

# Monte Carlo simulation of the High Energy Particle Detector of the space mission CSES-Limadou - performances and calibration procedure

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The High-Energy Particle Detector (HEPD) is an instrument devoted to the measurement of cosmic particles from few MeV up to hundreds MeV. It has been developed by the Italian Limadou collaboration in the framework of the Chinese CSES (China Seismo-Electromagnetic Satellite) space mission. The HEPD will contribute to the CSES mission by measuring the precipitation of trapped particles and by studying the solar-terrestrial environment, especially during impulsive events like coronal mass ejections and solar energetic particle emissions.

This work reports the main features of the HEPD Monte Carlo simulation, performed by means of the Geant4 package, with the aim of studying its performances, such as its particle discrimination capability, the energy threshold for trigger and the maximum energy detectable in full containment.

In order to contribute to the calibration of the detector, two tools were also developed with Monte Carlo simulation: 1) a “digitization” procedure, tested on beam runs performed at BTF (Frascati), Proton Therapy Center (Trento) and atmospheric muons; 2) a study of the particle range inside the calorimeter, as alternative method for the energy reconstruction.

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