

Timing Performance of a Digital SiPM Prototype with a Fast Laser

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Recent advances in CMOS technologies open up possibilities for new types of monolithic silicon detectors. DESY has designed a prototype of a silicon photomultiplier integrated with a digital readout ASIC. This device, combining features of a pixelated chip, such as a high granularity readout, with an intrinsically high temporal resolution of a SiPM, offers an interesting candidate for 4D tracking in future particle physics experiments.

This work presents characterization of timing performance of the dSiPM by the means of a fast pulsed laser, as well as comparison with the results, obtained via direct detection of charged particles at the DESY II testbeam facility. The study showcases temporal resolution of the device as a function of charge injection position. The results can be correlated to intrinsic properties of the single photon avalanche diodes and to the design of the digital circuitry.