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# Direct MIP detection with sub-10 ps timing resolution Geiger-Mode APDs

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Major advances in silicon pixel detectors, with outstanding timing performance, have recently attracted significant attention in the community. In this work we present and discuss the use of state-of-the-art Geiger-mode APDs, also known as single-photon avalanche diodes (SPADs), for the detection of minimum ionizing particles (MIPs) with best-in-class timing resolution. The SPADs were implemented in standard CMOS technology and integrated with on-chip quenching and recharge circuitry. Two devices in coincidence allowed to measure the time-of-flight of 180 GeV/c momentum pions with a coincidence time resolution of 22 ps FWHM (9.5 ps Gaussian sigma). This result paves the path for new generation of cheap plug-and-play trackers with extremely high spatial and timing resolution, meant to be used in beam test facilities.

## Collaboration

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