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A data processing system for balloon-borne telescopes

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The JEM-EUSO Collaboration aims at studying Ultra High Energy Cosmic Rays (UHECR) from space. In order to reach this goal, a series of pathfinder missions has been developed to prove the observation principle and to raise the technological readiness level of the instrument. Among these, the EUSO-SPB2 (Extreme Universe Space Observatory on a Super Pressure Balloon, mission two) foresees the launch of two telescopes on an ultra-long duration balloon. One is a fluorescence telescope designed to detect UHECR via the UV fluorescence emission of the showers in the atmosphere. The other one measures direct Cherenkov light emission from lower energy cosmic rays and other optical backgrounds for cosmogenic tau neutrino detection.

In this contribution, we describe the data processing system which has been designed to perform data management and instrument control for the two telescopes. It is a complex which controls front-end electronics, tags events with arrival time and payload position through a GPS system, provides signals for time synchronization of the event and measures live and dead time of the telescope. In addition, the data processing system manages mass memory for data storage, performs housekeeping monitor, and controls power on and power off sequences.

The target flight duration for the Nasa super pressure program is 100 days, consequently, the requirements on the electronics and the data handling are quite severe. The system operates at high altitude in unpressurised environment, which introduces a technological challenge for heat dissipation.

Minioral

Yes

IEEE Member

Yes

Are you a student?

No

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