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Vertex detectors for the future linear colliders

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The Linear Collider's vertex detectors present a new challenge in terms of requirements for material budget (0.2% X0. 200 um of Si), cooling system (air cooling) and temporal (˜10 ns) and spatial resolution (3 um) [1] with regard to LHC and ILC experiments. The hybrid planar pixel sensor technology, due to its robustness, low noise and fast timing properties, is currently studied using TCAD, GEANT4 and experimental measurements to determine its viability as the main building block of CLIC vertex detectors. We present plans for production of ultra-thin hybrid sensor devices and fine pitch fast readout electronics (SmallPix, CLICPix), using Through-Silicon-Via (TSV), to be used for test beam analysis of their characteristics. First results on power pulsing of Timepix type pixel sensors [2] using the Timepix Telescope in CERN SPS test beam campaign will be presented. Comparison and validation of a TCAD driven GEANT4 [3] digitization methods with test beam data to be used in full detector simulation of CLIC vertex detectors is also be discussed.

Primary author: BENOIT, Mathieu (CERN LCD)

Presenter: BENOIT, Mathieu (CERN LCD)

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