Abstract Submitted
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Radiation Damage in Si Diodes from Short, Intense Ion Pulses[1] S. J. DE LEON, Lawrence University, Appleton, WI 54911, USA, B. A. LUDEWIGT, A. PERSAUD, P. A. SEIDL, T. SCHENKEL, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA — The Neutralized Drift Compression Experiment (NDCX-II) at Berkeley Lab is an induction accelerator studying the effects that concentrated ion beams have on various materials. Charged particle radiation damage was the focus of this research – we have characterized a series of Si diodes using an electrometer and calibrated the diodes response using an ^{241}Am alpha source, both before and after exposing the diodes to 1 MeV He ions in the accelerator. The key part here is that the high intensity pulses from NDCX-II ($>10^{10}$ ions/cm^2 per pulse in <20 ns) enabled a systematic study of dose-rate effects. An example of a dose-rate effect in Si diodes is increased accumulation of defects due to damage from ions that bombard them in a short pulse. This accumulated damage leads to a reduction in the charge collection efficiency and an increase in leakage current. Testing dose-rate effects in Si diodes and other semiconductors is a crucial step in designing sustainable instruments that can encounter high doses of radiation, such as high intensity accelerators, fusion energy experiments and space applications and results from short pulses can inform models of radiation damage evolution.

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