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Gain-Layer Project

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The study of radiation damage created inside the gain-layer of LGADs is nearly impossible with defect spectroscopy techniques.
To investigate the gain-layer degradation at the defect level, the Gain-Layer Project has produced an extensive set of p-type pad diodes (19050 in total), whose bulk properties replicate the high doping concentrations of a gain layer.
Across 25 FZ wafers, various "flavours"of GLPDs (Gain-Layer Project Diodes) were fabricated to study the impact of different Carbon doses, Phosphorus co-doping, oxygenation and bulk resistivity.
The GLPDs have been specifically designed for defect spectroscopy and will serve as the primary tool for defect studies in the coming years.

In this presentation, the project will be introduced alongside results from the initial characterisation measurements (IV, CV, SIMS).
The first irradiation campaign was carried out using $23\,\mathrm{GeV}$ protons at CERN PS-IRRAD to a fluence of $2\mathrm{E}14\,\mathrm{p/cm}^2$.
This initial campaign aimed to establish whether the chosen fluence is suitable for Deep-Level Transient Spectroscopy (DLTS) measurements.
Further irradiation campaigns with neutrons and protons are currently in preparation to systematically study fluence effects.

First results from the proton-irradiated samples will be presented, along with an initial discussion on the origins of the Acceptor Removal Effect, which is presently considered the most probable mechanism behind the gain-layer degradation in LGADs.

Type of presentation (in-person/online)

in-person presentation

Type of presentation (I. scientific results or II. project proposal)

I. Presentation on scientific results

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