

The High Energy cosmic-Radiation Detection (HERD) facility: a future space instrument for cosmic-ray detection and gamma-ray astronomy

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The High Energy cosmic-Radiation Detection (HERD) facility is a future experiment that will be installed aboard the China's Space Station around 2027. Using a single instrument, the experiment aims to perform high energy measurements relative to cosmic ray, gamma astronomy and indirect dark matter search. This is possible thanks to the innovative design based on a homogeneous, isotropic and 3D segmented calorimeter, surrounded by scintillating fiber trackers, anti-coincidence scintillators, silicon charge detectors, and a transition radiation detector. The HERD instrument is designed to feature a very large acceptance, of about one order of magnitude larger than previous experiments, thus allowing to extend the measurements by about one order of magnitude in energy. Fundamental progresses in our understanding of acceleration and propagation of cosmic rays will be achieved by measuring the flux of protons and helium up to a few PeV and nuclei above hundreds of TeV/nucleon. By exploring the electron flux in the multi-TeV region, it will be possible to search for the signature of dark matter and nearby astrophysical sources. Finally, thanks to the large field of view, the experiment will also monitor the gamma-ray sky from a few hundreds of MeV up to the TeV region. In this contribution, a review of the current status of the experiment will be presented, with particular regards to the estimated detector performances and the expected physics results.

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