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The Fluorescence Camera for the PBR mission

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The Probe Of Extreme Multi-Messenger Astrophysics (POEMMA) Balloon with Radio (PBR) is an instrument designed to be borne by a NASA suborbital Super Pressure Balloon (SPB), in a mission planned to last as long as 50 days. The PBR instrument consists of a 1.1 m aperture Schmidt telescope, similar to the POEMMA design, with two cameras in its hybrid focal surface: a Fluorescence Camera (FC) and a Cherenkov Camera (CC), both mounted on a frame that can be tilted to point from nadir up to 13 degrees above the horizon. The FC camera is designed to detect the fluorescence emission of Extensive Air Showers produced by Ultra-High Energy Cosmic Rays from sub-orbital altitudes. This measurement will validate the detection strategy for future space-based missions, such as POEMMA. The FC will be made of 4 Photo Detection Modules (PDMs), each consisting of a 6x6 matrix of 64-channel Multi Anode PhotoMulTipliers (MAPMT), for a grand total of 2304 pixels for each PDM. Custom-designed SPACIROC-3 ASICs perform single photoelectron counting on each pixel as well as charge integration on groups of 8 pixels to measure extremely bright or fast signals, reaching a double pulse resolution in the order of 10 ns for a 1 microsecond acquisition gate. A field flattener lens and a BG3 filter, to match the wavelength range of interest (300-400 nm), are mounted in front of the PDM. The camera will be able to detect showers in a field of view of 24x24 square degrees, with a pixel size on ground corresponding to 115 m. Details on the camera design and implementation will be given, along with the expected performance and the state of the construction.

Eligibility for "Best presentation for young researcher" or "Best poster for young researcher" prize

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