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Overview of the ATLAS ITk Strip System Tests

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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 results of the 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 CO_2 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 its results and performance measurements.

Collaboration

ATLAS Inner Tracker (ITk)

Role of Submitter

The presenter will be selected later by the Collaboration

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