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Status of silicon detector R&D at CLIC

CLIC is an option for a linear electron positron collider in the post LHC era at CERN, aiming at a centre of mass energy of up to 3 TeV. Challenging requirements are imposed on the CLIC all-silicon vertex and tracking system to perform high precision measurements in an environment with high rates of beam-induced background particles. A spatial resolution of a few micrometers and a material budget down to 0.2% radiation length per vertex-detector layer have to be achieved together with a few nanoseconds time stamping accuracy. These requirements are addressed with innovative technologies in an ambitious detector R&D programme, comprising hardware developments as well as detailed device and Monte Carlo simulations. Various fine pitch hybrid silicon pixel detector technologies are under investigation for the CLIC vertex detector. The CLICpix and CLICpix2 readout ASICs with 25 micron pixel pitch have been produced in a 65 nm commercial CMOS process and bump-bonded to planar active edge sensors as well as capacitively coupled to High-Voltage CMOS (HV-CMOS) sensors. Monolithic silicon tracking detectors are foreseen for the large surface (~140 square meters) CLIC tracker. Fully monolithic prototypes are currently under development in High-Resistivity CMOS (HR-CMOS), HV-CMOS and Silicon on Insulator (SOI) technologies. This talk presents an overview of the CLIC silicon detector R&D programme, focussing on recent test-beam and simulation results.

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