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Radiation induced damage analysis of CCD47-20 at room temperature

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Space based detectors such as Charge Coupled Devices (CCDs) are subject to a damaging radiation environment. High energy particles, such as protons, can displace atoms in the CCDs regular silicon lattice and create defects that trap signal charge and degrade the image. This document describes the radiation induced damage on three e2v CCD47-20 after room temperature proton irradiation to 5×10^9 and 1×10^{10} at 10 MeV p cm^{-2} . The initial results are correlated to the number of traps obtained via the trap pumping technique developed at the Open University. By comparing results from previous irradiations of protons, electrons, and gamma rays results, the study will be used to inform the planning of a future cryogenic irradiation of radiation hardened e2v CCD347s. The initial results demonstrate a clear change for pre to post-irradiation properties in terms of Dark current, X-ray Charge Transfer Efficiency (CTE), End Pixel Edge Response (EPER CTE), Defects in darkness, and Dark Signal Non Uniformity (DSNU) at different fluences.

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