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Performance of capacitively coupled active pixel sensors in 180 nm HV CMOS technology irradiated to HL-LHC fluences

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We explore the concept of using a deep-submicron HV CMOS process to produce a drop-in replacement for traditional radiation-hard silicon sensors. Such active sensors contain simple circuits, e.g. amplifiers and discriminators, but still require a traditional (pixel or strip) readout chip. This approach yields most advantages of MAPS (improved resolution, reduced cost and material budget, etc.), without the complication of full integration on a single chip.

After outlining the basic design of the HV2FEI4 test ASIC, results after irradiation with protons, x-rays and neutrons up to 1e16 neq/cm2 or 100MRad will be presented. Subsequently, design changes towards the optimised HV2FEI4_v2 are discussed and first results are shown before elaborating on future plans and general prospects of active sensors within ATLAS.

Co-author: ON BEHALF OF ATLAS HV-CMOS R&D ACTIVITIES

Presenter: MUENSTERMANN, Daniel (Universite de Geneve (CH))

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