

Latest Results on the Radiation Tolerance of Diamond Pixel and Pad Detectors

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As nuclear and particle physics facilities move to higher intensities, the detectors used there must be more radiation tolerant. Diamond is in use at many facilities due to its inherent radiation tolerance and ease of use. We will present radiation tolerance measurements of the highest quality poly-crystalline Chemical Vapor Deposition (pCVD) diamond material for irradiations from a range of proton energies, pions and neutrons up to a fluence of 2×10^{16} particles/cm². We have measured the damage constants as a function of energy and particle species and compare with theoretical models. We also present measurements of the rate dependence of pulse height for non-irradiated and irradiated pCVD diamond pad and pixel detectors, including detectors tested over a range of particle fluxes up to 20 MHz/cm² with both pad and pixel readout electronics. Our results indicate the pulse height of unirradiated and neutron irradiated pCVD diamond detectors is not dependent on the particle flux.

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Primary authors: TRISCHUK, William (University of Toronto (CA)); KAGAN, Harris (Ohio State University (US))

Presenter: TRISCHUK, William (University of Toronto (CA))

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