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Prediction of Dark Count Rate (DCR) Degradation in Neutron-Irradiated Single Photon Avalanche Diodes

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Experimental data has confirmed that the performance of Single Photon Avalanche Diodes (SPADs) can strongly degrade due to radiation, particularly in terms of Dark Count Rate (DCR).

The objective of this study is to anticipate the DCR increase in CMOS SPADs after irradiation. The study is carried out on two SPAD arrays (called A1 and A3), fabricated in a 150 nm technology and subjected to neutron irradiation at increasing fluences, up to 4.2×10^{10} 1 MeV neutron equivalent $[\text{neutrons/cm}^2]$ ⁽⁻²⁾.

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