

Transponder TSC

Canberra 2018

Transponder SC Meeting: Canberra, Nov. 7, 18:30 – 19:00

Meeting Agenda

1. ACES, current status
2. 2-way Ranging to LRO
3. Time Transfer by Space Debris
4. Miscellaneous

ACES Status

- PHARAO FM delivered and integrated on the ACES baseplate
- FCDP, ELT, and on-board GNSS receiver FMs delivered to Airbus
- SHM PFM ready for integration at the end of November
- MWL FM completed, tested and delivered by May 2019
- ACES FM tests already started and continued until summer 2019
- MWL GTs:
 - First terminal deployed in PTB in Nov. 2015 and remotely monitored since then
 - Remaining fixed terminals to be deployed in the course of 2019
- ACES ready for shipment to launch site on December 2019
- ACES bookmarked for launch on SpaceX 21
 - 6 months: commissioning/calibration
 - 12 to 30 months: routine science phase



SLR Eye Safety

Eye Safety is required for the aided eye up to an aperture of 40 cm (encloses the largest piece of optics in the ISS)

Systems below that limit are fairly easy to be accepted for tracking
(However they have to add a precaution (shutter) to make sure that they don't exceed this limit)

Systems with variable power exceeding the limit require more precautions

The requirements are defined and accepted

The final (still missing) step is the definition and acceptance of a suitable test procedure

Time is not an observable in Geodesy since we cannot control the phase of the clock signal as it progresses through the hardware

Time is the SI unit that we can access with the highest resolution

Time is a prerequisite in order to progress to a relativistic Geodesy

SLR is the only technical realization of the Einstein Synchronization

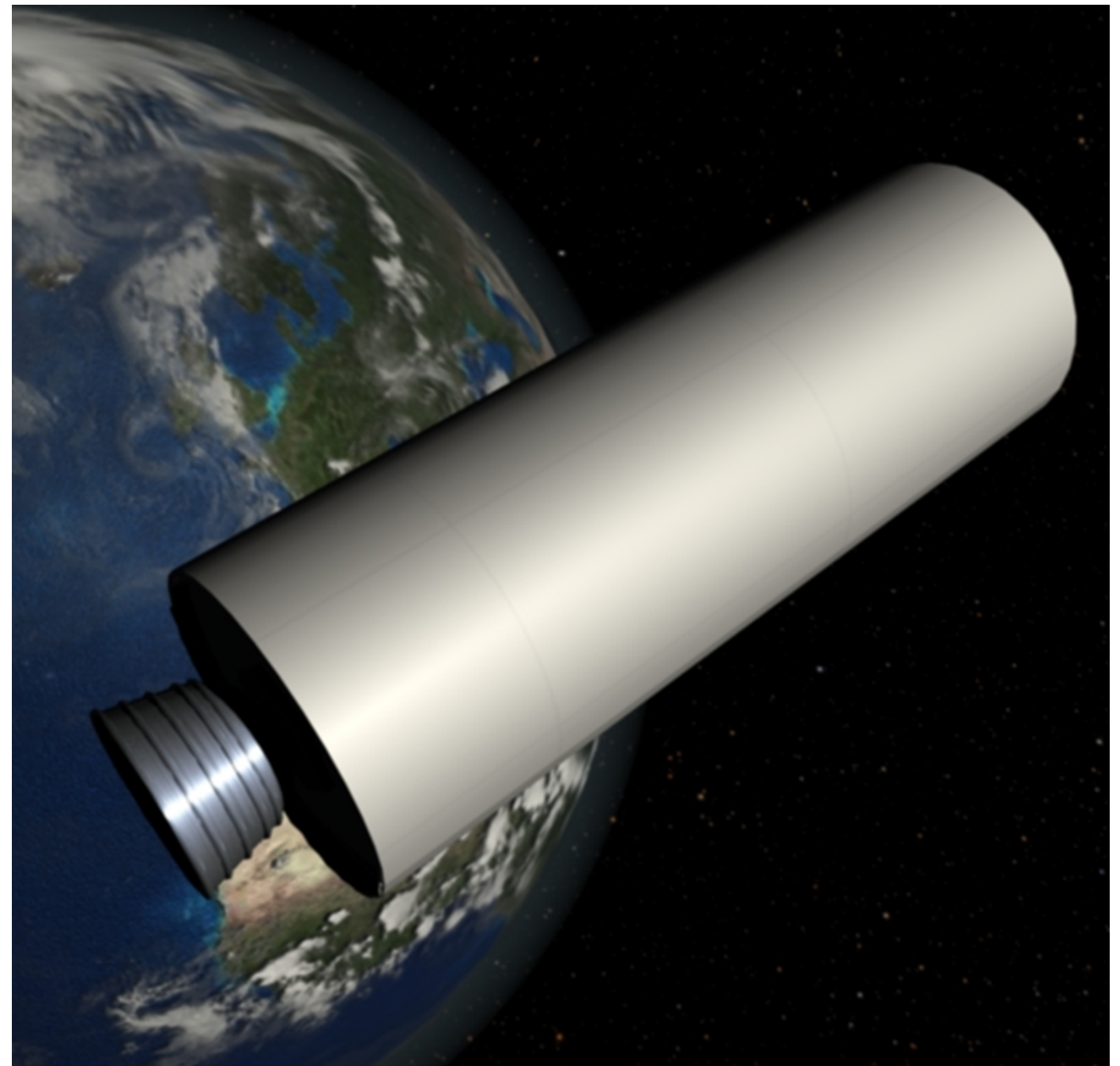
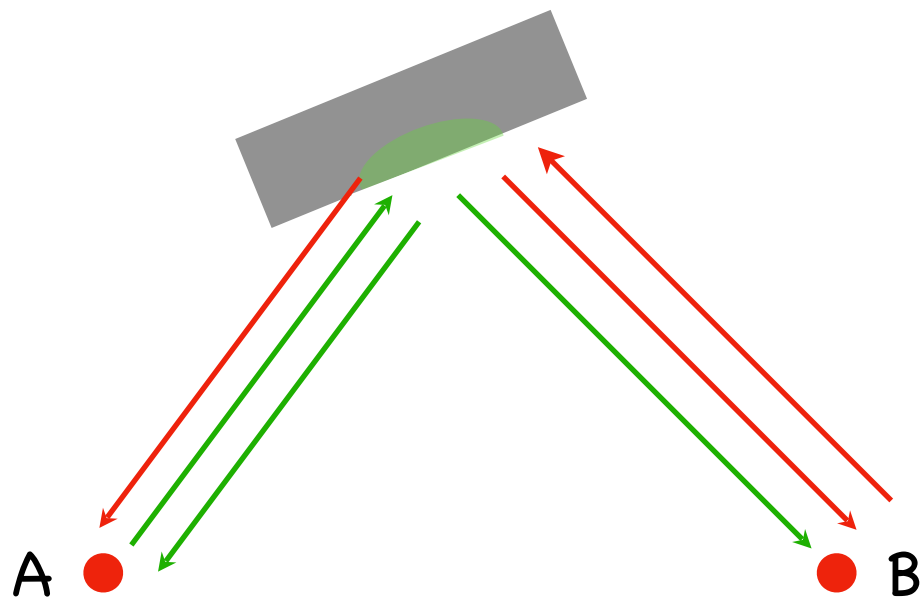
SLR therefore is the only viable technique to link **time** to geometry

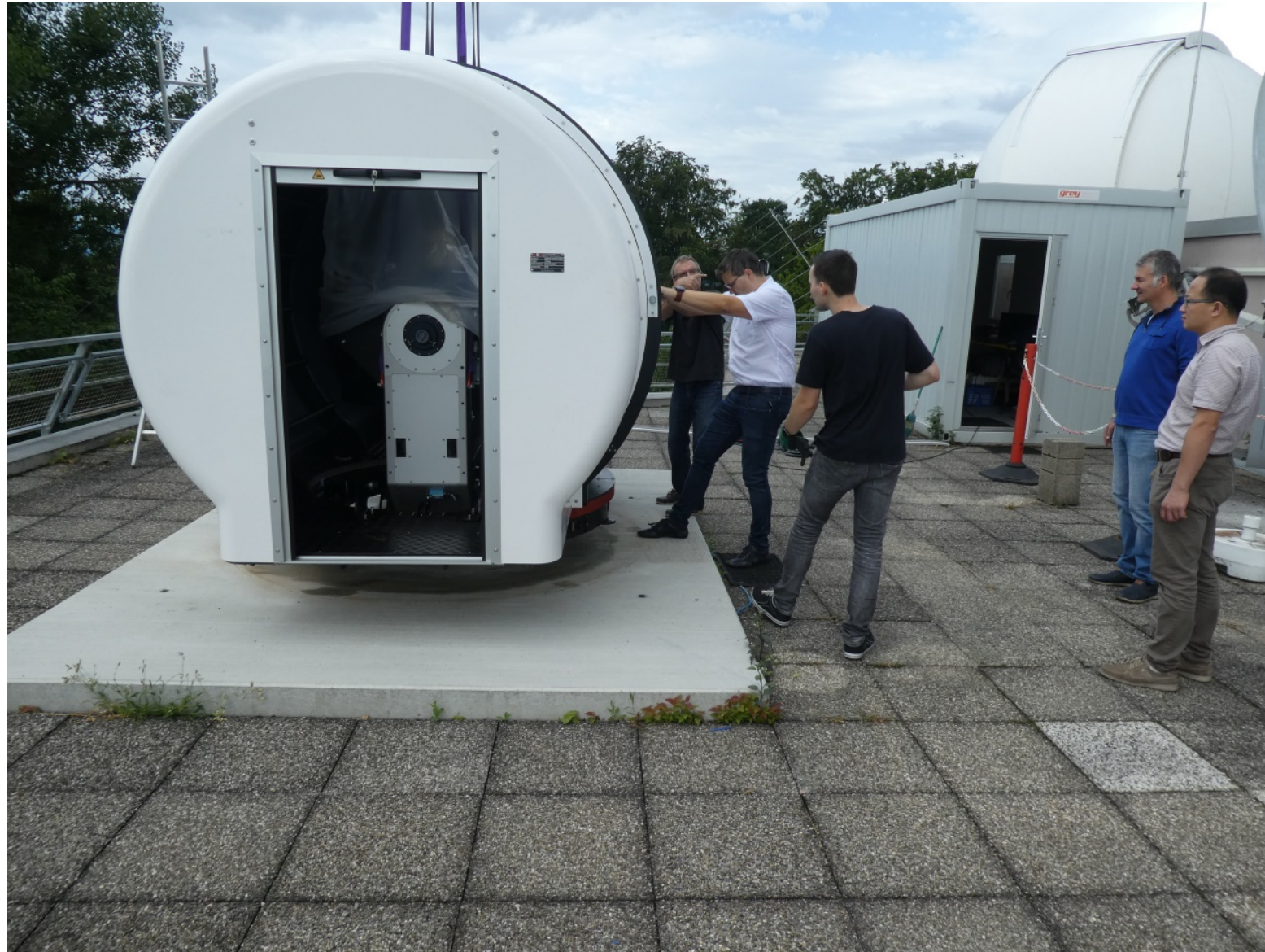
-> This requires to master the art of making **time** an **observable**

Space debris objects allow diffuse reflections at wide angles and have 0 delay at the spacecraft

Each station performs 2-way ranging to the space object

In addition to that each station performs 1-way detection of the other stations





- Station ,1‘: Graz SLR; firing the debris laser; Time Scale ,1‘
- Station ,2‘: New ASA telescope; Time Scale ,2‘)
- Echoes via debris target on both systems: Allows time transfer
- Possible with standard targets, debris targets