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## **POEMMA-Balloon with Radio: An Overview**

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The POEMMA-Balloon with Radio (PBR) is a Ultra Long Duration Balloon payload scheduled for launch in Spring 2027 from Wanaka, New Zealand. It will circle over the Southern Ocean for a mission duration as long as 50 days, serving as a precursor to the dual satellite mission, Probe of Extreme Multi-Messenger Astro-physics (POEMMA). The PBR mission represents a significant step towards establishing a space-based multi-messenger observatory.

Observations from space will enhance the statistics of the highest-energy cosmic rays and complement groundbased observatories by enabling simultaneous observations of both hemispheres with a single instrument. Additionally, POEMMA will facilitate the measurement of Very-High-Energy Neutrinos (VHENs) following multi-messenger alerts of astrophysical transient events, such as gamma-ray bursts. PBR is an adaptation of the POEMMA mission, featuring three primary science goals:

1. Observe Ultra-High-Energy Cosmic Rays (UHECRs) via the fluorescence technique from suborbital space.

- 2. Observe horizontal high-altitude air showers (HAHAs) with energies exceeding the cosmic ray knee (E > 3 PeV) using optical and radio detection for the first time.
- 3. Follow astrophysical event alerts in the search for VHENs.

This contribution provides an overview of the PBR payload and discusses the expected performance of its various detectors.

## Collaboration(s)

JEM-EUSO

Authors: Prof. OLINTO, Angela V (Columbia University); OSTERIA, Giuseppe (INFN); ESER, Johannes (Columbia University)

**Presenter:** ESER, Johannes (Columbia University)

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