

**Title**

Design and characterisation of the HEPD-02 MAPS-based tracker for operations in space

**Speaker**

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**Abstract**

The High Energy Particle Detector (HEPD-02) realised for the second China Seismo-Electromagnetic Satellite (CSES-02) will host the first pixel-based tracker operated in space. It is made using Monolithic Active Pixel Sensors (MAPS) ALTAI detector, a spin-off of the most known ALPIDE.

The tracker mechanical design is based on ALICE ITS2 structure, modified to fit the requirements for operation in space and has been qualified with a dedicated test campaign. All the features of the ALTAI have been explored to reduce the power consumption, obtaining results compatible with the HEPD-01 tracker (flown on board the CSES-01 satellite), based on silicon microstrip detectors ( $\sim 10$  mW/cm<sup>2</sup>). The tracker is now assembled into the HEPD-02 and its response has been widely characterised using atmospheric muons and particle beams (electrons, protons and nuclei) in the MeV energy range.

This contribution briefly describes the design of the tracker and its readout system and focuses on the characterisation results, proving that the innovative design fully fulfils and, in some cases, exceeds the experiment requirements.

The HEPD-02 is currently being integrated on the CSES-02 satellite, and the launch is scheduled for 2024. The successful operation in space of the tracker will constitute a solid heritage for the future experiments that will decide to rely on the same detection technology.