

Design and implementation of the double read-out system for the calorimeter of the HERD experiment

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The High Energy cosmic-Radiation Detection (HERD) facility will be installed aboard the China's Space Station around 2025. Thanks to its innovative design, based on a large, homogeneous and isotropic calorimeter, HERD will extend the direct measurement of cosmic rays by one order of magnitude in energy. In this talk, we will describe the solution that will be used for the read-out of the about 8000 LYSO crystals of the calorimeter. This is the main challenge of the hardware design, since a large dynamic range of 10^7 is needed and absolute energy scale calibration is crucial for space instruments. We will present the double read-out scheme, made of wave-length shifting fibers coupled with an intensified scientific CMOS and photodiodes connected to a specifically designed front-end electronics. Finally, we will discuss the advantages of this solution: independent systems for hardware trigger and energy measurement, improved cross-calibration capability, and increased redundancy.

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