

HERD space mission: Probing the Galactic Cosmic Ray frontier

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The High Energy cosmic Radiation Detection (HERD) facility, is a flagship space-borne instrument to be installed on-board China Space Station (CSS), around 2027. Its primary scientific goals include: precise measurements of Cosmic Ray (CR) energy spectra and mass composition up to the highest achievable energies in space (\sim few PeV), gamma ray astronomy and transient studies, along with indirect searches for Dark Matter particles. HERD is designed to detect incident particles from both its top and four lateral faces. Owing to its pioneering design, an order of magnitude increase in geometric acceptance is foreseen, compared to current generation experiments.

HERD is conceived around a deep ($\sim 55 X_0$, $3 \lambda_I$) and highly-segmented 3D calorimeter (CALO). Furthermore, a Fiber Tracker (FIT) is instrumented on all active sides, while a Plastic Scintillator Detector (PSD) covers the aforementioned calorimeter and tracker. Ultimately, a Silicon Charge Detector (SCD) envelops the above-stated sub-detectors, with a Transition Radiation Detector (TRD) instrumented on one of its lateral faces, for energy calibration in the TeV scale. A detailed overview of the detector will be provided in this work, ranging from its scientific objectives and recent advancements, up to its current and future activities.

Collaboration

HERD collaboration

Role of Submitter

I am the presenter

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