presidents: Soviet citizen Viktor A. Ambartsumian (1908–1996) of Armenia (1961–64) and the Belgian Swings (1964–67).[536] A Congress newspaper was published every morning in English and French by Czech astronomers (for eleven issues with a title based on Kepler's *Dissertatio cum Nuncio Sidereo, Series Secunda*). The authors Grygar, Horský, and Michal Bílek provided direct reports on the events of the Congress, as well as further food for thought.

Likewise the various events mentioned can be categorized under the cultural programme, which provided the participants with memories, and *astroculture*, fostering new research, scientific innovation and knowledge. According to Alexander Geppert, this term was coined in the 1960s as an intellectual reflection of the universe and its boundaries, which can be suitably set in its historical context.[537] Astroculture was no longer a utopian vision of man's socialist re-education and the reconstruction of society, but a technologically enlightened perspective on the universe, albeit with slightly naive astrofuturist visions and fears of military control in orbit.

It was in this context that 42 resolutions were adopted at the end of the Congress on 31 September. One important resolution echoed Cold War tensions in space: an agreement between Soviet and American astronauts

533 Cf. Goossen, "Europe's Final Frontier", 475–88. The Congress was also a societal meeting. Pecker remembered how he ended his term of IAU General Secretary: "I ended my term at the Prague General Assembly in 1967. I really enjoyed Prague, dancing the night away at the closing meeting." Andersen, Baneke, and Madsen, *The International Astronomical Union*, 79.

534 Bouška, "Jak probíhal XIII. sjezd", 195.

535 Zdenka Smith (née Kopal, born 1943 in Boston), astrophysicist and astronomer, contribution on optical astronomy.

536 Bouška, "Jak probíhal XIII. sjezd", 236. Cf. photo of both with Professor Mohr.

537 Geppert, *Imagining Outer Space*, 8.

to refer to objects on the far side of the Moon by numbers, not names. One of the resolutions involved the introduction of a new time standard (Coordinated Universal Time, UTC), which started to be determined by atomic clocks in the 1960s and only correlated with natural astronomical time by inserting the required seconds in pre-arranged years,[538] thereby marking the end of a chronological era, as astronomical time *stricto sensu* was slowly giving way to a global age governed by atomic clocks.

At the final session of the Congress, a new Committee was elected: a new president, Otto Heckmann (1901–1983, originally from Hamburg, but now from the USA) and a new General Secretary, Perek. This placed the IAU Secretariat headquarters in Prague for three years and further bolstered Perek's position.[539] Perek evidently helped out the IAU Committee with its tight budget problem when he proposed that the main publication – Transactions – actually be sold to members and other interested parties. The IAU had previously been handing them out: "The Astronomical Union lived on state contributions, but now getting the states to pay more wasn't really on, so I suggested selling Transactions. Since every astronomer worked at an institute somewhere, that institute could buy Transactions and let those interested use it. The Union could not survive otherwise. So that worked out."[540]

Thanks to the IAU Congress, awareness of the high standard of Czechoslovak astronomers and instruments spread. This is indirectly evidenced by the fact that thirteen astronomers from Czechoslovakia were accepted as individual IAU members, nine of whom were men and four women. The symposia and meetings organized in Prague generated a number of new issues and contacts for CSAS Astronomical Institute researchers.

Part 2: 1968 – a milestone in collaboration?

Further research in and out of Czechoslovakia

Although the new IAU Committee elected at the Congress in Prague had a balanced international line-up, in the years that followed, the two superpowers increasingly concentrated on their space programmes. Moreover, the communities of astronomers in both countries – the USA and the USSR – tended to overlook the results of minor scholars from Europe or even radio astronomers from Australia. Historians have often

538 Andersen, Baneke, and Madsen, *The International Astronomical Union*, 65.

539 Ibidem, 80–84.

540 Interview with Perek, 10 January 2016.

adopted this perspective, concentrating their interpretation of the history of science during the Cold War solely on the decision-making of the great powers. Goossen has rightly criticized the notion that Europeans only made a minor contribution to space exploration.[541] After all, it was European scientists, and to no small extent Czechoslovaks, who achieved numerous successes in exploring the entire planet during the 19th and 20th centuries. Unlike imperial states, they also largely drew attention to the dangers of inappropriate exploitation, as environmental historian Alison Frank Johnson points out: "Our understanding of the impact of Europeans on the world reflects innovative enquiries into European Arctic exploration, transatlantic exchanges, entanglements to the south and east, and even the pursuit of natural resources underground."[542]

Astronomy fits well into this perspective because it deals with the study of the universe and the solar system, geostationary orbits, the upper atmosphere and the influence of space and humans on the climate and the planet. Out of all Czech astronomers, Kohoutek has been most involved in this area since the 1990s, pointing out that younger generations of astronomers do not just look into outer space, but they also cannot fail to look at the Earth's atmosphere and its pollution. On the other hand he has made sceptical statements about messages to extraterrestrial civilizations, such as those placed by scientists in the Voyager 1 spacecraft in 1977.[543]

Geppert and his team consider all of these subjects through the lens of astroculture in Europe.[544] But nobody has studied the particular role played by Czechoslovakia. In the following two sections, I shall thus pursue two lines of questioning:

a) Which results achieved by the first post-war generation of Czechoslovak astronomers were useful abroad? What role did the Eastern bloc INTERKOSMOS programme play? Did it help not to overlook minor scholars? As is well known, the political emphasis of the occupation of Czechoslovakia (1968) created a fixed narrative in historical memory, but the study of expert cultures deserves a more precise adjustment of perspective. Indeed, the question is whether those emigrating (especially to the USA) were not exploited for their knowledge, while being unable to get involved in basic research.

541 Goossen, "Europe's Final Frontier", 476.

542 Alison Frank Johnson, "Europe without Borders: Environmental and Global History in a World after Continents," *Contemporary European History* 31, no. 1 (2022): 129–41.

543 Luboš Kohoutek, *Die Erde aus Sicht eines Astronomen. Sachbuch* (Frankfurt am Main: August von Goethe Literaturverlag, 2007); Kohoutek, *Unser Lebensraum*, 7.

544 Geppert, *Imagining Outer Space*.

b) The second set of questions relates to what the astronomical community in little Czechoslovakia meant to UN international diplomacy, which was seeking consensus in an accord on the peaceful uses of outer space. For diplomatic reasons, the representatives and moderators in such negotiations could hardly be experts directly associated with the US or the USSR, hence Poland and Czechoslovakia acted as a kind of bridge to peace negotiations.[545] Both states were of marginal importance in Soviet geopolitics, but promising in terms of technological development.

The events of the Prague Spring and the August invasion of Warsaw Pact troops mark a basic watershed in the development of society in Czechoslovakia, the development of Communist thinking and the organization of scientific research. There is no doubt that the restrictions imposed after August 1968 had the greatest impact on the individual lives of those who were actively involved in the reform movement. The confrontation with the tanks in Prague also brought back memories of the May 1945 revolution in the first postwar generation of astronomers. But this was neither the end of a war nor the declaration of a new one. By the end of 1969 in particular, it was not entirely clear how the situation would develop. Scientists made their decisions individually, and in each research institute the changes came with a different dynamic and intensity.[546]

Interpretation of historical memory is more complex, since due to the direct experience of August 1968 and its media commemoration in exile and in Czechoslovakia after 1989, the meaning of the scientific results has taken on alternative connotations, while not all of them are related to Czechoslovak Communist Party Central Committee policy or Soviet power politics.[547] The IAU Congress in Prague thus appears to be, and is presented as, the culmination of freely practised astronomy in Czechoslovakia.[548] By contrast, the Prague International Geological Congress in August 1968 was not properly concluded.[549] However, it was at the end of the 1960s that in many different respects Czechoslovak astronomy gained its international importance and developed dynamically in the following decade.

545 Doubravka Olšáková, "Pugwash in Eastern Europe. The Limits of International Cooperation Under Soviet Control in the 1950s and 1960s," *Journal of Cold War Studies* 20, no. 1 (2018): 210–40.

546 Lenka Krátká and Pavel Mücke, eds., *Za hranice služebně. Pracovní cesty z Československa do zahraničí v letech 1945 až 1989* (Praha: Karolinum – Ústav pro soudobé dějiny AV ČR, 2021); Krátká, Wohlmuth Markupová, and Vaněk, *(K)lidová věda*.

547 Martin Schulze Wessel, *Pražské jaro. Průlom do nového světa* (Praha: Argo, 2018), 183–200.

548 Koubská, *Hvězdář diplomatem*, 52–54; Andersen, Baneke, and Madsen, *The International Astronomical Union*, 80.

549 Interview with Miroslav Krůta and Gábina Zoubková by Tomáš W. Pavlíček, 22 August 2022.

Replacement of the directors and the organization of research under the State Plan

When the 13th IAU General Assembly in Prague was successfully completed and the new telescope was inaugurated, the CSAS Presidium decided to make one more change in January 1968: to replace the director of the Astronomical Institute. Šternberk was now 70 years old, while the successful Perek, elected IAU Secretary General, had acquitted himself well as a manager and was also a vetted party member. The long tenure of Director Šternberk, a retired member of the interwar generation, came to an end in a manner that was similar to the time the Prague Congress enforced the UTC time standard determined by atomic clocks instead of traditional astronomical time. The replacement at the Institute did not lead to any clashes, but it was not communicated with any relish by the CSAS Presidium, as Perek recalls: "Šternberk took it quite badly and the handover of the Institute to me did not actually take place at all. Šternberk remained sitting at his desk in his room, and I was also sitting in Vinohrady, where we had a number of rooms. There was a library, and I arranged the library into three rooms, in one of which I sat as director."[550]

Perek combined directorial duties with IAU Secretariat administration and hired new secretary Arnost Jappel for help. The organization of conferences and colloquia, many of which were held in Prague in the 1970s, generated new contacts for the CSAS Astronomical Institute scientists.

In his speech at the Congress, CSAS Chairman Šorm said that the Institute should concentrate on two areas of research, but Czech scientists' interests actually went off in various directions, so the State Research Plan was revised to put things in order. In the 1960s it had set up to twenty observational tasks for all the astronomical institutions involved in Czechoslovakia. If several tasks converged in one department or even one person, the work was not systematic. According to the 1966 report, the Stellar Department pursued the study of binaries, galactic structure, interstellar matter, occultation stars, and star clusters. Research was also limited by frequent instrument malfunctions and unfavourable weather.[551]

Some contemporary witnesses recall that Plavec, who lived at Ondřejov itself, was the main reason behind this great dispersion of topics. When he emigrated, not only did the administration of the Stellar Department change, but the individual fields of observation found a firmer footing and produced better quality results.[552]

550 Interview with Perek, 6 December 2015.

551 MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1966.

552 Harmanec, *Stelární oddělení*, autobiographical notes.

In terms of tasks completed, however, the CSAS Astronomical Institute still led the other Czechoslovak astronomical and geophysical institutions (running seven out of twenty observation topics). In 1970 the State Master Plan was significantly revised, which helped to make it more transparent and to combine similar observational methods and objects into common subgroups.[553]

The Institute's varied collaboration with other bodies can be well illustrated by the Chronometry Service, which has been unjustly overlooked by astrophysicists. This recorded changes in the Earth's rotation, using Šternberk's methods to evaluate data from three astronomical and geophysical observatories (the CSAS Geophysical Institute in Pecný, the Comenius University in Bratislava and the CTU in Prague, where measurements were made with the Circumzenithal). The Chronometry Service then compared the results with data from Greenwich.[554] Šternberk, though retired, continued to come into work, and it was thanks to him that the department patented a digital-to-analog converter which allowed the measured time readings to be reduced. This attracted the interest of the Polish Academy of Sciences Observatory in Borowiec amongst others.[555] The Czechoslovak televisual method of microsecond time system comparison met with unprecedented interest, and was even adopted by the US National Bureau of Standards to harmonize its WWV broadcasting.[556]

The CSAS Astronomical Institute succeeded in developing and selling other instruments. The protuberance coronagraph, first purchased by an Italian observatory in Catania, enjoyed great interest. These results and the successes mentioned in Kresák's review at the beginning of the chapter confirm that the CSAS Astronomical Institute was in a prominent position.

Impact of 1968 and emigrating scientists

The events of the Prague Spring did not have the same impact on the subsequent development of the Institute or the expertise of its staff as on other institutes, particularly the CSAS Institute of History. Perek mentioned in his memoirs that in 1968 and 1969 almost the entire Stellar

553 MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1970.

554 Ibidem, report of 1966. The department received time signals from foreign broadcasts and made around 8,000 of its own measurements in one year (new oscillograph 1966). Time signal corrections were measured with a Zeiss 100/1000 mm pass-through device and a 60/690 mm Nušl and Frič circumzenithal, the real pride and joy of Czech astronomical and technical work.

555 Ibidem.

556 Ibidem, report of 1969.

Department was on internships abroad and many of them decided not to come back. He himself also considered emigration, as confirmed by Grygar, who at the time was a member of the Institute Council, which feared this possibility.[557] However, in retrospect, Perek explained that his consideration for his extended family, his affinity with the astronomers at the Institute and his interest in continuing his observations on the two-metre telescope prevailed. As a newly appointed director, he had no opportunity to become more socially involved and thus there were no complications when he was reconfirmed in his post, and it is not clear to what extent he was under pressure to dismiss "inconvenient" people from the Institute. He certainly managed to defend his colleague Křivský, who had been involved in the reform process and even managed to employ the historian Horský: "I met him on Na Příkopech Street, he told me he had been fired from the Institute of History, so I told him: Zdeněk, if you did a little history of astronomy, I could take you in at the Secretariat. So I took him in there. He shared a room with Palouš, later the director. Zdeněk Horský was wonderful."[558]

However, normalization screening, emigration and scientists having to return from foreign internships for fear of losing their Czechoslovak citizenship brought about the awkward fragmentation of individual departments. Which promising teams at the CSAS Astronomical Institute were weakened by colleagues remaining abroad, as about fifteen scientists presently decided to emigrate?

From the Solar Department, the Švestkas left for the Netherlands and Milan Blaha (born 1923), who worked on cosmic plasma physics, left for the USA. Švestka thus moved to the location where the progressive journal *Solar Physics*, which he had co-founded in 1966, was published. The Department's research at Ondřejov was not weakened by this. Out of the Stellar Department, Plavec and Dědičová remained in the USA, while Kohoutek, the discoverer of several comets, worked successfully at the observatory in Bergedorf. His departure had also been based on family reasons.[559]

Out of the Interplanetary Matter Department, Zdeněk Kvíz (1932–1993), who worked on meteors, did not return from his internship in Sydney. Moreover, Vladimír Robert Matas (born 1943) and radio astronomer

557 Koubská, *Hvězdář diplomat*, 103. I.a. Jaroslav Kraus, Jaroslav Ruprecht, Blažena Růžičková and Jan Straka stayed abroad.

558 Interview with Perek, 6 December 2015. Jan Palouš (born 1949).

559 Josefovičová, *Z Československé akademie věd*, 73–76.

Budějický left the Institute. Sekanina, who was unable to complete his postgraduate studies for cadre discipline reasons, left the People's Observatory in Prague.[560]

Link spent 1968 and 1969 in France, where his children lived, and in Germany, where he was preparing the publication of his monograph. But eventually he returned to Czechoslovakia, complicating the lives of his two subordinates in the Upper Atmosphere Department, who now refused to fall into line behind him. The Institute Director even had to split the department into two working groups.[561] However, during the next IAU Congress in Brighton in 1970, Link took advantage of the opportunity and remained in permanent emigration.

While Czechoslovak astronomers were allowed to meet regularly with some of their former colleagues, even in the Czech Republic (as in the case of Kohoutek), others were forbidden to come to Czechoslovakia (e.g. Kopal or Gustav Bakoš, 1918–1991). Rather exceptionally, the scientific papers of some emigrants (such as Plavec) were not allowed to be cited. In subsequent years, the levels of emigration went down, though Ivan Hubený (born 1948) chose this solution in 1986 due to difficulties with the Institute administration.[562] Grygar's contract was not renewed and he left for the CSAS Institute of Physics.

As tensions rose during the changes, the Institute Director was particularly concerned about the curtailment of foreign contacts and trips, without which it was impossible to carry out research and compare the results of observations from different instruments and observatories, not to mention specific collaborative projects. At the end of his annual report for 1969, Perek stressed that any restrictions would have a detrimental effect on the research itself and on the results, which the Institute had previously been able to boast of with justification: "International cooperation is of great importance for our field. Since here in this country and in most other countries of the world, there are always just a few astronomical institutes, the development of astronomy and astrophysics depends on perfect liaison between these scientific institutions. We fear that by limiting this liaison and cooperation, the further development of the scientific disciplines developed at our Institute will be jeopardized."[563]

560 Similarly, part of the Institute's computing team remained in emigration – Jaroslav Pachner, Ladislav Kohout, Karel Arnold, Vladimír Svoboda and Miroslav Janatka.

561 MÚA, A AV ČR, collection Astronomický ústav ČSAV, unsorted, sign. 01, návrh na změnu organizačního řádu AsÚ ČSAV, 1969.

562 Interview with Ivan Hubený by Tomáš W. Pavlíček, 6 April 2019.

563 MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1969, 14.

The prudent attitude of the director and the international scientific importance of the Institute can be considered to be factors that stabilized Czechoslovak astronomy as normalization took hold, although this is not to deny the individual inconveniences to which some of the staff were subjected by the authorities.

The CSAS Presidium's respectful attitude towards the Astronomical Institute can also be explained by the state's interest in Czechoslovakia's involvement in the fledgling Interkosmos space research programme. In subsequent years, however, the Presidium's support cooled as normalization set in. In the first half of March 1970, an **exhibition of lunar rock samples** was even opened at the Ondřejov Observatory by the American ambassador Malcolm Toon (1916–2009) – authorized by the Presidium, which was afraid to hold it at CSAS headquarters. However, the exhibition held outside Prague city centre met with great public interest at the end of that winter. A similar situation was repeated in 1974 with the visit that was paid by Eugene Cernan (1934–2017), an American astronaut of Czech and Slovak descent. Government and official circles wanted nothing to do with it, so he was welcomed at Ondřejov. As Czech astronomers in general (and Perek in particular) remember it, there is an almost heroic aspect in the way both events were organized at Ondřejov, when the Czechoslovak Presidium was afraid to take up this interstate offer.[564] Some of the meetings, however, were organized informally by Perek. In 1974, when Charles Townes (1915–2015), a Nobel Prize-winning American physicist involved in space research, visited Prague privately, Perek arranged an informal lecture on infrared astronomy at the Emmaus Monastery for those interested, who had been invited orally.[565]

The bitter experience of the invasion of the Warsaw Pact troops is difficult to illuminate from a perspective other than the domestic one, but let us try. Brezhnev, seeking to smooth over his predecessor's Cuban crisis, forged new cooperation with Western Europe, which he was willing to win over by selling oil and gas to West Germany, where the Social Democrats were now in government. Some historians have even used the phrases "red globalization" or "red gas".[566] The change in export policy was mainly due to Soviet Minister Aleksey Kortunov (1907–1973), who ignored the

564 Koubská, *Hvězdář diplomat*, 47–48. Another NASA astronaut, Frank Borman (1928–2023), visited Prague in 1969.

565 Interview with Šolc.

566 Per Högselius, *Red Gas: Russia and the Origins of European Energy Dependence*, Palgrave Macmillan Transnational History Series (Basingstoke and New York: Palgrave Macmillan, 2013); Oscar Sanchez-Sibony, *Red Globalization. The Political Economy of the Soviet Cold War from Stalin to Khrushchev* (Cambridge: Cambridge University Press, 2014).

warnings of scientists against excessive exploitation. The construction of the pipeline through Czechoslovakia and Austria to the Federal Republic of Germany was approved by the Politburo on 28 October 1966.[567]

In this context, the suppression of the Prague Spring appears to be no more than the necessary re-establishment of Moscow's hegemony, so that the Politburo could continue its negotiations with Bonn. The USSR and West Germany concluded a gas deal in 1970, which remained in place until 2022. For the Politburo natural gas (sources) turned from a minor natural resource into a powerful political tool and "soft power".[568] After two unsuccessful uncrewed spacecraft missions (Zond 1967A, Zond 1967B) and the lost race to land on the Moon (1969), the USSR really needed a minor Eastern bloc partner for further negotiations in international space diplomacy. The expert knowledge of the CSAS Astronomical Institute could serve for this purpose.

Part 3: Hvar, Interkosmos, and global epistemic communities

> *It was a small miracle at that time that the construction of a joint Yugoslav-Czechoslovak observatory above the town of Hvar in Croatia was agreed and implemented in 1972. Dr. Pavel Mayer and Associate Professor Luboš Perek were behind the original negotiations. There are two stories about this, which I have second-hand, so I cannot vouch for their veracity. The first one is that after a successful dinner in Hvar, Associate Professor Perek and his entourage followed a rocky goat path up to the future observatory at Napoleon's Fortress, stopped at a resting place, looked at the beautiful view of the sea and the small islands and declared: "Building an observatory here is stupid… but it is beautiful!" [...]*
>
> *In any case, I remember the atmosphere in the Stellar Department in the sixties and seventies very fondly. In spite of the hostile political climate, we could talk about everything including politics quite openly with each other, and we had a lot of fun in the evenings in the operations building, but we also did a lot of useful work. I don't wish to be immodest, but the department's scientific output was definitely above average at the Institute during those years.*

567 Susanne Schattenberg, "Pipeline Construction as 'Soft Power' in Foreign Policy. Why the Soviet Union Started to Sell Gas to West Germany, 1966–1970," *Journal of Modern European History* 20, no. 4 (2022): 555–73.

568 Ibidem, 556.

> *Perek had the tempting opportunity to go to work for the United Nations Committee on Space Research, and he obviously did not wish to ruin his chances. This was demonstrated, among other things, by the fact that he repeatedly pressed the astronomers at the Stellar Department to take an active part in the Soviet-organized Interkosmos programme and to participate in the development of instruments for astronomical satellites. We all resisted this idea, as we knew it would effectively put our promising binary star research onto the back burner. True, it has to be said that this pressure eased off once Perek had actually left for the UN and Dr. Bumba had taken his place as director.*
>
> (Harmanec, *Stelární oddělení*, autobiographical notes)

This book cannot go into the necessary details over the question of working trips and individual research undertaken by Czechoslovak astronomers from the 1970s to the 1990s,[569] but I shall at least mention two major international projects created by the first post-war generation. The author of the memoir, Petr Harmanec, also mentions them, and appreciates the importance of the observatory in what is now Croatia, but not Interkosmos. This may just involve his disassociation from Communist collaboration in the Eastern bloc, but what is of value is the way the author contrasts Perek, who tried to persuade the Stellar Department to participate, and the incoming Director Bumba. He is often associated in astronomers' memories with normalization and party activity. Perek, on the other hand, is portrayed as a promoter of pro-Western cooperation, for which he was banned from travelling after his UN mission. Perek's own presentation of himself also supports this impression. In the end, the memoirist reflects on the Stellar Department's efforts to cope with the effects of normalization by focusing on its object of study and achieving some notable successes.

Observatory on the Adriatic Sea

In the 1970s, the CSAS Astronomical Institute played an important role in the **construction of the observatory on the island of Hvar**, which enabled the Stellar Department to observe the sky in this region, where there were at least twice as many clear nights as at Ondřejov. The preparations for this Communist collaboration project with the Faculty of Geodesy in Zagreb and the construction of the observatory were carried out in 1969–1972 on the basis of the framework agreement between the CSAS and the Federal Council of the Socialist Federal Republic of Yugoslavia from 1967.

569 Krátká and Mücke, *Za hranice služebně*.

The Astronomical Institute Director was authorized to decide on the free loan of instruments for the new observatory. The Yugoslav side paid for the transport and installation of the instruments and the Czechoslovak astronomers' stays during their observations on Hvar or lectures in Zagreb. Under the exchange visit scheme, a number of Yugoslav students and astronomers gained experience at Ondřejov. This lasted for 30 weeks a year on each side, and the Solar Department (led by Bumba and Kleczek) and radio astronomy (Antonín Tlamicha) were also involved in this collaboration as well as the stellar scientists (led by Svatopluk Kříž, 1938–2018).

For the Stellar Department this "socialist" collaboration was like having a thorn removed from its heel. The high expectations of the two-metre instrument came up against some glitches that soon appeared on the telescope and the spectrographs, hence Zeiss carried out repairs from mid-1969 onwards. Astronomers went back to observing with a 65 cm telescope retrofitted with interference filters to help measure the brightness of the stars. They also built an electronic comparator to measure the radial velocity of the stars.[570] The work thus moved into the theoretical realm in an effort to evaluate older material from the study trips.[571]

When the two-metre telescope was brought back into operation in November 1970, the Stellar Department returned to experimental observations of large envelope stars (shell stars), Beta Lyrae binaries (in the rapid mass transfer stage) and occultation stars (primarily Algol).

Now the 65 cm reflector and photometer could be moved in good conscience from Ondřejov to Hvar. At the Institute's workshop, a double solar telescope was constructed for Hvar to observe the photosphere and chromosphere. Both instruments have been in operation since 1972 and are also the result of successful design work by Czechoslovak experts from several different fields. Within eight years the reflector had made about 10,000 observations of long-term variations in the light of stars (some binaries and hot stars) observed in parallel on the Ondřejov two-metre telescope. What the frequent bad weather in Bohemia made impossible was achieved on Hvar – unique world-class results and twenty valuable publications in eight years. Czechoslovak astronomers also developed a methodology for recording and comparing observations from the two sites on computers.[572]

570 MÚA, A AV ČR, collection Sbírka základních, box 4, report of 1969.

571 Ibidem, report of 1970. The notes anonymously mentioned results from a stay in Victoria, Canada. The scholar was Grygar.

572 Hadrava, *Ondřejovská hvězdárna*, 279–82.

While Director Bumba's report suggests between the lines that the results from the solar physics observations had so far remained a mere promise (and the trips perhaps pleasant sojourns), the radio astronomy team was conducting important training in Zagreb on artificial satellite observations and in particular the use of laser radars. Miljenko Solarić (1934–2021), who wrote his CSc. thesis during his stays at Ondřejov, was particularly involved in this transfer of know-how. The summer schools sponsored by the IAU and UNESCO and organized by Kleczek at the Institute in Ondřejov, were essential for training young astronomers. For the Yugoslav side, the Hvar Observatory was of greater benefit than any other Eastern bloc collaboration.[573]

Interkosmos

The Eastern bloc's space programme (Interkosmos Kosmicheskaya Programma) ran from 1967 to 1994. Representatives of the invited countries agreed to collaborate, signed a document on cooperation in Moscow (15 and 20 November 1965) and two years later approved a programme of joint work in the field of research and use of outer space with peaceful objectives. The Soviets offered their rocket and space technology free of charge, and nine Eastern bloc states joined.[574]

Since the launch of Sputnik 1, the main focus had been on the US and USSR's rivalry in their conquest of space, but the Interkosmos programme (the name was not approved until 1970) actually had the goal of internationally manned spaceflight. The first astronaut to fly into space with a Soviet crew was from Czechoslovakia – Vladimír Remek (born 1948) in March 1978 in Soyuz 28, but then that same year, the first Pole, Mirosław Hermaszewski (1941–2022), and German, Sigmund Jähn (1937–2019), also flew, followed by another fourteen (e.g. from Cuba, Vietnam and Mongolia). Although the order they went up in had a small degree of political significance, the priority interest in Czechoslovak cooperation was due to the skills of the experts at the CSAS Astronomical Institute and Geophysical

573 MÚA, A AV ČR, collection Sbírka základních, box 4, report by V. Bumba, 7 August 1980.

574 Besides USSR, other socialist states participated: Bulgaria, Cuba, Czechoslovakia, Cuba, East Germany, Hungary, Mongolia, Poland, Rumunia, since 1979 Vietnam. The Czechoslovak delegation was led by the CSAS Vice-Chairman Jaroslav Kožešník, an expert in cybernetics. But Czechoslovak cooperation on the space programme was already led in the 1960s by the Commission for the Observation of Artificial Satellites (Chairman Rudolf Pešek). It was even arranged to launch from the Thumba rocket base in India. In 1971 the Commission entered Interkosmos as their 6th Section. Pacner, *Češi v kosmu*, 93–99.

Institute. The main focus of the programme was to conduct space physics research using the Interkosmos, Kosmos, Prognoz and Vega artificial satellites and Vertikal rockets (with a total of 31 unpiloted flights).

Until Remek's flight, Czechoslovak instruments and subsatellites (e.g. Magion) accounted for 45% of the experiments of all participating states.[575] The activities of the five working groups were coordinated by Valníček. In addition to the Eastern bloc countries, capitalist countries either sympathetic to the USSR (India and Syria) or interested in astronautics (UK, France and Austria) also joined.

For the Czechoslovak astronomers, research on the Sun was particularly promising, although at a meeting in Moscow in October 1967, the three Czech proposers – Bumba, Letfus and Valníček – could see that the Soviet physicists from the Institute of Physics at the USSR Academy of Sciences, who did not have so much experience, were the prime movers behind the programme. Instead of engaging in systematic observation, they just wanted to observe complicated eruptions. The launches were not timed appropriately (in the autumn) and the data received was sent from Moscow late.

At the time Ondřejov used the Minsk 22 computer, the data supplied on films taken from a screen in Moscow was an anachronism and had to be processed manually. Nevertheless, Interkosmos was of great importance to Czechoslovak scientists, as the costs of launching the rockets and satellites were borne by the Soviet Union and the individual partners could prepare their instruments for pre-launch testing.

Interkosmos 1 was launched on 14 October 1969 from the Kapustin Yar Cosmodrome, but it was not until Interkosmos 4 (1970) that more systematic data collection for measuring soft solar X-rays was provided.[576] Using photometry of the setting sun, the upper layers of the atmosphere were studied better than they could have been from aircraft.

As the designer Jaroslav Vojta (born 1935) pointed out, most of the instruments sent signals to the control centre in Moscow, but then the participating countries only received the measured data after a long delay. The Czechoslovak Magion artificial satellites investigating the ionosphere had one undeniable advantage, however, in that they were controlled directly from the workshop, namely by Pavel Tříska's (1931–2018) and Jaroslav

575 Ibidem. Since 1970, the instruments of the CSAS Institute of Geophysics have been put into orbit by the Interkosmos programme.

576 František Fárník et al., "Historie kosmického výzkumu," in *Ondřejovská hvězdárna*, 225–34, here 227.

Vojta's development team at the CSAS Geophysical Institute in Prague. Magion sent them the images or sound recordings from the ionosphere immediately.[577]

One major innovation brought about jointly with the other Eastern bloc states was the development of laser radar (1971–1973), which was in orbit for ten years. Research was extended in 1972 to include another field – cosmic rays (investigated by the Prognoz and PAGEOS satellites), which had previously been the primary concern of Link and the Lomnický štít station.

Valníček and the Commission's Scientific Secretary, Bumba, soon found that other institutes and the CSAS Presidium no longer applauded the programme of peaceful Eastern bloc cooperation, because they envied the increased financial support. The astronomers thus made efforts to submit a draft government resolution in support of the programme (1970), from which additional funds were then sent for five years, so that several young university graduates could be additionally employed under the programme.[578]

Naturally, in the post-1989 literature Czech astronomers criticize this collaboration for shortcomings on the Soviet side, or they refer to the lack of interest on the part of the CSAS's "normalized" administration. From a research perspective, it is significant to note how much disfavour the scientists encountered from their own colleagues after the 1989 revolution. While astronomers described the transformation in such a way that it was logical to curtail any further cooperation,[579] the geophysics team, which had constructed a total of five Magion satellites, was accused of pro-Soviet espionage as soon as the Institute's leadership had been replaced. The accusations of pro-Russian collaboration lasted until the long-successful team was expelled from its original workplace and transferred to another institute. However, it could hardly disclose this context in writing because its own programme still had to be completed.[580]

Here the oral history method offers a convenient tool for historical research among the experts. It has shown, among other things, that with regard to the Interkosmos programme, the astronomers have quite "successfully" overlooked the construction of the satellites that explored the ionosphere.

577 Interview with Jaroslav Vojta by Tomáš W. Pavlíček, 5 September 2023.

578 Ambrož, Bumba, and Švestka, "Sluneční astronomie", 186.

579 Fárník, "Historie kosmického výzkumu", 234.

580 Interview with Vojta.

Epistemic communities

When the first satellite was launched into space (Sputnik 1 in 1957), the view of the world changed dramatically. Thanks to this satellite – and thanks to the Czech astronomer Buchar – the flattening of the Earth's poles was determined more precisely. Technically speaking, it was now possible to observe the planet from outer space.

Shortly after the launch of Sputnik 1, the Committee on Peaceful Uses of Outer Space (COPUOS) was established at the United Nations and met for the first time in 1959 (with Kurt Waldheim as Chairman, 1918–2007). At the time the Soviet Union proposed that the scientists themselves should exchange knowledge on space exploration. They met in two subcommittees (Scientific and Legal) and developed *Principles for the Governance of Space Exploration and Exploitation*, which were then adopted by the UN General Assembly.

The Ten Principles that gave rise to the creation of international space law are of high ethical value. During 1967 a number of great powers then signed the Outer Space Treaty at the UN, committing themselves to the peaceful use of outer space, which no state is allowed to appropriate (the Treaty came into effect on 10 October 1967). Although a number of these principles have subsequently been translated into international treaties, some have remained in the form of recommendations, complicating the search for consensus on, for example, the issue of space debris (SD).[581]

However, this treaty "did not say that space was only to be used for peaceful purposes. In fact, the signatory states were allowed to use it for whatever they wanted, as the superpowers wanted to keep something of a free hand, but there was also a paragraph to the effect that if any damage was caused by space activities, the state whose satellite caused the damage had to provide compensation. Then Soviet Cosmos 954 with its nuclear power source broke up over Canada, scattering fragments near the town of Yellow Knife."[582] However, the main problem with SD is that of unused and uncontrollable satellites and their components, which continue to orbit for decades after they are decommissioned. Initially, the superpowers, i.e. their politicians and even the heads of their space programmes, were not at all concerned about the damage that space debris and objects could cause.

In both areas – peaceful use of space and space debris – Perek was significantly involved. When his role as IAU Secretary General was coming to an end after the well-organized IAU Congress in Brighton in 1970 (he had

581 Perek, "Mezinárodní organizace. Část V. OSN", in: *Ondřejovská hvězdárna*, 249–53.
582 Interview with Perek, 10 January 2016.

even been Vice-President of the ICSU from 1969–1970), he was informed that a P1 (Professionals) level position in the Outer Space Affairs Division (OSAD) at the UN Secretariat had fallen vacant. Although it was quickly filled, there was soon an unexpected turnover at this level. Perek recalled it this way:

"And at the time, A. H. Abdel-Ghani from Egypt was the head of the Space Affairs Division, and he was made chief because that was a neutral country. He didn't know anything about space, but this suited the great powers, because the Soviet Union controlled it to some extent at least. The East and the West got along pretty well there in the end. They needed nobody to interfere too much, so they put this Abdel-Ghani in charge of that division as well. Now when Abdel-Ghani set his mind on getting from position P1 to P2, he gauchely phrased it in such a way that if he didn't get P2, he'd leave." This actually happened in 1974 and Perek was invited to fill the vacant post of OSAD Director. The planetary nebula expert was thus given a prestigious managerial position in a diplomatic setting.

The most apposite term applied to scientists involved in such networks is "epistemic communities".[583] By virtue of their knowledge and careers, scientists become members of international supra-governmental organizations, where they no longer provide expertise for approval by their national government, but together with other scientists they form formal and informal networks through which they influence international policy.

Perek accepted the offer, resigned as Director of the Institute, and moved to New York with his wife in February 1975. The difference made by the arrival of an expert was soon noted by other related organizations, where the UN sent representatives of the UN Secretary-General to represent and negotiate. As long as Abdel-Ghani went to the International Astronautical Federation (IAF), "he gave such general speeches, and it was so obvious that he was indeed the UN Under-Secretary-General, but not a man involved in the field. But when I arrived, they understood me more, I spoke precisely their language, and I knew their problems and I knew what needed to be done scientifically, so that the United Nations could make an impact there."

In this respect, Perek's contribution was truly extraordinary. Some of his fellow astronomers used to come away from such meetings with the impression that they did not understand diplomats and lawyers. "But I have learned to listen. And I also learned how to formulate astronomical points of view so that the law respected scientific findings." Perek was both bright and able to use the skills of his father and grandfather, both

583 Haas, "Epistemic Communities", 1–35.

lawyers. It is not easy to find complementary sources for an evaluation. It is not possible to directly deduce the individual contribution of this Czech expert from the printed UN Reports published by the various commissions and subcommissions, nor was this my research aim. However, these copies, and especially the drafts intended for negotiation, are preserved in the Perek archive collection, some with his handwritten negotiating notes. It has not been possible to trace the personal recollections of any of the politicians or officials involved during Perek's time at the UN. But from the surviving photographs of Perek, it can be practically confirmed that he and his team worked well together.[584]

What was achieved by OSAD? Three conventions were ratified over time under the Outer Space Treaty. The first one on the return of astronauts and space objects (Rescue Agreement) was already approved at the first COPUOS Conference on the Exploration and Peaceful Uses of Outer Space, in August 1968 in Vienna. The second (Liability Convention, 1972) obliged the state to pay for any damage caused by its satellites. The third (Registration Convention, 1975) obliged states to register objects launched into space. "That registration was at first received with enthusiasm, but then the superpowers realized that they were actually losing their privacy and being too open. For example, the Registration Convention stated that the satellite had to be registered "as soon as possible", but "as soon as possible" is not defined, so some did it in a week, some did it in a month, and some did not do it at all." A Treaty on the Peaceful Uses of the Moon and Other Celestial Bodies was also negotiated. It was adopted by the UN in December 1979, but not ratified by the USSR or the US.[585]

Perek did not just content himself with drafting documents for COPUOS. He organized symposia, drew up scientific studies and took up new topics – from galactic planetary nebulae to geostationary orbits. Because of the movement of artificial satellites, a consensus on the altitude at which outer space and national airspace begin and end (about 100 km) was difficult to negotiate at the UN. A permanent definition cannot be established in this way, but astronomically speaking it is where a satellite can be maintained in orbit. However, COPUOS could not agree on this matter. Negotiating geostationary orbits was diplomatically difficult, which is why Perek stepped in with his expertise. A satellite enters geostationary orbit when it is above the equator and has the same angular velocity as the Earth, thus appearing to the observer to be stationary. Hence in what is known as the Bogotá Declaration (1976), diplomats from the equatorial states (Ecuador,

584 MÚA, A AV ČR, Luboš Perek collection, photo catalogue, No. 155.

585 Andersen, Baneke, and Madsen, *The International Astronomical Union*, 110.

Colombia and Central African countries) tried to enforce in international law the interpretation that they were entitled to the stretches of this orbit over their territory because the satellite is fixed at this point. Their lawyers thought that by arguing Newton's laws they would gain a portion of outer space under their sovereignty. So astronomer Perek sat down and wrote a study (1977), deducing mathematically and physically the extent to which this orbit is astronomically deflected and has to be corrected to be maintained, as required by the satellite operator.[586] The equatorial states, however, refused to accept the interpretation, which curtailed cooperation between the UN and the International Telecommunication Union. In fact, it was not until 1998 that Perek managed to push through a working paper with an unassailable argument. He found the experience to be a bitter testimony to the limits of cooperation between the great powers at the UN, as well as developing-world states, which had otherwise been in the mainstream of international politics since the 1970s. Hence he retrospectively appreciated the effects of the Cold War on consensus positions: "Oh the golden atmosphere during the Cold War! There, the United Nations made it important for states to cooperate and to formulate international laws [about space]. And every state was invited to accept it. [...] This certainly had a positive impact on space law, which is actually the only law that applies to space, and it's enshrined in four treaties that have been adopted by a quite broad range of states at the UN."[587]

Together with astrophysicist Donald Kessler (born 1940) of NASA's Johnson Space Center, he helped define space debris, which has become a new problem for space exploration and use.[588] Wreckage and debris from defunct satellites has gradually been accumulating in orbit, endangering active new instruments and astronauts. Unfortunately, this problem was ignored by the superpowers and the UN during the 1970s.[589]

Years later, Perek and his successor Petr Lála (born 1942) managed to get all launched objects, including secret ones, registered directly by the Division (which has since been renamed the Outer Space Division and moved to Vienna). When Perek retired from the UN in 1980, he wanted to nominate Institute Director Bumba as his successor, but he declined the offer and became involved at the regional level in the Soviet-Czechoslovak Friendship Society. The second person he proposed was the Czech lawyer Professor Vladimír Kopal (1928–2014), who was head of OSAD from 1983 to

586 Koubská, *Hvězdář diplomat*, 60.

587 Interview with Perek, 6 December 2015.

588 Miloslav Machoň, "Vliv epistemických komunit na mezinárodní jednání o problému kosmické tříště," *Mezinárodní vztahy* 50, no. 4 (2015): 5–25.

589 Perek, "Mezinárodní organizace. Část I.", 252.

1988. He had already worked for many years as Secretary of the Astronautical Commission at the Czechoslovak Astronautical Society (1959–1980) and had participated in the COPUOS Legal Subcommittee on behalf of Czechoslovakia since 1962.

Like Perek, Kopal had continued to participate in congresses after his resignation as chief, and was the elected chair of the Legal Subcommittee from 1999 to 2003 and 2008 to 2009.[590] The epistemic community in which the relationship between expert knowledge and development is established at the international diplomatic level can be documented when the UN (in a resolution dated 20 December 1965) included Kopal's lecture on the Progressive Development of International Space Law at the UN, which even the rocket engineer Wernher von Braun came to New York to hear.[591] This context confirms the exceptional position of both Czechoslovak astronomy and jurisprudence at the international level.

Before Perek finished his mission at the UN, he was elected President of the IAF and became a member of the International Institute of Space Law (IISL). By then, however, he had come back from New York to Prague, where due to the prevailing circumstances he encountered complications with the Czechoslovak Academy of Sciences administration and the Ministry of the Interior that prevented him from travelling on professional business and continuing his international scientific activities.[592]

He lived through the first 17 November in 1939 as one of the students for whom the universities were closed. He lived through the second 17 November in 1989 and what was known as the Velvet Revolution in Czechoslovakia as a seventy-year-old. Although he had retired shortly before, he returned to active scientific and organizational work after the fall of Communism. He received numerous awards and diplomas, to mention just two: the Prix Jules Janssen (1993, award named after the famous French astronomer) and an honorary doctorate from Masaryk University (1999).

What is particularly worth observing in his career is the way an astronomer from Communist Czechoslovakia joined the scientists' and politicians' epistemic communities, where he also found out how their particular interests were constrained, which diplomats were also spies, and the like. But he tenaciously pursued knowledge, negotiating and travelling to congresses until 2014, when he turned 95. From a science history standpoint, it should be noted that he managed to move from such

590 Mahulena Hofmannová, "Professor Vladimír Kopal Passed Away," *Czech Yearbook of Public and Private International Law*, no. 5 (2014): 475–77.

591 Audiovisual record see: https://legal.un.org/avl/ls/Kopal_LOS.html (accessed on 31 October 2023).

592 MÚA, A AV ČR, Luboš Perek collection, unsorted, box IAF.

early topics as the structure and dynamics of the Galaxy to astrophysical research on planetary nebulae and then to return from outer space to artificial satellites, orbits, telecommunications licences and space law.

In an interview regarding the question of whether he utilized what he knew of the law from his family in scientific and political negotiations, he summed up his life's mission as follows:

I'm one of the few astronomers who can listen to a lawyer, because that's where I find the logic that I know from my family. So you can have a scientific paper, the lawyer reads up to the first equation, stops there and reads no further, whereas the astronomer skips over the text and reads the first equation and then keeps reading. But you have to try to make the mathematical logic understandable to the lawyer and find the logical core of the legal argument. And that's what I've tried to do everywhere. I've been quite the amphibian here – I've been able to listen to the law and translate it into mathematics, and then again I've been able to make the mathematics comprehensible to legal minds.[593]

593 Interview with Perek, 10 January 2016.

The swan song of socialist astronomy: presentation of the CSAS Golden Plaque
to Luboš Perek, accompanied by Vlasta Perková, Václav Bumba,
Ladislav Sehnal, Jaroslav Ruprecht, Jiří Grygar, Jan Palouš, Prague, 1989
(photo by Jiří Plechatý, MÚA, A AV ČR, Luboš Perek collection, photo catalogue No. 441)

Conclusion

During the Cold War, when two superpowers collaborated on the exploration of space, the United Nations and other international organizations needed **to engage astronomical consultants from small socialist states**. In our book we have discussed the issue, how much experts were dependent on the decisions and finances of their national state,[594] and whether the scholar scheme of the Czechoslovak Academy of Sciences was conditional or was a facultative benefit for astronomers. Certainly, they worked in a socialist system of research planning, but they remained loyal to both of the scholar collectives, on the national as well as on the international level, rather than to the CSAS Presidium.[595]

We assume that for a proper appreciation of their research goals, historiography should not simply compare their goals with huge physicist laboratories and biochemical teams producing "big science." Czechoslovakia, as a peripheral state (from the perspective of superpowers), had **significant 'world's first' achievements** (the first network for photographing bolides, among others) and had the first man in space outside of the USA and USSR (Vladimír Remek). Many unique results and observations (made with low budgets and by individual astronomers) were appreciated by the public sphere and quoted by international academia.[596] In 2008, the Czech Republic was the first post-communist state to become a member of the European Space Agency. Since 2007, it has been a full member of the European Southern Observatory, a project in Chile that has been slowly built up since the 1960s. Some of our astronomers, especially Jiří Grygar, actively participated in projects involving new telescopes there, as well as in the popularization of scientific knowledge.

The sociology and historiography of expert culture traditionally create an image of successful, elite individuals.[597] Within the discussion, we do not assume how strongly the first postwar generation of astronomers was interconnected. Time (historical, not astronomical) differed in the case of this particular generation, because **their youth and studies were**

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594 Oreskes and Krige, *Science and Technology*, 256–257.

595 Hadrava, ed. *Ondřejovská hvězdárna.*

596 Similar arguments by Goossen, "Europe's Final Frontier".

597 Sommer, *Řídit socialismus*, 59–67.

interrupted and changed by WWII.[598] The community, of course not without disputes and quarrels, had a common communicative memory. Their expert knowledge is individually fragile but collectively interconnected.

The internal transformation of academia

This book is a contribution to the discussion of expert cultures, the circulation of knowledge, the significance of space research for international politics, and the anthropological study of professions in a socialist society. However, the result is not a collective biography, since the key attention of astronomers was centred around observational methods and instruments. Scholars of different generations met there and shared evaluated data with each other. It was the first postwar generation that vigorously promoted modern approaches in astronomy and astrophysics. Although they expressed their gratitude toward mentors for the prolegomena in research, they vigilantly made sure that the field did not lag behind in Czechoslovakia. If astrophysics as a minor discipline came under the influence of larger disciplines (physics, mathematics), the community held together. When we look at its scientific results and international contacts, it is clear that the CSAS Astronomical Institute, which coordinated the state research, did not derive such a significant benefit from belonging to the Academy of Sciences, as it had only a small amount of power there. At the same time, astronomy far surpassed neighbouring fields in its public popularity. Astroculture was much more visible than the abstract philosophical interpretation of materialist philosophy,[599] both toward atheistic education and in the image of science.

Naturally, the memories of astronomers are highly selective, but the study of memory narratives has shown that even politically different actors maintained a united community after 1989 and continued joint activities despite their different life histories. We assumed that the oral history method was not primarily a prosopographic tool, but that it was developed in order to examine distinctive, and still essential, characters in a minor social group and their internal cohesion.[600]

From interviews with astronomers, we found out how strongly their collective experience of war shaped their youth. Even though a social vacuum did not occur in the occupied Czech lands by moving one cohort

598 Fürst, *Stalin's Last Generation*.

599 Tesař, *The History of Scientific Atheism*, 115–117.

600 Thompson, *The Voice of the Past*.

from society to the forefront, the Soviet war experience was already used as a model during the implementation of the national cleansing in 1945 and later in the studentocracy.[601]

Although historiography highlights the harsh impact of the communist reforms on the educational system in 1948, a cohort of Czech youth during and immediately after WWII actually experienced a far deeper transformation in the scientific sphere. University closures had similar consequences for Polish and Norwegian society. In this context, philosopher Andrzej Leder analysed the entire extended period of the late 1930s, 1940s and early 1950s as an internal revolution, a social imaginary, that Polish society went through as if in a dream.[602] This **transformation of the scientific sphere** also relates to the positions of university students in Czechoslovakia who were directly affected by the ideologization and reform of the educational system. Their perception of academic freedoms and the formation of their own habitus differed from that of the generation of professors between the wars, involving both an image and a commitment presented to the first postwar generation of students, who were allowed to return to universities, as well as the engine behind further scholarly work to replace the losses. It is precisely the individual temporal layers or deposits of such narratives that are problematic, as the politics of memory can use them to pass quick or even unjustified judgments. This was confirmed by research on the memory of victims of the Holocaust and the occupation.[603]

The narrative of wartime victims

In taking a closer look at the first postwar generation, one should mention the **important value of the core of the historical experience and the internal cohesion of the collective**. That is why we stressed the main output of our analysis of written as well as oral archive sources. Historical time differed in the case of the first postwar generation, because their youth and studies were interrupted by WWII. During the cleansing revolution after the liberation in 1945, the foundations of a new politics of memory were quickly formed.[604]

601 Seth Bernstein, *Raised under Stalin. Young Communists and the Defense of Socialism* (Ihtaca – London: Cornell University Press, 2017), 201–12.

602 Andrzej Leder, *Prześniona rewolucja. Ćwiczenia z logiki historycznej* (Warszawa: Wydawnictwo Krytyki Politycznej, 2014), 10–25.

603 See chapter by Katarzyna Chmielewska, " Życie na niby czyli diagnoza na serio. Polski świadek Zagłady", in Hopfinger and Żukowski, eds., *Lata cztyrdzieste*, 215–49.

604 Brenner, *Mezi Východem a Západem*.

The testimonies and numbers of victims did not serve only for reverent memory, but began to shape a new narrative of science. The limiting phenomena of the First Republic were quickly condemned. The Marxist critique of idealistic, bourgeois science contributed to this.[605] A loud narrative began to be created about the mute victims of the Holocaust, the concentration camps and the resistance, which convinced society that everyday life in the protectorate did not exist. The competence to run the state belonged to those who were involved in the resistance and suffered for their activities.[606] It is also known that in May of 1945, records of the composition and activities of various resistance groups were hurriedly completed retrospectively, even during the period when the conspiracy network was scattered after Heydrich's assassination.

On the contrary, scholars who continued their work during the war were unreflectively suspected. If Professor of Theoretical Physics Trkal or Associate Professor of Astronomy Mohr could continue their scholarly activities, i.e., even after the closure of the universities (the Czech Astronomical Institute was not occupied at first), Professor of Physical Chemistry Heyrovský was necessarily confined to a laboratory that could not be moved, and he therefore sought a modus vivendi with a colleague from the German University. After the war, he was slandered for collaboration. The same dilemma has often manifested itself in the medical sciences. In the case of astrophysics and meteorology, the link to the observatory led to the need to negotiate or barter for access to the instruments. The state-directed promotion of the natural and technical sciences from above also helped to equalize their situation after the war.[607]

The fragile establishment of a scientific career

The situation for students during the war was even more complicated. Similar to Luboš Perek, some flirted with the idea of continuing their studies. Perek's life is well-known, but thanks to the oral history method, the tension in which students found themselves was named. When Luboš got engaged to his girlfriend Vlasta at the beginning of 1945, they thought that he would either continue in other professions, or that he would be assigned work as an astronomer far away from home.[608]

605 Landová-Štychová, "Astronomie v Československu".
606 Hopfinger and Żukowski, *Lata cztyrdzieste*, 220.
607 Olšáková, *Věda jde k lidu!*, 284.
608 Interview with Perek, 23 April 2020.

The impact of war on Czech students has been sufficiently covered, but not their postwar trajectories, which were influenced by the prevailing politics of memory. This involved the complicated social and family situations of students who could not secure a more favourable work placement in the Czech lands through their acquaintances, a practice to which Jaroslav Kurzweil drew attention. If a student faced the decision not to be an economic burden to his own family, such economical needs had a real social basis, as we showed in the case of Martin Černohorský. Family reasons led him to study at polytechnics in Darmstadt, and although he was cleansed after the war, as a scientist he had this scar written on his cadre report for the next decade and was able to obtain his habilitation only in 1967.[609] The rigid state scientific system under the supervision of the Communist Party contradicted its own socialist ideas, while overlooking the real social traumas caused by the war.

We have shown how the scientific trajectories of the first postwar generation were extraordinarily entangled. In the documents of their professional competence, astronomers tried to make up for the lost years of their young careers and diligently overcome them with hard work. Many of them became autodidacts and obtained their first respected results as amateurs. The historiography of science examined their research but often neglected the internal connections from the WWII period. We tried to choose novel methods so that the process of knowledge transfer, the development of observation techniques, and new devices stood out.[610]

From archival sources, we found that the difficult process of the studies and the training of research assistants (the *aspirantura* for a CSc. title) is usually not written in the professional curriculum or the scientist's biography, but is told within the community of astronomers. However, their knowledge is fragile in a certain respect – they themselves are aware that they rely on the experience and help of the closest people in the team. The socialist collective was exposed to planning and competition, which placed demands on a scholar's formation.[611]

The socialist vision of the public observatory

There are always specifics in the academic field because it is not uniform. It distinguishes different workplaces, interests, and methods (sub-fields). Using Bourdieu's notion of distinction, we observed habitual elements

609 Pavlíček and Kulawiaková, *Martin Černohorský.*

610 Dupré and Somsen, "The History of Knowledge".

611 Kott et al., *Planning in Cold War.*

that professors, associate professors, and assistant professors shared among themselves. Those elements affect academic skills, cultural habits and communication skills, but also attitudes towards values, social issues and political beliefs.[612] If we try to formulate the postwar development in the astronomical community, we see that the drive for innovation was clearly emerging. However, the postwar tuition of astronomy showed that it remained in the old knowledge, despite the transformation of the educational system. On the other hand, the socialist vision of the democratization of education and of making science (*nauka*) accessible to the public had promising potential. Related to this was the requirement that not only professors, but also assistants and students participate in the running of universities. Lectures were to be accessible to laymen and were to respond flexibly to scientific knowledge and the practical needs of society and the economy.

Young astronomers were grateful for the construction of public observatories but had to take a stance toward politically engaged activists, such as Luisa Landová-Štychová. Her significant contribution was in the radical leftist, feminist policy as a member of the Parliament during the First Republic. In the collective memory of astronomers, she was a dilettante; however, this seems to be a consequence of the diversion of the professional community from her powerful influence in CAS. She lacked professional training in astronomy, but her appeal for the availability of scientific knowledge to all levels of society and an emphasis on the national heritage of astronomy in the Czech lands and its contribution to the world appealed to astronomers.[613] It had the potential to innovate knowledge and postwar economic recovery, as well as scientific and technical progress.

Later on, an innovative treatment of the history of astronomy and the philosophy of science (thanks to Zdeněk Horský in particular) found a methodological framework for regulating the leading Marxist-Leninist interpretations of nature. Astronomers in Czechoslovakia wanted to become acquainted with the innovations in global research. Still, public observatories and amateur observations held great potential for them. They provided an opportunity to popularize one's own results and spread materialistic enlightenment. From their collective memory, these contemporary, socialist features were lost. The actions of Landová-Štychová were definitely described as unscientific.

612 Pullmann, "Proměny třídních pozic".

613 Holubec, *Nešťastná revolucionářka*.

Although Landová-Štychová arranged the financing for many observatories, she became an icon of the "cosmic proletariat," similar to how scientists in other fields (e.g. biology) performed a ritual of cleansing their own memory. From this perspective, in agreement with historian Josef Petráň,[614] this generation can be characterized as young revolutionaries who were able to demand the dismissal of their director, František Link, a member of the Communist Party.

In interviews, astronomers were critical of their teachers' lecturers, who were lagging behind scientifically – Heinrich and Nechvíle, but also Mohr, who was proactively involved in popularizing the materialistic interpretation of nature. Indirectly, we found out that the postwar reform of higher education (to the extent that it was enforced politically from above) was also justified socially and by the content of tuition. We compared different student trajectories. While some had connections, others had to earn money for their studies by tutoring, like Černohorský. Subsequently, he connected his entire professional life with the academic sphere.

Although the vision of a socialist university could not be fully realized, both the universities and the students benefited from the construction of public observatories (e.g., the joint construction at Kraví Hora in Brno). Through popularizing lectures at observatories, the public made contact with professional astronomy. Subsequently, as demonstrators, they applied their own knowledge and the results of their amateur observations. However, the idea of CAS as an association that also included lay people arose as early as in the interwar period, and not as a result of the communist coup d'etat in 1948. In connection with breakthrough discoveries in astrophysics, astronomers professionalized the editorial board of the journal *Říše hvězd* and founded their own magazine (*Kosmické rozhledy* – Cosmic Perspectives). Simultaneously, they transformed CAS into an expert scientific society organized under CSAS (1959). This process can be placed in the context of overcoming "naive socialism" or Stalinism and moving toward an expert socialist culture, which is also worth engaging internationally.

Debate on expert culture

The closer view in our book showed how astronomers from socialist Czechoslovakia achieved **scientific acknowledgment from the international community**. Let us mention the fundamental contribution to solar physics, the dynamics of the Galaxy, the observation of stars, and the

614 Petráň, *Filozofové dělají revoluci*, 30–49.

development of new telescopes and other instruments. We can continue with the observation of meteors, the calculation of bolide paths, the creation of the European bolide network, and the discovery of minor planets. Even a minor scholar has the right to name a discovered space body. In the case of comets, they used to be named after their discoverer – even amateurs can be experts. Last but not least, the measure of time was a privilege of astronomy.

There is a debate in historiography as to whether, after overcoming the period of Stalinism, the sign of indecision emerged as a key factor[615] or as a dynamic search for a starting point for building a socialist future.[616] While Soviet Stalinism wanted to overtake the West at all costs, the peripheral states of the Eastern bloc strove to complete the processes that had been started.[617] If professional astronomers in Czechoslovakia renounced the ideological demands of Landová-Štychová, we ask the question, how did they participate in the aforementioned departments in the building of state socialism? Was it about overcoming the Soviet vision of scientific research, or about trying to organize it in a better way?

The first postwar generation was more convinced of a better organization of collective research than their teachers. While Pavel Kolář characterized the period before the onset of late socialism as the Zwischenphase, erudition and development in technology meant that members of the first postwar generation were already becoming experts during the 1960s. In this way, they clearly determined the further development of research. Jan Mervart confirmed that after a period of projective visions, in the 1970s and 1980s there was an effort to materialize it. Conventions were imposed from above so that promising ideas were secured and experts were capable of greater self-reflection, but those conventions also authorized the necessity of control, and possibly the limits of freedom.[618]

The role of objective knowledge and the need to entrust it exclusively to experts was emphasized. The more successful expert teams it produced, the more science was free from politics. This was the privileged position of the institutes of CSAS, and in our case it was several departments in the CSAS Astronomical Institute.

Małgorzata Mazurek showed how Polish economists as experts of developmental thinking became a geopolitical instrument in India in

615 Pullmann and Kolář, *Co byla normalizace?*

616 Mervart and Růžička, *„Rehabilitovat Marxe!“*, 9–11.

617 Olšáková and Janáč, *Kult jednoty.*

618 Mervart and Růžička, *„Rehabilitovat Marxe!“*, 14–15.

the process of decolonizing the world.[619] If India was a broker of social science in the Cold War, Czechoslovakian astronomers became brokers of the peaceful use of space law in the Cold War. The shared perception of knowledge transfer during the 13th IAU General Assembly in Prague (1967) revived the legacy of science of minor European states and was internationalized in new ways, both because of and in spite of the Cold War.

The application of expert cultures

It seems that the political reforms and defeats from 1968–70 did not destroy the value of astronomical research, although emigration impoverished the community. The atmosphere at the CSAS Astronomical Institute changed rather in the 1980s, and a precise assessment of all of the factors would require further research. We examined how the first postwar generation quickly grew into the role of experts whose results could also be used politically.[620]

Members of the interwar generation (Buchar, Guth, Link, Šternberk, Mohr) are still characterized by quantitative and statistical efforts. They derived models of the Galaxy (Mohr) and interplanetary matter (Guth) and proposed more precise methods (Link) or instruments (Šternberk). A good example is Emil Buchar, who, by processing the data from Sputnik 1, gained primacy in the method of calculating the flattening of the Earth. Excellent theoretical results in astronomy and astrophysics ensured recognition and membership in international organizations. The question is, have younger scientists followed them on this path to fulfill the same model as their trainers? When we analysed the career trajectories of postwar astronomers, what stood out was their efforts to apply knowledge in the role of experts extending into the engineering technocracy. They developed radio radars and remotely controlled photometers. They studied solar flares and related them to forest planting and logging or to the biorhythms of the human body. They calculated the paths of comets, artificial satellites, and meteorites, and at the same time they proposed the practical use of artificial satellites. From the rocket programme and the launching of instruments into orbit, they predicted the future exploitation.

619 Małgorzata Mazurek, "Polish Economists in Nehru's India: Making Science for the Third World in an Era of De-Stalinization and Decolonization," *Slavic Review* 77, no. 3 (2018): 588–610.

620 Lutz Raphael, "Radikales Ordungsdenken und die Organisation totalitärer Herrschaft. Weltanschauungseliten und Humanwissenschaftler im NS-Regime," *Geschichte und Gesellschaft* 27, no. 1 (2001): 5–40.

Expert cultures are distinct political actors and, as seen in the case of American progressivism, they have co-created power practices in the name of science.[621] Nevertheless, we believe that the epistemic communities in which Czechoslovak astronomers were involved differ from these experts. **Epistemic communities** arise within transnational organizations with the involvement of individual members and states. At the same time, a parallel or superior identity of the members of this community is formed on this platform, which either diminishes the national interests of individual expert cultures or supports them with the international circulation of knowledge. One can then better argue in local politics.[622] It turned out that the defeat of the Prague Spring did not disqualify experts in further research.

Valuing men and women in the role of expert

Taken together, the discoveries of quasars and pulsars in the 1960s led experts to study new phenomena and develop new methods and instruments. Their knowledge accelerated. However, it must be added that at the same time, the contribution of women in astronomy was often overlooked.[623] We believe that this effect was less pronounced in astronomy in socialist Czechoslovakia when women in the CSAS Astronomical Institute had continuous support in their research (Ludmila Weberová), but we discovered that they experienced more demanding judgments during defenses than men at the Section of CSAS (Eliška Chvojková). On the contrary, women leaving to emigrate testified that they encountered much more difficult conditions (Zdeňka Plavcová). We can also take a look at the discoverer of pulsars herself. Jocelyn Bell Burnell (born 1943) and Antony Hewish (1924–2021) of the University of Cambridge detected the first pulsar in 1967 using radio astronomy. Surprised, they first named it little green men (LGM-1); a year later, they used an abbreviation made from the words pulsating star. In this context, Jiří Grygar commented on the oldest case of gender neglect from 1974:

"Those pulsars were discovered by Ph.D. student Jocelyn Bell, now known as Burnell. Her trainer assigned her the task, but she built the antennas. She analysed the data that was on the graph bars. She figured out that there are those periodic [radiations]. But the Nobel committee gave

621 Sommer, *Řídit socialismus jako firmu*, 15.

622 Adler and Haas, "Conclusion: Epistemic Communities, World Order, and the Creation of a Reflective Research Program," *International Organization* 46, no. 1 (1992): 367–90.

623 Kałwa, "Herstoria Mówiona".

the prize only to Hewish and not to her. That was bullshit of the highest kind. And to this day it is perceived that way. It's just that the Nobel committee did a lot of damage, it's unbelievable. And the same Jocelyn Bell saved the debate about Pluto in Prague [in 2006], because she managed it neutrally, as if she had nothing to do with it. She was done with it in three quarters of an hour. That's what left me dumbfounded. Everyone fell silent, they had been arguing for three years before this. You may know that she received the big prize – Special Breakthrough [Prize in Fundamental Physics, 2018]. That's three million dollars, and she donated it all to a foundation to support young female and male scientists [immigrants and refugees]. That's a wonderful lady."[624]

The IAU General Assembly being held for the second time in Prague is an indisputable success for Czech and Czechoslovakian astronomy. Even more valuable is the above-cited recognition of the woman who managed the final vote.

The importance of socialist consultants for astroculture

Researchers from the CSAS Astronomical Institute have been successful trainers and scientific diplomats abroad. We have mentioned the results of socialist Czechoslovakia that had an impact across the Iron Curtain. In West Germany, a similar network for the photographing of bolides was created, coordinated from Ondřejov (today a European network). The Time Service provided methodological consultations (e.g., to an observatory in Bucharest) and offered a digital converter. The Stellar Department built an observatory on the island of Hvar in Yugoslavia. The Solar Department sold self-made solar spectrographs, provided its know-how to observatories in the Soviet Union, and coordinated Czechoslovak participation in the Interkosmos programme.

Manuals and monographs with a fundamental international acceptance were published – Kohoutek and Perek's *Catalogue of Galactic Planetary Nebulae* (1967) and Josip Kleczek's remarkable work, *Astronomical Dictionary in Six Languages* (1961). Astronomers also represented the importance of their field in scientific-diplomatic roles – for instance, Perek as Secretary General of the IAU and then as head of the UN Office for Outer Space Affairs in New York, where he went in 1975. This also marked the end of a crucial era in the management of the CSAS Astronomical Institute.

The cooperation between scientists in the Eastern bloc deserves attention, because the idea of a "chained academy" (cf. John Connelly) declined

624 Interview with Grygar.

before *perestroika*. In some areas of research, long-term cooperation in the Eastern bloc had a dynamic effect, and innovative methods were respected by the West. An example is the intensive circulation of knowledge between Czechoslovak, Polish and Soviet physicists in the field of cosmic rays at the specialized workplace in Dubna (USSR) and the transfer of experience from the development of "particle accelerators" to the Western European workplace CERN.[625]

Finally, the importance of astronomers' work for astroculture was unforgettable. First came the expectation from CAS and the Socialist Academy that knowledge would help break the dogmatic views of the (rural) people about religious faith. But planetariums and public observatories, which were supposed to fulfill this task, triggered side effects in parallel. Through exhibitions, popularization, and visitor days, which reached thousands a year at Ondřejov, more than one Czech astronomer learned to popularize the results. At the same time, these objects created an environment for informal discussions within the astronomical community about the role of science in society and the freedom of knowledge.

* * *

The first postwar generation of astronomers in Czechoslovakia had many scholarly ambitions such as, among others, to transfer their knowledge across the Iron Curtain. Surprisingly, their world-renowned achievements were founded on three factors:

They developed various innovative instruments, observations techniques, and methods appreciated abroad. Despite their ambitions, they were engaged not as individual experts, but rather as consultants from a small socialist community with notable internal cohesion. This cohesion came about through the special circumstances of their youth and studies interrupted by the Second World War.

625 Hladký, *Paměti kosmika*, 283–309.

Figures

Luboš Perek with his 60-cm telescope, Brno, 1953
(MÚA, A AV ČR, Luboš Perek collection, photo catalogue No. 32)

The conference of Czechoslovak and Polish astronomers, Wrocław, 1956
(MÚA, A AV ČR, Luboš Perek collection, photo catalogue No. 199)

Waiting for a bus in Wrocław. From the right: Ceplecha, Vanýsek, Link, Heinrich (in the foreground), Plavec, Kresák, Kopecký, June 1956
(MÚA, A AV ČR, Luboš Perek collection, photo catalogue No. 202)

Luboš Perek in conversation with Professor Vladimír Heinrich, Prague, 1940s
(MÚA, A AV ČR, Luboš Perek collection, photo catalogue No. 119)

Informal education in mathematics due to the closure of universities,
from the left: Brabec, Perek, Pata, Katětov, Blumová, 1940
(MÚA, A AV ČR, Luboš Perek collection, photoalbum WWII)

During his stay in Leiden, Perek takes a photo at a meeting
with Jan Oort (second from right) and Pieter Oosterhoff (second from left), 1949
(MÚA, A AV ČR, Luboš Perek collection, photoalbum WWII)

Štefánik People's Observatory, the eastern dome with the short-focal comet finder
(photo by Josef Klepešta, MÚA, A AV ČR, collection Astronomický ústav ČSAV, unsorted)

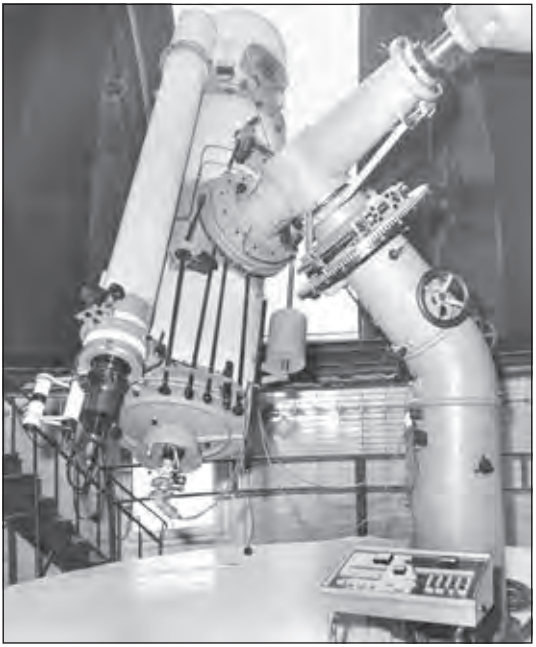
Construction of the dome for the school planetarium Nad Hamburkem, 1958
(Hvězdárna a planetárium Plzeň collection)

Vlasta and Luboš Perek with their friend Gabriela Matulová (first from left) skiing above Skalnaté pleso, early 1950s
(MÚA, A AV ČR, Luboš Perek collection, photoalbum from the 1950s)

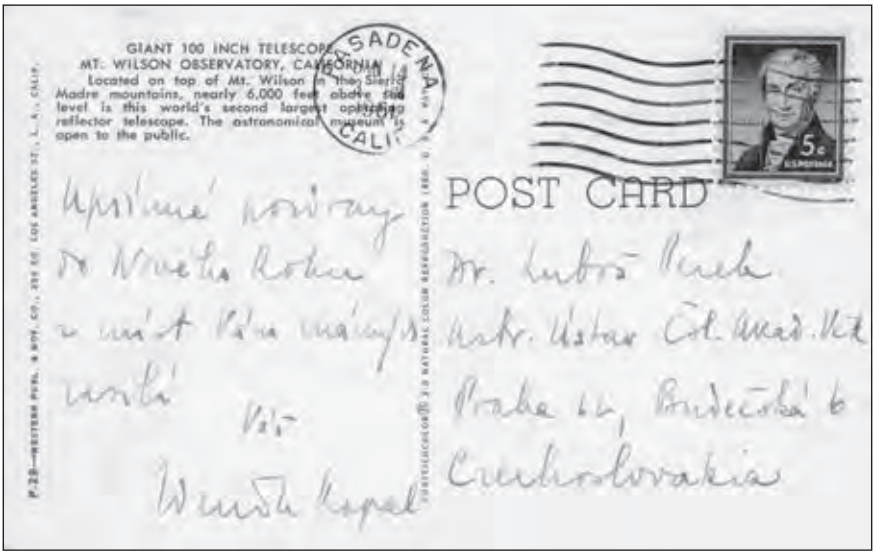
Observatory at Skalnaté pleso in the High Tatras
(photo by J. Krejza, MÚA, A AV ČR, Václav Bumba collection, unsorted)

High-altitude observatory and meteorological station at Lomnický štít
(MÚA, A AV ČR, Václav Bumba collection, unsorted)

Mt Palomar Observatory, California, 1962
(MÚA, A AV ČR, Luboš Perek collection, photo catalogue No. 528)



Reflector with a mirror with a diameter of 60 cm, Skalnaté pleso
(MÚA, A AV ČR, Václav Bumba collection, unsorted)



Giant 100-inch telescope at Mt Wilson Observatory, California,
postcard sent from Zdeněk Kopal to Luboš Perek, 1961
The message reads:
Sincere regards in the New Year from places known to you, Zdeněk Kopal
(MÚA, A AV ČR, Luboš Perek collection, photo catalogue No. 527)

Parabolic radio telescope with a diameter of 64 m,
second largest movable telescope in the world, in 1987 extended to 70 m, Parkes, 1961
(MÚA, A AV ČR, Luboš Perek collection, photo catalogue No. 507)

Excursion to the focus cabin of the parabolic radio telescope, 1961
(MÚA, A AV ČR, Luboš Perek collection, photo catalogue No. 506)

Parabolic radio telescope at night, 1961
(MÚA, A AV ČR, Luboš Perek collection, photo catalogue No. 509)

Dome construction for the two-metre telescope, Jena, early 1960s
(MÚA, A AV ČR, Václav Bumba collection, unsorted)

Optical diagram of the first focus, the Cassegrain focus, and the coudé focus
by Luboš Perek
(MÚA, A AV ČR, Luboš Perek collection, unsorted)

Perspective view of the dome of the two-meter telescope
(MÚA, A AV ČR, Luboš Perek collection, unsorted)

Visit of the IAU Executive Committee at Ondřejov,
from the left Vladimír Guth, Luboš Perek, Jean-Claude Pecker, Pol Swings,
Martin Schwarzschild, Andrei Severny, Viktor Ambartsumian, Walter Fricke,
Guillermo Haro, Donald Sadler, Wilbur Norman Christiansen,
Václav Bumba, Bohumil Šternberk, September 1966
(MÚA, A AV ČR, Luboš Perek collection, photo catalogue No. 216)

In his speech, Pol Swings mentioned the hospitality of Prague towards foreigners, 22.8.1967
(photo by Jiří Plechatý, MÚA, A AV ČR, Luboš Perek collection, photo catalogue No. 227)

Participants listen attentively to the opening speeches
(photo by Jindřich Marco, MÚA, A AV ČR, Luboš Perek collection, photo catalogue No. 221)

Toast and talks under the two-metre telescope, inauguration in Ondřejov, 23.8.1967
(photo by Jiří Plechatý, MÚA, A AV ČR, Luboš Perek collection, photo catalogue No. 229)

Zdeněk Kopal during his congress lecture, Prague, 1967
(MÚA, A AV ČR, Václav Bumba collection, unsorted)

In order to balance relations between East and West, Charles University awarded honorary doctorates to a Soviet citizen Viktor Ambartsumian (standing right) and a Belgian Pol Swings (standing left), between them Professor Josef Mohr, Prague, 1967
(MÚA, A AV ČR, Václav Bumba collection, photoalbum Congress)

Voting by IAU member states, Prague, 1967
(MÚA, A AV ČR, Václav Bumba collection, photoalbum Congress)

Popular astroculture – popular astronaut during his speech to the people in Prague, 1969
(MÚA, A AV ČR, Václav Bumba collection, unsorted)

Double NASA astrounaut Frank Borman receives an award
from the CSAS President František Šorm, Prague, 1969
(MÚA, A AV ČR, Václav Bumba collection, unsorted)

Malcolm Toon and Luboš Perek in Ondřejov open the Exhibition of Lunar Rock Sample, which the Academy was afraid to organise in Prague, March 1970
(MÚA, A AV ČR, Luboš Perek collection, photo catalogue No. 257)

A socialist army officer at the Exhibition of Lunar Rock Sample brought by the American ambassador Toon, March 1970
(MÚA, A AV ČR, Václav Bumba collection, unsorted)

Ľudmila Pajdušáková in conversation with Boris Valníček at the IAU Symposium, Prague, 1975
(MÚA, A AV ČR, Václav Bumba collection, unsorted)

Participants of the IAU Symposium on an excursion to the double solar telescope, Ondřejov, 1975
(MÚA, A AV ČR, Václav Bumba collection, unsorted)

Director Perek is going to develop socialist cooperation,
considering how to build a new observatory on the Hvar island, early 1970s
(MÚA, A AV ČR, Luboš Perek collection, photo catalogue No. 537)

Director Bumba is speaking during the meeting
of members of the Communist Party of Czechoslovakia at the Institute, late 1970s
(MÚA, A AV ČR, Václav Bumba collection, unsorted)

Another face of Interkosmos – Vladimír Rajský,
economic manager of the CSAS Astronomical Institute, Prague, 1971
(MÚA, A AV ČR, Václav Bumba collection, unsorted)

Eugene Cernan, American astronaut of Czech and Slovak descent, accompanied by Jiří Grygar and Josef Zicha, Ondřejov, 1974
(MÚA, A AV ČR, Luboš Perek collection, photo album Cernan)

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Summary

The inauguration of the two-metre telescope at Ondřejov observatory and the 13th General Assembly of the International Astronomical Union in Prague in 1967 was an important turning point in astronomy. After the discovery of quasars, new methods of observation were discussed, and the Space Race between two Cold War rivals was culminating. Luboš Perek, father of the mirror reflector and mastermind of the congress, became a leader of the generation of scholars and the Director of the Astronomical Institute of the Czechoslovak Academy of Sciences.

The formation of the first postwar generation of astronomers was specific with regard to the war experience. The uncertainty of life and the future profession created a bitter mental legacy which, together with the efforts to catch up with the surrounding scientific world and the lost years of a scholarly career, represents the factors that co-created the Cold War. This book asks how, from this postwar legacy, students of astronomy in Czechoslovakia become experts in demand on international platforms.

The Iron Curtain did not have the strict east-west opposition. Czechoslovak astronomy participated in the UN debates about space law and had a number of excellent results (e.g. chronometry, solar physics, radio astronomy, network for photographing bolides, research of the high atmosphere, the Galaxy and stellar astronomy). Indeed, after astronauts from the USA and the USSR, the Czechoslovak cosmonaut Vladimír Remek was the next person in space thanks to the programme Interkosmos. On the topic of the interconnectedness of the East and West, the authors ask how balanced the two-way foreign cooperation was when several NASA astronauts visited Prague.

The innovative contribution of the book is supported by fragments from interviews with experts of this generation, from the oldest one, Luboš Perek, to the youngest, Jiří Grygar. Using the oral history method, the authors evaluate their life stories, networking, gender aspect, and circulation of knowledge.

This epoch begins with the launch of the first artificial satellite, Sputnik 1, in 1957, and it is closed by the grid of the Cold War. The unique position of the first postwar generation can also be defined on the platform of astroculture, from both the angles of futurological visions and socialist ideas. This approach opened up a productive way to consider how astronomers brought their knowledge into society using public observatories as places for the promotion of atheism and modern scientific knowledge.

List of abbreviations

AUK	Archiv Univerzity Karlovy [Archives of the Charles University]
AV ČR	Akademie věd České republiky [Czech Academy of Sciences]
BAC	Bulletin of the Astronomical Institutes of Czechoslovakia
BIH	Bureau International de l'Heure [International Time Bureau]
BTU	Brno Technical University (brněnská polytechnika)
CAOSP	Contributions of the Astronomical Observatory Skalnaté pleso
CAS	Czech/Czechoslovak Astronomical Society (Česká/Československá astronomická společnost)
CASA	Czech Academy of Sciences and Arts (Česká akademie věd a umění)
CERN	Conseil Européen pour la recherche nucléaire [European Organization for Nuclear Research]
CCD	Charged Coupled Device (electronic detectors)
CFU	Charles-Ferdinand University, Prague (Karlo-Ferdinandova univerzita)
CNC	Czech National Council (Česká národní rada)
CSAS	Czechoslovak Academy of Sciences (Československá akademie věd)
CSc.	candidatus scientiarum [Candidate of Sciences] (scientific doctor degree, relevant to PhD)
CTU	Czech Technical University, Prague (České vysoké učení technické)
CU	Charles University, Prague (Univerzita Karlova)
CUB	Comenius University, Bratislava (Komenského univerzita)
ČSAV	Československá akademie věd [Czechoslovak Academy of Sciences]
ČVUT	České vysoké učení technické
DrSc.	doctor scientiarum [Doctor of Sciences]
GPS	Global Positioning System
IAF	International Astronautical Federation
IAU	International Astronomical Union
IISL	International Institute of Space Law
Inv. No.	Inventory Number (inventární číslo)
JAS	Jihočeská astronomická společnost [South Bohemian Astronomical Society]
JČSMF	Jednota českých/československých matematiků a fyziků
Kčs	Koruna československá [Czechoslovak crowns – currency]
MIT	Massachusetts Institute of Technology
MU	Masaryk University, Brno (Masarykova univerzita)
MÚA	Masarykův ústav a Archiv [Masaryk Institute and Archives]
NASA	National Aeronautics and Space Administration
NČSAV	Nakladatelství Československé akademie věd
NLN	Nakladatelství Lidové noviny

OIR	Organisation Internationale de Radiodiffusion [International Radio Organization]
ORWO	Original Wolfen (trademark of the East Germany company)
OSAD	Outer Space Affairs Division, United Nations
PTU	Prague Technical University (pražská polytechnika)
RNDr.	rerum naturalium doctor [Doctor of Natural Sciences] (extension of a master-like degree)
ROH	Revoluční odborové hnutí [Revolutionary Trade Union Movement]
SAS	Slovak Academy of Sciences (Slovenská akadémia vied)
SC AGGM	Scientific Collegium for Astronomy, Geophysics, Geodesy, and Meteorology (CSAS)
SOkA	Státní okresní archiv, branch of the Státní oblastní archiv
SS	Schutzstaffel (paramilitary and military organization of Nazi Germany)
ss	summer semester
TP	Tempus Pragense [Prague Time]
UCMP	Union of Czech Mathemathicians and Physicists (Jednota českých/československých matematiků a fyziků)
UN	United Nations
USSR	Union of Soviet Socialist Republics
ÚSTR	Ústav pro studium totalitních režimů
UTC	Coordinated Universal Time
VEB	Volkseigener Betrieb [Publicly Owned Enterprise]
ws	winter semester

List of tables

Tables 1–6. Gender distribution of students in astronomy and related fields

After the war, the teaching of astronomy at the MU Faculty of Science in Brno was just starting, and student numbers were minimal. Due to GDPR, we could not see the catalogues, but we got access to incomplete student statistics from 1945–47, showing the distribution by gender, nationality and state.

Paper catalogues of male and female students from this period used sorting by alphabet or subject, but not by class. Thus, these are enrolments not only for the first year but also for subsequent years. The data in the tables 1–3 are incomplete and missing from some years. The duplicates of the RNDr. diplomas used sorting by date, peaking in 1952 before the degree was abolished (tab. 4, total number was 457, last diplomas awarded on 31 August 1953).

Sources: Archiv Masarykovy univerzity Brno, collection A1 Rektorát, book 17, Opisy diplomů Drů přírodovědecké fakulty Masarykovy univerzity v Brně 1945–1953; collection A6 Přírodovědecká fakulta, box 18, sign. RN A/9 1, Statistiky. (Note: Due to GDPR, we could not access parallel catalogues of students from the CU Faculty of Science in Prague from this period.)

At the CTU, astronomy was taught at the College of Special Studies (CSS) in the F1 and F2 engineering courses. When the studies were reorganized in 1920, the CSS was discontinued, and astronomy was moved under Surveying to a new independent Faculty of Surveying. The student catalogues do not indicate the status of female students; two hyphenated surnames may indicate married students. Due to GDPR, it was impossible to record students' biographical data, but we were allowed to note their numbers.

Table 5 contains the numbers of female and male students (fem./m.) enrolled in the College of Special Studies and the Faculty of Surveying in F1 and F2, respectively. It begins with the extraordinary summer term in 1945 and shows the increased interest in studying just after the war, followed by a rapid decline in student numbers. Table 6 contains the numbers of doctoral degrees in 1945–51.

Sources: Archiv Českého vysokého učení technického v Praze, collection Vysoká škola speciálních nauk ČVUT, catalogues 1945-1952; collection Zeměměřičská fakulta ČVUT, catalogues 1953-1960.

Tables 7–13. Academic staff, directors of institutes, people's observatories

The education of the first postwar generation was influenced by many factors. Tab. 7 (CU Prague) and tab. 8 (MU Brno) list internal teachers (for Brno also assistants, in 1960 the institute was transformed in a department of the Institute of Physics). Tab. 7 provides an overview of two decades (1953–73), because the previous period of the CU Faculty of Science (1945–53) did not differ a lot from the interwar situation, which is described in Chapter I.

Further training of postgraduate researchers (*aspirantura*) was organized by the directors of academic astronomical institutes (tab. 9, tab. 10), and indirectly by the presidents of the Czechoslovak Astronomical Society (tab. 12), which belonged to the Czechoslovak Academy of Sciences. The list of people's observatories in Czechoslovakia is enclosed (tab. 11). The last tab. 13 shows an overview of Czechoslovak astronomers mentioned in our book, who belonged to two generational units (born 1919–27, 1928–36) or, more precisely, those astronomers who graduated after WWII or for political and social reasons could not officially finish their studies.

Sources: MÚA, A AV ČR, collection Astronomický ústav ČSAV, collection ČAS; journals *Říše hvězd*, *Kosmické rozhledy*; Najser, Pavel, *Přehled hvězdáren v ČSR* (Praha: Štefánikova hvězdárna hl. m. Prahy, 1971).

Tab. 1–3. Marital status of students, Masaryk University Brno, Faculty of Science, winter semester 1945/46

Marital status of students (ws 1945/46)	717
Single female students	139
Single male students	452
Married female students	11
Married male students	106
Other marital status of female students	3
Other marital status of male students	6

Nationalities of enrolled students	717
Czech female students	152
Czech male students	560
Slovak female students	1
Slovak male students	3
Ukrainian male students	1

Fields of study and graduates	ws 1945	ws 1946	ss 1947
Enrolled female students in total	***158***	***154***	***165***
Regularly enrolled female students	122	153	
Extraordinary enrolled female students	32	1	
Teacher training - female students	134		
Math/physics - female students	12		
Physics/chemistry - female students	5		
Enrolled male students in total	***646***	***573***	***552***
Regularly enrolled male students	488	563	
Extraordinary enrolled male students	148	10	
Teacher training - male students	400		
Math/physics - male students	102		
Physics/chemistry - male students	29		
Postgraduate female students in total	***19***		
Postgraduate male students in total	***182***		

Tab. 4. Number of graduates, MU FS Brno, 1945–1953

Number of graduates	1945	1946	1947	1948	1949	1950	1951	1952	1953
Female RNDr. graduates	0	1	4	3	9	8	6	25	9
Male RNDr. graduates	11	20	17	43	60	57	49	106	29

Tab. 5. Female and male students and graduates of fields F1 and F2, Czech Technical University Prague, Faculty of Surveying, 1945–1960

Students of fields F1 and F2									
Academic year	Enrolled fem.st.	Enrolled fem.st. with two surnames	Enrolled m.st.	F1 fem.grad.	F1 fem.grad. with two surnames	F1 m.grad.	F2 fem.grad.	F2 fem.grad. with two surnames	F2 m.grad.
1945	1	1	143	0	0	0	0	0	0
1945/46	36	15	1150	2	1	86	0	0	0
1946/47	29	10	608	0	0	20	7	0	127
1947/48	24	4	486	0	0	8	n.a.		
1948/49				1	0	56			
1949/50	21	1	294	0	0	39			
1950/51				0	0	17	Discontinued		
1951/52				2	0	65			
1952/53				6	0	82			
1953/54	35	1	275	4	0	67			
1954/55				3	0	63			
1955/56				5	0	49			
1956/57				9	0	104			
1957/58				7	2	39			
1958/59				11	1	57			
1959/60				1	1	37			

Tab. 6. Doctors, Czech Technical University Prague, Faculty of Surveying, 1945–1951

Doctoral degrees		
year	female graduates	male graduates
1945	0	5
1946	0	7
1947	0	6
1948	0	1
1949	0	2
1950	0	5
1951	0	2

Tab. 7. Academic staff at the Astronomical Institute of the CU Faculty of Mathematics and Physics, Prague, 1953–1973

1953	Václav Heinrich	Vincenc Nechvíle	Jiří Bouška	Josef Mohr				
1954								
1955								
1956								
1957								
1958								
1959								
1960					Vladimír Vanýsek	Pavel Mayer		
1961								
1962								
1963								
1964								
1965								
1966							Jan Svatoš	
1967								Antonín Mrkos
1968								
1969								
1970								
1971								
1972								
1973								

Tab. 8. Academic staff at the Astronomical Institute of the MU Faculty of Science, Brno, 1946–1960

1946	Josef Mohr	Luboš Perek				
1947						
1948						
1949						
1950						
1951						
1952						
1953						
1954				Bedřich Onderlička	Karel Lang	
1955						
1956			Vladimír Vanýsek			
1957						
1958						
1959						Miroslav Vetešník
1960						

Tab. 9. Directors of the CSAS Astronomical Institute, Ondřejov, 1954–2022

Šternberk, Bohumil	1954–1968
Perek, Luboš	1968–1975
Bumba, Václav	1975–1990
Sehnal, Ladislav	1990–1996
Palouš, Jan	1996–2004
Heinzel, Petr	2004–2012
Karas, Vladimír	2012–2022
Bursa, Michal	2022–

Tab. 10. Directors of the SAS Astronomical Institute, Skalnaté pleso, 1943–2019

Bečvář, Antonín	1943–1951
Guth, Vladimír	1951–1956
Bochníček, Záviš	1956–1958
Pajdušáková, Ľudmila	1958–1979
Sýkora, Július	1979–1989
Štohl, Ján	1989–1993
Zverko, Juraj	1993–2001
Svoreň, Ján	2001–2009
Kučera, Aleš	2009–2017
Vaňko, Martin	2017–2019
Peter Gömöry	2019–

Tab. 11. People's observatories in Czechoslovakia (until 1970)

1912	Pardubice	(closed after 1930)
1921	Praha, Havlíčkovy sady	(grotto, closed in 1923)
1927	Brandýs n. Labem	(private, stopped working in 1937, closed in 1965)
1928	Praha, Petřín	(Štefánik People's Observatory)
1929	Valašské Meziříčí	(wooden, 1955 new observatory)
1936	Plzeň	(closed in 1948, planetarium 1958–1983)
1937	České Budějovice	(1971 planetarium)
1937	Tábor	(since 1940 public)
1947	Kroměříž	(private, in the 1970s public)
1947	Rokycany	
1948	Prešov	
1950	Vsetín	
1951	Nový Jičín	(closed in the 1980s)
1952	Humenné	
1953	Příbor	
1953	Zlín	(wooden)
1954	Brno	(1959 planetarium)
1954	Hradec Králové	(1957 planetarium)
1954	Olomouc	(closed in 2000)
1955	Valašské Meziříčí	(wooden in the 1920s)
1955	Třinec	
1956	Žebrák	
1956	Ostrava	(closed in 1981)
1956	Praha, Ďáblice	
1957	Broumov	
1957	Kleť	(branch of České Budějovice)
1957	Levice	
1957	Olomouc	(branch in Lošov)
1957	Třebíč	
1958	Hlohovec	
1959	Holešov	(closed in 1987)
1959	Úpice	
1960	Cheb	(1970 damaged by vandals)
1960	Český Těšín	
1960	Praha, Stromovka	(planetarium)
1960	Veselí nad Moravou	
1961	Banská Bystrica	
1961	Boskovice	
1961	Jindřichův Hradec	
1961	Nymburk	(stopped working in the 1970s)
1961	Prostějov	(temporary observation room from 1949)

1961	Sedlčany	
1961	Uherský Brod	
1961	Vlašim	
1962	Hurbanovo	(1969 Slovak Central Observatory)
1963	Karlovy Vary	(burned in 1971)
1963	Příbram	(closed in the 1980s)
1963	Slaný	
1963	Teplice	(planetarium)
1965	Sezimovo Ústí	
1965	Jičín	(1969 occupied by Polish army, 1999 renewed)
1965	Ždánice	(closed in the 1990s)
1966	Ptení	
1967	Jaroměř	(burned in 1991)
1969	Rožňava	
1970	Most	
1970	Přerov	
1970	Vyškov	

Tab. 12. Presidents of Czech (Czechoslovak) Astronomical Society, 1917–2024

Zdeněk, Jaroslav	1917–1919
Pokorný, Kazimír	1919–1922
Nušl, František	1922–1948
Jaroš, Václav	1948–1959
Šternberk, Bohumil	1959–1976
Letfus, Vojtěch	1976–1989
Perek, Luboš	1989–1992
Grygar, Jiří	1992–1998
Borovička, Jiří	1998–2001
Pravec, Petr	2001–2002
Kovář, Štěpán Ivan	2002–2004
Marková, Eva	2004–2010
Vondrák, Jan	2010–2017
Heinzel, Petr	2017–2024

Tab. 13. First postwar generation of Czechoslovak astronomers

name	life	studies	main institute	main discipline
Chvojková, Eliška	1914–1988	CU	Ondřejov	stellar, upper atmosphere
Pajdušáková, Ľudmila	1916–1979	CUB	Skalnaté pleso	comets
Mrkos, Antonín	1918–1996	none*	Lomnický štít	meteorology, comets, minor planets
Vlček, Jaroslav	1918–1991	CU	CAS	solar, diplomacy
Budějický, Jaromír	1919–1991	CTU	Ondřejov	radio astronomy
Perek, Luboš	1919–2020	CU, MU	MU, Ondřejov	stellar, Galaxy
Sadil, Josef	1919–1971	CU, unfinished	[ORBIS publishment house]	planets, public outreach
Bochníček, Záviš	1920–2002	CU	CU Bratislava	stellar, public outreach
Ptáček, Vladimír	1920–2001	CTU	Ondřejov	time
Weberová, Ludmila	1922–2011	CTU	Ondřejov	time
Blaha, Milan	born 1923	CU	Ondřejov, Univ. of Maryland	solar
Kleczek, Josip	1923–2014	CU	Ondřejov	solar, dictionaries
Lang, Karel	1923–1980	MU	Brno (MU)	stellar, computing on PC
Letfus, Vojtěch	1923–2003	CU	Ondřejov	solar
Maleček, Bohumil	1923–2008	CTU	Plzeň, Valašské Meziříčí	photometry, lunar occultations
Onderlička, Bedřich	1923–1994	MU	Brno (MU)	stellar
Bouška, Jiří	1925–2014	CU	CU Prague	comets
Bumba, Václav	1925–2018	CU	Ondřejov	solar

Křivský, Ladislav	1925–2007	CU	Ondřejov	solar
Plavec, Miroslav	1925–2008	CU	Ondřejov, University of California	stellar
Švestka, Zdeněk	1925–2013	CU	Ondřejov	solar
Vanýsek, Vladimír	1926–1997	MU	CU Prague	stellar, comets, photometry
Kresák, Ľubor	1927–1994	CU	Bratislava (CU)	comets, minor planets
Valníček, Boris	1927–2021	CU	Ondřejov	solar
Vozárová-Kresáková, Margita	1927–1994	CUB	Bratislava, Skalnaté pleso	comets, minor planets
Zacharov, Igor	born 1927	CU	Ondřejov	atmosphere
Kopecký, Miloslav	1928–2006	CU	Ondřejov	solar
Neužil, Luděk	1928–2017	CU	Ondřejov	atmosphere
Ceplecha, Zdeněk	1929–2009	CU	Ondřejov	meteors
Fritzová-Švestková, Ludmila	1929–2018	CU	Ondřejov, Utrecht	solar
Horský, Zdeněk	1929–1988	CU FMP+FA	IH CSAS, Ondřejov	history of astronomy
Baziková-Plavcová, Zdeňka	1930–2023	CTU	Ondřejov	radio astronomy
Tlamicha, Antonín	1930–2011	CTU	Ondřejov	solar
Tremko, Jozef	1930–2020	CUB, MU	Skalnaté pleso	stellar
Sehnal, Ladislav	1931–2011	CU	Ondřejov	celestial mechanics, artificial satellites
Kvíz, Zdeněk	1932–1993	MU	Ondřejov, Genéve	meteors, variable stars

Mayer, Pavel	1932–2018	CU	CU	stellar
Rükl, Antonín	1932–2016	CTU	Planetarium Prague	cartography, celestial and planetary
Štohl, Ján	1932–1993	CU	Bratislava (SAS)	interplanetary matter
Šimek, Miloš	born 1933	CTU	Ondřejov	radio astronomy, radar
Vetešník, Miroslav	born 1933	MU	Brno (MU)	stellar
Příhoda, Pavel	born 1934	CTU	Planetarium Prague	teaching
Antal, Milan	1935–1999	none*	AI SAS Skalnaté pleso	comets, minor planets
Kohoutek, Luboš	1935–2023	MU, CU	Ondřejov, Bergedorf	stellar, comets
Anderle, Pavel	1936–1991	CU	Ondřejov	celestial mechanics
Antalová, Anna	1936–2007	CUB	Tatranská Lomnica (SAS)	solar
Grygar, Jiří	born 1936	MU, CU	Ondřejov, IP CSAS Řež	stellar
Sekanina, Zdeněk	born 1936	CU	Petřín, JPL Pasadena	comets

* for political reasons
FA – Faculty of Arts, FMP – Faculty of Mathematics and Physics, IH – Institute of History, IP – Institute of Physics, JPL – Jet Propulsion Laboratory, Pasadena, California

Subject index

This index contains references to key topics related to the education of astronomers and their professional research. Subjects in individual sections are sorted alphabetically and contextually. Page indices refer to passages selected according to importance

Telescopes

Other instruments

Journals

Scholar institutions

Universities

Astronomical organizations and societies

Other organizations

Programmes and projects

Name index

This index provides links to the names of persons appearing in the main text of the book, as well as in footnotes. Page indices referring to biographical passages of historical actors – or at least their life dates – are typed in bold.

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Tomáš W. Pavlíček, Petra Hyklová and Martin Šolc

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Cover pictures: The inauguration of the two-metre telescope in Ondřejov, 1967
(MÚA, A AV ČR, Václav Bumba collection, unsorted) and the view of nebula
NGC 6853 from the Catalogue by Perek and Kohoutek, 1967

The inauguration of the two-metre telescope at Ondřejov observatory and the 13th General Assembly of the International Astronomical Union in Prague in 1967 was an important turning point in astronomy. After the discovery of quasars, new methods of observation were discussed, and the Space Race between two Cold War rivals was culminating. Luboš Perek, father of the mirror reflector and mastermind of the congress, became a leader of the generation of scholars and the Director of the Astronomical Institute of the Czechoslovak Academy of Sciences.

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