

Abstract Submitted
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APOLLO: Testing Gravity with Millimeter-precision Lunar Laser Ranging JAMES BATTAT, Harvard University, THOMAS MURPHY, UC San Diego, ERIC ADELBERGER, University of Washington, C.D. HOYLE, Humboldt State University, RUSSET MCMILLAN, Apache Point Observatory, ERIC MICHELSEN, UC San Diego, KENNETH NORDTVEDT, Northwest Analysis, ADAM ORIN, UC San Diego, CHRISTOPHER STUBBS, Harvard University, H. ERIK SWANSON, University of Washington — Based on the discovery of the accelerating universe and dark energy, along with our inability to unite quantum mechanics and General Relativity, there is a clear need to probe deeper into gravitational physics. The Earth-Moon-Sun system is a natural, fertile laboratory for such tests. The Apache Point Observatory Lunar Laser-ranging Operation (APOLLO) bounces laser light off of man-made retro-reflectors on the lunar surface to measure the Earth-Moon separation with one millimeter precision. These measurements of the lunar orbit enable improved constraints of gravitational phenomena such as the Weak Equivalence Principle, the Strong Equivalence Principle, de Sitter precession and dG/dt by an order of magnitude or better. I will describe the APOLLO project and its current status, as well as prospects for constraining PPN parameters and the universality of free-fall.

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