

Evaluation of novel n-in-p pixel sensors for ATLAS Upgrade with testbeam

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A new type of pixel sensors, n-in-p type, is being developed in order to cope with the particle fluence of $1\text{--}3 \times 10^{16}$ 1-MeV neutron-equivalent particles/cm² in the LHC upgrade (HL-LHC). The n-in-p pixel sensors are ones for the present front-end chip (FE-I3) of the ATLAS detector and the others for the new front-end chip (FE-I4) for the higher occupancy in the HL-LHC. They are made in a p-bulk silicon wafer, planar in geometry, with biasing structures with polysilicon or punch-thru resistance, with isolation structures with p-stops, and a thickness of 320 or 150 μm . The charge collection efficiencies and the performance of the structures before and after irradiation were evaluated by using pion beam of 120 GeV at CERN super proton synchrotron (SPS).

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