

## Design, development and performance of a scintillating fiber tracker for space-based astroparticle experiments

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Tracking detectors based on scintillating fibers read out with silicon photomultipliers (SiPMs) are emerging as a competitive alternative to silicon strip detectors in high-energy and astroparticle physics. The scintillating fiber tracker (FIT), originally developed as the tracking detector for the upcoming High Energy cosmic-Radiation Detection (HERD) facility, consists of multiple tracking planes made of fiber mats arranged in two orthogonal directions and read out using Hamamatsu S13552-10 SiPM arrays. The custom-made Beta ASIC has been developed to meet the stringent requirements for noise, dynamic range and power consumption demanded by space applications. The FIT tracker has been designed to enhance the conversion of gamma rays into electron-positron pairs, reconstruct the trajectory of traversing particles, and measure the absolute charge of cosmic rays.

In this contribution the FIT design and performance will be discussed thoroughly. The talk will encompass the development of the readout system and internal trigger for the identification of ionizing particles, as well as the characterization and calibration of the Beta ASICs and S13552-10 SiPMs in an optical-bench set-up. Results from test-beam campaigns at CERN with a prototype miniFIT tracker will also be presented. Finally I will report on future plans for space qualification and implementation in possible future space borne experiments.

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