

Expected performance of the High Energy Particle Detector (HEPD-02) tracking system on board of the second China Seismo-Electromagnetic Satellite

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The China Seismo-Electromagnetic Satellite (CSES) is a scientific space program that aims to deepen the comprehension of the time correlation between the main earthquake shocks and an increase in the electron flux in the inner Van Allen belt. For this purpose, the suite of payloads on board the second CSES satellite (CSES-02) consists of several detectors to measure: the particle flux and the energy spectrum, the total intensity of the magnetic and electric fields with their components, the disturbance of plasma in the ionosphere and the density of electrons.

The launch of CSES-02 is foreseen in the first half of 2024.

The present work will be focused on the second generation High-Energy Particle Detector (HEPD-02), developed by LIMADOU Italian collaboration, and in particular on its tracking system (Direction Detector - DD) to reconstruct the incident particle angle. The DD is made of five standalone tracking modules, consisting, as first and unique case, of monolithic silicon pixel sensors, namely ALTAI. This technology is based on the ALPIDE (ALice Pixel DEtector) developed for the ALICE (A Large Ion Collider Experiment) ITS upgrade at CERN.

The results on the DD performance will be discussed based on the demanding requirements of space applications. Mechanical requirements on tracker stiffness, needed to withstand the vibrational stress, and its thermal properties for heat dissipation in vacuum will be presented as well as sensor performance as a function of the temperature.

Moreover, event selection strategies will be discussed.

Your name

Umberto Savino

Institute

Università and INFN of Torino (Italy)

Email address

umberto.savino@cern.ch

Author: SAVINO, Umberto (Universita e INFN Torino (IT))

Presenter: SAVINO, Umberto (Universita e INFN Torino (IT))

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