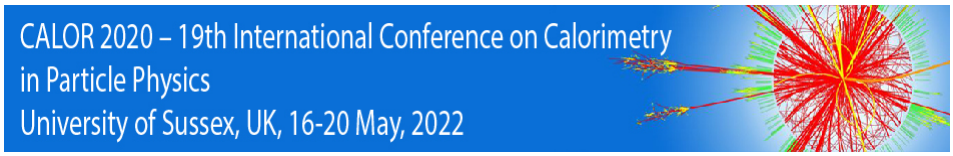

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WSF read-out and calibration light source of the 3-D crystal array of HERD calorimeter

The High Energy cosmic-Radiation Detection (HERD) has been proposed as a space experiment which will be installed on the China's Space Station (CSS) around 2027. The main scientific goals of HERD are searching for dark matter particles, study of cosmic ray chemical composition and high energy gamma-ray observations.
HERD will consist of a calorimeter (CALO), a fiber tracker (FIT), a plastic scintillator detector (PSD), a silicon charge detector (SCD) and a transition radiation detector (TRD). The CALO is a homogeneous and 3D segmented calorimeter made of about 7500 LYSO cubic scintillators, corresponding to about 55 radiation lengths(X0) and 3 nuclear interaction lengths in all directions.
The scintillation light of each cube is read-out by two independent systems: the first one consists of Wavelength Shifting fiber (WSF) coupled to Intensified scientific CMOS (IsCMOS) cameras, the second one is made of photo-diodes (PD) connected to customized front-end electronic chips named HIDRA. This design can significantly improve the reliability of the data by cross calibration between the double read-out systems.
Two pieces of WSFs are winded and attached to one face of the LYSO cube with different contacting areas. Two fiber ends which belong to different WSFs are routed to IsCMOS cameras, while the other two opposite ends are connected to the trigger system. The requirement on the dynamic range of the read-out system is up to 10^7. A set of LEDs is mounted on the side of WSFs on every LYSO tray as a fast calibration light source of IsCMOS. Expected upper limit of calibration energy is ~$3*10^6$ MeV.
The PD read-out system is introduced in P. Betti's poster of this conference.

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