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Timing and Gain Performance of Teledyne e2v's LGADs before and after Irradiation

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Low Gain Avalanche Detectors (LGADs) are a novel silicon sensor technology being developed to design full 4D trackers able to measure precisely both spatial and temporal coordinates. The first deployment of this technology will be in the ATLAS and CMS timing layers at the High Luminosity LHC where, by adding fast timing information to each crossing track, they will allow to better separate overlapping events.
Further developments of this technology will be pursued in anticipation of their use at future collider experiments where 4D tracking detector systems will be needed to cope with an unprecedented number of pile-up and beam background events through the addition of precise timing information to each point along the track. In this context, the University of Birmingham, University of Oxford, Rutherford Appleton Laboratory and Open University are working with the UK foundry Teledyne e2v to establish their processing line for LGAD production. The addition of Te2v to the currently established LGAD manufacturers will significantly increase LGAD production volume capabilities.
This talk will present a detailed study of the performance of the first batch of LGADs produced at Te2V, before and after irradiation with 27 MeV protons. A sample of wafers with varying gain layer implant energy/dose have been tested for IV and CV characteristics, gain and timing measurements. The study is performed at different levels of fluence up to roughly 1e15 1 MeV neq/cm-2, with the goal of assessing the timing performance of these devices as a function of gain after irradiation.

Submission declaration

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