Contribution ID: **27** Type: **Oral**

EUSO-SPB2: Mission Status and Prospects

Thursday 22 June 2023 13:00 (25 minutes)

Utra high energy cosmic rays are the highest energy subatomic particles known to exist. Very high energy neutrinos also carry information about the most extreme environments in the universe, and being neutral point, back to their creation point. The Extreme Universe Space Observatory on a Super Pressure Balloon II (EUSO-SPB2) has been built to PeV energy neutrinos from steady-state and transient astrophysical sources and will measure PeV and EeV cosmic rays. To do this EUSO-SPB2 will fly two astroparticle telescopes that use optical methods and specialized camera systems to measure light from extensive air showers in the atmosphere. A fluorescence telescope will point down to measure scintillation light from EeV cosmic ray interactions. A Cherenkov telescope will point toward the earth's limb. It can be tilted a few degrees above the limb to observe Cherenkov emission from PeV energy cosmic rays or tilted below the limb to search for Cherenkov emission from air showers induced through neutrino interactions in the earth's limb. The gondola can be rotated in azimuth to point the CT to observe sources of interest just before they rise or just after they set. The FT camera features a 12x36 degree field of view with a 1 MHz digitization rate. The CT features a 12.8x6.4 degree field of view with a 100 MHz digitization rate. Both telescopes use Schmidt optics with 1 m diameter entrance pupils. At the time this abstract was written, the payload is in preparation for launch at the NASA balloon launch site in Wanaka NZ. The expected launch date is April or May 2023. The targeted flight duration is up to 100 days. This exploratory mission of opportunity is a pathfinder for a space observatory such as the Probe of Extreme Multi Messenger Astrophysics (POEMMA) that would apply methods that EUSO-SPB2 will pioneer from sub-orbital space.

Eligibility for "Best presentation for young researcher" prize

No

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Session Classification: Indirect Cosmic Ray Measurements (Space and balloon-borne)

Track Classification: Instrumentation and missions for indirect high-energy cosmic ray measurements in space