

# Astronomical Institute

## of the Czech Academy of Sciences



# Astronomical Institute

of the Czech Academy of Sciences



- Public Research Institution
- Leading in scientific exploration in Astronomy, Astrophysics, and Space Physics
- Educating students (accredited Ph.D. programs in cooperation with Universities)
- Representing the science field in the Czech Republic and towards international organizations



# Astronomical Institute of the Czech Academy of Sciences



Google

Prague



1 h 30 min

30 min  
34.2 km



Ondřejov



Astronomical Observatory  
in Ondřejov



Clementinum Astronomical Tower  
in Prague



# History to modern science



- **1722** – Clementinum observatory established in Prague
- **1898** – grounds purchased in Ondřejov
- **1922** – Czechoslovakia joins IAU
- **1928** – Ondřejov observatory donated to Charles University in Prague
- **1954** – **Astronomical Institute** within Czechoslovak Academy of Sciences
- **2007** – Czech Republic joins ESO
- **2008** – Czech Republic joins ESA



# Scientific Teams



- ① Solar Physics (Miroslav Bárta)
- ② Stellar Physics (Brankica Kubátová)
- ③ Interplanetary Matter (Pavel Spurný)
- ④ Galaxies and Planetary Systems (Richard Wunsch)

## Support Teams

- Library and IT
- Mechanical Workshop
- Technical and Economy Administration

# Main Research Topics



Sun and heliosphere

Space weather

Hot massive stars

Exoplanets

High energy astrophysics

Asteroids and meteors

Galaxies and star formation

Space geodesy

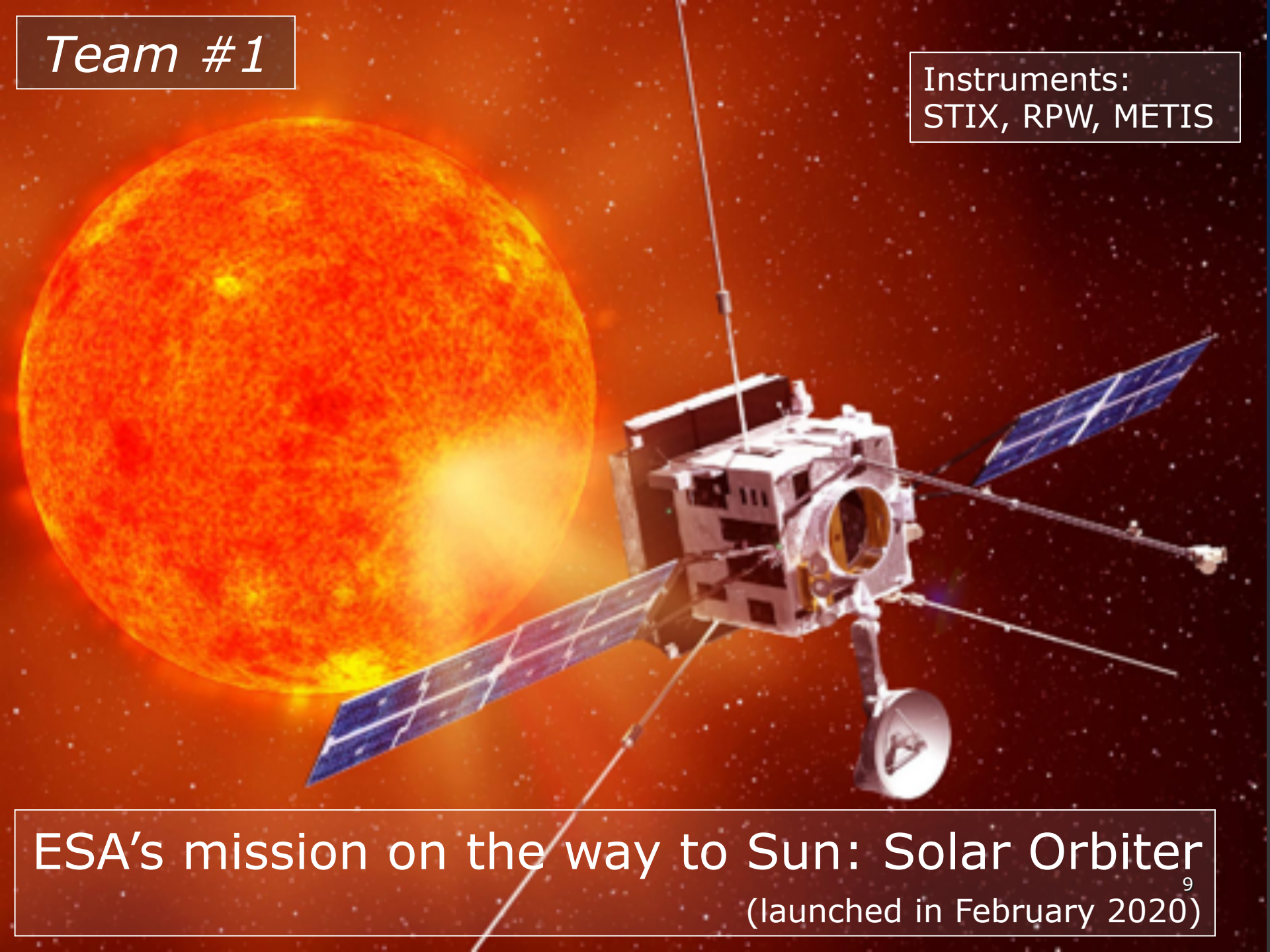
Strong gravity, black holes



*Team #1*

Instruments:  
STIX, RPW, METIS

ESA's mission on the way to Sun: Solar Orbiter<sup>9</sup>  
(launched in February 2020)



*Team #1*



RT5 10m radio telescope



*Team #2*



Perek 2m optical telescope<sup>11</sup>



*Team #2*

Exoplanets in Chile



Robotic telescopes





*Team #3*



One of the recovered meteorites captured in its original position.



**Physics of interplanetary matter**

*Team #4*



Going to students: Faculty of Mathematics and Physics  
in Prague, Faculty of Natural Sciences in Brno,...



**Solar Orbiter**  
ke Slunci

**Juice**  
k Jupiteru

**Athena**  
zkoumající  
rentgenový vesmír

**Proba 3**  
technologická  
mise

**ExoMars**  
sonda k Marsu

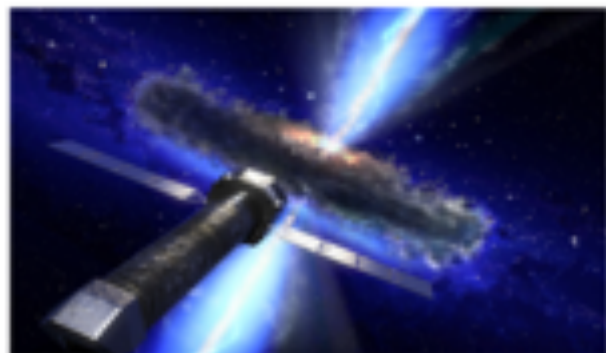
**Taranis**  
družicový projekt

**Česká optika**  
ve vesmíru

**České dozimetry**  
ve vesmíru

**Nové přístroje**  
pro kosmický  
výzkum

# Space exploration – link to advanced industry



23. 01. 2019

## Mise ATHENA pro pozorování rentgenového vesmíru získala financování české účasti

Ministerstvo školství, mládeže a tělovýchovy potvrdilo financování projektu „X-IFU Warm Electronics for the ESA L2 X-ray mission Athena – Phase B“, který obsahuje vývoj a dodání elektronické řídicí jednotky Remote Terminal Unit přístroje X-IFU ...



19. 11. 2018

## 10 let členství České republiky v Evropské kosmické agentuře

Uplynulý týden byl tím nejvýznamnějším v rámci Czech Space Year, ostatně proto se také jmenoval Czech Space Week. Hned několik akcí u nás připomnělo 10. výročí vstupu České republiky do ESA. ...



12. 11. 2018

## CZECH SPACE WEEK právě startuje.

Připravujeme pro vás stream z workshopu ESA z Ministerstva dopravy - na facebooku Akademie věd a Astronomického ústavu AV ČR. Program na <http://workshop.vesmirprolidstvo.cz/>.



# Scientific cooperation in EU and worldwide

- International Astronomical Union (IAU, \*1919)
- *Astronomy & Astrophysics (A&A)*
- European Southern Observatory (ESO)
- European Space Agency (ESA)
- European Astronomical Society (EAS)

European Week of Astronomy & Space Science, Prague 2017

## Infrastructures at national level

- Czech National Committee for Astronomy
- Czech Astronomical Society
- Central Bohemian Innovation Centre
- ...

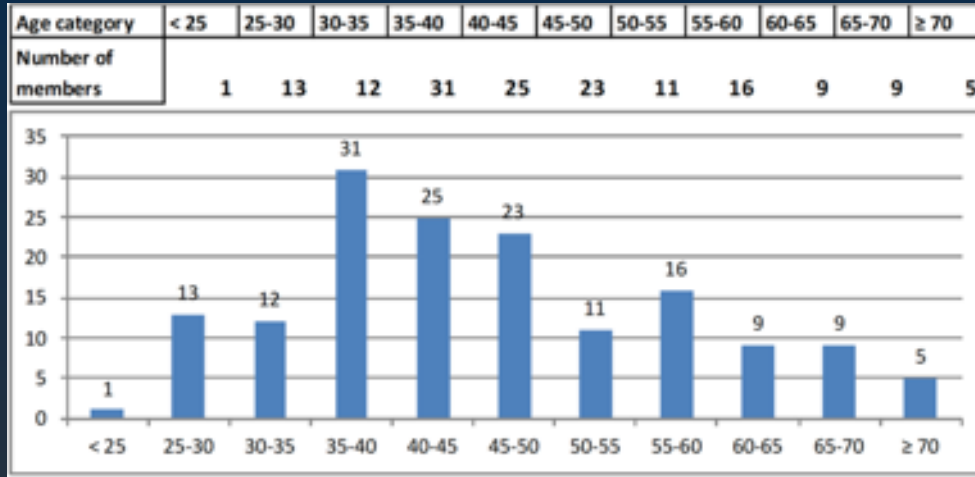


*A distinguished Czech astronomer doc. Luboš Perek (\*1919 †2020). From 1968 to 1975, Perek served as Director of the Astronomical Institute of the Czechoslovak Academy of Sciences. In 1975 he was appointed Director of the United Nations Office for Outer Space Affairs. Perek served as General Secretary of the International Astronomical Union (IAU) from 1967 to 1970, and he participated enthusiastically in the IAU's centenary celebration event in Prague 2019.*

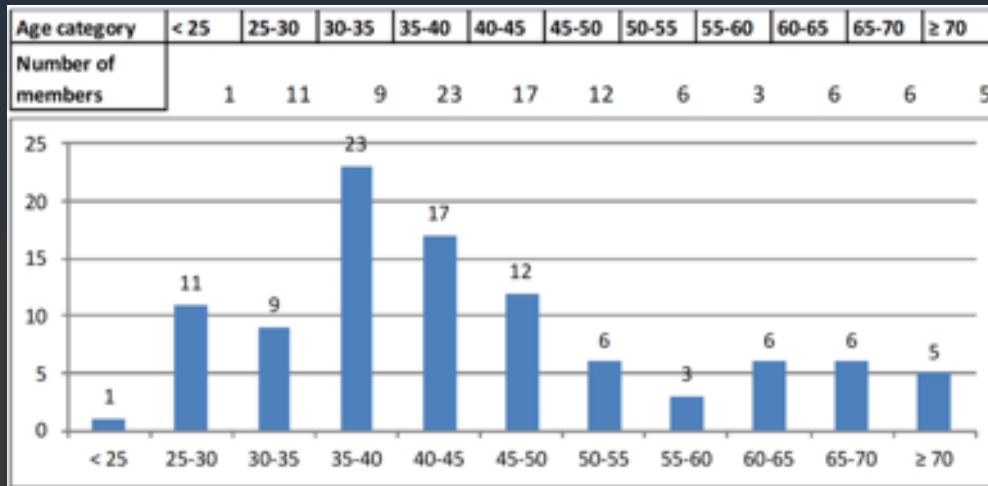
# Employees and age structure

All: **155** (physical persons)

Academical: **99** (scientists and engineers)



All employees



Academical staff



# Publications



## Collaborative effort and individual investigations

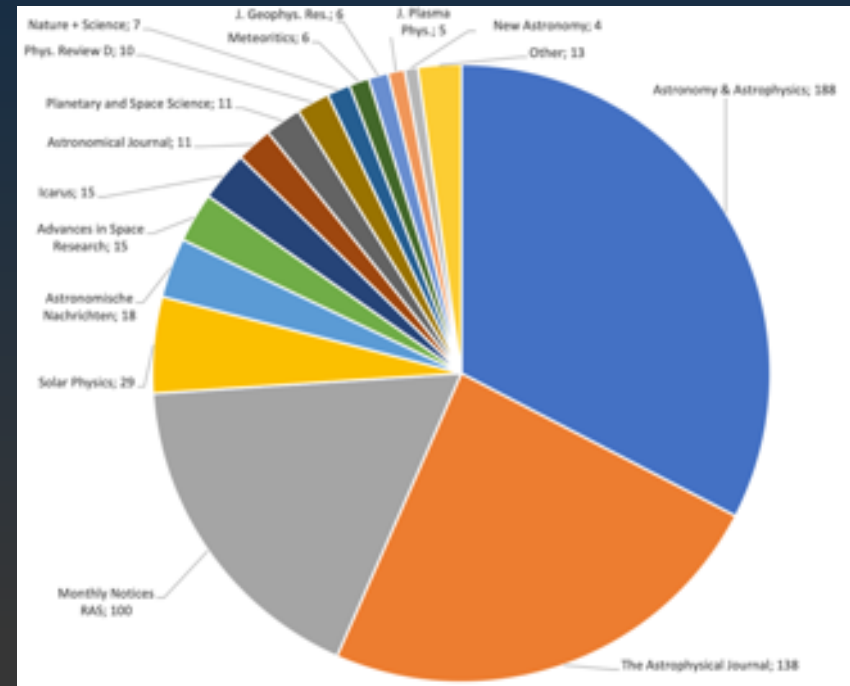
### Citations



1973

2019

### Journals



2015–2019

# Activity Report 2020

<http://www.asu.cas.cz/en/about/activity-reports>

Perek 2m Telescope in Ondřejov

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**Cooperating with large international infrastructures and institutions:  
ALMA (located in Atacama desert in Chile),**





# Cooperating with large international infrastructures and institutions: ALMA and the Ondřejov Regional Centre



## European ARC nodes

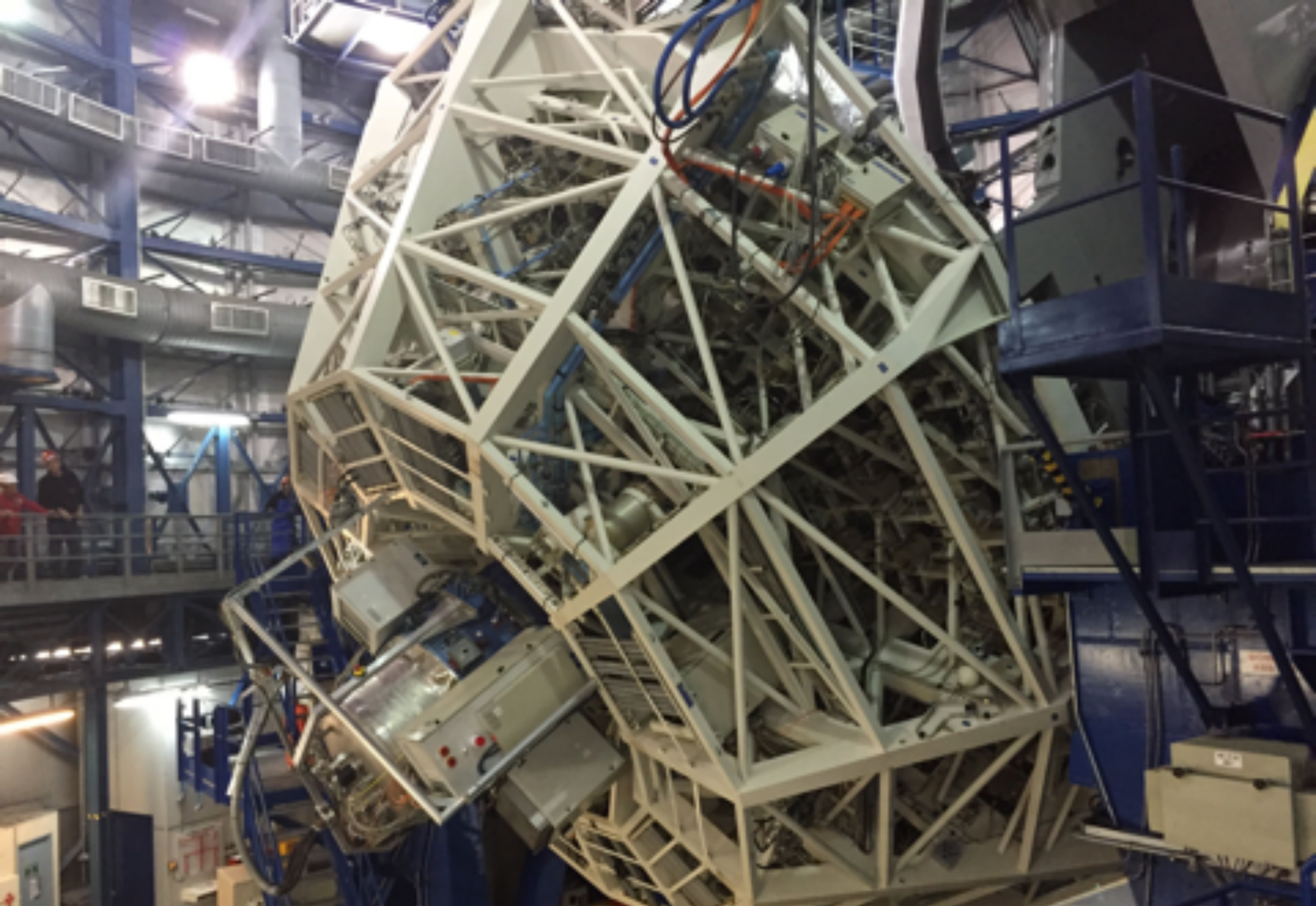


ALMA is a challenging new program of world-wide significance in **science and technology**.

# European Southern Observatory, Paranal and La Silla sites







One of four 8m Very Large Telescopes (VLT) at Paranal Observatory



## European Fireball Network

- ✓ Established in Czechoslovakia (1963)
- ✓ All time coordinated from ASU
- ✓ The longest continuously operational fireball network in the world
- ✓ Now equipped with automated cameras

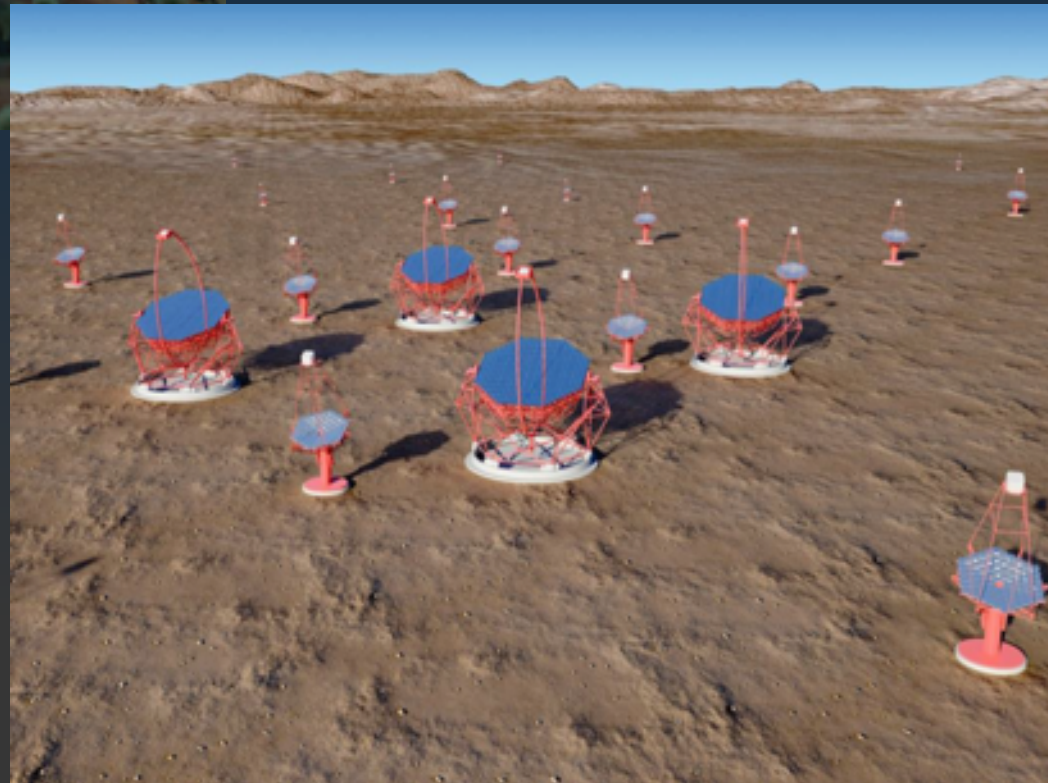
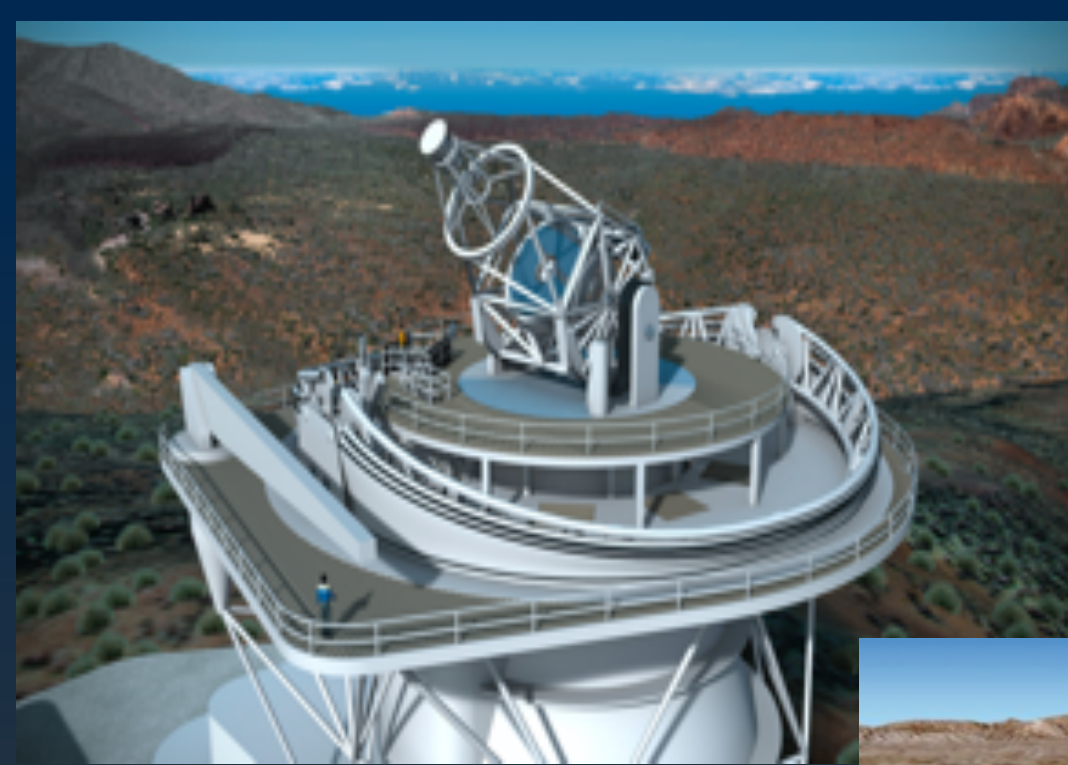


# Cooperating with international infrastructures and institutions – European Space Agency (ESA)





**New and upcoming  
collaborations:  
EST, CTA, ...**



# Supervising students at all levels



Training and research at  
(super)modern facilities

Type of study	No. of supervisors	No. of consultants	Theses defended 2015-2019
Bachelor	18	7	26
Master	20	7	31
Doctoral	25	9	12

Source: **ASIS** (Astronomical Institute Student Information System)

# Astronomical Institute

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Key programs are codified in documents:

- ✓ *Roadmap of the Czech Republic for Large Research Infrastructures, Development and Innovations*
- ✓ *National Space Plan for the Czech Republic*



# Public outreach – *Open Days,* *Guided Tours, ...*



Solar eruption and flares: Bridging the scale gap	01/04/12
Radiophysics of the Sun	01/06/12
Solar and Heliospheric Collisionless Kinetics: Enabling Data Analysis of the Sun to Earth ...	01/01/12
Space Weather Integrated Forecasting Framework	01/02/11
High-Resolution Solar Physics Network	01/04/13
Flare Chromospheres: Observation, Models and Archives	01/01/14
EST: the Large Aperture European Solar Telescope	01/02/08
BepiColombo: Kinetic processes in the solar wind, Mercury's magnetosheath ...	01/07/08
Main M1 and M2 mirrors for METIS coronagraph onboard the Solar Orbiter mission	01/01/11
PROBA-3 - Hardware contribution to ASI/CSO coronagraph onboard PROBA-3	01/01/11
RPWI Instrumentation for JUICE Mission: Definition and Development	01/01/11
Solar Orbiter: Low-Voltage Power Supply for ESA Cosmic Vision	01/01/11
DSLIP Operations on Board Proba 2 - Raw Data Processing and Archiving	01/08/11
L-DEPP - Lunar Dust Environment and Plasma Package for Lunar Exploration	01/01/12
STX - Czech contribution - Power Supply design (LVPS, HVPS) and development	01/01/11
SCHOO observations and data analysis	01/01/05
Langmuir Probe	01/01/10
Radio and X-ray	01/01/07
Magnetic reconnection in the solar corona and its connection to solar surface magnetic activity	01/01/08
Interaction of moving plasma with magnetic fields in the solar photosphere	01/01/08
Global Kinetic Simulations of the Mercurys magnetosphere	01/01/08
...	

## **Challenges and risks:**

❑ **Significant fraction of the budget from grants**

❑ **Ever changing boundary conditions**

❑ **\$**



# Perspectives



- **National level**: leadership in high-quality research in A&A.
- **International**: active participation in collaborations (EU and world-wide).
- **Education**: young generation (graduate and undergrad), post-doctoral programme, public awareness.
- **High-tech & applied**: creating opportunities for innovative businesses.



An aerial photograph of a dense forest with trees in various shades of green and yellow. In the center of the image, there is a circular structure, possibly a telescope or a small observatory, with a blue and white design. The structure is surrounded by a path or clearing.

*Thank you / Děkuji !*

Further information: [Astronomical Institute Website](#)

Public videos: [Astronomical Institute on Facebook](#)

St. Rektorátu české university Karlovy v Praze.

D <sup>faso. 13</sup>/<sub>num.</sub>

Váše Magnificence,

Slovutný pane rektore!

Ve dnech, kdy vzpomínáme na svého, jasněho dne naší národní svobody, pohled jsem se nedutěnil své dříve předsevzeti: věnovati svoji duchovní hvězdárnu v Ondřejově, s tříšlufní budovami stroji a pozemky naší české university Karlově.

Chystal odvydati jednou novou listinu národu vyvířel zdavení a myšlenkami jej vybudovali již před více, než třiceti lety, v době proměn těžké, po jímrti bratři.

Hvězdárna post po roce vyvířala, jak stály, má síly a je pro nás dnes nepotrožením, vidím-li, že již v nynější úpravě je hotova k předání práci, vysokého učení důstojně, celý tento majetek odvydávám tedy české university Karlově, to je základní podmínkou, že spravován bude státem jako neobčasný, pyže český listin se samostatnou administrací.

Podávám Vám dnes, slovutný pane rektore, s tímto svým rozhodnutím nativou zjednou, prosím, aby staroslavná university Karlova českého národa přijala sílu svého života, s láskou vyvířil, pro budoucí věky do své ochrany.

Odezdám listinu spolu s inventářem a některými osobními vyhradami srozumitelně po předchozí vzájemné dohodě.

Vám pak, slovutný pane rektore,

svědomím a hlubokou věrností  
oddaný

J. Josef Jan Jirák

Právo v Praze dne 28. října 1928.