CPAD Workshop 2022



Contribution ID: 2

Type: Contribution Talk

Use of Diamond Sensors for High Radiation, Flux and Repetition Rate Applications

Thursday, 1 December 2022 08:30 (20 minutes)

Funded by its Office of the President, a consortium of University of California affiliated institutions has been exploring the use of electronic-grade diamond sensors for applications in extreme environments, including settings involving high fluences of hadronic particles (in excess of 10¹⁶ Neq/cm²), high instantaneous flux (approaching 100 J / cm² of deposited energy) and/or high repetition rate (approaching 10 GHz). Results are presented on the rate and efficiency of charge collection as a function of the electron-hole plasma density induced by the XPP beamline X-Ray laser beam at SLAC's LCLS. Additional studies on the intensity and position resolution of the XPP beam with a quadrant sensor capable of running at 50 MHz are also presented. Finally the results of a real-time charge-collection degradation study, performed at the Crocker Nuclear Laboratory on the UC Davis campus, for a hadronic fluence reaching 4x10¹⁶ protons per cm², are presented.

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Session Classification: Cross Cutting Topics

Track Classification: WG8: Cross Cutting Topics