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Cobalt-60 gamma irradiation of silicon test structures for high-luminosity collider experiments

During the era of the High-Luminosity (HL) LHC the experimental devices will be subjected to enhanced radiation levels with fluxes of neutrons and charge hadrons in the inner detectors up to $\sim 2.3 \times 10^{16}$ neq/cm² and total ionization doses up to ~ 1.2 Grad. A systematic program of radiation tests with neutrons and charge hadrons is being run by the CMS and ATLAS collaborations in view of the upgrade of the experiments, in order to cope with the higher luminosity of HL-LHC and the associated increase in pile-up events and radiation fluxes. In this work we present results from complementary radiation studies with gamma photon with a ⁶⁰Co source in which the doses are equivalent to those that the outer layers of the silicon tracker systems of the two experiments will be subjected. CV and IV measurements are complemented by time-resolved current transient measurements will be subjected. The devices under test are p-type diodes and MOS capacitors.

Authors: ASENOV, Patrick (NCSR Demokritos, Institute of Nuclear and Particle Physics, Athens, Greece); AS-SIOURAS, Panagiotis (NCSR Demokritos, Institute of Nuclear and Particle Physics, Athens, Greece); KAZAS, Ioannis (NCSR Demokritos, Institute of Nuclear and Particle Physics, Athens, Greece); KYRIAKIS, Aristoteles (NCSR Demokritos, Institute of Nuclear and Particle Physics, Athens, Greece); LOUKAS, Dimitrios (NCSR Demokritos, Institute of Nuclear and Particle Physics, Athens, Greece)

Presenter: ASENOV, Patrick (NCSR Demokritos, Institute of Nuclear and Particle Physics, Athens, Greece)