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Laser and Beta source setup characterization of 3D-DDTC detectors fabricated at FBK-irst

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Double-sided Double-Type Column 3D detectors (3D-DDTC) have been fabricated at Fondazione Bruno Kessler (former IRST). These sensors have columnar electrodes etched perpendicularly to the wafer surface from both sides and not fully penetrating into the substrate, so that the fabrication process is simpler than for standard 3D detectors. Compared to the previously developed 3D Single-Type-Column detectors, these new detectors are expected to yield shorter charge collection time and higher radiation hardness, as also predicted by TCAD simulations. The electrical characteristics of the first prototypes (p-on-n with non optimized column depth) are promising: very low leakage currents, in the order of 0.1pA/column, lateral depletion voltage at about 0.5V and full depletion voltage just below 3V. We will report on the latest results from the functional characterization of strip sensors connected to ATLAS SCT ABCD3T chips running at 40MHz. The sensors are stimulated with infrared LASER pulses having a spot size of few microns, so as to investigate the signal variation as a function of the laser injection point. Moreover, also a Sr90 Beta source setup will be used to perform Charge Collection and Efficiency measurements.

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