Title: The High Energy Radiation Detector experiment

Author: Leandro Silveri

Abstract:

HERD (High Energy Radiation Detector) is a next-generation experiment for space-borne detection of cosmic rays and gamma ray astronomy, to be installed onboard the Chinese Space Station in 2027. Its most innovative feature will be the event collection from the top and 4 lateral sides, and paired with its large size it will result in a one-order-of-magnitude acceptance increase with respect to currently operating calorimetric experiments.

This will make possible to investigate cosmic ray spectra for each species from protons to iron, up to the so-called knee region at PeV energies. The cosmic rays' electron and positron spectrum will be also measured up to 10 TeV, and the gamma sky will be studied with a large effective area from a few hundred MeV up to few TeV, also allowing for the search for dark matter signatures in that energy region.

HERD will be made by several sub-detectors: Silicon Charge Detector on the outermost shell to perform precision charge measurement, a Plastic Scintillator Detector to be used both as a gamma anti-coincidence and as a fast and redundant charge measurement, a Scintillating Fiber Tracker, then at its core a LYSO fine-segmented calorimeter also allowing for shower imaging.