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POEMMA: Probe Of Extreme Multi-Messenger Astrophysics

Tuesday, 6 July 2021 12:00 (25 minutes)

Developed as NASA Astrophysics Probe-class mission, the Probe Of Extreme Multi-Messenger Astrophysics (POEMMA) is designed to identify the sources of ultra-high energy cosmic rays (UHECRs) and to observe cosmic neutrinos with full-sky coverage for both of these extreme- energy messengers. POEMMA consists of two spacecraft flying in a loose formation at 525 km altitudes oriented to view a common atmospheric volume. Each spacecraft hosts a large Schmidt telescope with a novel focal plane optimized to observe both the UV fluorescence signal from extensive air showers (EAS) and the beamed, optical Cherenkov signals from EAS. In UHECR stereo fluorescence mode, POEMMA will measure the spectrum, composition, and full-sky distribution of the UHECRs above 20 EeV and will have remarkable sensitivity to UHE neutrinos in this energy range. In neutrino limb-viewing Cherenkov mode, POEMMA will be sensitive to cosmic tau neutrinos above 20 PeV by observing the upward-moving EAS induced from tau neutrino interactions in the Earth. POEMMA is designed to quickly re-orient to a Target-of-Opportunity (ToO) neutrino mode to view and follow transient astrophysical sources with exceptional neutrino flux sensitivity to models of both short-duration, including short gamma-ray bursts (sGRB), and long-duration transients, including binary neutron star (BNS) mergers. POEMMA's science goals and UHECR and neutrino measurement capabilities will be discussed along with a summary of POEMMA's instrument & mission designs.

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