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Negotiating a great telescope: The case of Czechoslovakia

Abstract. *In the late 1950s and early 1960s, the Astronomical Institute of the Czechoslovak Academy of Sciences undertook a long, complicated journey towards obtaining a 2-m refractor comparable to the largest instruments in the world, inaugurating it during the XIIIth General Assembly of the International Astronomical Union held on August 22–31, 1967 in Prague. The journey can be reconstructed from archival materials and recorded memories of the witnesses. What made this situation unique is the fact that two very similar telescopes were ordered at roughly the same time for the Czechoslovak Socialist Republic and the Azerbaijan SSR; those telescopes were developed in parallel to reduce costs, becoming the second and third in the Zeiss series of 2-m universal telescopes. The astronomical institutes of CSSR and AzSSR had to negotiate and compromise their requirements, and in addition, because constructing a large telescope and bringing it into service takes many years, anticipate future developments in the relevant fields as well as requirements for equipment and configuration. Successful completion of this international project required a high number of negotiations between astronomers from both institutions, the instrument manufacturer VEB Zeiss Jena, the highest levels of the state administrations, the Czechoslovak foreign trade company KOVO, and multiple other corporations from CSSR and the GDR involved in the construction and delivery of the telescope, its dome, and associated equipment. The project understandably experienced issues such as misunderstandings and delays, which all those actors had to deal with. The outcome of this early effort is a telescope that, following numerous modernisations, is still used for research in today's Czech Republic. This paper explores this early history of this telescope – from the first suggestions to the delivery and construction in the observatory of the Astronomical Institute of the CSAS in Ondřejov – with particular attention to the negotiations among key actors and to their personal reflections and memories of the process.*

Keywords: 2-m telescope; stellar astronomy; VEB Zeiss Jena; Ondřejov; Astronomical Institute of the Czechoslovak Academy of Sciences



Introduction.

Constructing a large telescope is a painstaking and costly process that can last many years. Therefore, in order to facilitate this process, from the early 1950s, Carl Zeiss Jena had been developing the project of a universal, mass-produced 2-m reflecting telescope. The series's first telescope, named the Alfred Jensch Telescope since 1992, was constructed for the Karl Schwarzschild Observatory of the German Academy of Sciences at Berlin near Tautenburg in 1960. The second was for the Shamakhy Observatory in the Azerbaijan Soviet Socialist Republic. The third was built for the Astronomical Observatory of the Czechoslovak Academy of Sciences (CSAS), located in Ondřejov.

The purpose of this publication is the case study of the process of procuring the Ondřejov 2-m telescope, combining thorough archival research in archives of the CSAS, and Zeiss; retrospective narrations from witnesses (Perek, 1998; Zicha, 1998); contemporary articles and papers from Czechoslovak astronomers (Bumba et al., 1964; Guth, 1956, p. 19; Kohoutek, 1963; 'Ondřejovská observatoř', 1959; Perek, 1961); interviews with Luboš Perek (Autumn 2017, Winter 2017); publication about the generation of astronomers that was involved in building the telescope, and also about the 1967 General Assembly of the IAU in Prague (Pavlíček, Hyklová, & Šolc, 2024); and descriptions of history and technical background from experts on the 2-m telescopes (Jensch, 1961, 1967; Jensch, 1966; Pitoňák, 2023; Šlechta, n.d.-b, 2020).

Research Methods.

The text is based on archival research in the Zeiss Archive; Masaryk Institute and Archives of the CSAS; Archive of the Astronomical Observatory of the CAS; a survey of primary and secondary literature; and oral history interviews, which were based on methodologies of T. S. Kuhn and M. Vaněk (Kuhn, Heilbron, Forman, & Allen, 1967; Vaněk, 2003).

Results and Discussion.

The Astronomical Observatory in Ondřejov was founded in 1898 by Czech factory owner and amateur astronomer Josef Jan Frič (1861–1945) and built in cooperation with astronomer František Nušl (1867–1951) (later professor of astronomy at Charles University). This oldest part of the observatory was continuously built at the beginning of the 20th century. In 1928, on the 10th anniversary of the establishment of the First Czechoslovak Republic, Frič donated the observatory to the state for the purposes of Charles University.

In the postwar period, Czechoslovak academia as a whole underwent a transformation. The Czechoslovak Academy of Sciences (CSAS) was formed in the early 1950s, modelled after the Soviet Academy of Sciences, and Ondřejov Observatory became part of its Central Astronomical Institute (Ústřední ústav astronomický). From 1950, the institute was divided into two parts, the CSAS

Astrophysical Observatory and the CSAS Chronometry Laboratory, which were merged in 1954 into CSAS Astronomical Institute.

In the first years of its existence, CSAS underwent a period of enthusiasm and expansion. Moreover, space research, which has already played a key role in the Cold War science rivalry, entered a new round after the launch of the first artificial Earth satellite, Sputnik, by the USSR in 1957 (Dvořáčková & Franc, 2020).

However, to remain competitive in world-class stellar astronomy research, the Astronomical Institute of the CSAS lacked adequate instrumentation. The largest Czechoslovak instruments were 60-cm refractors in Brno and Skalnaté Pleso, whereas internationally, the diameters of the new instruments were on the order of meters, and the largest instrument in the world was the 5-m Hale Telescope of the Palomar Observatory, finished in 1949. The need for a “great reflector” for the new department of stellar research of the Ondřejov observatory was first officially voiced without particular specifications in February 1956 (Guth, 1956).

In November 1956, the CSAS organised an astronomical conference in order to prepare a perspective plan of astronomical research for the next ten years. Among other things, the future of stellar research was discussed, in particular, research into proper motions, radial velocities, spectral classification, and photographic and photoelectric photometry of faint stars. The resulting *Proposal for a long-term plan for Czechoslovak astronomy* voiced the need for a large astronomical instrument again, as “in many cases we are relying on data that observers in other countries have not been able to process themselves. It’s almost unbelievable that in 1956 it is not possible to take a positional photo or to record a stellar spectrum” (MIA CAS (Masaryk Institute and Archives of the Czech Academy of Sciences). Collection I. sekce ČSAV 1952–1961. Inv. No. 19 Astronomický ústav 1954–1957. Návrh perspektivního plánu čs. astronomie 1956–1965). Multiple designs were discussed, including an astrographic camera with a 50 cm diameter and a 6 m focal length, a 2-m reflector for spectroscopy, a 120–80–240 cm Schmidt camera and a 120-cm Cassegrain reflector for photometry (Perek, 1998).

After the meeting of the Section for Mathematics and Physics of the CSAS in November 1956 in Prague, the final plan included the first two designs—the astrograph with triplet object lens made by Zeiss, and a 2-m parabolic reflector for observing faint stars around 13 mag.

In the end, the idea of a 2-m reflector won the competition; the arguments included the research focus of the Astronomical Institute and the fact that the Zeiss factory in Jena was just designing the 2-m universal telescope for the new Tautenburg observatory (Perek, 1998). The Zeiss project of the 2-meter reflector already gained the attention of the Czechoslovak astronomical community in 1952, as seen in the article (‘Dvoumetrový’, 1952) in the magazine *Říše hvězd*, published by the Czechoslovak Astronomical Society.

However, at the time of these discussions, CSAS was undergoing a period of political limitation in terms of international contacts and cooperation, and, in addition, financial limitations (Dvořáčková & Franc, 2020, pp. 425–426).

Discussions and Plans.

Constructing a large telescope requires extensive financial, material and human resources. From design through building infrastructure to installation of the instrument, the process takes many years. Therefore, a forecast of the future development of the relevant fields of astronomy is required, in order for the telescope to not become obsolete during its construction. Modern large telescopes needed to be as versatile as possible, which is achieved by basing the construction on the primary, usually parabolic mirror, in combination with secondary mirrors and correction systems. This “multiple telescope” should have combined all possible optical arrangements utilised at the time of this inception (prime focus reflector, Cassegrain, coudé and even Schmidt), and therefore one universal telescope would be sufficient instead of multiple single instruments (The Zeiss Archives. NL 51 Nr 32. Alfred Jensch: Universal Telescope (2-metre reflecting)).

Designing such a universal telescope is significantly complicated, as the constructor is in fact designing multiple instruments at once. The chief constructor of Zeiss’ *Department for development of astronomical instruments and planetaria* (*Entwicklungsabteilung für astronomische Geräte und Planetarien*), Alfred Jensch (1912–2001), had several years of direct experience as an observer at the Sonneberg Observatory. He led the 2-meter-telescope project from its beginning in the early 1950s. His key requirements for the design included convertibility between systems (such as exchanging the secondary mirror) in one day; automatic compensation of physical phenomena connected with operating large heavy instruments; uniform clock drives to compensate Earth’s diurnal motion; simple and accurate operation; precautions against maloperation; minimum maintenance; and work safety (The Zeiss Archives. NL 51 Nr 32).

The costs of the telescope and necessary accessories were estimated at ca. 20 million Kčs. This was comparable with the yearly budget of the CSAS for machine investments, and exceeded the import quota several times. Thus, the purchase could only be realised on the basis of a government resolution on the allocation of special funds. The proposal argues that several telescopes with diameters around 2 m were under construction in the USSR, the German Democratic Republic, the Federal Republic of Germany, and Britain, and a similar proposal was submitted in Poland (MIA CAS. Collection I. Section of the CSAS 1952–1961. Inv. No. 19. Dvoumetrový teleskop z NDR).

The CSAS Presidium approved the proposal on 21st March 1958 and tasked the Astronomical Institute with sending 1-2 people to Zeiss to negotiate technical details of the telescope and its accessories and to request a fixed-price offer, followed by rapid

drafting of documentation to the proposal of the government resolution, in particular a detailed justification for importing the telescope (MIA CAS. Collection I. sekce ČSAV 1952-1961. Inv. No. 19.).

However, after Luboš Perek (1919–2020) and Boris Valníček (1927–2021) returned from negotiations in Jena in summer 1958, they were notified of a communication that the former director of the Astrophysical Observatory of CSAS, František Link (1906–1984), submitted to the CSAS Presidium, arguing against purchasing a 2-m telescope. Link was the director of the CSAS Astrophysical Observatory until 1953, when he left the position after pressure from the CSAS Presidium, which resulted from the complaints of his subordinates that he “has hitherto rejected any hints that purely astrophysical research is to expand” (Pavlíček, Hyklová, & Šolc, 2024, p. 131). According to further communication from the current director Bohumil Šternberk (1897–1983), Link had not previously shown any interest in commenting on the proposal of the 2-m telescope or joining the discussions at the institute, and submitted his communication directly to the Presidium without discussing it with the observatory staff, its union and party organisations. Šternberk mentioned that Link had also refused to cooperate on the earlier construction of a 60-cm telescope. The proposal for the 2-meter telescope, however, was supported by Czechoslovak émigré Zdeněk Kopal (1914–1993)—director of the radioastronomical observatory at Jodrell Bank in the United Kingdom and a veteran of nearly all major observatories worldwide—as well as by conclusions drawn from a Soviet delegation's visit to observatories in the United States (MIA CAS. Collection I. sekce ČSAV 1952–1961. Inv. No. 19).

The proposal of the 2-m telescope from 8 August 1958 was based on requirements for perfect photometric and spectroscopic functions. Direct photography was next in the list of priorities. As a result, wide-field photography by Schmidt and Matsukov cameras was abandoned as incompatible with the basic requirements (Perek, 1961).

Šternberk in this proposal argued that a 2-m diameter is “technically not an experiment, but a clear technical issue“ (MIA CAS. Collection I. sekce ČSAV 1952–1961. Inv. No. 19). The first 2-m telescope in Tautenburg was not yet finished, but Zeiss had recently made a 120-cm telescope for Hamburg Observatory that proved successful in practice. Other custom diameters that Zeiss had not constructed yet would mean higher costs, and much a smaller, already tested design would significantly reduce its scientific value. In the Soviet bloc, only Carl Zeiss Jena and the Optical and Mechanical Institute in Leningrad were able to construct a 2-m telescope. However, the USSR had already been negotiating a 2-m telescope for Shamakhy with Zeiss, and the proposal even mentioned that 2-m telescopes for Poland and China were discussed (MIA CAS. Collection I. sekce ČSAV 1952–1961. Inv. No. 19).

At first, an English mount with the polar axis supported by concrete pillars on its northern and southern ends was suggested. Only the Cassegrain and coudé foci would be developed, because developing the primary focus would raise financial costs and

the weight of the tube. The proposal also mentions a prism spectrograph for a range of dispersion 90 to 300 Å/mm.

The institute and Zeiss agreed on a delivery period of five years from signing the definitive order, if it happened in 1958, and on any system of payments. The plan of work was: pre-project in 1959, project in 1960, construction in 1961–1962, dome installation in 1962 and telescope installation in 1963. However, shortly before the contract with Zeiss was signed, Nikita Khrushchev, General Secretary of the CPSU and Chairman of the Council of Ministers of the USSR, de facto leader of the USSR in 1953–1964, visited Jena. Khrushchev signed a contract for the 2-m reflector for the observatory in Shamakhy.

This delayed the delivery of the telescope for Ondřejov by a year. Consequently, negotiations at the ministry level were launched to reduce the delivery times (MIA CAS. Collection I. sekce ČSAV 1952–1961. Inv. No. 19). Though the telescope still arrived later than originally planned, Perek remarked on one unexpected advantage: the dome was “ready, cleaned and wiped-off of dust” when the instrument arrived, in contrast to being still in construction if the telescope was delivered at the original date (L. Perek, oral history interview, Autumn 2017).

Experiences and Opinions.

When entering the negotiations over the 2-m telescope, none of the Ondřejov astronomers had direct experience working with a large instrument. However, from 12th to 20th August 1958, the 10th General Assembly of the International Astronomical Union (IAU) took place in Moscow and gave Šternberk and Perek the opportunity to discuss their plans in person with astronomers from all around the world, including astronomers from Mt. Wilson and Mt. Palomar, who had experience with instruments larger than 2 meters. Šternberk in his report wrote about discussing the argument that “usage of optical telescopes is on the decline and the future belongs to modern methods of radioastronomy” with Otto Beckmann from Hamburg, but did not elaborate further on the origin of this argument. He also refers to Professor Kienle’s recommendation that Czechoslovak astronomers spend several years in foreign institutions to acquire observational data and subsequently process it in specialised facilities in the CSR. However, this proposal was impractical for both the CSAS and the foreign institutes, and its results would not have represented a complete or unquestionable success for Czechoslovak astronomy or the state system (MIA CAS. Collection I. sekce ČSAV 1952–1961. Inv. No. 19).

After the IAU congress, the requirements were adjusted for spectrographs with a range of dispersion 4–400 Å/mm for all three focal points and a photoelectric photometer. In the prime focus, accessible from an observation bridge, astronomers could install an 80×110 mm grating spectrograph covering dispersions 33–400 Å/mm or a three-lens correction system for photographing on a 6x6 cm photographic plate, which corresponds to the field of view 21’45”x21’45” on the sky. At the Cassegrain

focal point, accessible from an observation basket, a two-camera spectrograph with a 140×150 mm grating covering 10×72 Å/mm, a photoelectric photometer and devices for photography were installed. In addition, a second Cassegrain focal point for two Schmidt cameras could be created by a special optical system. The 150×180 mm grating in the coudé focal point, which was accessible from a coudé room and in which the working conditions for the astronomer were the best, covered dispersions in the range 4–24 Å/mm. (Bumba et al., 1964; Koubský, 1967; Perek, 1998).

The next month, an expert opinion from Kopal was submitted, dated 2 September 1958. The text compared perspectives of optical 2-m telescopes and mentioned an interferometer for radioastronomy (such as the one on the Jodrell Bank Observatory) and concluded that the future lay in optical astronomy. Kopal also highlighted the benefits of Ondřejov as a location, due to above-average conditions for observations, adequate altitude and proximity to Prague and its scientific infrastructure. He estimated that Ondřejov had 70 clear nights a year, which means that processing its observations would fully occupy 12 people; however, as of 1959, the department of stellar astronomy didn't even have proper rooms. To train these people, Kopal recommended sending young astronomers Luboš Perek and Mirek Plavec—who were involved in the 2-m telescope project—to international observatories equipped with large instruments. As they had invitations and/or stipends, those travels would not create any further costs for the CSAS (MIA CAS. Collection I. sekce ČSAV 1952–1961. Inv. No. 19).

In 1959, Luboš Perek and Miroslav Plavec (1925–2008) visited observatories at Mt. Wilson, Mt. Palomar, Tonantzintle (Mexico), Haute Provence, and Dominion Astrophysical Observatory, and brought that experience to negotiations with Zeiss. Later, in 1963, when the 2-m Ondřejov telescope was already under construction, Perek visited Kitt Peak Observatory and Lick Observatory, and was able to implement small adjustments of the design—in particular, Perek remembers the inspiration for “vivid colours, as opposed to Zeiss ‘field grey’” (Perek, 1998).

In 1962, Luboš Kohoutek (1935–2023) got the opportunity to work with the Tautenburg 2-m telescope during his study trip to Germany (Kohoutek, 1963). This telescope was specific, as it included a Schmidt camera, which was abandoned in the Shamakhy and Ondřejov projects. However, it provided an opportunity for astronomers to get experience with the Jensch 2-meter universal telescope and for engineers to test it in practice.

The Negotiations.

The approval of the purchase of the 2-m telescope by the Czechoslovak government was proudly announced to the broader astronomical community in June 1959 as “a great appreciation of the work done so far”, and also “a proof of the great care of the [Communist] Party and the government for the universal development of science in our state” (‘Ondřejovská observatoř’, 1959). However, Perek considered the approval a miracle, prompted among other things by the popularity of astronomy after

the recent emergence of artificial satellites, the persuasive speech of astronomer Mirek Plavec at the CSAS Presidium meeting and the visit of Minister of Culture, Václav Kopecký, to the observatory and his expectations of the usefulness of astronomy to atheism (Perek, 1998).

Kopal assessed the price offer from Zeiss as realistic. However, a letter from the Ministry of Foreign Trade from 15 May 1960 to the Deputy Prime Ministers on the basis of information from the foreign trade company KOVO mentioned a competing offer from Britain, with “significant price differences”, and that as a result, the price offer was negotiated with Zeiss several times “with partial success” and the signing of the contract was postponed to 20 October 1959. According to a further letter from Ondřejov economist Vladimír Rajský (1926–2000), the ministry confused the plan of meetings at the Zeiss factory with delivery dates and considered the delays “unexpected”, although Šternberk stated in his proposal that Zeiss had available production capacity for 1959 in case the contract closed in 1959. From 1960, KOVO tried to negotiate the shortening of delivery dates at the level of government delegations. Some issues also arose in the CSAS itself; at the end of 1960, the board of the Section for Mathematics and Physics recommended the Astronomical Institute to contact directly the CSAS Presidium on economic and technical issues and only inform the section bureau.

The negotiations with Zeiss were held during more than thirty meetings, taking place in Jena, Prague or Ondřejov, as in the following years, many new questions and problems emerged. Luboš Perek remembered approximately four meetings every year in the range of eight years of planning and construction. After every meeting, the meeting notes were cut up and glued together by subject areas (the dome, the telescope, the research program, the accompanying instruments), in order to have an overview of what had been agreed upon a year or two earlier. Perek described the negotiations with Zeiss as “very good” (L. Perek, oral history interview, Winter 2017).

On the CSSR level, this large project, including not only production, but also transportation and on-site construction of the instrument, many other corporation from CSSR and GDR entered the negotiations. As a result, in addition to representatives from CSAS, KOVO and VEB Zeiss Jena, representatives from VEB Sächziger Brücken- und Stahlhochbau Dresden, Krajský projektový ústav Praha, Průmstav Kolín and Hutní montáže Ostrava are listed as participants in meeting protocols in Zeiss Archives.

In the meeting protocols by Zeiss, the negotiations with KOVO were described as “very lengthy and difficult”, as the Czechoslovak side did not want to accept the price and delivery dates, but in the end, they signed the contract. It was “clearly expressed that the reflector is necessary for an extremely important government programme for CSR scientists and must thus be delivered at all costs, whereby the government may still want to exert influence to bring forward the delivery dates”. Even financial issues are hinted at; the protocol states that, in case of any additional requests, ensuring that

the full price is charged is essential. In contrast, meetings with astronomers from Ondřejov and their experience with Zeiss devices were described as very positive (The Zeiss Archives. BACZ 19529. Bericht von der Dienstreise des Kaufmännischen Direktors [KD] in die CSSR, nach Ungarn und Bulgarien vom 20.10. bis 4.11.1959 sowie Protokolle von Besprechungen mit den Disponenten).

As the productions of the Azerbaijan and Czechoslovak telescopes overlapped, a unique situation occurred – the three sides, Czechoslovak, Azerbaijan and GDR, negotiated a double order of the same type of telescope for two different observatories. This reduced costs, but Czechoslovak and Azerbaijani astronomers had to compromise.

Azerbaijan astronomers Sultanow, Krat, Michelson and Stepanov came with requirements for the accompanying instruments that evoked various responses from the Czechoslovak side. Luboš Perek in particular reminisces that Azerbaijan astronomers were interested in photographic photometry, which was being abandoned in Czechoslovakia in favour of photoelectric photometry (L. Perek, oral history interview, Autumn 2017). Perek also mentioned apodizing grid cassettes and gearbox for observations of the Moon and planets, which Czechoslovak astronomers considered redundant. On the contrary, automatic compensation of atmospheric refraction was greatly appreciated. The optical correction system for a broader field of view seemed at first a good idea, but in the end, it wasn't used in practice (Perek, 1998).

Though the construction project for the dome was already completed, there were additional changes. An improvement of the German mount was invented by Jensch, moving the centre of the mass of the telescope, including its counterweight, to the centre of the hydrostatic bearing, improving the precision of guiding of the telescope, allowing unobstructed usage of movable observation platforms, and extending the lifetime of bearings in the hour axis (Figure 1). This mount was installed at both the Azerbaijan and the Czechoslovak telescopes. Automatic dome rotation and slit-curtain (which allowed the dome slit to be partially closed in the vertical direction) adjustments made nightly observations much easier, especially at the coudé focal point. In total, Jensch concluded that all the joint consultations of Zeiss employees and Czechoslovak and Azerbaijan astronomers enabled technological fine-tuning and precise manufacturing (The Zeiss Archives. NL 51 Nr 81. Manuskripte von A. J. über die Konstruktion astronomischer Großgeräte).

Technical requirements were difficult even during the installation of the dome in Ondřejov. The rotating dome was 20 m in diameter, and itself weighed 195 tons; the whole building weighed more than 1000 tons, and the pillar another 960 tons. The telescope's infrastructure included a transformer station and a service building to house the air conditioning and provide facilities for the observatory staff (Figure 2) (Perek, 1998).

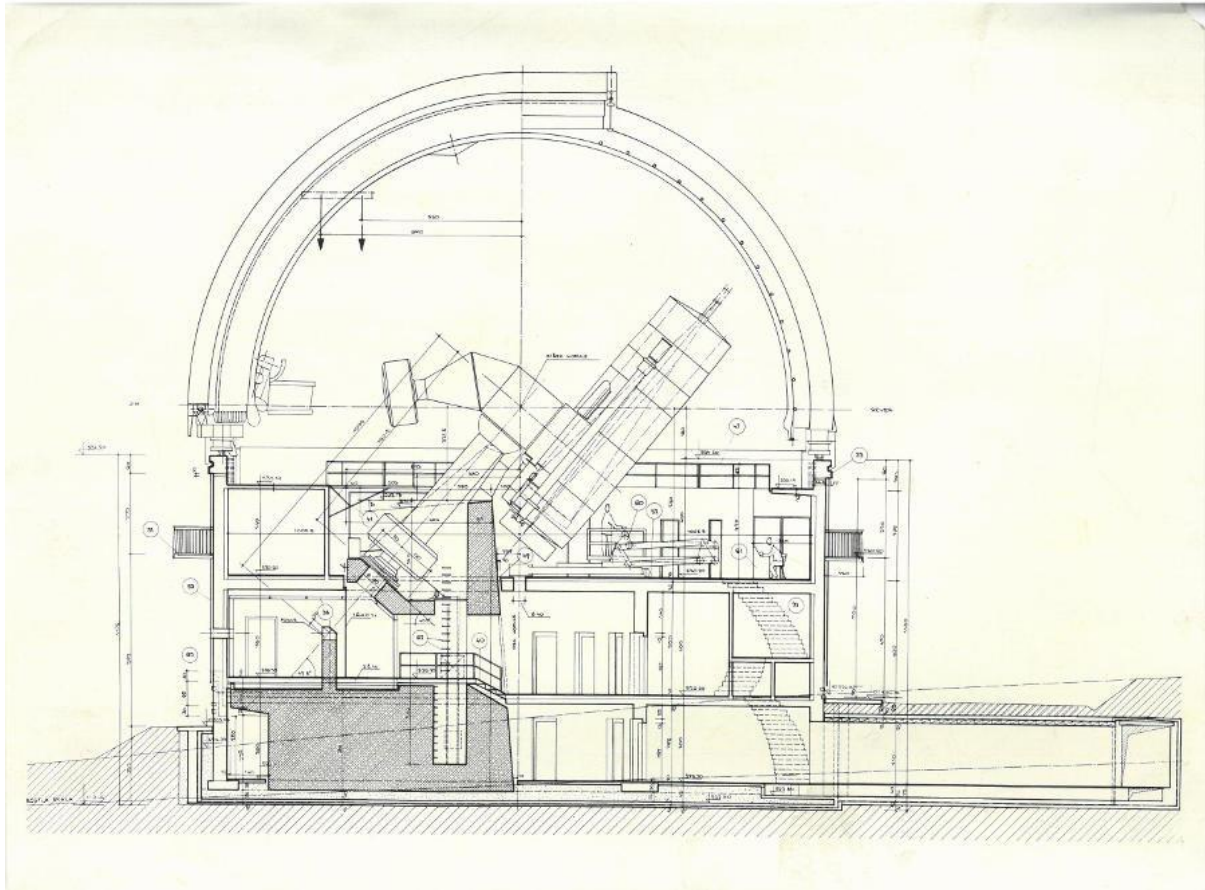


Figure 1. Final project of the Ondřejov 2-m telescope (Source: Archive of the Astronomical Institute of the CAS).

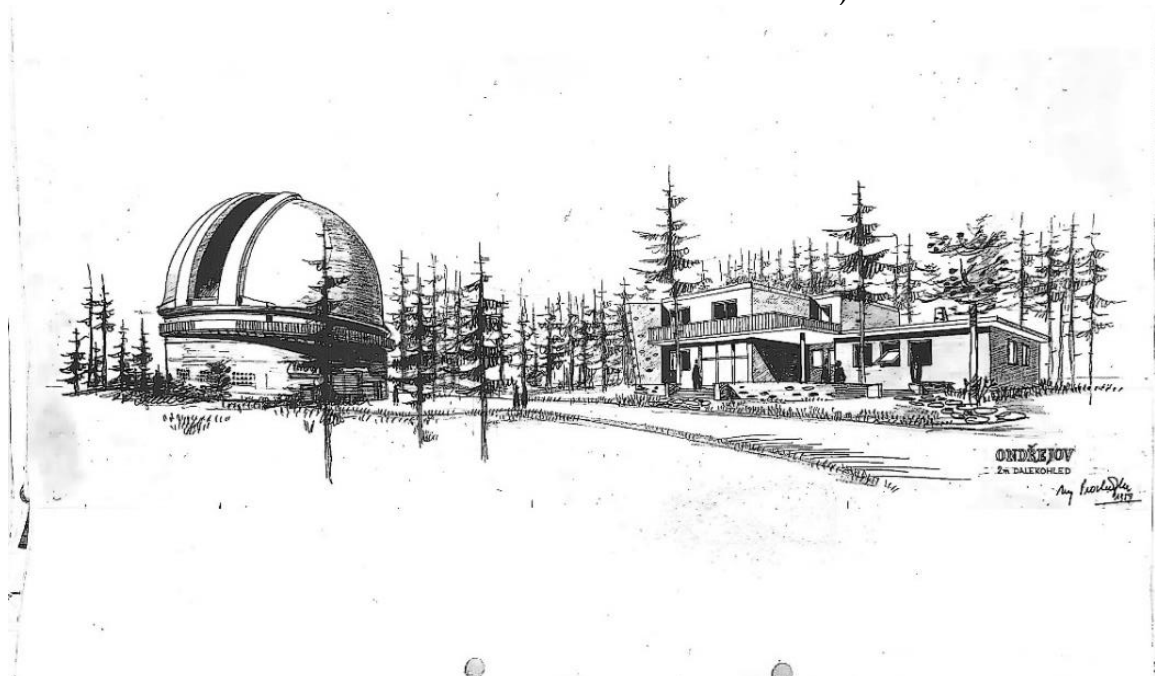


Figure 2. Drawing of the telescope building, service building, and their surroundings (Source: MIA CAS).

However, the necessary infrastructure for a large telescope extends beyond its immediate surroundings. The quality of observations also depends on the reduction of external interference. Some of that interference, such as light and air pollution, can be avoided by careful choice of the location for the instrument; in the case of Ondřejov, the land in the surrounding area was purchased and, if needed, planted with trees (Perek, 1998). Forests ensured thermal stability of the terrain, which prevented excessive heat generation in the night that would distort the air in the telescope's surroundings (MIA CAS. Collection I. sekce ČSAV 1952–1961. Inv. No. 19). Others, such as vibration from the rotational movement of the dome and thermal turbulence of air inside the dome, can be resolved by good thermal insulation and structural isolation of the dome and the pillar of the telescope from each other, which was usually achieved by creating a sand bedding for the building and the pillar.

The Inauguration and Further Developments.

Both telescopes were finished before the 50th anniversary of the Russian October Revolution (1917). The Shamakhy 2-m telescope was handed over by Zeiss on 12 September 1966 and named Telescope of the German-Soviet Friendship (The Zeiss Archives. NL 51 Nr 81. Manuskripte von A. J. über die Konstruktion astronomisches Großgeräte). The Ondřejov telescope, whose final price exceeded the first estimates more than twice (more than 40 million Kč in contrast to the first estimates of 20 million Kčs), was inaugurated during the 1967 IAU General Assembly in Prague (Pavliček, Hyklová, & Šolc, 2024; Perek, 1998).

At the time of the inauguration, there were nine reflecting telescopes with a diameter of 200 cm or more in the world. These were at Mt. Palomar (508 cm), Mt. Hamilton (305 cm), Crimea (260 cm), Mt. Wilson (254 cm), Kitt Peak (210 cm), McDonald (208 cm), and the three 2-m telescopes in Tautenburg, Shamakhy and Ondřejov. Of those, four were finished before 1958, of them three in the USA and one in the USSR, and another one was finished in the USA in 1958. The Kitt Peak and Crimea telescopes were finished in the early 1960s (Koubský, 1967).

Czechoslovak astronomers had, of course, high hopes for the 2-m telescope. The telescope was expected to enable observation at all three foci, while the photoelectric pointer checked the settings; photographing on 6x6 cm plates; photoelectric photometry in primary and Cassegrain foci in six colours; and spectroscopic measurements in all three focal points (Bumba et al., 1964, p. 76).

Although the preparations were thorough, many issues could be revealed only by practice. The photoelectric photometer of a yet-untested principle was never put into full operation due to unreliable technology. Using spectrographs at Cassegrain focus proved to be too complicated, as confirmed by experience from other telescopes (Zicha, 1998). Luboš Perek described that, as Zeiss focused on optics and mechanics, the electrical instruments around the 2-meter telescope consisted of electronic components from

various eras, which were later replaced by electronics from the Hungarian company VILATI (L. Perek, personal communication, Autumn 2017).

However, the biggest problem that the technical staff, led by chief technician Josef Zicha (1939–2024), had to deal with was the failure of the hour axis hydrostatic oil bearing in 1969. The problem manifested by oil leaks and happened a few weeks after the two-year warranty period expired. However, as the defect resulted from manufacturing—the used material composition proved to be unsuitable for the slow movements of the telescope—the repair was carried out under warranty. It took 9 months, but most of the time was spent on preparations in the Zeiss factory. The whole telescope needed to be lifted by 2 cm, for which special hydraulic devices had to be constructed.

The Zeiss 2-meter universal telescope project continued with telescopes for observatories in Rozhen (1981) and Terskol (1995). The Zeiss engineers were able to draw on experience not only from the construction process, but also from their involvement in warranty and routine maintenance, as well as from subsequent modernisations of these telescopes.

In the case of Ondřejov, there were several large modernisations in the early 1980s, in 1996–1998, in 2006 and 2009, and in 2018–2019 (Šlechta, n.d.-b, 2020). Though the primary mirror and mechanics remained the same, many other parts of the telescope were modernised or replaced. The present-day 2-m telescope (Figure 3) uses Siemens electronics from the late 2000s, standard CCD chips since 1996 (Šlechta, n.d.-a), the “Ondřejov echelle spectrograph” since 2005, and the optical system feeding light from the primary focus to the coudé focus consists of optical fibres since 2019 (Pitoňák, 2023).

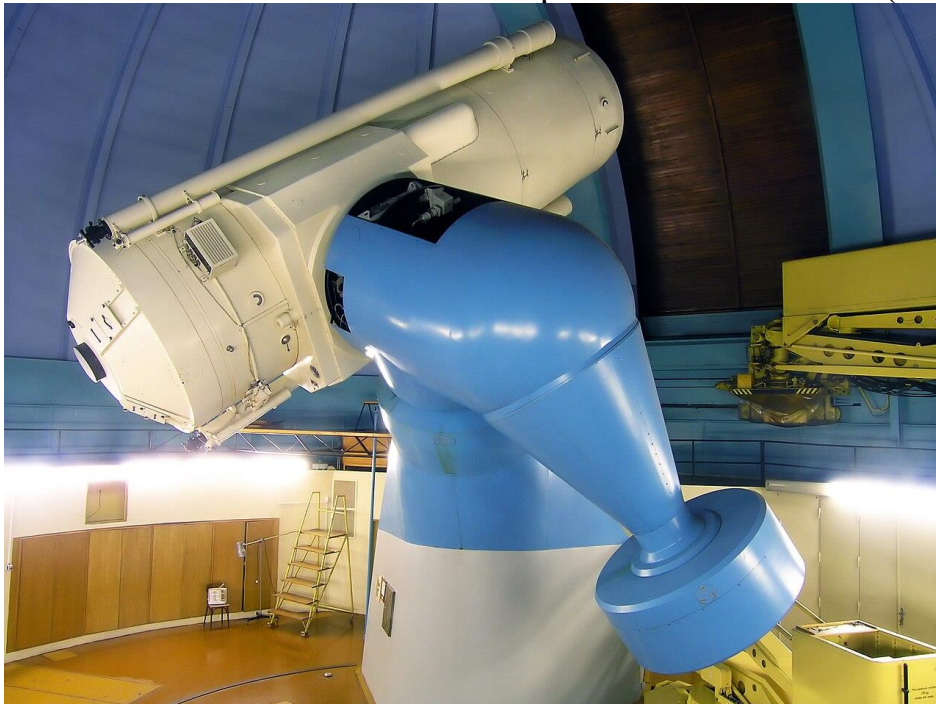


Figure 3. The Perek Telescope in 2007. (Source: CC BY-SA 2.5/Wikimedia Commons/Packa).

And in 2012, the Ondřejov 2-m telescope received its new name: the Perek Telescope.

Conclusions.

The project of the Ondřejov 2-m telescope was negotiated in the context of the 1950s formation and development of the Czechoslovak Academy of Science, following the ideals of the new Socialist society with top-level science that should not fall behind western science. Especially astronomy was a promising field, with the emergence of artificial satellites as a Soviet success and the perceived and real historical entanglements of Czechoslovak astronomy and atheism in the 20th century, as shown in Pavlíček et al. (2024). However, this still did not mean the project would be successful due to the high costs of large telescopes and the political and financial limitations of the CSAS's international cooperations.

The whole construction of the telescope took 13 years of expert work from a wide range of fields. In the words of Luboš Perek, it was not a long time for such an instrument in the Czechoslovak context of the late 1950s and the 1960s, but long enough to „take one generation to build and another to bring into operation and achieve a level of excellent results“ (Perek, 1998).

All of the 2-meter Jensch telescopes remain operational today, having undergone the necessary modernisations to accommodate advances in technology and scientific practice.

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Conflicts of interest.

The author declares no conflict of interest.

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Переговори щодо створення великого телескопа: Випадок Чехословаччини

Анотація. Наприкінці 1950-х та на початку 1960-х років Астрономічний інститут Чехословацької академії наук розпочав довгу й складну роботу над отриманням двометрового рефрактора, співставного з найбільшими телескопами світу. Телескоп було урочисто введено в експлуатацію під час XIII Генеральної асамблеї Міжнародного астрономічного союзу, що проходила 22–31 серпня 1967 р. у Празі. Цей процес можна відтворити за архівними матеріалами та записаними спогадами очевидців. Унікальність ситуації

полягала в тому, що два дуже подібні телескопи були замовлені майже одночасно для Чехословацької Соціалістичної Республіки та Азербайджанської РСР. Їх розробляли паралельно, щоб знизити витрати, і вони стали другим і третім у серії універсальних 2-метрових телескопів Zeiss. Астрономічні інститути ЧСР та АзССР мали погоджувати й узгоджувати свої вимоги. Додатковою складністю було те, що створення та введення в експлуатацію великого телескопа триває багато років, тому потрібно було передбачати майбутній розвиток відповідних галузей, а також вимоги до оснащення та конфігурації. Успішне завершення цього міжнародного проекту вимагало великої кількості переговорів між астрономами обох інститутів, виробником інструментів VEB Zeiss Jena, вищими рівнями державного управління, чехословацькою зовнішньоторговельною компанією KOVO та численними підприємствами з ЧСР і НДР, залученими до будівництва та постачання телескопа, його купола й супутнього обладнання. Очікувано, проект супроводжувався низкою проблем – непорозумінь, затримок тощо, з якими всім учасникам довелося мати справу. Результатом цих ранніх зусиль став телескоп, який, після численних модернізацій, досі використовується для наукових досліджень у сучасній Чеській Республіці. У статті розглядається рання історія цього телескопа – від перших пропозицій до його постачання й монтажу в обсерваторії Астрономічного інституту ЧСАН в Одржейові – з особливою увагою до переговорів між ключовими учасниками, а також до їхніх особистих рефлексій і спогадів про цей процес.

Ключові слова: 2-метровий телескоп; зоряна астрономія; VEB Zeiss Jena; Одржейов; Астрономічний інститут Чехословацької академії наук

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