



Contribution ID: 997

Type: **Talk**

The Cherenkov Camera for the PBR mission

Thursday 17 July 2025 15:35 (15 minutes)

The POEMMA-Balloon with Radio (PBR) mission is a NASA super-pressure balloon experiment designed to advance the detection of ultra-high-energy cosmic rays, high-altitude horizontal air showers, and astrophysical neutrinos. A key instrument of PBR is the Cherenkov Camera (CC), which utilizes a 2048-pixel SiPM camera to detect the optical Cherenkov emission from cosmic-ray-induced air showers and search for upward-going signals indicative of neutrinos.

The CC operates in the 320–900 nm spectral range with a 10 ns integration time, leveraging a bi-focal optical design to enhance detection efficiency. The CC enables precise reconstruction of shower trajectories and provides valuable data on cosmic rays' composition and energy distribution. PBR's sub-orbital altitude is particularly advantageous for these measurements, offering a unique vantage point that bridges the observational gap between ground-based and space-based instruments. Additionally, the CC will play a critical role in neutrino searches, detecting tau-lepton decay showers from Earth-skimming neutrinos associated with astrophysical transients. By integrating the CC with fluorescence and radio detection systems, PBR will pioneer a multi-messenger approach to high-energy cosmic phenomena, refining observational techniques for future space-based missions.

This contribution will describe the current status of the development of the CC as well as its expected performance.

Collaboration(s)

The JEM-EUSO Collaboration

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Session Classification: CRI

Track Classification: Cosmic-Ray Indirect