Contribution ID: **80** Type: **Talk (invited speaker only)**

[D03] 3D-trench Silicon Pixels with 20ps timing resolution

Thursday 8 October 2020 21:00 (30 minutes)

The increase in instantaneous luminosity at the HL-LHC experiments will have a severe impact on event reconstruction. Original tracking capabilities could however be restored by measuring tracks with picosecond precision. Within the INFN-TIMESPOT initiative we are developing innovative 3D pixels with the aim to build a demo mini-tracker using 55μm x 55μm silicon pixels with a required time resolution of better than 50ps per hit. The 3D technology allows a new approach to timing with respect to traditional planar approaches and can push time resolution performance without affecting the radiation resistance of the devices. The first production batch of sensors was produced in 2019 by FBK in Trento, Italy. Different structures, designed on the basis of different electrodes geometries, were tested in 2019 and 2020. A high-density trench-type pixel layout was found to be particularly interesting from the point of view of timing performances. In this seminar results on the sensor time resolution measured both in the laboratory with an infrared pulsed laser and a beta source and with charged hadrons at the PSI πM1 beamline in October 2019 will be presented. In all tests, time resolutions around 20 ps per hit have been measured, showing also that the performance obtained can be further improved, being still limited by the front-end electronics used.

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