SCF-Test of infrared laser ranging and altimetry to retroreflectors on moons and planets

Dell'Agnello, S.; Delle Monache, G. O.; Martini, M.; Vittori, R.; Cantone, C.; Boni, A.; Berardi, S.; Patrizi, G.; Tibuzzi, M.; Lops, C.; Maiello, M.; E. Ciocci, E.; Salvatori, L.; Rinaldi, S.
INFN-LNF, Italy
Manuele.Martini@lnf.infn.it

The SCF modular, versatile and evolutionary design allows also for its upgrade to the characterization of Infrared (1064 nm) Laser ranging and Altimetry (ILA) investigations to cube corner retrorectors, CCRs, deployed on landers, rovers or directly on the surfaces of solar system moons and planets. The CCR thermal control and real-time CCR movement can be adapted to simulate the CCR orientation on the moon or planet with respect to solar illumination and laser interrogation beams. ILA has been, and is an important tool in the exploration and planetary science of Mars (Mars Orbiter Laser Altimeter, MOLA, onboard the Mars Global Surveyor), Mercury (Mercury Laser Altimeter, MLA, onboard MESSENGER) and the Earth's Moon (Lunar Orbiter Laser Altimeter, LOLA, onboard the Lunar Reconnaissance Orbiter).
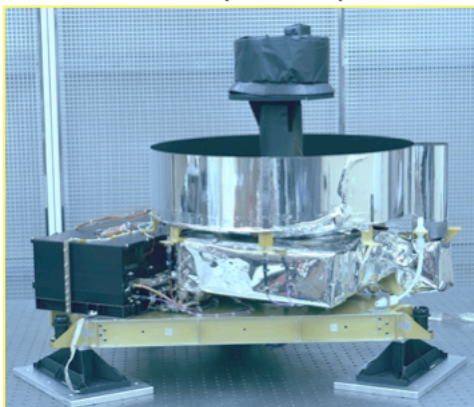

A prototype, very compact, very lightweight CCR payload has been designed and built for lunar laser altimetry to CCRs deployed close to the lunar poles. Its optical far field diffraction pattern and thermal behavior will be characterized at 1064 nm. Preliminary structural simulation of the CCR package will be presented; its vibration test is foreseen by end of 2012.

INRRI-5
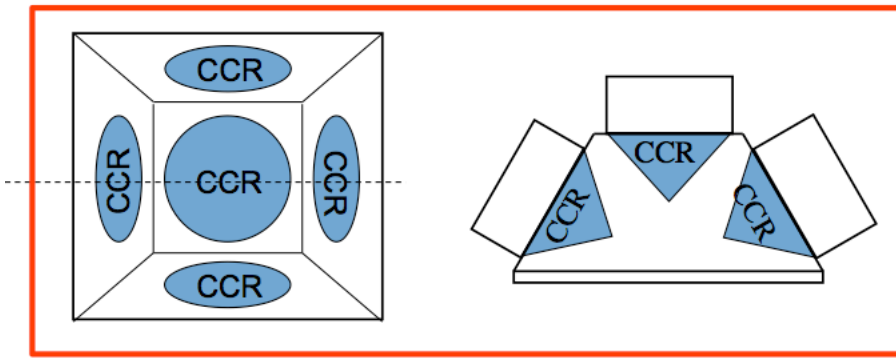
INRRI-1
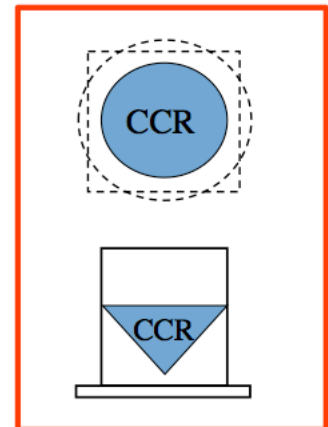
INRRI-1 will be used also to SCF-Test the effect of lunar dust (for ex. for Apollo reflectors) in collaboration with T. Murphy and D. Currie

Our ILA SCF-Test can be used to validate and optimize reflectors for future missions like GETEMME (Gravity, Einstein's Theory, and Exploration of the Martian Moons' Environment), proposed for the Mars-Deimos-Phobos system, and missions to explore the icy and rocky moons of Jupiter.