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Use of CVD Diamond Sensors in Extreme Environments and Applications

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The Advanced Accelerator Diagnostic (AAD) collaboration, which is a consortium of University-of-California affiliated institutions and the SLAC National Accelerator Laboratory, is exploring the use of electronic-grade diamond sensors for diagnostic applications that push the limits of the capability of the sensors and their applications. Results from TCAD simulation of charge collection efficiency of diamond sensors as a function of the deposited density of charge carriers are presented and are benchmarked against data obtained from irradiating diamond sensors with intense X-Ray laser pulses from the XPP beamline at SLAC's LCLS. Results are presented on the lateral diffusion of charge carriers within the diamond sensor, which provides a limit on the position sensitivity of diamond sensors. Real-time results from a radiation damage study of diamond sensors are presented during an exposure to a 67.5 MeV proton beam that reached a fluence of 4×10^{16} protons per cm^2. Finally, work towards the development of a diamond-sensor-based detection system capable of readout bandwidth in excess of 5 GHz is presented.

Early Career

Yes

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