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Performances of the 3-D imaging calorimeter for HERD

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The High Energy cosmic-Radiation Detection (HERD) facility is a flagship and landmark scientific experiment onboard China's Space Station for search of dark matter, high precision measurement of charged cosmic rays and gamma rays, planned for operation starting around 2025 for about 10 years. The main instrument of HERD is a highly optimized five-sides-effective 3-D calorimeter (CALO) with more than one order of magnitude larger geometric factor than that of previous experiments. CALO is segmented into 7500 LYSO cubic crystals, corresponding to about 55 radiation lengths and 3 nuclear interaction lengths deep. The e/p separation power of CALO is up to 10e-6 thanks to its high granularity. The crystal signals are transferred by wavelength shifting fibers and read out by IsCMOS devices with compact and simple electronics. Energy resolution of electrons, protons and other key performances of CALO were well demonstrated in the CERN beam tests.

Primary authors: Dr WANG, Junjing (IHEP, CAS); Dr ZHANG, Li (IHEP, CAS); Dr XU, Ming (IHEP, CAS); Dr HU, Peng (IHEP, CAS); Dr WANG, Ruijie (IHEP, CAS); Dr BAO, Tianwei (IHEP,CAS); Dr LIU, Xin (IHEP, CAS); Dr DONG, Yongwei (IHEP, CAS); Dr QUAN, Zheng (IHEP,CAS); Dr WANG, Zhigang (IHEP, CAS)

Presenter: Dr QUAN, Zheng (IHEP,CAS)

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