
Tatra Astro Summit 2025

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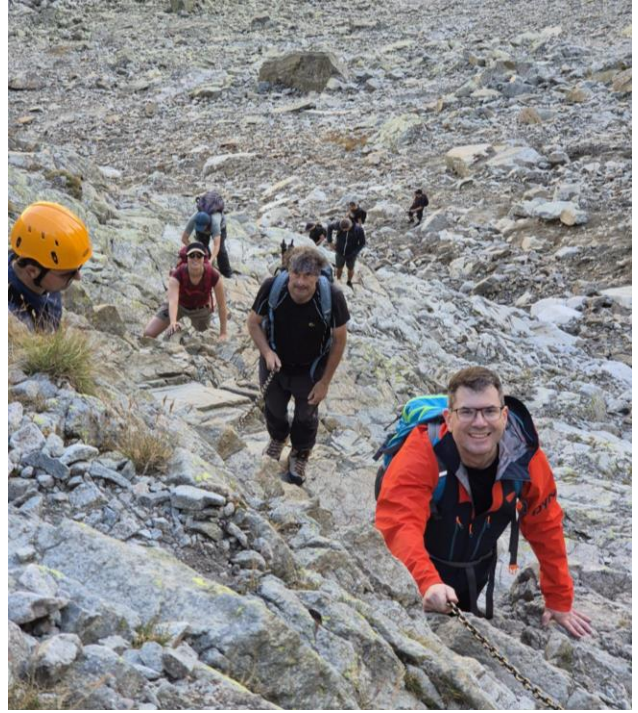
September 23rd, 2025

Motivation for the meeting

- Originally we wanted to organize just an informal retreat for the High-Energy Astrophysics (HEA) group at MUNI & friends
- In the meantime HEA group members lost the interest (a bit), whole others (Slovak and Czech Academy of Sciences) became interested more
- 40 registered participants exceeds the original expectations
- Meeting old collaborators in a mountainous setting (can trigger new projects) and getting to know completely new people, experts from various disciplines (theory, observations, instrumentation)



First official trip: Priečne sedlo

- hike to Téry cottage, then via the Priečne saddle (2352 m) to Zbojnicka cottage and back to Starý Smokovec

Second trip: Spiš region

Scope of the *Tatra Astro Summit 2025*

- Exchange of new results and tools in various disciplines: stellar astronomy, exoplanets, Sun, cosmic rays, gamma-ray astronomy, compact objects
- Meeting of Czecho-Slovak professionals
- Intergenerational meeting: from PhD students to senior scientists

Why the High Tatras?

- The High Tatra mountains were known as a region with exceptionally clear skies and high elevations — attractive for scientific observations even before formal observatories were built
- Some early expeditions in the late 19th and early 20th century noted their potential for climate, meteorological, and astronomical studies

Why the High Tatras?

Skalnaté Pleso Observatory (1943):

- Founded during World War II on the initiative of **Antonín Bečvář**, Czech meteorologist and astronomer
- Located at 1786 m near Skalnaté pleso tarn
- Originally equipped with a 60 cm Zeiss reflector — at that time one of the largest telescopes in Central Europe, transported from Hurbanovo observatory that was closed after the Munich Agreement.
- Became the core of modern Slovak astronomy; research of Sun, interplanetary matter, and now also variable stars
- Antonín Bečvář also compiled the famous **Atlas Coeli Skalnaté Pleso** (star atlas, widely used internationally)

Antonín Bečvář (1901-1965)

- Czech astronomer, climatologist, and photographer
- was born in Stará Boleslav/Brandýs nad Labem
- Amateur astronomer: first observatory in Brandýs nad Labem (1925-1927)
- State climatologist in Štrbské Pleso: second observatory on the terrace of a hotel (1937)
- Bečvář initiated the construction of the Skalnaté Pleso observatory in 1941 – 1943 and became its first director from 1943-1950
- Important contribution: maps of the celestial sky

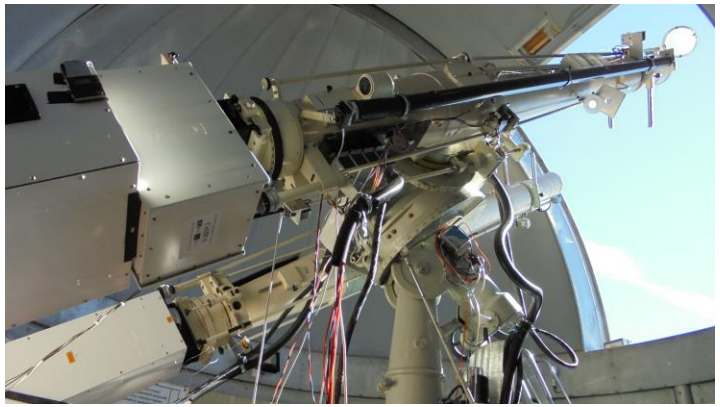
  (i) *Atlas Coeli Skalnaté Pleso* (1948)

  (ii) *Atlas Eclipticalis* (1958)

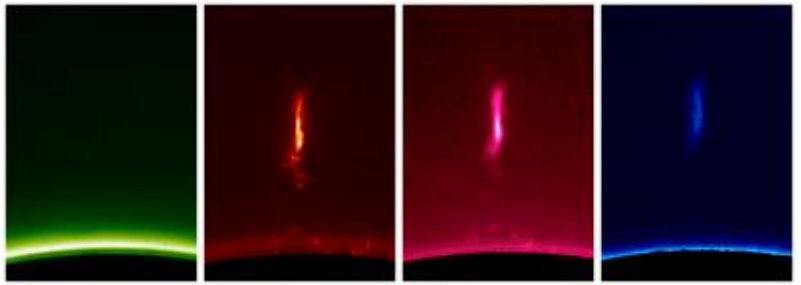
  (iii) *Atlas Borealis* (1962)

  (iv) *Atlas Australis* (1964)
- He discovered two comets and published the atlas of clouds (1953)

Lomnický štít Solar Observatory



- Built at the peak of Lomnický štít (2 634 m)
- Construction 1957-1962 (activities related to International Geophysical Year)
- 2 identical coronographs (Carl Zeiss) with 20/300 cm objectives: designed to study the solar corona during daylight using artificial eclipses (second one added in 1970)
- One equipped with the **Coronal Multichannel Polarimeter** (CoMP-S) and the other is equipped with the **Solar Chromospheric detector**
- study of Solar corona, prominences, flares, and other fine Solar structures
- Focused on Solar physics, meteorological studies, and cosmic particles
- Still operational today, one of Europe's highest permanent solar observatories
- 2 regular indices of Solar activity – homogeneous series of the intensity of the green coronal line and and a time series of the coronal index of solar activity



Eruptive protuberance imaged with the COMP-S instrument in 4 spectral lines: HeI 587 nm, HI 656 nm, Ca II 854 nm, and He I 1083 nm

Post-WWII and communist period

Ľudmila Pajdušáková (1916-1979)

- in the early 1940s, she joined the newly established **Skalnaté Pleso Observatory** in the High Tatras, led by Antonín Bečvář
- Specialized in **cometary astronomy** and sky patrol photography
- Between **1946–1953** she **co-discovered five comets**, usually with other Slovak and Czech astronomers:
  - C/1946 K1 (Pajdušáková–Rotbart–Weber)
  - C/1948 E1 (Pajdušáková–Mrkos)
  - C/1948 W1 (Pajdušáková–Mrkos)
  - C/1951 C1 (Pajdušáková)
  - C/1953 X1 (Pajdušáková)
- These discoveries gave her international recognition in the astronomical community

Post-WWII and communist period

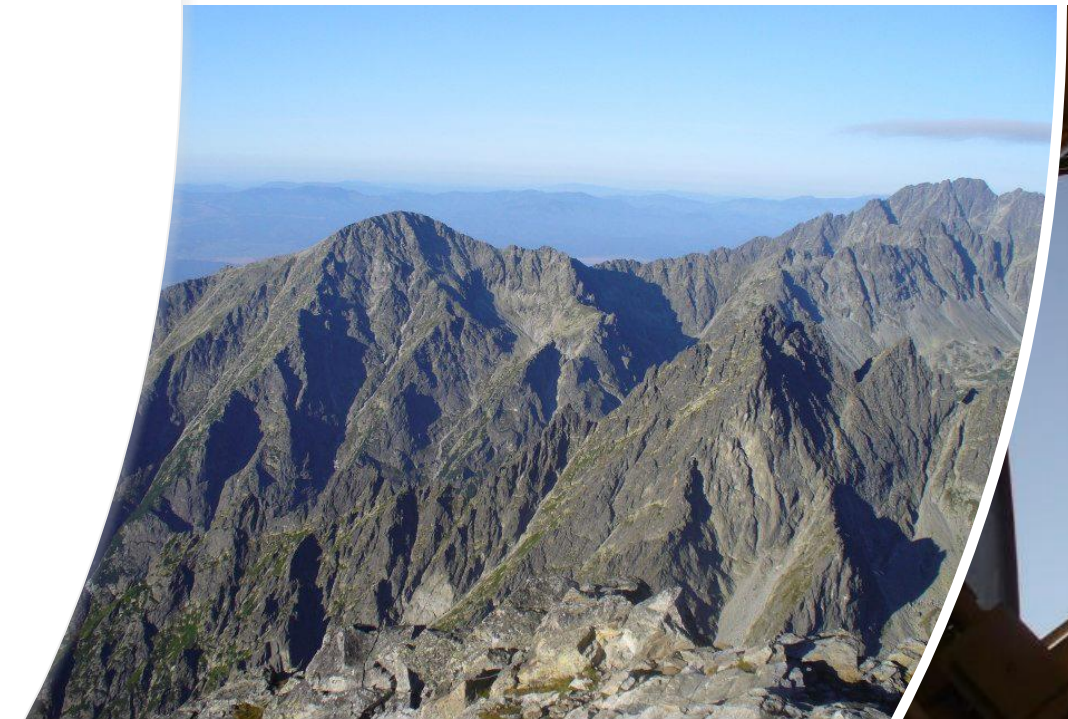
- From 1944 **Ľudmila Pajdušáková** started to work at the Skalnaté Pleso observatory
- From 1958 till 1979 she served as the director of the Astronomical Institute SAS, **first female director of the astronomical institute in the world**
- During 1946-1959, 18 comets out of 70 discovered world-wide were discovered in the High Tatras (Skalnaté Pleso + Lomnický štít): **Czechoslovakia was a real cometary world power at that time**

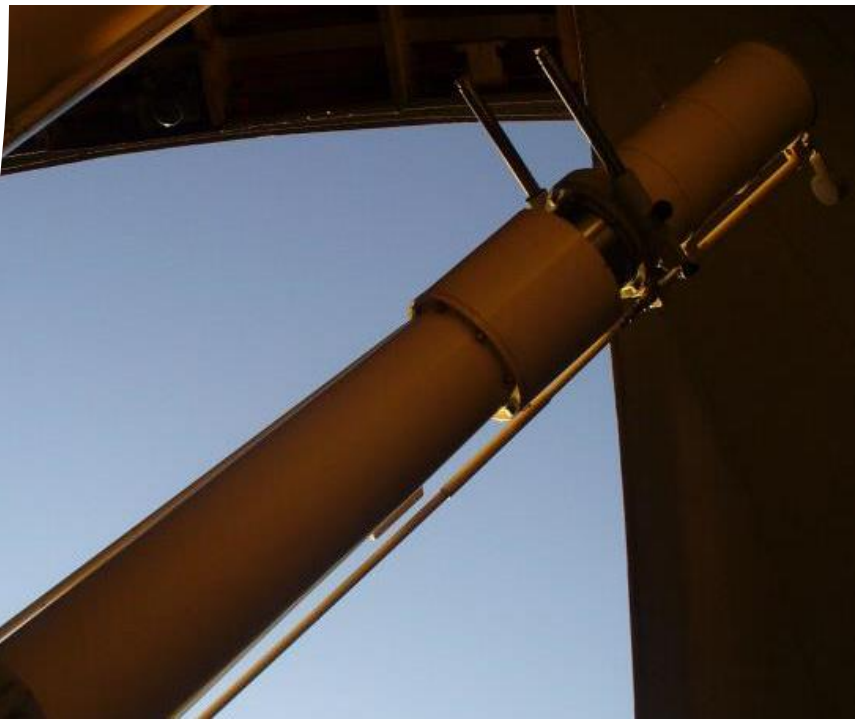
After the Velvet Revolution and nowadays

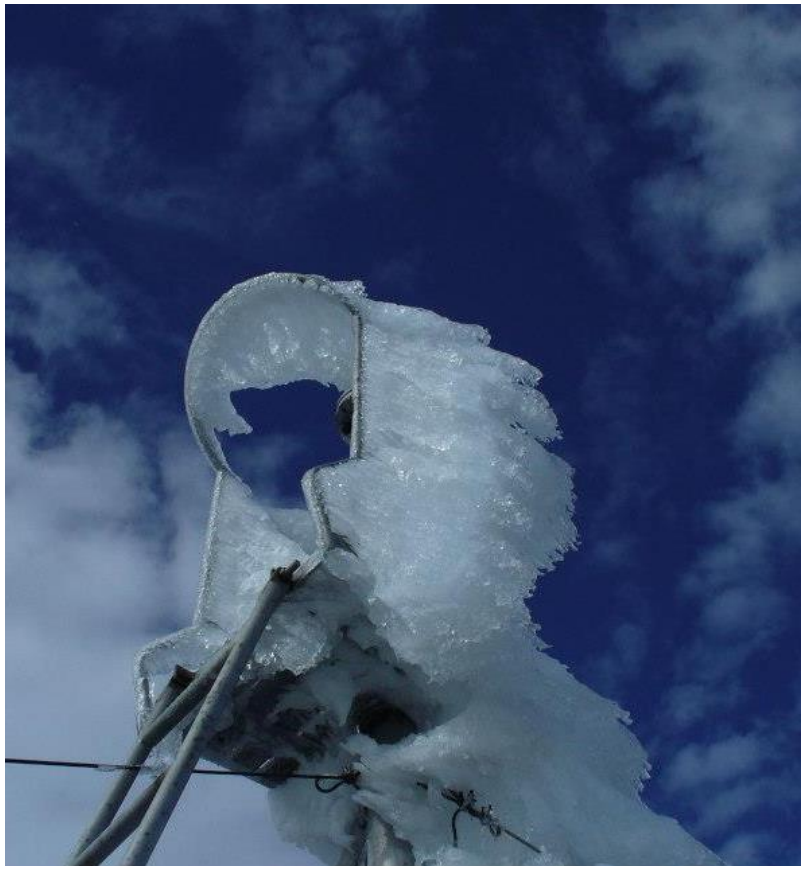
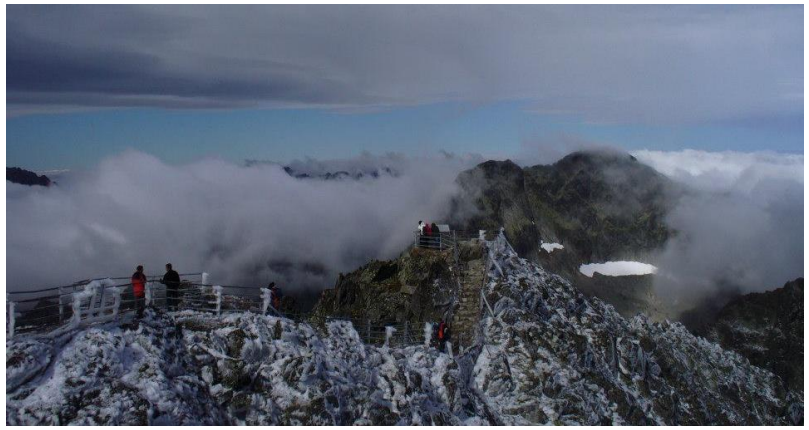
- Astronomical Institute SAS was formally established in 1953 (foundation of the Czechoslovak Academy of Sciences)
- Based close to Tatranská Lomnica
- **Three divisions: Solar physics, Interplanetary matter, and Stellar department**
- **More details about some of the current research will be presented at the Tatra Astro Summit**

My experience in 2012

- Staying for 2-3 weeks at the Lomnický štít station (2634 m)
- Science internship under the supervision of Dr. Ján Rybák
- General work with data, initial COMP-S tests, collecting water, cooking
- Main result: correlation between the neutron flux and the protuberance latitudal distribution






My experience in 2012

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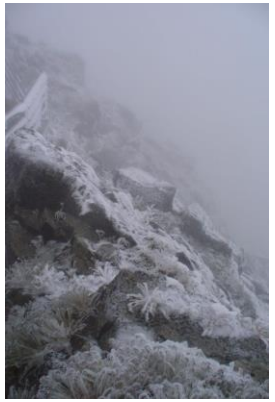
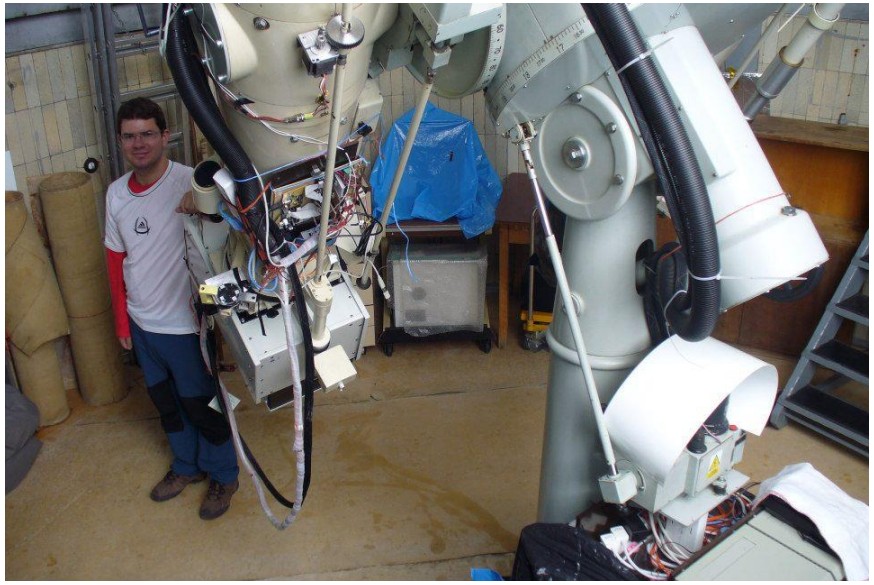
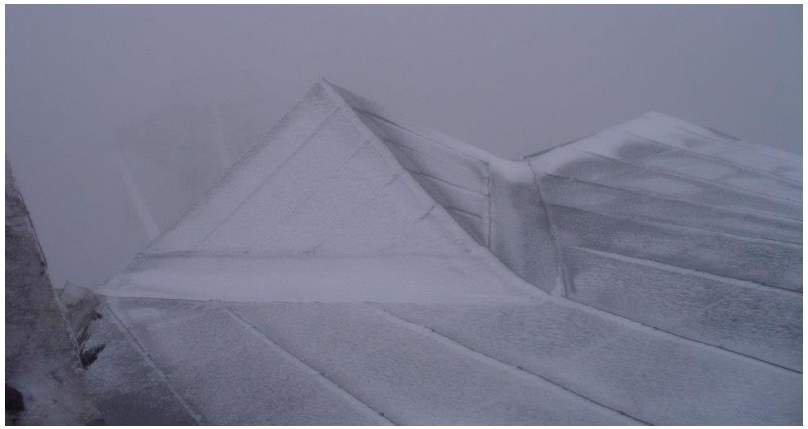




- In August 2012 there was a sudden drop in temperature
- Natural creations from ice in combination with wind
- Highest botanic garden in Slovakia





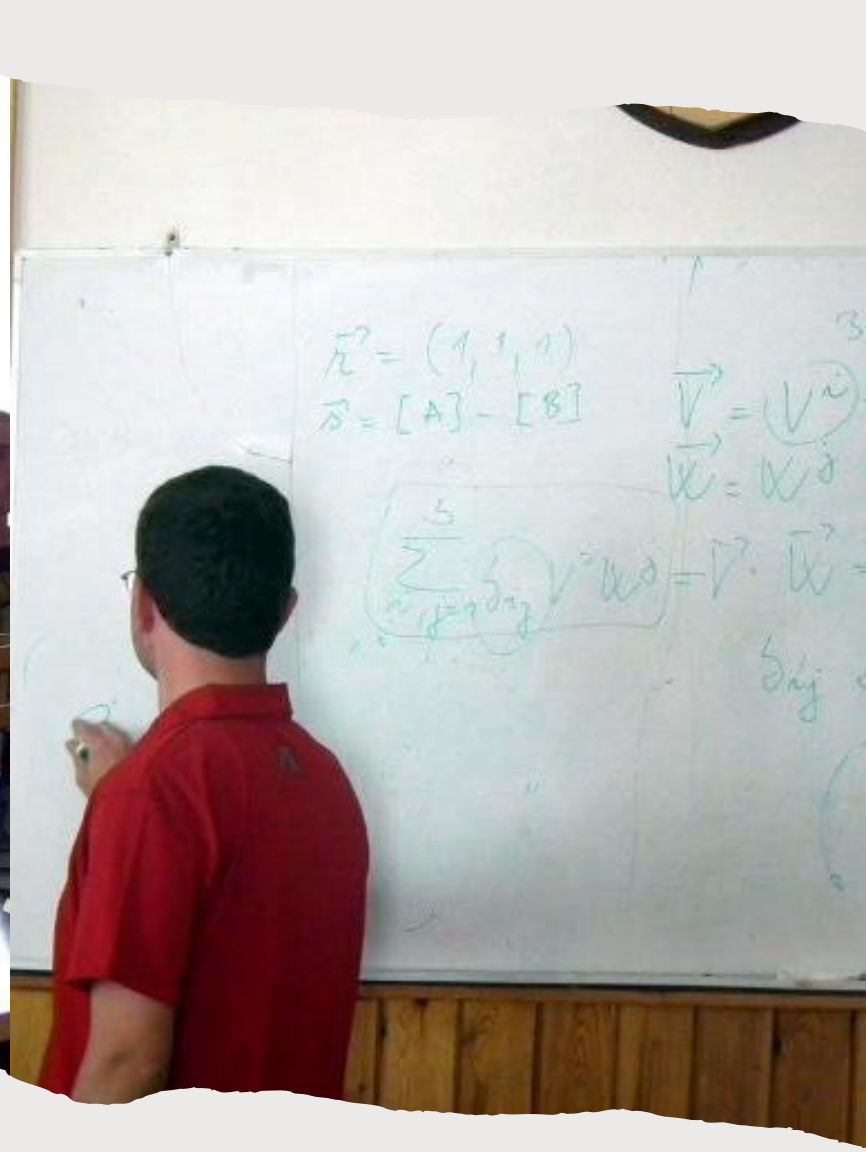

My experience in 2012

Astronomical exchange of experience (Astronomická výmena skúseností)

- Organized by the Astronomical club in Bratislava (Peter Kráčalík)
- Taking place in Stará Lesná
- In close collaboration with the Astronomical institute of Slovak Academy of Sciences

AVS – some memories

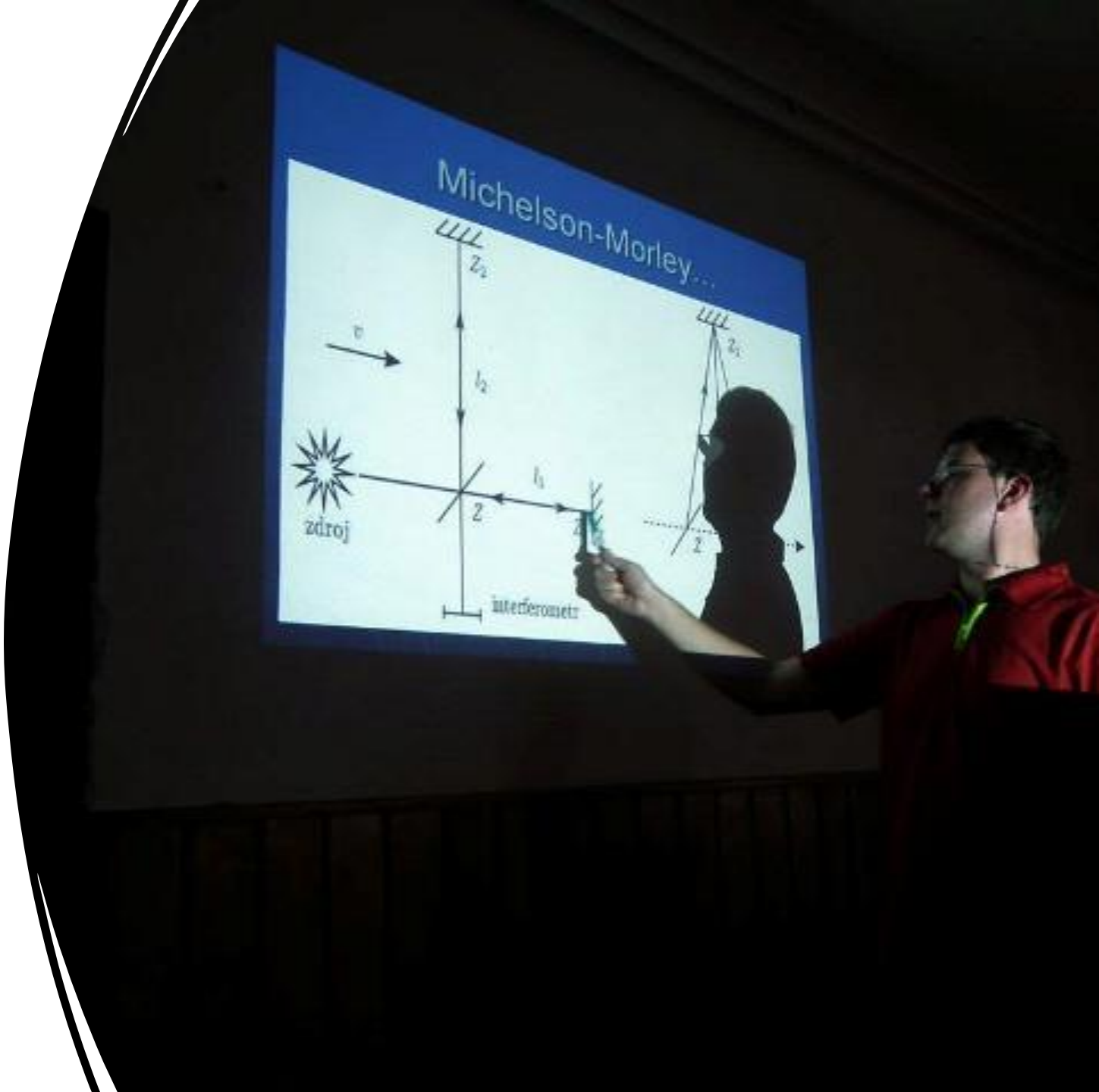
- Program consists of freetime "fun" activities, hiking, visit of astronomical sites and lectures
- Keynote lecturers: Ondrej Urban, Matúš Kocka, Vojtech Rušin, and many others



AVS – some memories from 2011

AVS 2011

- Explanation of the Michelson-Morley experiment
- At that time I was a bachelor student of physics, working on the Solar System dynamics (Late Heavy Bombardment)
- With Vladimir Karas I met in the second half of 2012



AVS – typical program of lectures

Zoznam potvrdených prednášateľova prednášok z radov účastníkov 2011

1. Kamila Součková (Astronomický klub Bratislava) - ???
2. Mgr. Jozef Pecho (Ústav fyziky atmosféry, AV ČR) - Počasie na iných planétach slnečnej sústavy
3. Mgr. Jozef Pecho (Ústav fyziky atmosféry, AV ČR) - Monitorovanie globálnej klímy z vesmíru
4. Michal Zajaček (študent MFF Karlovej Univerzity v Prahe) - Základy špeciálnej a všeobecnej teórie relativity a ich aplikácie
5. Michal Zajaček (študent MFF Karlovej Univerzity v Prahe) - Vznik planét
6. René Novysedlák (Astronomický klub Bratislava, SAS pri SAV) - Nestraťme tmu - téma svetelného znečistenia
7. Juraj Knapec - Fotometria úkazov Galileiho mesiacov
8. René Novysedlák (Astronomický klub Bratislava, SAS pri SAV) - Objavovanie so SOHO
9. Mgr. Stanislav Šišulák (Historický ústav SAV) - Ranostredoveká astronómia

Zoznam potvrdených prednášateľova prednášok z radov profesionálnych astronómov

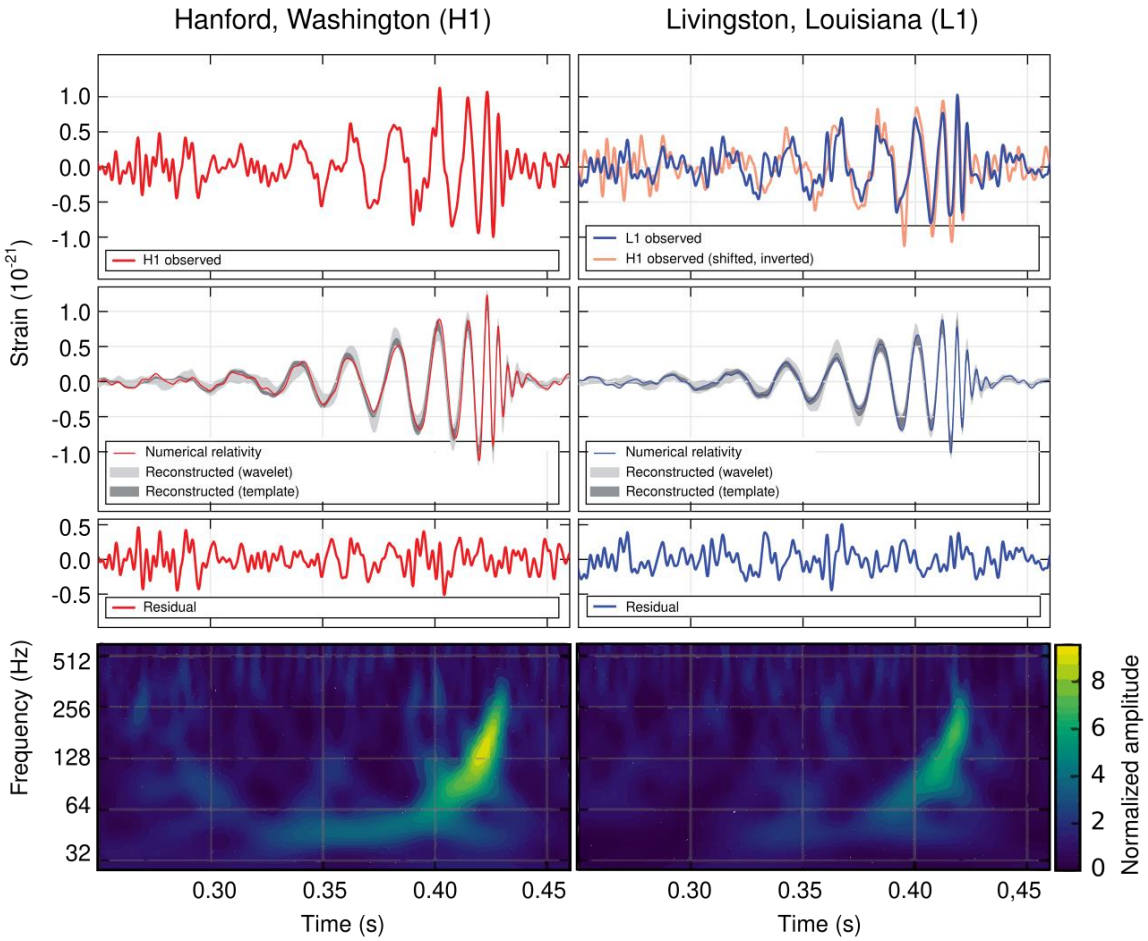
1. RNDr. Theodor Pribulla, CSc., AsÚ SAV - Extrasolárne planéty
2. RNDr. Ladislav Hric, CSc., AsÚ SAV - CCD technika v astronómii
3. Mgr. Július Koza, PhD., AsÚ SAV - Prechody Venuše v 21.storočí - predstavenie v dvoch dejstvách
4. RNDr. Vojtech Rušin, DrSc., AsÚ SAV - Zážitky z ciest za zatmeniami Slnka, výskum slnečnej koróny pocas zatmeni, resp. o Slnku.
5. Doc. RNDr. Ján Svoreň, DrSc., AsÚ SAV - Populácia asteroidov a ich zrážky so Zemou
6. Mgr. Ondrej Urban, Masarykova univerzita, Brno, ČR - Gravitačné šošovky

Zoznam potvrdených prednášateľova prednášok 2012

1. Mgr. Stanislav Šišulák - Dejiny výskumu Mesiaca
2. Bc. Michal Zajaček - Veľké neskoré bombardovanie v rôznych miestach Slnečnej sústavy
3. Mgr. Jozef Pecho - Počasie na iných planétach
4. Mgr. Jozef Pecho - Monitorovanie globálnej klímy z vesmíru
5. Mgr. Matúš Kocka - Od bielych trpaslíkov po čierne diery
6. Samuel Petrovič, Bc. Peter Kráčalík - Fotografovanie nočnej oblohy
7. René Novysedlák - Park tmavej oblohy Poloniny
8. RNDr. Theodor Pribulla, CSc. - Extrasolárne planéty
9. RNDr. Jozef Žižňovský, CSc. - Ženy pri zrode modernej astronómie
10. Mgr. Marek Husárik, PhD. - Zrážky asteroidov so Zemou
11. RNDr. Vojtech Rušin, DrSc. - Cykly slnečnej činnosti
12. Dagmar Sedliaková - Predstavenie projektu Veda pre mladých

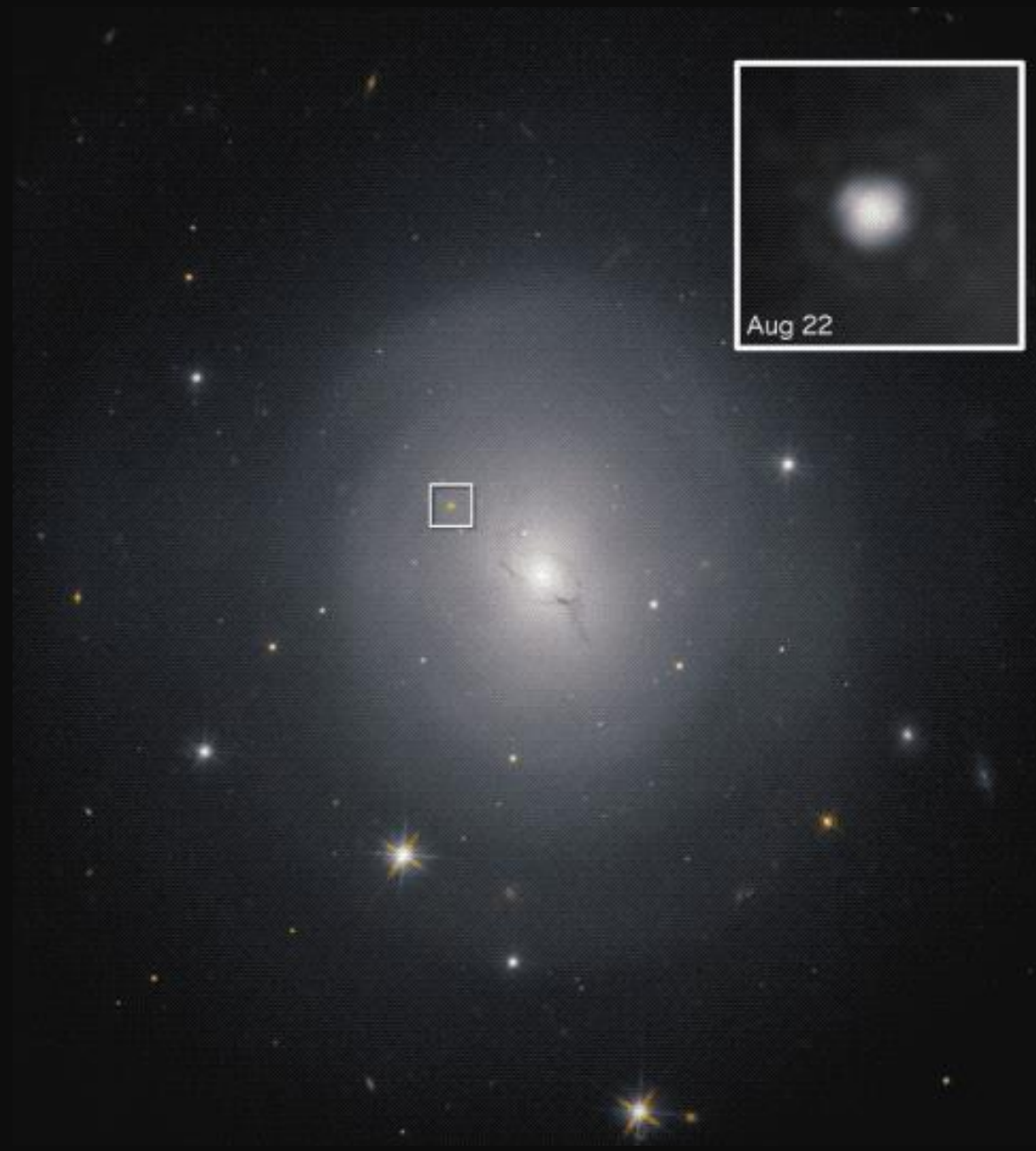
2025: we commemorate the 10th anniversary of the first gravitational-wave detection

- September 14th, 2015: detection of a merger of two stellar black holes of 30 and 35 Solar masses. Final black hole mass of 62 Solar masses (GW150914)
- Equivalent of ~3$M_{Sun}c^2$ radiated in the form of gravitational waves
- Confirmation of gravitational waves (predicted in 1916) and of the existence of binary black holes



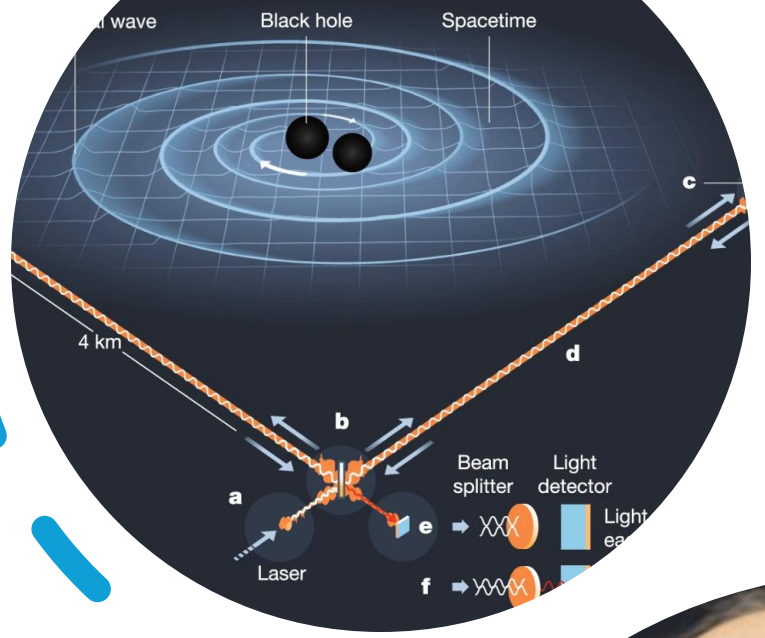
Some notable GW detections

- ~300 BBH detections so far
- **GW170817**: first EM counterpart detected (GRB and kilonova AT 2017gfo associated with the elliptical shell galaxy NGC 4993)
- **GW231123**: the most massive final black hole of 225 Solar masses (O4 LVK run) formed from 100 and 140 M_{sun} black holes. Previous most massive: GW190521 (140 M_{sun})
- **GW250114**: first test of Hawking's surface area theorem



Rainer Weiss (1932-2025)

- Contributed significantly to the interferometric technique of current gravitational-wave observatories (LIGO-Virgo-KAGRA)
- Nobel prize in 2017 with Kip Thorne and Barry Barish
- Developed a more precise atomic clock and also contributed to cosmic microwave background spectrum measurement via weather balloons
- Passed away on August 25th, 2025



Rainer Weiss - connection to Prague and the High Tatras

- Born in Berlin in 1932 to a Jewish doctor and a Catholic actress (both parents were kind of rebels)
- When he was small, they initially lived in Prague (it was safer because of Nazis in Germany)
- Short biography - the Kavli Prize:"**In 1937 they had another child, Sybille. In September of 1938 the family took a vacation to the Tatra mountains in Slovakia. In a hotel filled with expatriate German jews we all gathered around a gothic looking wooden radio and heard Neville Chamberlain give Czechoslovakia to Hitler to avoid a second world war. The hotel emptied in hours with people rushing to the consulates in Prague with the hope of leaving before the Nazis took over. Most did not get visas to leave.**"

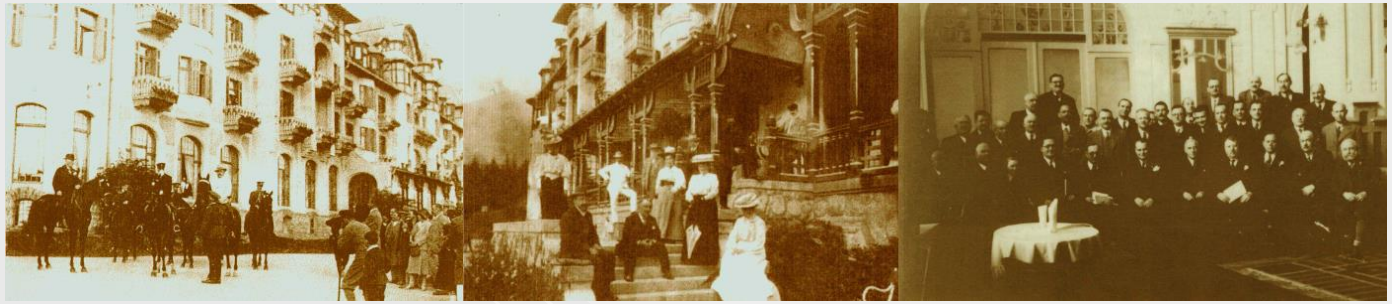
Which hotel Rainer Weiss's family stayed in in 1938?

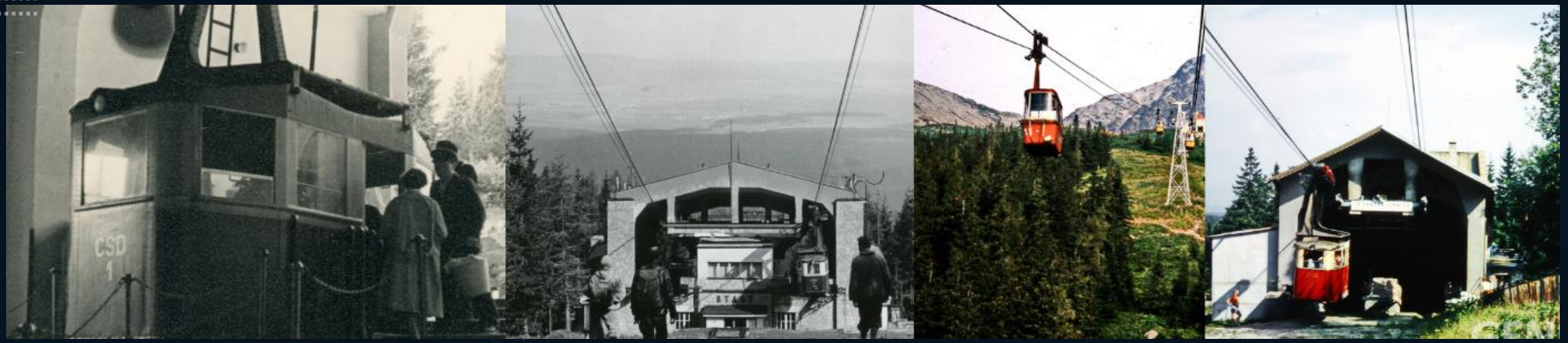
Not specified but there only a handful of possibilities:

- **Grandhotel Starý Smokovec** (Starý Smokovec, opened 1904): the flagship “grand hotel” of the interwar Tatras and a hub for visitors from Prague and abroad
- **Grandhotel Praha** (Tatranská Lomnica, opened 1905 as Palace Hotel; renamed 1919): another major First-Republic luxury hotel likely to host many émigré guests
- **Hotel Lomnica** (Tatranská Lomnica) - opened 1893/1894
- **Grand Hotel at Štrbské Pleso** (then the interconnected Jánošík [1893] – Kriváň [1906] – Hviezdoslav [1923] complex; today Kempinski High Tatras): a premier lakeside resort active in the 1930s.

Let us assume it was Grandhotel Prague…

- It represents the typical atmosphere where among others, expatriate German Jews took holidays and even longer retreats
- Established in 1905 (this year it celebrates 120th anniversary)
- Major Art-Nouveau resort above the village
- Architects Quido Hoepfner and Gejza Györgyi
- First guests came in on July 1st, 1905 (Hotel Palace), renamed in 1919 as Grandhotel Prague
- Many famous guests, including the first president of Czechoslovakia, Tomáš Garrigue Masaryk, Edvard Beneš, Karel Čapek, Sonja Henie…





Old cableway station next to Grandhotel

- The construction of the cableway from the vicinity of Grandhotel Prague to the Lomnicky peak between1936 and 1940 was a major boost for Tatranska Lomnica
- It also enabled the construction of the observatories
- All four stations of the cableway were designed by the architect Dušan Jurkovič

GRANDHOTEL PRAHA

120 ROKOV

With all these anniversaries in mind, enjoy the rest of your stay in the High Tatras, especially the conference day tomorrow!