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Comparative analysis of proton and ion damages in Si detectors supplemented with SRIM simulations

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In the study impact of ⁴⁰Ar ion irradiation was compared with proton irradiation for scaling the silicon detectors degradation characteristics and evaluating the influence of the vacancy generation rate on the degradation. The ⁴⁰Ar ions with the total energy of 1.62 GeV were chosen since they provide uniform defect generation like 23 GeV protons. The values of the current related damage rate, introduction rates for microscopic defects and the effective space charge concentration were obtained from the experimental data at increasing ion fluence. The results are discussed using the data on vacancy generation obtained from SRIM simulation.

Primary authors: MITINA, Daria (Ioffe Institute); EREMIN, Vladimir (Ioffe Institute (RU)); VERBITSKAYA, Elena (Ioffe Institute (RU))

Presenter: MITINA, Daria (Ioffe Institute)

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