

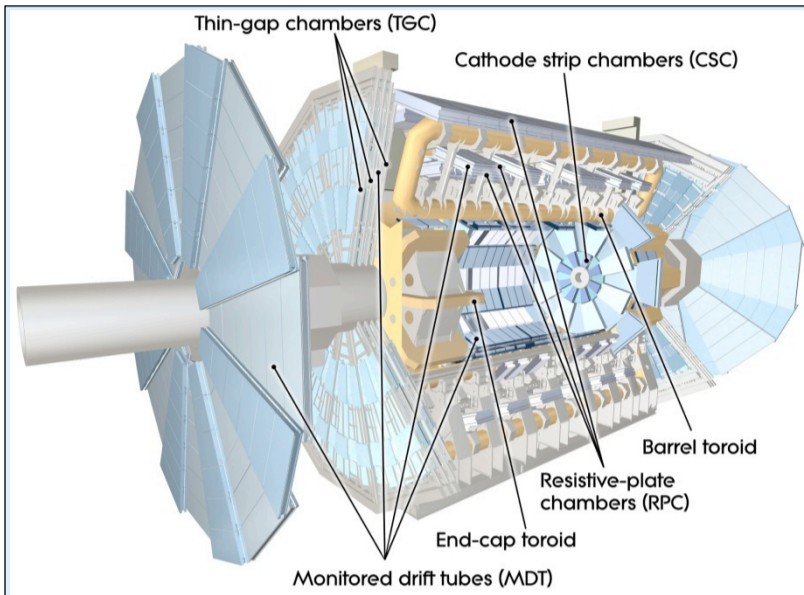
LHCC Poster Session - CERN, 21 March 2012

ATLAS Detector Operation 2011

Muon System

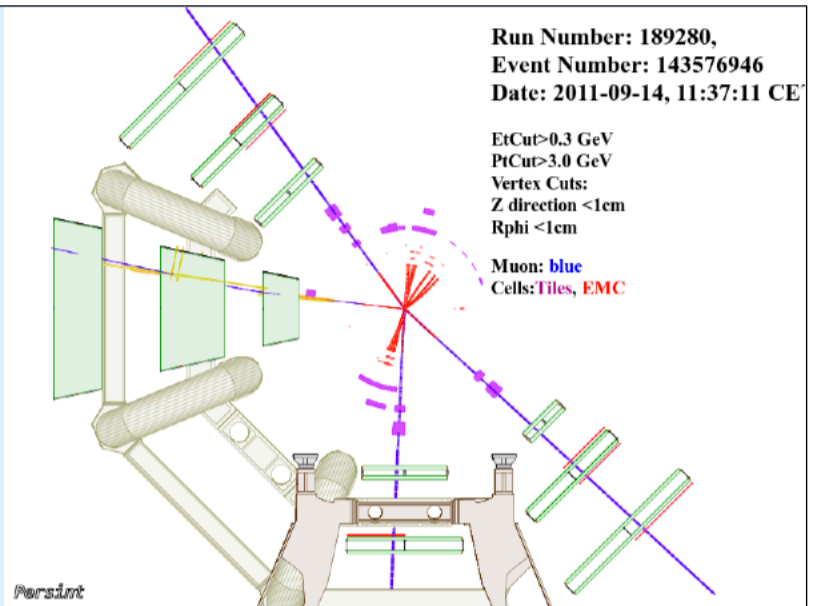
During the 2011 LHC Data taking period the ATLAS Detector recorded 5.22 fb^{-1} which is 96.5% of the delivered data from proton-proton collisions. The recorded data with Muon Spectrometer was at a level of more than 99% good for physics analysis. This illustrates an excellent performance. Starting the 2012 data taking period the Muon Spectrometer will perform to more than 99% operational fraction at the Level 1 trigger and at an average of more than 97.6% operational fraction of trigger and precision chambers. This poster presents the performance of the Muon Spectrometer trigger chambers as well as the precision chambers. In addition a combined Muon Spectrometer performance is presented.

The Muon Spectrometer



- Left:** The muon system of the ATLAS detector consists of
- Precision Chambers:**
 - Monitored Drift Tubes, 3 layers for $|\eta| < 2.0$, 2 layers for $2.0 < |\eta| < 2.7$
 - Cathode Strip Chambers, 1 layer (inner) for $2.0 < |\eta| < 2.7$
 - Trigger Chambers:**
 - Resistive Plate Chambers, $|\eta| < 1.05$
 - Thin Gap Chambers, $1.05 < |\eta| < 2.7$ (big wheel, muon trigger is provided up to $|\eta| < 2.4$)

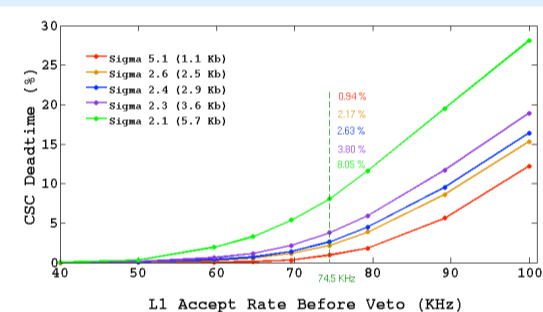
Right: Event display of a 4 muon candidate event with $m_{4\ell} = 124.6 \text{ GeV}$. The masses of the lepton pairs are 89.7 GeV and 24.6 GeV. One of the muons traverses the endcap chambers while the other three go through the barrel.



Muon Precision Chambers

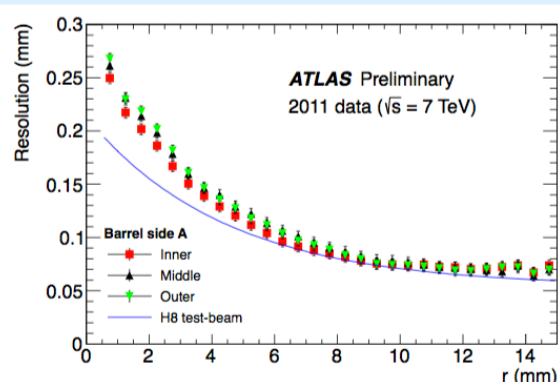
Cathode Strip Chambers

The firmware of the CSC RODs was updated giving a big improvement on the event rate handling. CSC will run at the foreseen trigger rate with less than 1% busy time.

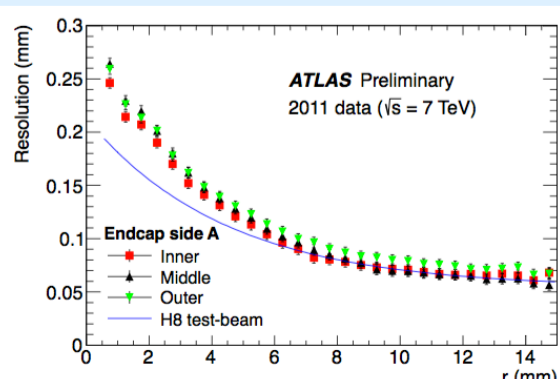


Monitored Drift Tubes

Spatial Resolution was measured for the MDT chambers with 2011 data. It was found to be $\sim 70 \mu\text{m}$ for 12mm drift radius.



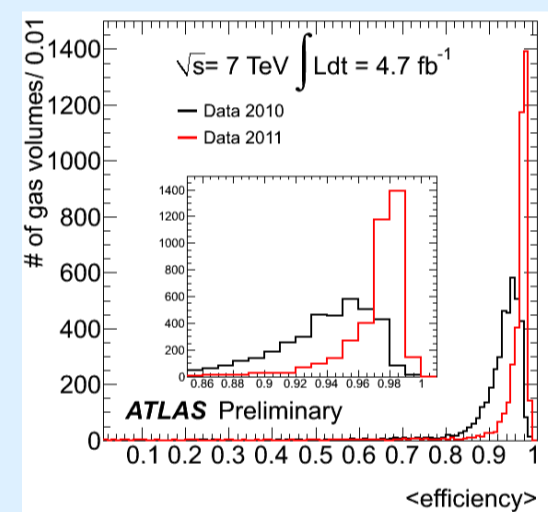
Spatial resolution as a function of the radius measured separately for Inner (red squares), Middle (black triangles), Outer (green triangles) chambers of the Muon Spectrometer Barrel side A on the top and Endcap side A on the bottom.



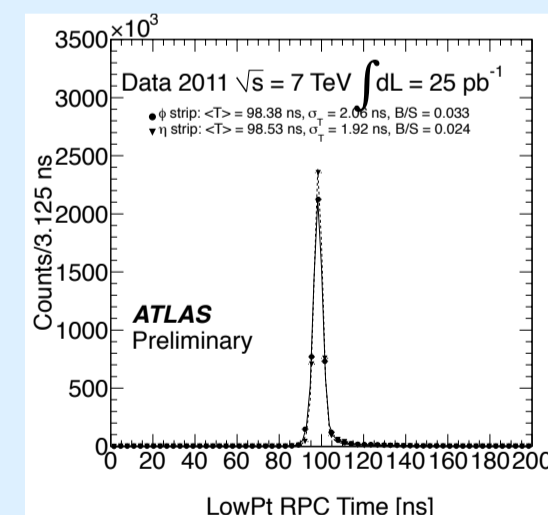
Muon Trigger Chambers

Resistive Plate Chambers

After 2011 shutdown period, the Level 1 RPC operational fraction will be 98.4%.



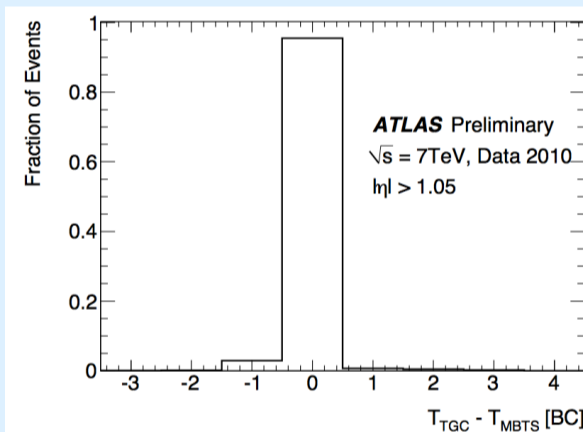
The plot shows the distribution of the measured 2010 and 2011 RPC gas volume efficiencies. The improvement mainly comes from High Voltage working point correction and better control of the gas flux.



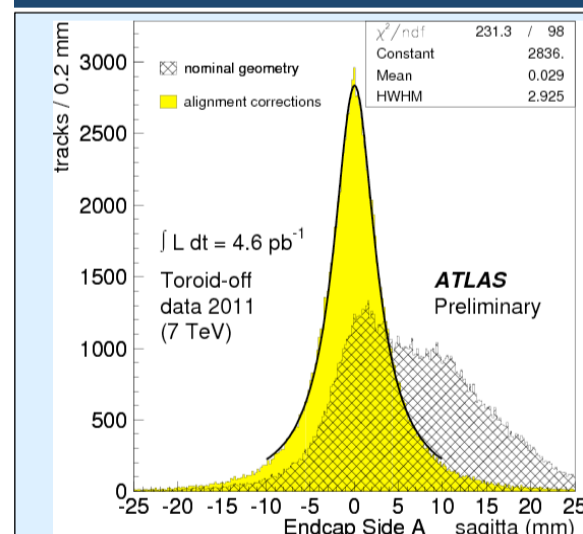
RPC timing Resolution for clusters matched ($|\Delta\eta|, |\Delta\phi| < 0.1$) to combined muons was measured to be from 1.9 ns to 2.1 ns after the offline calibration.

Thin Gap Chambers

In 2012 TGC will perform at Level 1 with 99.7% operational fraction compared to 97.9% in 2011. Very good timing in Bunch crossing identification was achieved already at the start of the LHC and maintained throughout the 2011 running period.



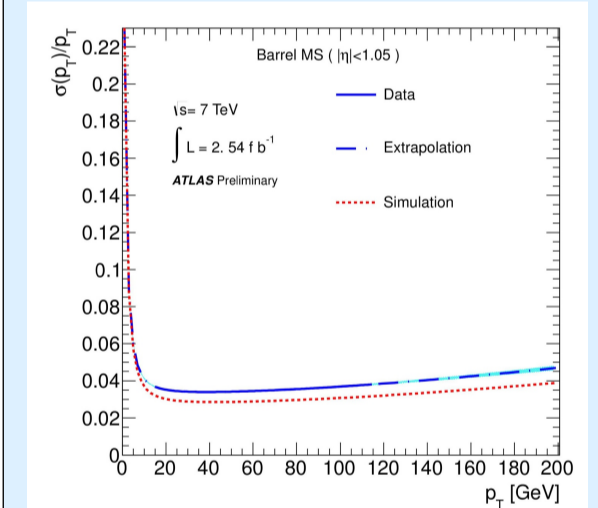
Alignment



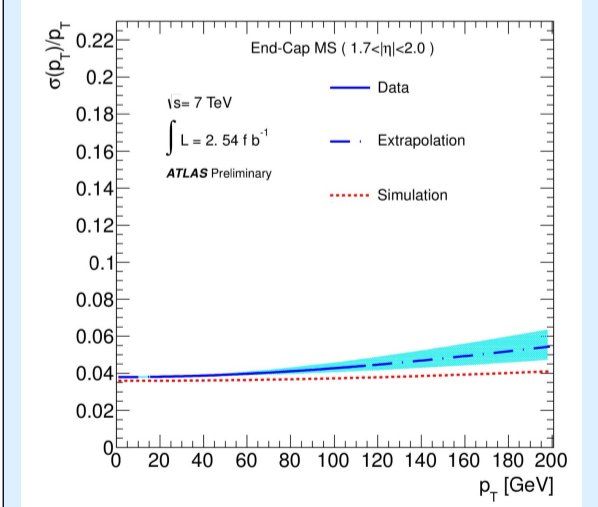
Sagitta distribution of Endcap A from "Nominal geometry" and "after alignment corrections". Multiple scattering is the dominant contribution for the width after the corrections. We observe mean values of $+29 \mu\text{m} \pm 12 \mu\text{m}$. Similar correction was done for Endcap Side C.

Muon Spectrometer

Muon Momentum resolution is shown below for Muon Spectrometer in comparison with simulation. These plots illustrate a great performance with $\sim 4\%$ resolution for muon p_T between 10 GeV and 140 GeV for Barrel and Endcap region.

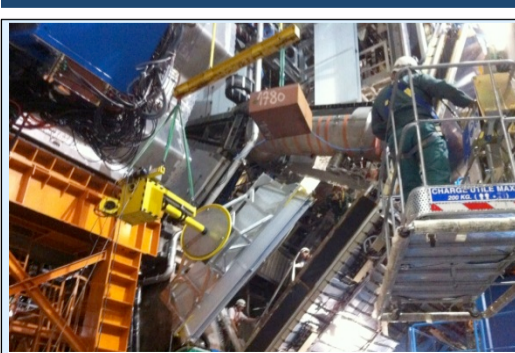


Muon Spectrometer momentum resolution for Barrel.



Muon Spectrometer momentum resolution for Endcap.

Upgrade During 2011 Shutdown Period



During the 2011 shutdown period, 26 MDT chambers were installed on side C (completed) and 2 MDT chambers were installed on side A. This upgrade will improve the muon momentum resolution and acceptance in the corresponding region of the Muon Spectrometer for the high p_T physics analysis.

