

## **Large-Scale Hollow Retroreflectors for Lunar Laser Ranging at Goddard Space Flight Center**

Laser ranging to the retroreflector arrays placed on the lunar surface by the Apollo astronauts and the Soviet Luna missions have dramatically increased our understanding of gravitational physics along with Earth and Moon geophysics, geodesy, and dynamics. Although the precision of the range measurements has historically been limited by the ground station capabilities, advances in the APOLLO instrument at the Apache Point facility in New Mexico is beginning to be limited by errors associated with the lunar arrays. We report here on efforts at Goddard Space Flight Center to develop the next generation of lunar retroreflectors. We will describe a new facility that is being used to design, assemble, and test large-scale hollow retroreflectors. We will also describe results from investigations into various bonding techniques used to assemble the open corner cubes and mirror coatings that have dust mitigation properties.