

Performance of LPNHE/FBK/INFN thin planar n-on-p silicon pixels after HL-LHC radiation fluences

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The tracking detector of ATLAS, one of the experiments at the Large Hadron Collider (LHC), will be upgraded in 2024-2026 to cope with the challenging environment conditions of the High Luminosity LHC (HL-LHC). The LPNHE, in collaboration with FBK and INFN, has produced 130 μm thick n-on-p silicon pixel sensors which can withstand the expected large particle fluences at HL-LHC, while delivering data at high rate with excellent hit efficiency. Such sensors were tested on beam before and after irradiation both at CERN-SPS and at DESY, and their performances are presented in this paper. Beam test data indicate that these detectors are suited for all the layers where planar sensors are foreseen in the future ATLAS tracker: hit-efficiency is greater than 97% for fluences $\Phi=7e15$ neq/cm² and module power consumption is within the specified limits. Moreover, at a fluence $\Phi=1.3e16$ neq/cm², hit-efficiency is still as high as 88% and charge collection efficiency is about 30%.

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