

CMS Drift Tubes performance

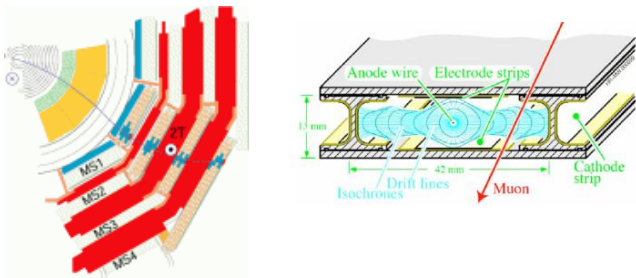
Presented at LHCP2015, Saint Petersburg, Russian Federation



The CMS muon barrel system has a total of 250 Drift Tubes (DT) stations, representing 172000 channels for triggering and measuring the muon Pt. After the Long Shutdown (LS) 1, the fraction of living channels is still 99.6%. The spatial resolution is ranging between 200 and 250 μm in the phi direction and the intrinsic time resolution is about 2ns. In addition the DT system has shown an excellent behavior during Run1, with very low down time associated and minor fraction of data not qualified by the data certification. Despite these performances, the HL-LHC conditions will compel an upgrade of the on-board electronics, in order to deal with the higher radiation environment and also the higher trigger rate. A replacement of the so-called mini crates installed on the chambers is scheduled during LS3.

CMS Drift Tubes chambers:

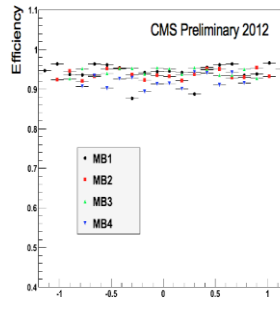
- > 250 DT chambers organized in 5 wheels
- > from the interacting point, a central muon crosses 4 chambers
- > each chamber MB1, MB2 and MB3 made of three superlayers (2- Φ and 1- θ) except the MB4 made of two Φ superlayers
- > each superlayer contains 4 single layers
- > for a central muon : maximum of 32- θ hits and 12- θ hits
- > DT system covers the region up to $|\eta| = 1.2$



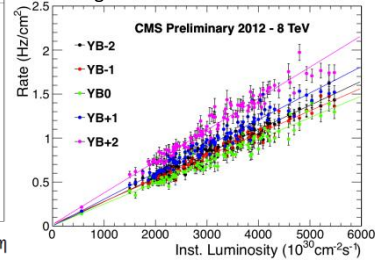
DT performance:

DT chambers have shown an excellent behavior in overall during run1, causing very small down time for CMS as well as very tiny amount of data not qualified "good" for physics

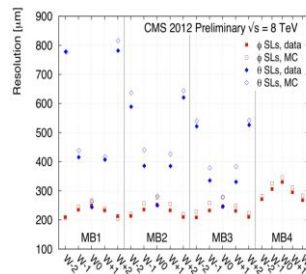
DT local trigger efficiency



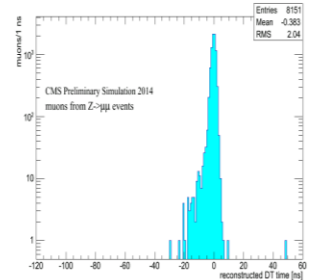
Background rate measured in the top sectors and outermost stations, induced by neutron gas produced by colliding beams



Spatial (hit) resolution: 200 to 250 μm in the ϕ -view

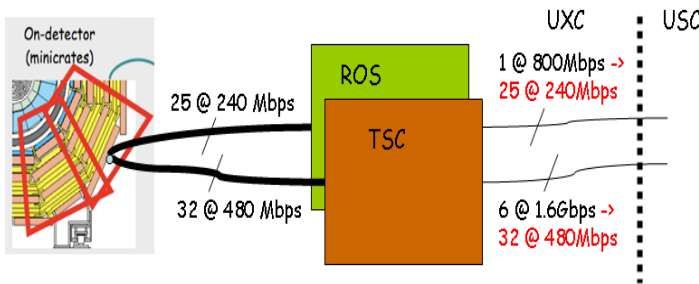


Time resolution $\sim 2\text{ns}$ (slight asymmetry coming from delta ray contribution)

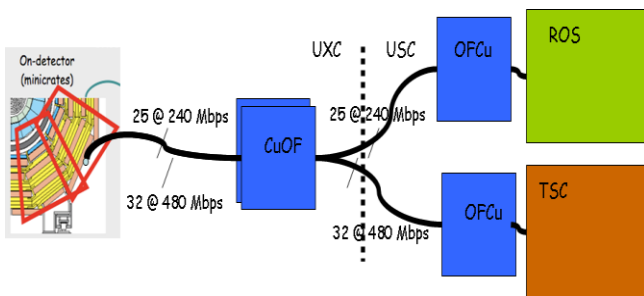


Long Shutdown 1 work and readiness for runII:

Previous electronics:

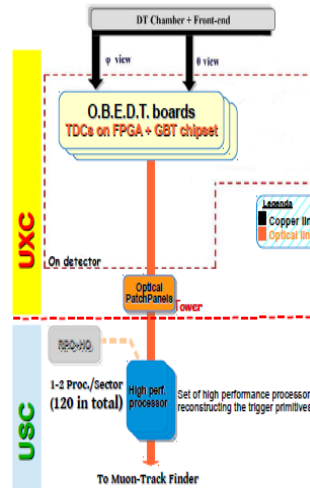


New electronics for runII (ROS and TSC more accessible):



ROS: Read Out Server
TSC: Trigger Sector Collector
CuOF: copper optical fiber

Electronics upgrade (LS3):



Radiation issues and L1 trigger limitations in the HL-LHC program: transfer of the trigger primitives functionality outside the experimental cavern scheduled for LS3