Characterization of Teledyne e2v LGADs

P. Allport[1], D. Bortoletto[2], M. Gazi[2,3] , L. Gonella[1], D. Hynds[2], D. Jordan[4], I. Kopsalis[1], S. McMahon[3], J. Mulvey[1], R. Plackett[2], K. Stefanov[5], E. G. Villani[2,3,(1)]

[1]University of Birmingham

[2]University of Oxford

[3]STFC Rutherford Appleton Laboratory

[4]Teledyne e2v

[5]The Open University

***Abstract*:**
Low Gain Avalanche Detectors (LGADs), due to their excellent timing resolution, have been proposed for the High Granularity Timing Detector (HGTD) for the upgraded ATLAS detector at LHC. Beside timing applications, other uses, including Low LET radiation dosimetry, have been proposed and currently investigated.
Their operation is based on impact ionization, which provides the internal gain underlying their timing performances.
In this talk, we will present results on LGAD sensors produced by Teledyne e2v (Te2v, UK). Beside individual cell of 1x1 mm2, the sensors produced include 15x15 array of 1.3x1.3 mm2 cells, specifically designed for the HGTD.
Design, simulation and test results of the fabricated devices will be presented, including gain and timing of non-irradiated and neutron-irradiated cells, obtained using laser pulses and radioactive source. Performances of LGAD readout amplifier board developed at the University of Oxford will be shown. Plans for the next development of these devices will be presented and discussed.

[1] Corresponding author: giulio.villani@stfc.ac.uk (E.Giulio Villani)