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Transient Current Technique characterization of HV-CMOS sensor prototypes after irradiation

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Silicon detectors built in high-voltage and high-resistivity CMOS technology are an interesting options for the outermost pixel layers of ITk (Inner Tracker), the new all-silicon tracking system foreseen for the ATLAS experiment upgrade for the high luminosity LHC program. They are less expensive and easier to produce with respect to standard hybrid silicon pixel detectors, which would represent an important advantage, given the large area silicon detector to be built. Furthermore they allow to reduce the material budget before the calorimeter.
This technology must be carefully tested and characterized: one of the techniques used for this purpose is the TCT (Transient Current Technique): electron-holes pairs are produced in a precise position of the detector using a IR laser beam, allowing to probe parameters like the depletion depth of the sensor.
TCT measurements have been performed on the H35DEMO chip, produced by ams, before and after proton and neutron irradiation. The proton irradiation have been performed at the Bern Inselspital cyclotron (18 MeV) and at the Proton Syncrotron at CERN (24 GeV) up to more that 10^{15} 1 MeV neq/cm^2. The neutron irradiation has been performed at the Jožef Stefan Institute reactor in Ljubljana up to $2 \cdot 10^{15}$ 1 MeV neq/cm^2. Measurement technique, data analysis, issues encountered and results will be presented.

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