

Development of the system tests for the ATLAS Inner Tracker Strip Detector

Wednesday 6 December 2023 12:10 (20 minutes)

The new ATLAS Inner Tracker (ITk) will replace the current tracking detector of the ATLAS detector to cope with the challenging conditions for the Phase-II upgrade of the Large Hadron Collider experiment (LHC), the so-called High Luminosity LHC (HL-LHC). The new tracking detector is an all-silicon detector consisting of a *pixel* inner tracker and a silicon *microstrips* outer tracker, differentiated again in a central *barrel* section around the interaction point and two *end-cap* sections covering the forward regions for the collisions.

This contribution focuses on the currently developed full *system tests* for the ITk strips detector, being the testbed for testing and evaluating the performance of several close-to-final detector components before production. These will also serve in the future for training and testing purposes of the detector during operation. The barrel system test is conducted in SR1 at CERN and will consist of 8 *staves* - mechanical core structures loaded with rectangular short (~ 2.5 cm) and long (~ 5 cm) strip sensor modules. In a similar fashion, the system test for the end-caps is developed at DESY in Hamburg/Germany loaded with up to 12 *petals* - again a core structure loaded with trapezoidal shaped sensors of various lengths and strip pitches including the readout and power electronics. The staves and petals are mechanically held in place within a support structure and connected to the electrical, optical and cooling services as realistic as possible as in the latter detector integration. As such it is possible to validate the detector design, verify the detector DAQ and perform tests with the services, e.g. concerning the dual-phase CO₂ cooling.

This contribution gives an overview of the developed system tests for the ITk strip detector, summarizes the current status of the two sites, and shows a selection of performance measurements conducted in the last months.

Submission declaration

Original and unpublished

Primary authors: TRISCHUK, Dominique (Brandeis University (US)); ITK SPEAKERS COMMITTEE; ARLING, Jan-Hendrik (Deutsches Elektronen-Synchrotron (DE))

Presenter: ARLING, Jan-Hendrik (Deutsches Elektronen-Synchrotron (DE))

Session Classification: Day 3 - Session 2

Track Classification: Detector concepts