

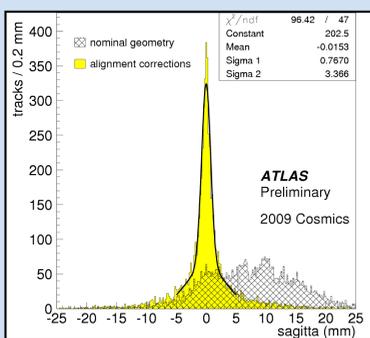
ATLAS 2010 Detector Performance I

During the 2010 LHC run the ATLAS detector recorded 45 pb^{-1} of proton-proton collision data with 93.6% data taking efficiency and $9.17 \mu\text{b}^{-1}$ of heavy ion collision data. This poster presents the main performance results for each sub-detector which enabled the excellent ATLAS performance during the past year. Particle identification, alignment, tracking resolution and efficiency results are shown for the Inner Detector and Muon Spectrometer. Results on electromagnetic and jet energy scales are presented for the Liquid Argon and Tile calorimeters. Finally, the LUCID and ZDC luminosity measurements are described.

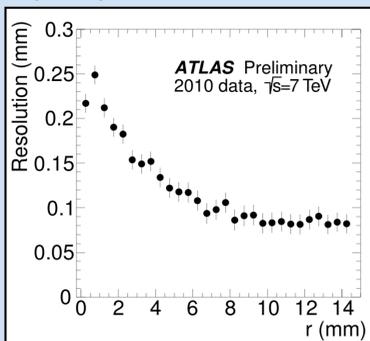
Muon System: MDT, RPC, CSC, TGC

The Muon Spectrometer

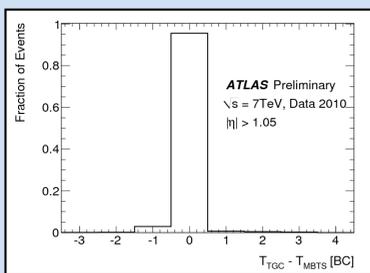
The ATLAS muon spectrometer is comprised of the MDT, RPC, CSC, and TGC. The MDT/CSC are responsible for standalone precision tracking. The RPC and TGC make up the muon trigger system. In the 2010 LHC run, the muon system operated with 98.2% of the detector channels active. The fraction of good data recorded was >96%.



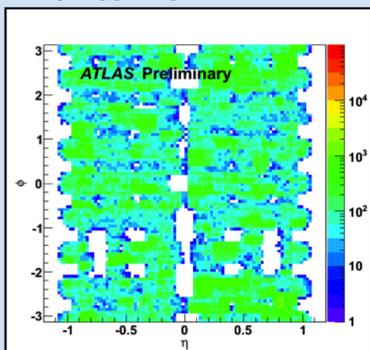
Striving for 10% resolution at momentum of 1 TeV, achieved good alignment precision for MDT: 50 μm in endcap; 80 μm in barrel



Single MDT hit resolution of 80 μm at 12 mm separation using 7 TeV data, a value near that of results with test beam.



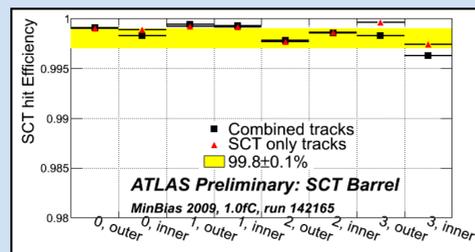
TGC is timed in and performs well, providing triggering of forward muons.



RPC ensured 100% barrel trigger coverage within the geometrical acceptance.

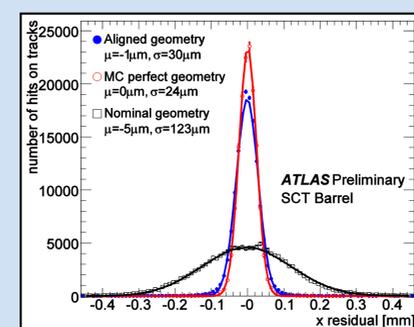
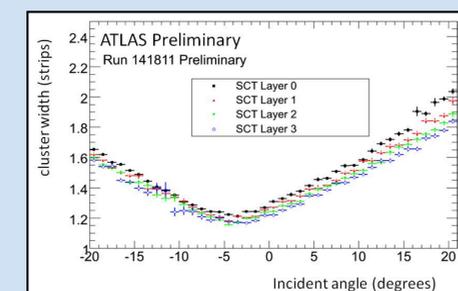
Inner Detector: SCT

The Semiconductor Tracker

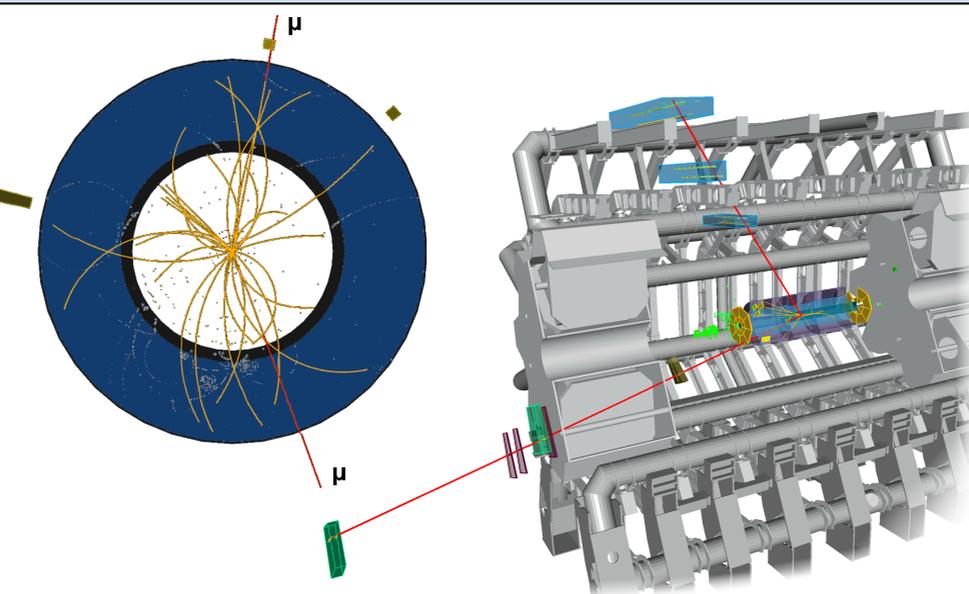


The intrinsic module efficiency for tracks measured in the SCT Barrel is calculated as the number SCT hits per possible hit. The SCT hit efficiency is measured to be $99.8 \pm 0.1\%$.

Unbiased residual distribution in x, integrated over all hits-on-tracks in the SCT barrel for the nominal geometry and the preliminary aligned geometry. The residual is defined as the measured hit position minus the expected hit position from the track extrapolation.



The SCT cluster size (in strips) plotted as a function of the track incidence angle for the four layers in the SCT barrel. The incidence angle is measured in degrees. We note that the minimum of the distribution is, in each case displaced, from the zero by the measured Lorentz angle.

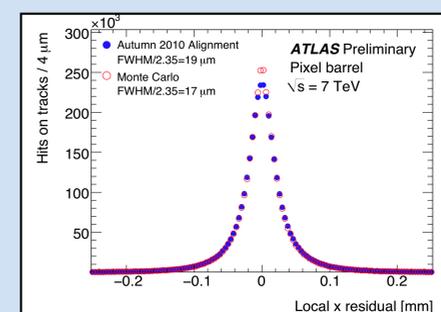
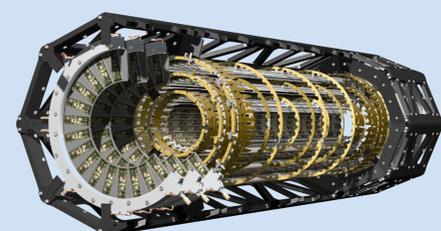


$Z \rightarrow \mu^+ \mu^-$ event recorded in ATLAS during run 154822. The two muons (in red), with $p_T=27 \text{ GeV}$ and $p_T=45 \text{ GeV}$, demonstrate the combined tracking performance of the ID and MS achieved in both the barrel and the endcap.

Inner Detector: Pixels

The Pixel Detector

The innermost silicon detector of ATLAS consists of nearly 80 million pixels for particle tracking and identification

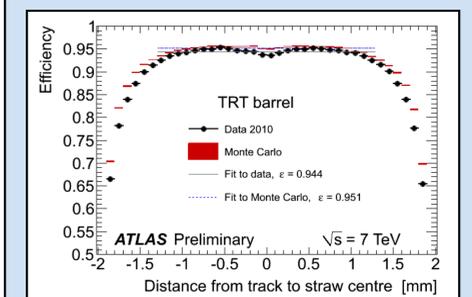


A full alignment of the Pixel sensors, including wafer distortions, resulted in a hit resolution of 19 μm

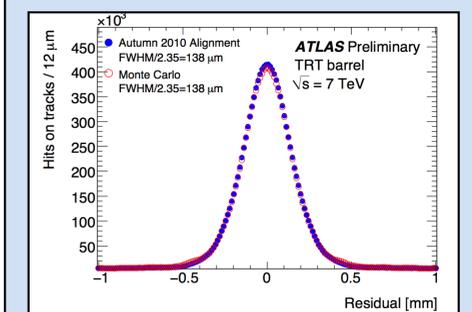
Inner Detector: TRT

The Transition Radiation Tracker

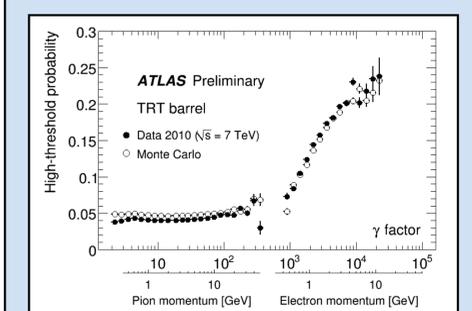
A gaseous straw tracker with 350,848 channels providing on average 35 hits per track and electron identification from detection of transition radiation



In 2010, the TRT achieved 100% data taking efficiency, with 97.5% of the detector being read out and a plateau hit efficiency of 94% in the barrel



Alignment with collision tracks and improved calibration resulted in a hit resolution of 138 μm in the barrel, comparable to both design performance and results achieved in the combined test beam



The increased fraction of high threshold TRT hits on track from electrons from photon conversions demonstrates that the TRT is capable of discriminating between electrons and hadrons