

Silicon monolithic pixel detectors in a SiGe Bi-CMOS process for sub-100ps time resolution.

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The TT-PET Collaboration is developing a fast, low power consumption monolithic silicon detector in SiGe Bi-CMOS VLSI process to realize a Time-Of-Flight PET scanner. The development of picosecond-time-resolution silicon pixel detectors is a challenge that requires a detailed study of the sensor geometry and an accurate choice of the Front-End electronics technology.

A time resolution of 100ps was obtained with planar silicon sensors with minimum-ionizing particles using SiGe HBT technology for the pre-amplification stage of the Front-End. The same amplifier, coupled to an LGAD detector, achieved 30ps time resolution with a pulse rise time of 600ps and a signal to noise ratio of 100.

The preliminary results of the tests of a monolithic chip realised with the SG13s IHP process will also be presented.

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Planar Sensors

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