

## Investigation of the electrical characteristics of double-sided silicon 3D sensors after irradiation with different particles

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We have previously reported on the impact of layout on the electrical characteristics of double-sided silicon 3D sensors fabricated at FBK. In the past year, our study has been continued to account for radiation damage effects. To this purpose, different irradiation campaigns have been conducted in collaboration with some external groups. Several sets of 3D diodes with different layout and test structures have been irradiated with 800-MeV protons and reactor neutrons up to  $5 \times 10^{15}$  neq/cm<sup>2</sup>, i.e., the fluence of interest for the ATLAS IBL. Moreover, additional irradiations have been performed with X-rays, in order to focus on surface damage alone. The characterization of parameters such as leakage current, breakdown voltage and capacitance, performed through measurements at different temperatures, has shown a good correspondence with theoretical model for radiation damage. TCAD simulations incorporating radiation damage models have also been performed in order to better understand the device behavior in view of future layout and technology optimization. Selected results will be presented at the workshop.

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