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Radiation damage investigation of epitaxial p-type silicon for partial detectors using Schottky and pn-junction diodes

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This project focuses on the investigation of trap energy levels introduced by radiation damage in epitaxial p-type silicon. Using 6-inch wafers of various boron doping concentrations ($1e13$, $1e14$, $1e15$, $1e16$, and $1e17$ cm^{-3}) with a $50 \mu m$ epitaxial layer, multiple iterations of test structures consisting of Schottky and pn-junction diodes of different sizes and flavours are being fabricated at RAL and Carleton University.

In this talk, details on the diode fabrication and electrical measurements of the structures will be given. IV and CV scans of fabricated test structures have been performed and cross-checked between institutes, the results of which will be presented. Furthermore, another focus of this talk will be in the characterisation of trap parameters obtained from Deep-Level Transient Spectroscopy (DLTS) and supplemented by Thermal Admittance Spectroscopy (TAS). Spectra for unirradiated and irradiated diode samples will be shown and their details collected from Arrhenius analyses will be listed. Lastly, DLTS and Charge Collection Efficiency (CCE) measurements conducted on samples before and after neutron irradiation will be evaluated and their results compared.

Keyword-1

Particle Physics Detectors

Keyword-2

Silicon Sensors

Keyword-3

Author: VILLANI, Enrico Giulio (Science and Technology Facilities Council STFC (GB))

Co-authors: KLEIN, Christoph Thomas (Carleton University (CA)); KOFFAS, Thomas (Carleton University (CA)); MCCORMICK, Angela (Carleton University (CA)); TARR, Garry (Carleton University (CA)); VANDUSEN, Robert (Carleton University (CA)); WILSON, Fergus (Science and Technology Facilities Council STFC (GB)); ALL-PORT, Philip Patrick (University of Birmingham (UK)); GONELLA, Laura (University of Birmingham (UK)); KOP-SALIS, Ioannis (Austrian Academy of Sciences (AT)); MANDIC, Igor (Jozef Stefan Institute (SI)); CHEN, Yebo (Chinese Academy of Sciences (CN)); Dr KURTH, Matthew Glenn (Institute of High Energy Physics (CN)); LIU, Peilian (Chinese Academy of Sciences (CN))

Presenter: KLEIN, Christoph Thomas (Carleton University (CA))

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