



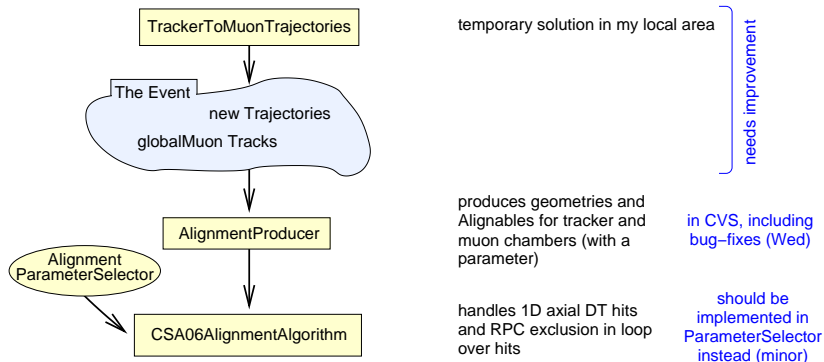
Status of Muon Chambers in CommonAlignment

Jim Pivarski

Texas A&M University

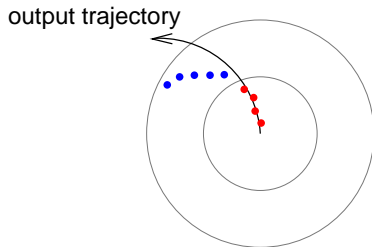
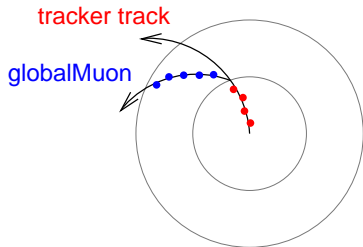
16 February, 2007

Muon Alignment System in CommonAlignment



- ▶ System works in my local area
- ▶ We want to put a working and acceptable system into CVS as soon as possible

Temporary Solution for Trajectory-Making



- ▶ Unbiased by muon hits \rightarrow fewer HIP iterations
- ▶ This is the trackerfit-only extreme, StandAloneMuon-only extreme is also easy to implement
- ▶ Optimal fit is some $(1 - \alpha)$ trackerfit + α muonfit

How should we implement that?

Implementing $(1 - \alpha)$ trackerfit + α muonfit

- With GlobalMuonProducer?

```
module globalMuonsForAlignment = GlobalMuonProducer
{
  InputTag MuonCollectionLabel = standAloneMuons
  InputTag TrackerCollectionLabel = ctfWithMaterialTracks
  PSet TrackLoaderParameters =
  {
    untracked bool PutTrajectoryIntoEvent = true
  }
  double MuonWeightInFit = 0.5
}
```

- With a new producer in RecoMuon?

I should talk with Riccardo again...



Muon Geometry in AlignmentProducer

- ▶ AlignmentProducer has two new parameters:
doTracker (bool) and doMuon (bool)
- ▶ With doMuon, it produces DTGeometry and CSCGeometry
- ▶ Applies muon misalignment scenarios, saves to database, etc.
(completely parallel to tracker)
- ▶ Passes AlignableMuon to the concrete algorithms
(HIP, MillePede, Kalman)

All AlignmentProducer updates have been committed to CVS
(including two bug fixes last Wednesday)



Changes to CSA06AlignmentAlgorithm

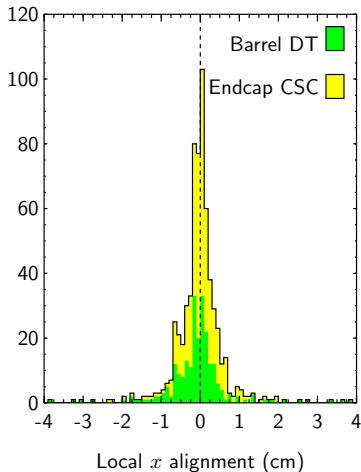
These changes are only in my local area, not CVS.

- ▶ Axial DT hits have $z = \text{center of chamber}$ and $\sigma_z^2 = 0$
 - ▶ Okay for rphi alignment, bad for z alignment
 - ▶ I set $1/\sigma_z^2 = 0$ for these hits in sum over residuals
 - ▶ Instead, we must tell AlignmentParameterSelector/Builder to apply these hits to rphi alignment, but not z
- ▶ Tracks from some sources include RPC hits
 - ▶ I have excluded them from the loop over hits
 - ▶ Also should be solved with AlignmentParameterSelector/Builder
 - ▶ Perhaps RPC hits shouldn't be in offline tracks?

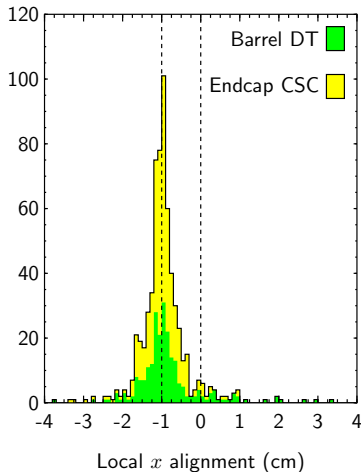
Alignment Test with 6000 Muons

Alignment corrections, starting from...

an ideal alignment

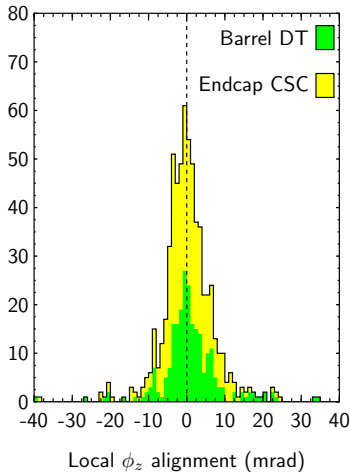


all chambers $\Delta x = +1$ cm

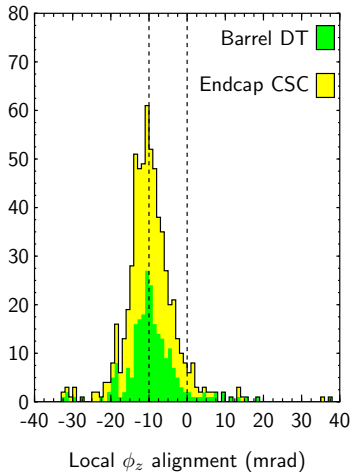


Alignment Test with 6000 Muons

Alignment corrections, starting from...
an ideal alignment



all $\Delta\phi_z = +10$ mrad





Next Steps in Software Development

I should. . .

- ▶ Ask Riccardo what is the best way to implement globalMuons with partially-weighted muon chambers
- ▶ Look at AlignmentParameterSelector/Builder and try to implement 1D DT hits in the same way as 1D SiStrip hits (asking Gero for help, if needed)
- ▶ Exclude RPC hits in AlignmentParameterSelector/Builder
- ▶ Submit a working and acceptable system to CVS
- ▶ Write a Twiki page



Next-After-Next Steps

- ▶ Coordinate with Frederic and Reco groups to add `AssociationMap<Tracks,Trajectories>`
- ▶ CSA06 → `HIPAlignmentAlgorithm`
- ▶ Add a suite of diagnostic plots (to `HIPAlignmentAlgorithm`? or the whole framework? as an optional extension?)
- ▶ Help define the muon alignment data stream (Currently contains only `StandAloneMuons`)