The 30th International Workshop on Vertex Detectors



Contribution ID: 48

Type: not specified

LGAD Development for the LHC's High-Luminosity Upgrade at Teledyne e2v

Thursday 30 September 2021 16:10 (15 minutes)

The need for 4D tracking and Ultra-Fast Silicon Detectors is a result of the expected pile-up at the High-Luminosity LHC General-Purpose Detectors. To fully reconstruct events along the beam line where postcollision reconstruction with 3D detectors is insufficient, timing information is added to the spatial measurements to disentangle overlapping events. Track timing resolution of the order of tens of picoseconds is required to sufficiently resolve individual vertices.

As a part of a collaboration with commercial silicon foundry Teledyne e2v, the University of Oxford, University of Birmingham, Rutherford Appleton Laboratory and Open University are developing and testing new Low Gain Avalanche Detectors (LGADs). The project is aimed at developing Ultra Fast Silicon Detectors with properties suitable for use in the ATLAS High Granularity Timing Detector (HGTD). The simulation and production of the first batch of 22 six-inch wafers, featuring 50 µm thick high-resistivity epitaxial layers and different gain layer implants, has been completed successfully.

We will present the results of TCAD simulations, followed by leakage current (IV) and capacitance (CV) measurements for LGAD devices of sizes ranging from 1 mm to 4 mm, including comparisons to PiN diodes where the gain layer is absent. Gain measurements using laser injection on both LGAD and PiN devices will also be shown. Furthermore, we will present results and observations from laser wafer dicing and post-dicing thermal annealing.

Author: GAZI, Martin (University of Oxford)

Co-authors: ALLPORT, Philip Patrick (University of Birmingham (UK)); BORTOLETTO, Daniela (University of Oxford (GB)); GONELLA, Laura (University of Birmingham (UK)); HYNDS, Daniel (University of Oxford (GB)); JORDAN, Douglas (Teledyne e2v); KOPSALIS, Ioannis (University of Birmingham (GB)); MCMA-HON, Stephen (Science and Technology Facilities Council STFC (GB)); MULVEY, Jonathan (University of Birmingham); PLACKETT, Richard (University of Oxford (GB)); STEFANOV, Konstantin (University of Oxford (GB)); VIL-LANI, Enrico Giulio (STFC - Science & Technology Facilities Council (GB))

Presenter: GAZI, Martin (University of Oxford)

Session Classification: YSF talks