



Contribution ID: 68

Type: **contributed talk**

The CLICTD monolithic CMOS sensor for the CLIC tracking detector

Tuesday, 18 February 2020 11:40 (20 minutes)

Challenging requirements are imposed on the detector for the proposed future Compact Linear Collider CLIC. For the large-area (140 sqm) main tracker, a temporal resolution of a few nanoseconds and a spatial resolution of $7\ \mu\text{m}$ need to be achieved simultaneously with a material budget per layer of 1% of a radiation length. The CLICTD monolithic CMOS sensor has been developed targeting these requirements. It features a small collection-electrode design with a pixel size of $30\ \mu\text{m} \times 300\ \mu\text{m}$ and sub-segmentation of each pixel into 8 analogue frontends. The chip is implemented in two variants of a modified 180 nm CMOS imaging process, optimised for fast signal collection and high spatial resolution. This contribution introduces the CLIC tracking-detector requirements and concept, and presents results of recent laboratory and test-beam data-taking campaigns with the CLICTD sensor.

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Session Classification: CMOS

Track Classification: Monolithic Sensors (CMOS)