



Contribution ID: 59

Type: **Parallel Contributed Talk**

POEMMA: Probe Of Extreme Multi-Messenger Astrophysics

Wednesday, 24 February 2021 17:30 (20 minutes)

Developed as NASA Astrophysics Probe-class mission, the Probe Of Extreme Multi-Messenger Astrophysics (POEMMA) is designed to observe cosmic neutrinos and to identify the sources of ultra-high energy cosmic rays (UHECRs) with full-sky coverage for both of these extremely energetic messengers. POEMMA consists of two spacecraft flying in a loose formation at 525 km altitudes. Each spacecraft hosts a large Schmidt telescope with a novel focal plane optimized to observe both the beamed, optical Cherenkov signals from extensive air showers (EASs) and the near-UV fluorescence signal from EASs. In neutrino limb-viewing Cherenkov mode, POEMMA will be sensitive to cosmic tau neutrinos above 20 PeV by observing the upward-moving EASs 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 flux sensitivity with full-sky coverage. In UHECR stereo fluorescence mode, POEMMA will have remarkable sensitivity to UHE neutrinos above 20 EeV and will measure the spectrum, composition, and full-sky distribution of the UHECRs above this energy. POEMMA's neutrino measurement capabilities will be discussed along with a summary of POEMMA's instrument & mission designs and UHECR measurement performance.

Collaboration name

POEMMA Collaboration

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Session Classification: New Facilities