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EUSO-BALLOON: readout electronics performances

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The EUSO-Balloon experiment is a pathfinder for the satellite mission JEM-EUSO whose goal will be to observe Extensive Air Showers. The experiment consists in launching a balloon, equipped with a set of lenses which is used to focus the fluorescent UV photons on the Photo Detector Module (PDM) which will be controlled by the Data Processing systems.

The PDM contains two elements: the 9 Elementary Cell units (EC unit) and the 6 EC-ASIC boards. The EC unit includes four 64-channel MAPMT and a set of PCBs used to supply high voltages to the MAPMTs and to read out the output signals. These signals are transmitted to the front-end electronics, the EC-ASIC boards each of which contains 6 SPACIROC. The ASIC is designed to perform single photon counting in a dynamic range of 1 photoelectron (PE) to 300 PEs/pixel/2.5 μ s, with double pulse resolution of 30 ns, and low power consumption (<1 mW/ch). During the year 2013 and 2014, the flight model EC_units and EC_ASIC PCBs were produced and the performance was successfully tested and confirmed.

The 24th of August 2014, the EUSO-BALLOON instrument went for a night flight for several hours, 40 km above Timmins (Canada) balloon launching site. The flight has been interesting from the scientific point of view, since different types of grounds could be overflown, as well as regions with and without clouds of different types. This paper will present in detail the performances of the electronics before, during and after the flight.

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