ID de Contribution: **19** Type: **15mOral**

The first MAPS based tracker for space applications

lundi 18 novembre 2024 14:40 (20 minutes)

For decades, silicon microstrip detectors have been the preferred technology for tracking particles in space, allowing the realisation and operation of successful missions as AMS-02 and FERMI LAT, which are providing remarkable scientific results. However, the next generation of experiments aims to push our understanding even further, and will require significant improvements in tracking performance, achievable by transitioning to pixel detectors. Among various pixel designs and technologies, Monolithic Active Pixel Sensors (MAPS) stand out due to their low production costs, simple assembly and readout, and low noise.

The High Energy Particle Detector (HEPD-02), developed by the Italian Limadou collaboration, is set to mark a significant advancement in particle tracking in space. Scheduled for launch on the second China Seismo-Electromagnetic Satellite (CSES-02) at the end of 2024, HEPD-02 will measure electron and proton fluxes within energy ranges of 3-100 MeV and 30-200 MeV, respectively. This experiment will be the first to use Monolithic Active Pixel Sensors as a tracking unit in space.

Designing the HEPD-02 tracker posed several challenges, particularly in keeping power consumption low, with the consequent positive impacts on thermal regulation. Power reduction was achieved through innovative readout techniques and comprehensive strategies. The final tracker design consists of five modules, each containing three sensitive layers with 10 ALTAI units.
The HEPD-02 tracker has undergone successful space flight qualification and scientific performance assessment, demonstrating excellent efficiency and a spatial resolution of less than 10 μm, comparable to the best-performing trackers currently operating in space. Now integrated onto the CSES-02 satellite, HEPD-02 will set a new standard in particle detection from space, opening new frontiers for space-based particle physics research and opening the way for future advancements in the field.

Auteur principal: RICCI, Ester (University of Trento and INFN-TIFPA)

Orateur: RICCI, Ester (University of Trento and INFN-TIFPA)

Classification de Session: Astrophysics applications

Classification de thématique: Astrophysics applications