**PLATO Telescope Optical Units: design and evolution**

**FULLY REFRACTIVE:** 6 lenses
- **Spectral Range:** 500 – 1000 nm
- **Entrance Pupil Diameter:** 120 mm
- **Field of view:** ~1150 deg²
- **Image quality:** 90% EE ≤ 2x2 pixel²
- **Plate scale:** 15 arcsec/pixel
- **Field Distortion:** ~5%

**Optical Design**

  - INAF-OAPD (IT), *Univ. Bern (CH)*, INAF-OAB (IT), *Stockholm Observatory (SE)*, INAF-OACT (IT)

**Mechanical Design**

- **Material of the tube:** AlBeMet
  - **Pros:**
    - high thermal conductivity
    - high heat capacity
    - low density
    - moderate CTE (matches L1 glass)
  - **Cons:**
    - toxicity of its dust and fumes

**Thermal Analysis**

- The temperature of each TOU subsystem is regulated by an active thermal control. For each TOU, it consists of two heaters and three sensors. A thermal analysis which combines power consumption and reached temperature has been carried on.

**Straylight Analysis**

- **Sources of straylight:** Sun, Moon, Earth, Zodiacal light, field and out of field stars...
  - **Current model:** an ideal (geometry and of surfaces properties) model was used to estimate scattered flux and ghosts on the CCD. Future work: translation in ASAP and refinement of the model

**Prototyping Activities**

- **L2 radiation environment:**
  - Low energy protons and electrons from solar wind plasma
  - Galactic cosmic ray particles and particles from solar events
  - Ionizing Gamma, X and UV radiation
- **GEANT4 simulation assumptions:**
  - AlBeMet tube
  - Aluminum baffle
  - Solar proton spectrum model for L2 (SPENVIS) irradiated isotropically from a spherical surface
  - The effect of irradiation on each lens has been estimated.

- **Effects of radiation:**
  - Color centers: (darkening of the glass)
  - Dimensional stability
  - Alteration of the CTE
  - Alteration of the refractive index

- **Prototyping Activities:**
  - Pre-breadboard (commercial 1” lenses): to define AIV procedure using Airy and Newton rings. DONE
  - Breadboard (no aspheric surfaces, thermally-equivalent structure): to verify on-axis requirement achievement, AIT schedule issues and warm-to-vacuum cold behavior. DONE
  - Prototype (flight optics): to verify full-field quality and warm-to-vacuum cold behavior.
  - **ADDITIONAL TESTS:**
    - CaF2 blank thermal and vibration test DONE
    - L6 group (new mount after failure) additional vibration test NEXT