Summary of "The Roadmap to the POEMMA Mission"

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POEMMA (PROBE OF EXTREME MULTI-MESSENGER ASTROPHYSICS) is a probe mission funded for a conceptual study funded by NASA for Astro2020 decadal survey. POEMMA Collaboration: 76 scientists in 13 countries. POEMMA observes:

- ultrahigh-energy cosmic rays (UHECRs) and UHE neutrinos to measure the spectrum, composition, and anisotropies over the full sky for Energies > 20 EeV
- astrophysical neutrino emission from Target of Opportunity of multi-messenger transients with E> 20 PeV
- study the physics beyond SM, e.g., Secret Neutrino Interactions, Supermassive Dark Matter, and Macroscopic Dark Matter.

POEMMA observes **UV from fluorescence** from extensive airshowers (EAS) generate by UHECRs and UHE neutrinos and optical Cherenkov emission from upward going EAS from tau-lepton decay generated by tau neutrinos that traverse the Earth. UHECR at 100 EeV observations: energy resolution of 17%, angular resolution ~1 degree, and X_{max} resolution <30%.

POEMMA mission deploys 2 telescopes from Atlas V to 525km alt orbit, 28.5 deg inclination, 95 min orbit, over a 5-year mission goal. Each telescope with a 45 deg FoV optics, 4-meter mirror, a hybrid MAPMT (1 midrosec sampling) and SiPM (20 nanosec) focal surface, a corrector lens, and optical collection of over 6 m^2.

Roadmap to POEMMA: legacy from OWL, JEM-EUSO (EUSO-SPB), CHANT. **EUSO-SPB2** is scheduled to fly in 2023 with both the fluorescence and the Cherenkov detection techniques for POEMMA. In addition to EUSO-SPB2, a smallsat named Terzina and the Trinity ground-based observatory will also be testing the POEMMA Cherenkov detection technique.