



Contribution ID: 226

Type: Poster

Commissioning and first performance results of the new ALICE upgraded Inner Tracking System

Tuesday, 24 May 2022 08:51 (1 minute)

The ALICE collaboration is currently carrying out the final commissioning the upgraded Inner Tracking System (ITS), a new ultralight and high-resolution silicon tracker designed to match the requirements of the experiment in terms of material budget, readout speed and low power consumption of the sensors. The upgraded ITS has an active area of about 10m², consisting of 24120 Monolithic Active Pixels Sensors (referred to as ALPIDE) produced using the 180 nm TowerJazz CMOS image sensor process. They are assembled in seven concentric layers around the beam pipe ranging from 22 mm to 406 mm. The extremely low material budget of 0.35% X₀, the fine granularity with a pixel size of 27μm x 29μm and the small distance of the innermost layer to the beam axis will allow a major improvement of the detector performance in terms of impact resolution and tracking efficiency in particular for low p_T.

After the end of the production in late 2019, the fully assembled ITS was thoroughly characterised during the on-surface commissioning before being installed in the ALICE experiment in the beginning of 2021. Since then the full ITS detector system has been extensively studied in terms of performance and operational stability both in stand-alone mode including cosmic data taking and integrated with the full ALICE detector system.

In this contribution we present the operational experience gained with the upgraded ITS during commissioning as well as selected results of the LHC pilot beam tests providing first measurements of the detector performance in terms of efficiency and spatial resolution.

Collaboration

ALICE

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Session Classification: Solid State Detectors - Poster session