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[US] Energy dependence of the acceptor removal by protons for several UFSD types

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The performance of Ultra-Fast Silicon Detectors (UFSD) is compromised by hadronic irradiation which removes the acceptors in the thin layer below the junction responsible for the gain. This effect is measured in several different UFSD after irradiation with protons with energy of 70 MeV (CYRIC), 800 MeV (LANL) and 24 GeV (CERN) and compared to the same sensors irradiated with neutrons at IJS. The fluence dependence were determined with capacitance –voltage, C-V, measurements of the doping concentration and with measurements of charge collection, CC, using charged particles. We find that the simplified assumption of NIEL scaling does not apply to the acceptor removal mechanism which exhibits a larger effect for protons than predicted by NIEL

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