

Multi kilo Hertz laser ranging for deep space missions

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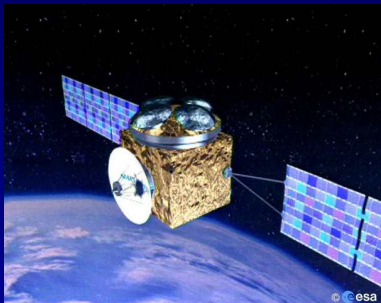
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*presented at
International Laser Ranging Service Meeting, Koetzting, October 28-30, 2003*

GOALS

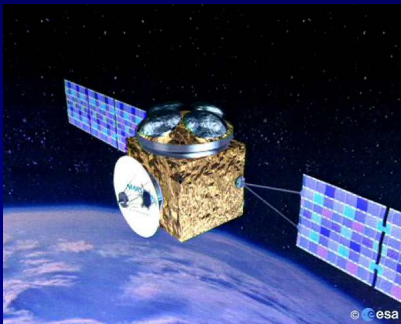
- multi kilo Hertz laser ranging for ESA deep space missions (Mercury..)
- laser ranging to non cooperative targets
- ranges 0 \rightarrow > 1000 km
- range resolution < 1 m / shot (6 cm)
- /deep/ space qualified:
radiation, heat flux, lifetime..
- photon counting concept
- high repetition rate microlasers



Technology demonstrator

Phase A (2003-2004)

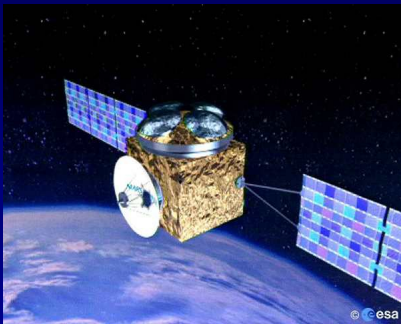
- microlaser “NanoLas”
- 16 kHz , 1 uJ, < 1 ns, 532 nm
- Si SPAD , 40 um, CW
- Modular electronics
 - programmable gate arrays (100 MHz)
- optics - refractive
 - scaled to preserve
 - energy budget
 - high back ground count rate



Technology demonstrator

Phase A (2003-2004)

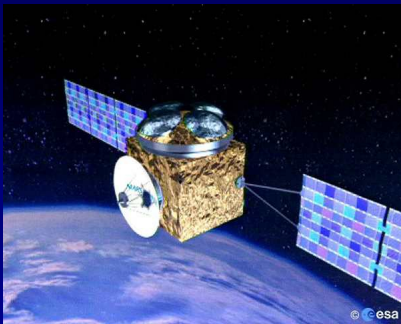
- timing electronics
 - 100 nsec counter
 - 8 bit TDC -> 0.5 nsec resolution
- adaptive range gate
 - gate delay programmed via orbit parameters and terrain profile
 - gate strategy can be modified within the experiment



Technology demonstrator

Phase A (2003-2004)

- control electronics
 - Z80 based
 - real time & parallel processing OS
 - range gate position calculation
 - data flow control
 - data accumulation
 - echo signal identification



Technology demonstrator milestones

- concept design/decision Oct. 2003
- budget collection Oct. 2003
- laser, filter, SPAD Dec. 2003
- mechanics & optics design Jan. 2004
- breadboard electronics&control Dec. 2003
- mechanics and optics May 2004
- programming Jan. June 2004
- first echoes June 2004