



## EXECUTIVE SUMMARY

### **The High Energy Cosmic-Radiation Detection (HERD) facility onboard the Chinese Space Station: hunting for high-energy cosmic rays**

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- The High Energy cosmic-Radiation Detection (HERD) facility is an international space mission that will start operation around 2027
- The experiment is based on a 3D, homogeneous, isotropic and finely-segmented calorimeter that will measure the cosmic ray flux up to the knee region, search for an indirect signal of dark matter and monitor the full gamma-ray sky
- HERD is an international collaboration between China, Italy, Spain and Switzerland
- HERD is composed by four sub-detectors. Starting from the outer layers Silicon Charge Detectors (SCD), Plastic Scintillator Detectors (PSD), Fiber Trackers (FIT) and a Calorimeter (CALO) are presents. A Transition Radiation Detector (TRD) is foreseen for calibration purposes.
- HERD is expected to accomplish important and frontier goals relative to DM search, CR observations and Gamma-Ray astronomy:
  - extend the measurement of  $e^+/e^-$  flux up to several tens of TeV
  - testing the hypothesis of the expected cutoff at high energy
  - distinguishing between DM or astrophysical origin of the positron excess
  - extend the measurement of nuclei flux up to a few PeV
  - testing the theory of the knee structure as due to acceleration limit
  - searching for gamma line associated to DM annihilation
  - accomplishing a gamma sky survey up to very high energy