

Performance of irradiated TI-LGADs at 120 GeV SPS pion beams

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Trench-Isolated Low-Gain Avalanche Detectors (TI-LGADs), implement pixel segmentation through physical trenches etched into the silicon substrate and filled with a dielectric material. In this work, we present results from a 120 GeV pion test beam campaign at the CERN SPS, focusing on carbon-infused single-trench TI-LGAD prototypes with varying trench widths. The devices, irradiated with neutrons up to a fluence of 2.5×10^{15} neq/cm², were characterized under minimum ionizing particle conditions. The experimental setup combines precise tracking from a MIMOSA26-based beam telescope, achieving sub-10 μ m spatial resolution, with timing measurements from a reference LGAD and a multi-channel waveform digitization system.

We report on the spatially resolved time resolution, detection efficiency, and inter-pixel performance of the tested devices, highlighting the impact of trench geometry and radiation damage. Preliminary results from the April 2025 test beam campaigns will be presented and discussed.

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