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Technology and characterization results in new 3D double sided pixel detectors for future colliders

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Future colliders, like High Luminosity Large Hadron Collider (HL-LHC) or future generation of colliders will deliver higher radiation doses to the detectors, specifically those closer to the beam line. The instantaneous luminosity as well as the particle fluxes at the detectors, will be increased considerably. Inner tracker detectors will be the most affected part, increasing substantially its occupancy and radiation damage. In order to conserve the sensors performance under this new conditions, the pixel sensor technologies have to be improved. The new requirements demand the use of new silicon technologies instead of actual pixel planar sensors. Planar sensors have not shown enough radiation hardness for the innermost layers where the radiation doses can reach values around $1 \cdot 10^{16}$ neq/cm². 3D sensors technologies are one of the candidates in the closest layers to the beam pipe. They show higher radiation hardness, and the double sided design provide some additional technical advantages.

Several wafers have been produced at the IMB-CNM (Barcelona, Spain), implementing two different pitches between p-electrodes. First characterizations have been developed at IMB-CNM and PSI (Villigen, Switzerland). Results after electrical characterization and radioactive source test (90 Sr), before and after irradiation will be presented.

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