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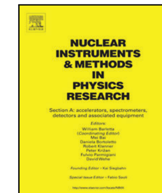

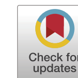

Characterization and simulation of radiation effects on active edges n-on-p technology planar pixel sensors

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ABSTRACT

The ATLAS inner tracker has to be upgraded to meet the requirements for radiation hardness and geometrical acceptance in order to withstand the harsh conditions of High Luminosity LHC (HL-LHC). This requires segmented silicon sensors of increased geometrical efficiency. The active edge technology allows to reduce the inactive area at the border of the sensor. The main objective of this work is to evaluate by TCAD simulation, conducted using Silvaco™ TCAD software, the performance of planar n-on-p technology sensors with active edges exposed to high level of radiation for fluences up to 1×10^{16} n_{eq}/cm^2, using a three-level trap model for ptype FZ silicon material. By using the secondary ion mass spectrometry (SIMS) technique, an accurate representation of the sensor structure was obtained in terms of doping concentration profile. Charge collection efficiency (CCE) is studied as a function of radiation fluence.