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The High Energy cosmic-Radiation Detection (HERD) Facility onboard China's Future Space Station

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The High Energy cosmic-Radiation Detection (HERD) facility is one of several space astronomy payloads onboard China's future Space Station, which is planned for operation starting around 2020. It is designed as a next generation space facility focused on indirect dark matter search, precise cosmic ray spectrum and composition measurements up to the knee energy, and high energy gamma-ray monitoring and survey. HERD is composed of a calorimeter (CALO) surrounded by micro-strip silicon trackers (STKs) from five sides except the bottom. CALO is made of about 10ˆ4 cubes of LYSO crystals, corresponding to 55 radiation lengths and 3 nuclear interaction lengths, respectively. Mont Carlo simulation shows that electrons and photons with a high energy resolution (~ 1% for electrons and photons and 20% for nuclei) and a large effective geometry factor (> 3 mˆ2sr for electrons and diffuse photons and > 2 mˆ2sr for nuclei) can be achieved under this design. Moreover, R&D is under way for reading out the LYSO signals with optical fiber coupled to image intensified CCD and the prototype of 1/40 CALO for beam test at CERN at November this year. Furthermore, the extended design and optimization of HERD for gamma-ray astronomy physics will be discussed in this contribution.

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