

Sub-pixel characterization of innovative 3D trench-design silicon pixel sensors using ultra-fast laser-based testing equipment

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For the operations during the High Luminosity phase of LHC, dedicated studies have shown that new vertex detectors with single-hit time resolutions in the range from 10 to 50 picoseconds will allow to recover the current tracking and vertexing capabilities. The TimeSPOT project has developed 3D trench-based silicon pixel sensors with a time resolution in the range of 20 ps. To carefully study their performances and optimize their design, it is important to precisely measure the time response of the sensors at a sub-pixel level. Such a characterization, performed at the INFN Cagliari laboratory, is obtained using a custom laser-based setup, able to deposit a known energy in a specific region of the pixel and perform a detailed scan of the sensor sensitive volume. The detailed characterization of a TimeSPOT 3D pixel sensor will be presented at the conference.

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