



Contribution ID: 9

Type: **Talk**

Silicon Vertex & Tracking Detectors for the Compact Linear Collider

Thursday 17 October 2019 14:30 (22 minutes)

CLIC is a proposed linear e^+e^- collider with center-of-mass energies of up to 3TeV. Its main objectives are precise top quark, Higgs boson and Beyond Standard Model physics. In addition to spatial resolutions of a few micrometers and a very low material budget, the vertex and tracking detectors also require timing capabilities with a precision of a few nanoseconds to allow suppression of beam-induced background particles.

Different technologies using hybrid silicon detectors are explored for the vertex detectors, such as dedicated 65nm readout ASICs, small-pitch sensors as well as bonding using anisotropic conductive films. Monolithic sensors are the current choice for the tracking detector, and a prototype using a 180nm high-resistivity CMOS process has been designed and produced, and is currently under evaluation.

Different designs using a silicon-on-insulator process are under investigation for both vertex and tracking detector.

All prototypes are tested in laboratory and beam tests, and newly developed simulation tools combining Geant4 and TCAD are used to assess and optimize their performance. This contribution gives an overview of the R&D program for the CLIC vertex and tracking detectors, highlighting new results from the prototypes.

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Session Classification: Future facilities/experiments