

Test-beam and simulation studies for the CLICTD technology demonstrator - a monolithic CMOS pixel sensor with a small collection diode

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The CLIC Tracker Detector (CLICTD) is a monolithic pixel sensor featuring pixels of 30 μm x 37.5 μm and a small collection diode. The sensor is fabricated in a 180 nm CMOS imaging process, using two different pixel flavours: the first with a continuous n-type implant for full lateral depletion, and the second with a segmentation in the n-type implant for accelerated charge collection. Moreover, CLICTD features an innovative sub-pixel segmentation scheme that allows the digital footprint to be reduced while maintaining a small sub-pixel pitch. In this contribution, test-beam measurements for both pixel flavours are presented. Their performance is evaluated in terms of time and spatial resolution as well as efficiency. Furthermore, the test-beam data is compared to simulation studies using a combination of 3D TCAD and Monte Carlo simulation tools.

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Primary author: DORT, Katharina (CERN, Justus-Liebig-Universitaet Giessen (DE))

Presenter: DORT, Katharina (CERN, Justus-Liebig-Universitaet Giessen (DE))

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