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Abstract for an Invited Paper
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Advancing Tests of Relativity via Lunar Laser Ranging

TOM MURPHY, University of California, San Diego

Laser range measurements between the earth and the moon have provided some of our best tests to date of general relativity and gravitational phenomenology–including the equivalence principle, the time-rate-of-change of the gravitational constant, the inverse square law, and gravitomagnetism. APOLLO (the Apache Point Observatory Lunar Laser-ranging Operation) is now collecting measurements at the unprecidented precision of one millimeter, which will produce order-of-magnitude improvements in a variety of gravitational tests. Experimental performance, evidence for degradation of the reflectors, project status and science outlook will be discussed.