

Qualification of pre-production 3D sensors for the new ATLAS ITk detector with test beams

Tuesday, 28 May 2024 15:34 (1 minute)

The inner detector of the ATLAS experiment will be completely replaced with a new all-silicon tracking detector (ITk) during the Long Shutdown 3 (2026-28) to cope with the challenging conditions that will be posed by the High Luminosity LHC (HL-LHC) after 2029.

The pixel detector will be located in the innermost part of ITk detector. As a fluence up to $2 \cdot 10^{16} \text{ n}_{eq}/\text{cm}^2$ is expected in its innermost layer, 3D sensor technology was chosen to instrument the latter due to its radiation hardness. Sensors with $50 \times 50 \mu\text{m}^2$ and $25 \times 100 \mu\text{m}^2$ pixel cell size will be used in the endcaps and barrel regions, respectively, whose production is divided among two vendors, Fondazione Bruno Kessler (FBK) and Stiftelsen for industriell og teknisk forskning (SINTEF).

During 2022 and 2023 pre-production 3D sensors of both vendors and both pixel sizes were manufactured and tested with pion beam at CERN SPS. A summary of the results will be given.

Collaboration

ATLAS

Role of Submitter

The presenter will be selected later by the Collaboration

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Session Classification: Solid State Detectors - Poster session

Track Classification: T3 - Solid State Detectors