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Observation of an inactive region in irradiated silicon diodes

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The Transient Current Technique (TCT) is used to investigate the response of silicon diodes. Electron-hole pairs are generated close to the surface by illuminating the diode with two sources: either a pulsed red-light laser or α-particles. These charge carriers drift in the electric field and induce transient currents on the diodes electrodes. The charge collection of a diode is determined by integrating these transients.

In this work, n^+-p-p^+ diodes irradiated with 23 MeV protons up until a 1 MeV equivalent neutron fluence of $1.2 \times 10^{16} \mathrm{cm}^{-2}$ are examined. The measurements are done at -20 ℃ up to a bias voltage of 800 V. TCT observations show evidences for a region with zero charge collection at the n^+-p interface. The thickness of this inactive region is determined by comparing charge collection measurements with the two sources. This talk presents the results for three diodes irradiated with varying degrees of fluence.

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