

Recent developments on 3D silicon sensors and electronics for 4D-tracking at extreme intensities

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Future collider experiments, operating at exceptionally high instantaneous luminosities, will require tracking detectors with space and time resolutions of a tenth of microns and a tenth of picoseconds, to properly perform tracks and vertices reconstruction. Several technologies have been explored, with the 3D-trench silicon pixel developed by the INFN TimeSPOT collaboration emerging as one of the most promising. Beam tests were conducted at SPS/H8 in 2022 and 2023, using both discrete-component low-noise electronics and integrated ASIC developed in CMOS 28-nm. An overview of these results will be presented. Since the performance of the front-end electronics is a critical bottleneck for future 4D tracking systems, the INFN IGNITE project is exploring innovative solutions for integrated micro-systems, which will also be discussed at the conference. Finally, the latest results on the performance of highly irradiated 3D silicon sensors up to 10^{17} 1-MeV neq/cm² will also be presented.

Alternate track

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