

Abstract Submitted  
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**Detection of the Crab Nebula and Cygnus X-1 at MeV Energies from the Moon and Mars** PATRICK PEPLOWSKI, RICHARD MILLER, Johns Hopkins University Applied Physics Lab — We report observations of the first astrophysical sources detected from the Moon and Mars at MeV energies. Our detections of the Crab Nebula and Cygnus X-1 demonstrate the efficacy of the Planetary and Lunar Occultation Technique (PLOT) as a paradigm for gamma-ray astronomy, and build upon “first light” demonstration of the technique by Miller & Lawrence (2016). NASA’s Lunar Prospector and Mars Odyssey Gamma-Ray Spectrometers served as proxies for a dedicated PLOT-based mission, and together provided modest (12% FWHM@0.662 MeV) and high-resolution (<0.4% FWHM@1.332 MeV) spectra, respectively, for over 10 years. Long-term monitoring and spectral characterizations of the detected sources verifies basic tenets and validates the performance of the occultation methodology, reinforces its feasibility as an alternative astronomical detection paradigm for nuclear astrophysics investigations, and is an illustration of the fundamental benefits of the Moon (and Mars) as a platform for science. We will report details of the analysis methodology, present new insights into the behavior of the detected sources, contrast the benefits of lunar vs. Martian operating environments, and discuss the relevance of these results to the development of the Lunar Occultation eXplorer (LOX) mission concept.

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