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# Response to minimum ionising particles of p-type substrate silicon microstrip detectors irradiated with neutrons to LHC upgrade doses

Silicon sensors will probably be the choice for the inner tracker detectors of the experiments in the anticipated LHC luminosity upgrade (Super LHC, SLHC). These sensors will have to survive a radiation environment almost an order of magnitude higher than within the already challenging LHC trackers. The final cumulated fluence will depend on the integrated luminosity targeted by the experiments, but an increase of a factor of 5 to 10 is expected. A significant contribution to the radiation damage of the sensors in the tracker volume is due to backscattered neutrons. Simulations show that the neutron flux equals the charged particle flux emerging from the interactions at a radial distance of about 25cm from the beam axis. Irradiation with neutrons are therefore a necessary test for proving the ability of prototype silicon detectors to survive the SLHC fluences. Short strip microstrip detectors made on p-type silicon substrate for optimised radiation hardness, have been irradiated with fast neutrons to various fluences up to 3×10 15 cm −2. They have been characterised in term of charge collection efficiency with LHC speed electronics (40MHz). The results are here presented in the light of a possible upgrade scenario of the ATLAS tracker.

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