

Latest Results on the Radiation Tolerance of Diamond Detectors

Wednesday 6 September 2023 12:00 (20 minutes)

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 constant 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 beam test results indicate a 2% upper limit to the pulse height dependence of unirradiated and neutron irradiated pCVD diamond detectors leading to the conclusion that the pulse height in pCVD diamond detectors is, at most, minimally dependent on the particle flux.

Your name

William Trischuk

Institute

University of Toronto

Email address

william@physics.utoronto.ca

Author: MALI, Miha (Jozef Stefan Institute (SI))

Presenter: MALI, Miha (Jozef Stefan Institute (SI))

Session Classification: Detectors for High radiation and extreme environment

Track Classification: Detectors for High Radiation & Extreme Environments