Return to the Moon (02)
Poster Session (P)

Author: Prof. Douglas Currie
University of Maryland, College Park, United States, currie@umd.edu

# THE NEXT GENERATION OF LUNAR LASER RANGING: SCIENCE, PERFORMANCE AND FLIGHT STATUS

**Abstract**

The unique science that has produced by the Lunar Laser Ranging Program (LLRP) addressing the lunar interior and General Relativity will be described. While these Apollo retroreflector arrays on the lunar surface are still operation and continue to produce new science results, the combination of the lunar librations and the design of the arrays currently limit the range accuracy that may be obtained for each single photo-electron return to 20 mm. A next generation lunar retroreflector (e.g., the Lunar Laser Ranging Retroreflector for the 21st Century or LLRRA-21) will improve this by one or two orders of magnitude, depending upon the method of deployment. This will lead to new discoveries of the lunar interior (e.g., the solid inner core of the moon) and advances in the tests of General Relativity (i.e., to address the new theories that are being proposed to explain dark energy and dark matter). The design and the challenges in obtaining the required performance will be described, as well as the detailed simulations that address the optimization of the design w.r.t. the thermal issues to maintain high performance thorough out the lunar cycle. The methods of deployment and the relation of the deployment method to the ranging accuracy will be described. Finally, the flight readiness of the package and the relation to the expected flights of the Google Lunar X Prize teams that may deploy the LRRA-21 within the next two years will be discussed.