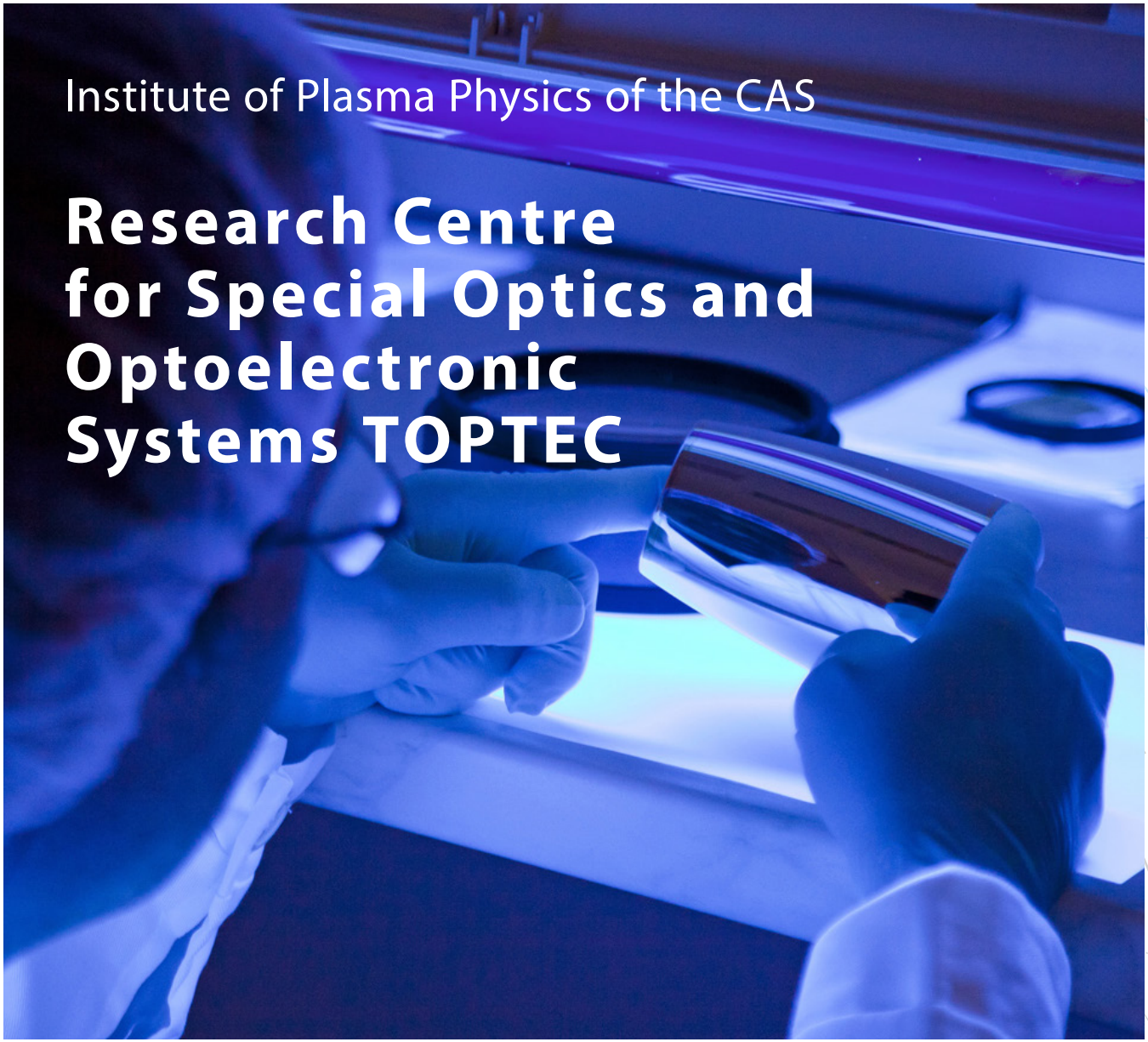
toptec

Research Centre
for special optics
and optoelectronic
systems



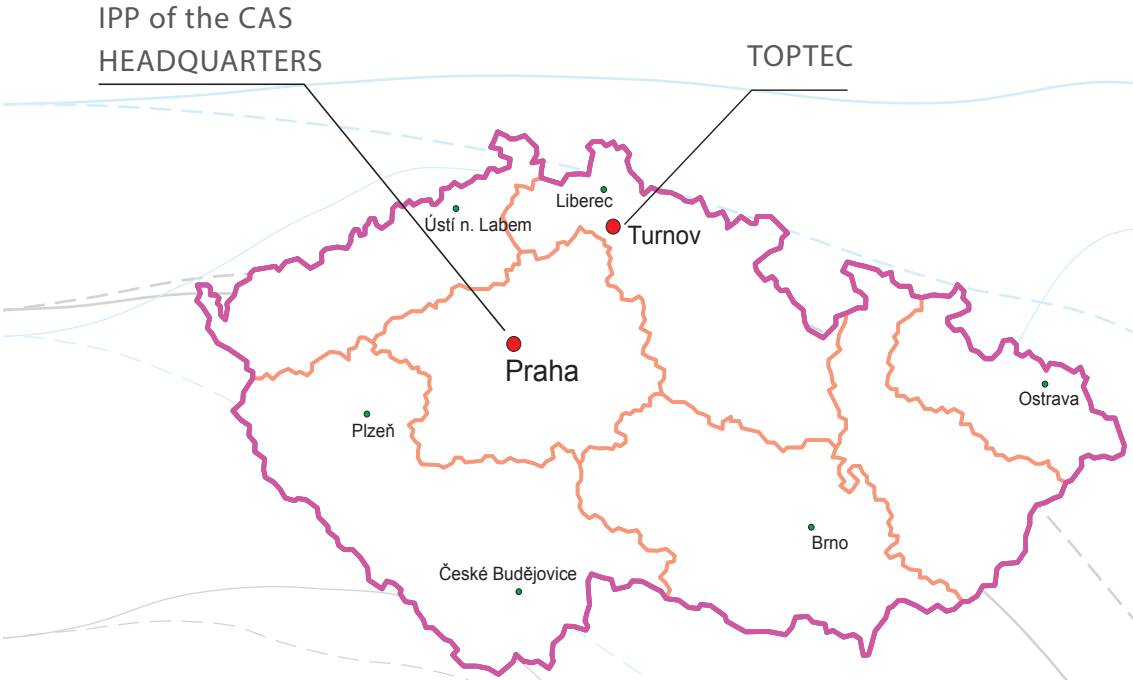
Institute of Plasma Physics of the CAS

Research Centre for Special Optics and Optoelectronic Systems TOPTEC

toptec@ipp.cas.cz
www.toptec.eu

toptec

Research Centre
for special optics
and optoelectronic
systems



TOPTEC 50 years of experience

Institute founded in 1959 – nearly 60years of history

Application centre of the CAS

- ➔ Research in optics
- ➔ Development of Systems
- ➔ Prototype production
- ➔ Metrology R&D
- ➔ R&D of anuf. processes
- ➔ Complex designs

Scientific departments

- ➔ Tokamak (COMPASS D)
- ➔ Pulse Plasma Systems
- ➔ Thermal Plasma
- ➔ Material Engineering
- ➔ TOPTEC
- ➔ Laser Plasma (PALS)

toptec@ipp.cas.cz
www.toptec.eu

toptec

Research Centre
for special optics
and optoelectronic
systems

TOPTEC all around

- TOPTEC – application centre aimed at R&D of precise optics and optical systems
- Located in Turnov – the region with long tradition of optics development and manufacturing
- Turnov optical group – more than 50 years - in 2006 integrated into IPP
- Recently - newly equipped with cutting edge technologies for machining, measurement, software for simulations and design – new laboratory rooms. The team has been extended to 50 employes and 12 students.
- TOPTEC has turnover of about 2,5 M EUR

toptec@ipp.cas.cz
www.toptec.eu

toptec

Research Centre
for special optics
and optoelectronic
systems

Research development and production of precise optics and optical systems

- Aspheric and FreeForm
- Optical systems design
- Thin film optics
- Hyperdimensional detection and spectroscopy
- Ultraprecise measurement methods
- Fine mechanics
- Segments: space, metrology, spectroscopy, high power lasers, diagnostics, automotive

toptec@ipp.cas.cz
www.toptec.eu

toptec

Research Centre
for special optics
and optoelectronic
systems

Selected R&D projects

- PRESO - Partnership for Excelence in Superprecise Optics
  Crytur + Aspericon - „Fundamental research“

- NCK - National Comp. Centers, sevaral specialised topics and teams
  supercoherence lasers, metrology, superpower laser beams

- ERC CZ - ASČR - RUSH - Random Phase Ultrafast Spectroscopy

- Hyperspectral detection system of hazardous substances
  Aim: To develop method and device for fast hyperspectral imaging of burning object with regard to detect the hazardous gases

- Digital Holographic tomography of domain wals
  Aim: Research of domain walls growth and movement in feroelectric materials. Digital holographic interferometry / microscopy will be used as a method.

- Advanced optical systems using aspherical surfaces
  Aim: Design, manufacturing processes, very good form, low microroughness, high cosmetic quality

- High-power modules for fiber laser pumping
  Aim: To develop the new ways of coupling the high power laser diodes to fiber lasers

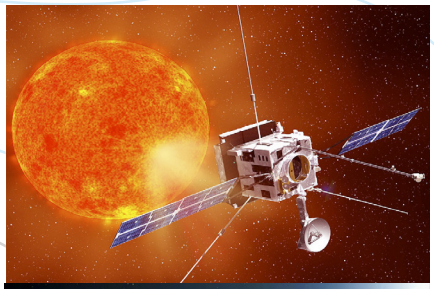
toptec@ipp.cas.cz
www.toptec.eu

toptec

Research Centre
for special optics
and optoelectronic
systems

ESA space research projects in TOPTEC

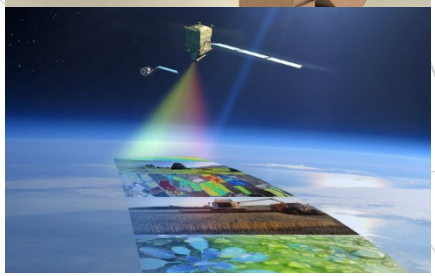
➔ **Optical part of the coronograph on the SOLAR ORBITER**
Lightweight strongly aspheric zerodur mirrors. Surface with extremely low microroughness for 121, 6 nm EUV



➔ **Optics of the coronograph ASPIICS on Proba 3 mission**
Telescope – redesign and optimalization
Relay optics with aspheres, design and optimization

➔ **Lenses and whole collimation systemfor NEOSTEL telescope**
The set of precision aspheric lenses proto type manufacturing Mechanics design and prototype manufacturing, thin film layers

➔ **Whole optical system of spectrograph on FLEX FLORIS**
Optical system design and prototyping



➔ **Ariel, SAT REVOLUTION, TRUTHS**

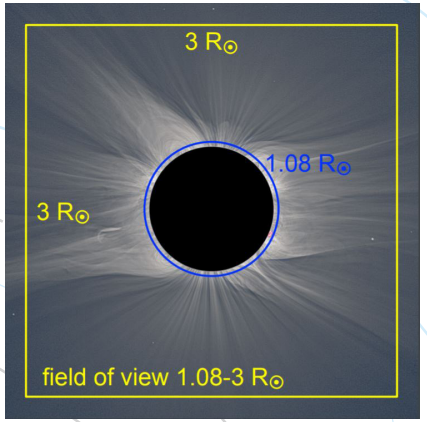
toptec@ipp.cas.cz
www.toptec.eu

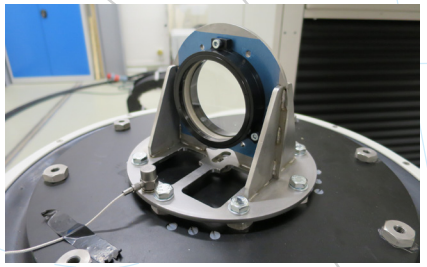
toptec

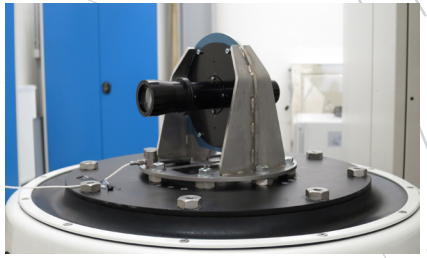
Research Centre
for special optics
and optoelectronic
systems

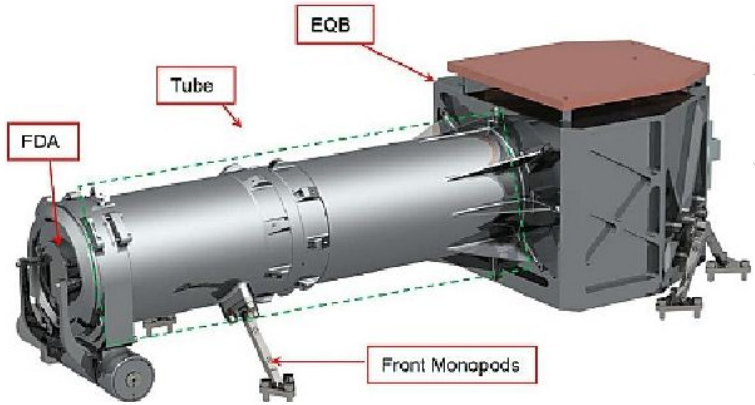
ASPIICS PROBA III

- Orbit not on LEO but in HEO - why?
- What is the main aim - why?
- Coronograph and spectrograph
- Noise and surface quality requirements
- Telescope – redesign and optimalization - relay optics – design and optimization









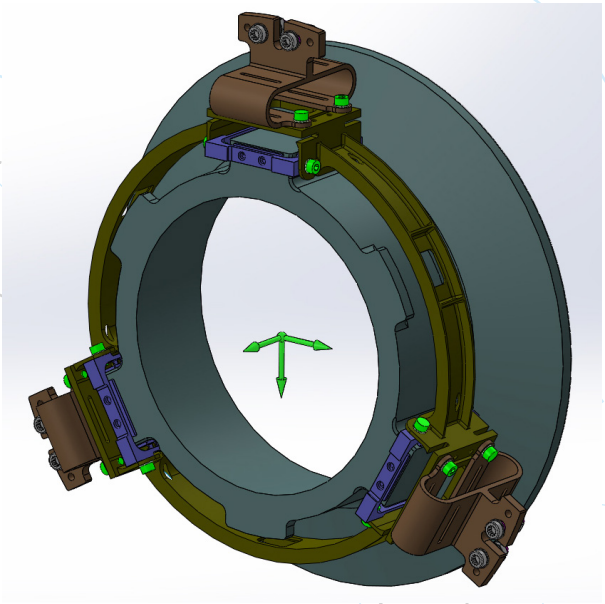
toptec@ipp.cas.cz
www.toptec.eu

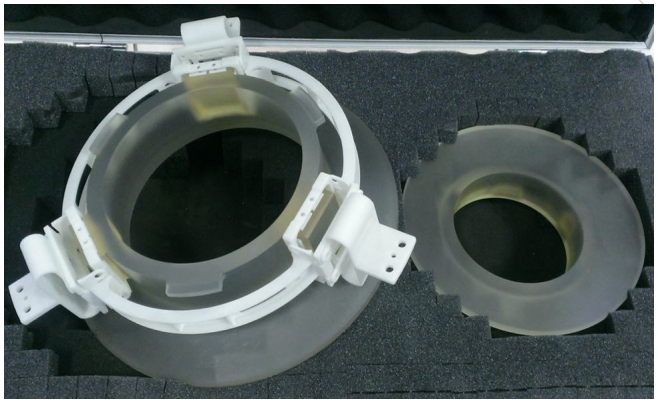
toptec

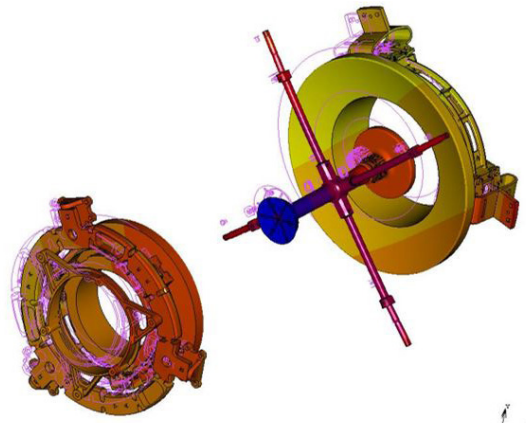
Research Centre
for special optics
and optoelectronic
systems

Solar Orbiter - Metis

- Coronograph based on mirr. telescope
- Three super polished mirrors with inner hole, having steep aspherical shape with more than 50 µm departure from best fit sphere and inner hole. microroughness 2Å for 121, 6 nm EUV,
- We try to optimize as much as possible to make the alignment easier







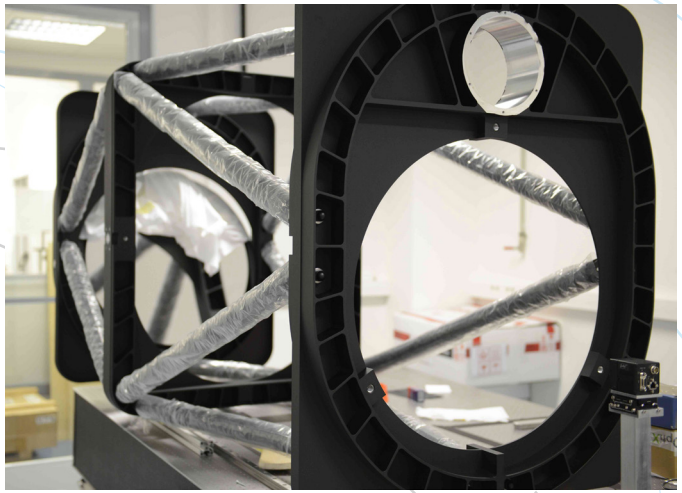
toptec@ipp.cas.cz
www.toptec.eu

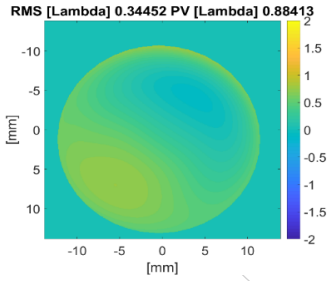
toptec

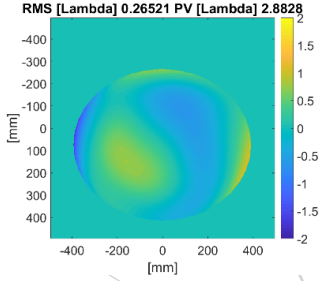
Research Centre
for special optics
and optoelectronic
systems

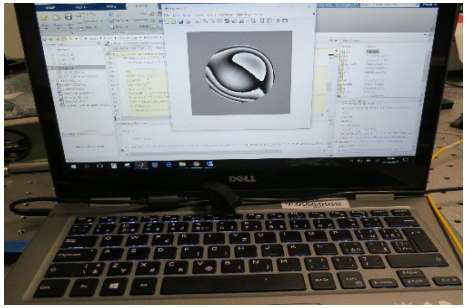
Neostell Computer assisted alignment

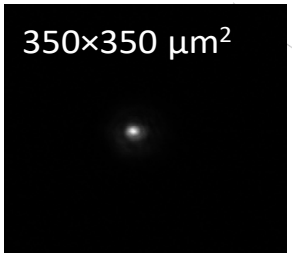
- Why do we need it?
- How to do it?
- Here we used monte carlo optimization and analysis of just spot

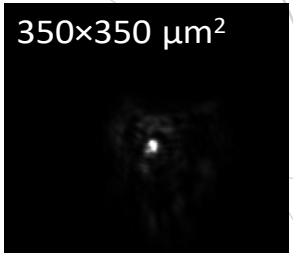








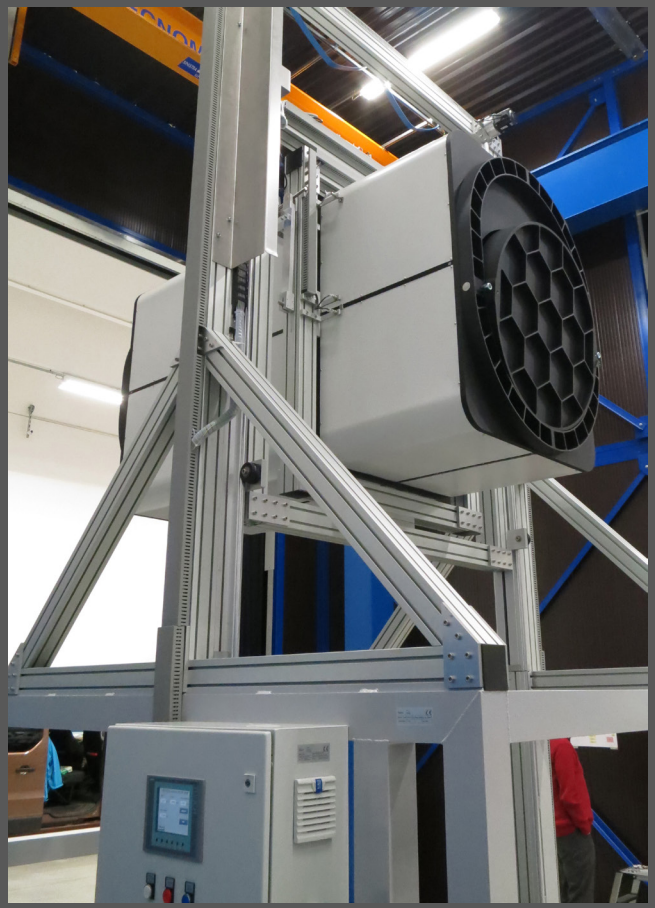




toptec@ipp.cas.cz
www.toptec.eu

toptec

Research Centre
for special optics
and optoelectronic
systems



toptec@ipp.cas.cz
www.toptec.eu

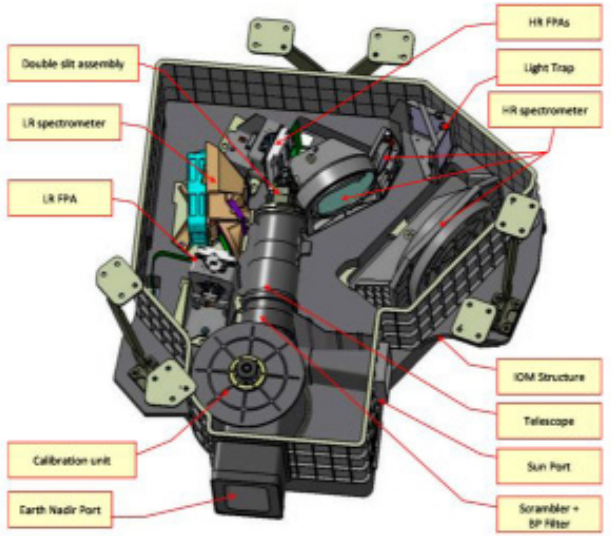
10/12

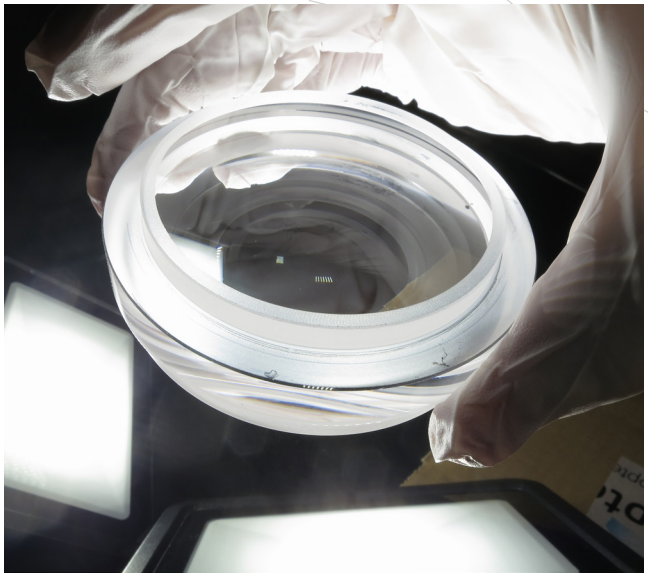
toptec

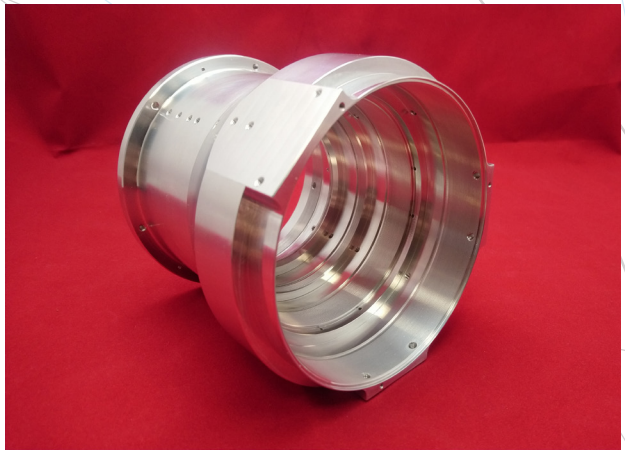
Research Centre
for special optics
and optoelectronic
systems

FLEX FLORIS

- Highly precise spectrometer
- Chlorophyl fluorescence
- Extremelly low stray light
- Extremelly low noise
- Mechanics, optics, gluing, design







toptec@ipp.cas.cz
www.toptec.eu

toptec

Research Centre
for special optics
and optoelectronic
systems

Thank you for your kind attention

ledl@ipp.cas.cz

toptec@ipp.cas.cz
www.toptec.eu