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Qualification measurements of INFN-FBK 3D modules for High Luminosity LHC

Due to their radiation hardness, 3D sensors are a promising option for the innermost pixel layers at the High Luminosity LHC. However, the required very high hit-rate capabilities, increased pixel granularity, extreme radiation hardness, and reduced material budget call for a device downscale as compared to existing 3D sensors, involving smaller pitch (e.g., 50×50 or $25 \times 100 \mu\text{m}^2$), shorter inter-electrode spacing ($\sim 30 \mu\text{m}$), narrower electrodes ($\sim 5 \mu\text{m}$), and reduced active thickness ($\sim 100\text{-}150 \mu\text{m}$). Within a joint R&D effort with INFN, FBK has produced a new generation of 3D pixel sensors with these challenging features. In this talk preliminary results from the electrical and functional characterization of the first prototypes are reported, included their behaviour after large radiation fluences, close to the ones expected in the High Luminosity LHC environment. Their use for the new ATLAS tracker will be also discussed.

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