


Experiences with Alignment on the CAF
– or –
Validation of 1_5_4 Samples

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What I did

- Read events from DrellYan_mumu_40/CMSSW_1_5_4-RelVal (ideal and short-term (10 pb^{-1} scenarios), turned them into AlCaRecoMu format, and wrote to my personal CASTOR area
- Ran a simple globalMuon alignment: inflated alignment parameter errors for muon system to refit globalMuon tracks to tracker only, then compared track − hit residuals in the muon system
- Both processes performed on the CAF
- Conclusion: the samples look good, but I have intermittent technical problems accessing the data

Problem #1 with file I/O

(A) AICaRecofication method that hardly ever worked:

- Select all files at once (`vstring fileNames = {everything...}`) and split jobs with `skipEvents = N*10000, maxEvents = 10000`.
- Most jobs were unresponsive for days, so I gave up on them
- Perhaps this requires all files to be loaded in a cache somewhere, which taxes resources

(B) AICaRecofication that works:

- One file per job
- There's probably an optimum of 10 or 100 files, didn't explore

Maybe this isn't a "problem," maybe the system wasn't designed for method A.

Problem #2 with file I/O

About half of the files I created (with either method) can't be read back.

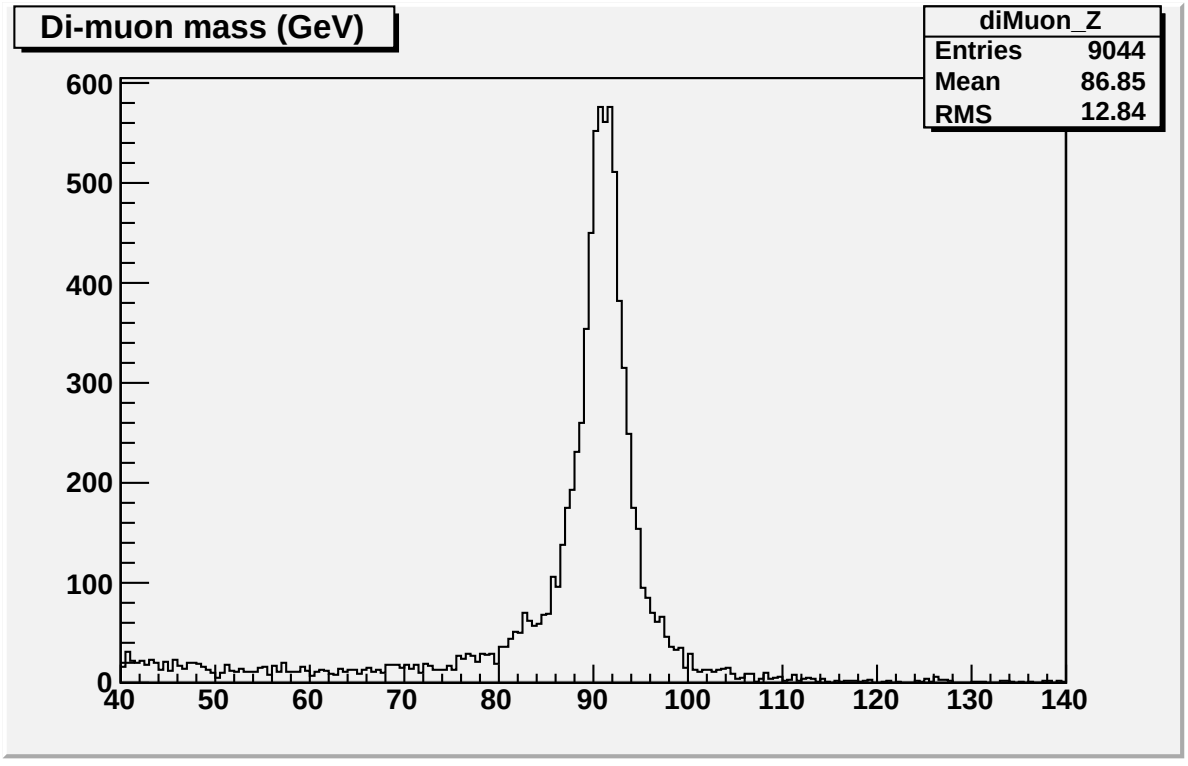
```
[HIPAlignmentAlgorithm] constructed.
%MSG
%MSG-e FwkJob:  PoolSource:source{*ctor*} 22-Aug-2007 18:31:09 CEST pre-events
<FrameworkError ExitStatus="8002" Type="StdLibException" >
  Standard library exception caught in cmsRun
St9bad_alloc
</FrameworkError>

%MSG
%MSG-s StdLibException:  PoolSource:source{*ctor*} 22-Aug-2007 18:31:09 CEST  p
Standard library exception caught in cmsRun
St9bad_alloc
```

Standard library allocation error? (No version mismatch)

Data quality in two files that worked

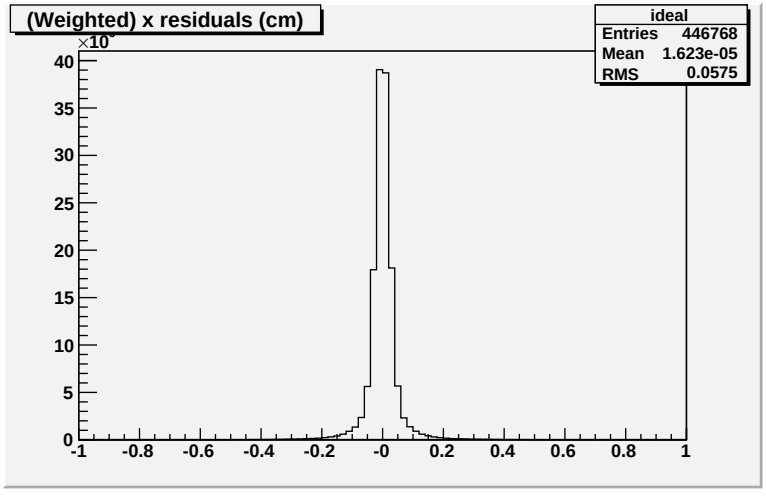
- 10,000 short-term scenario events (miscal and misalign) and 10,000 ideal events

Z peak in short-term scenario, using globalMuons fitted to the tracker: event generation is okay, tracker is okay

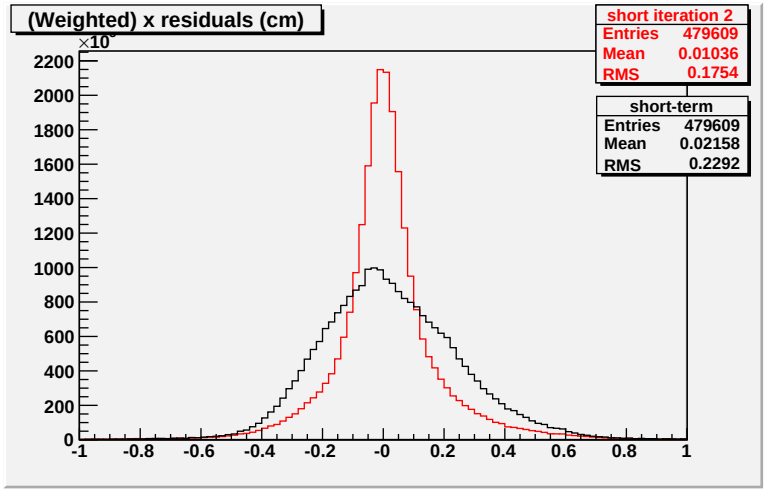


Residuals in the muon system

- Again, tracks fitted to the tracker, extended to the muon system



Ideal

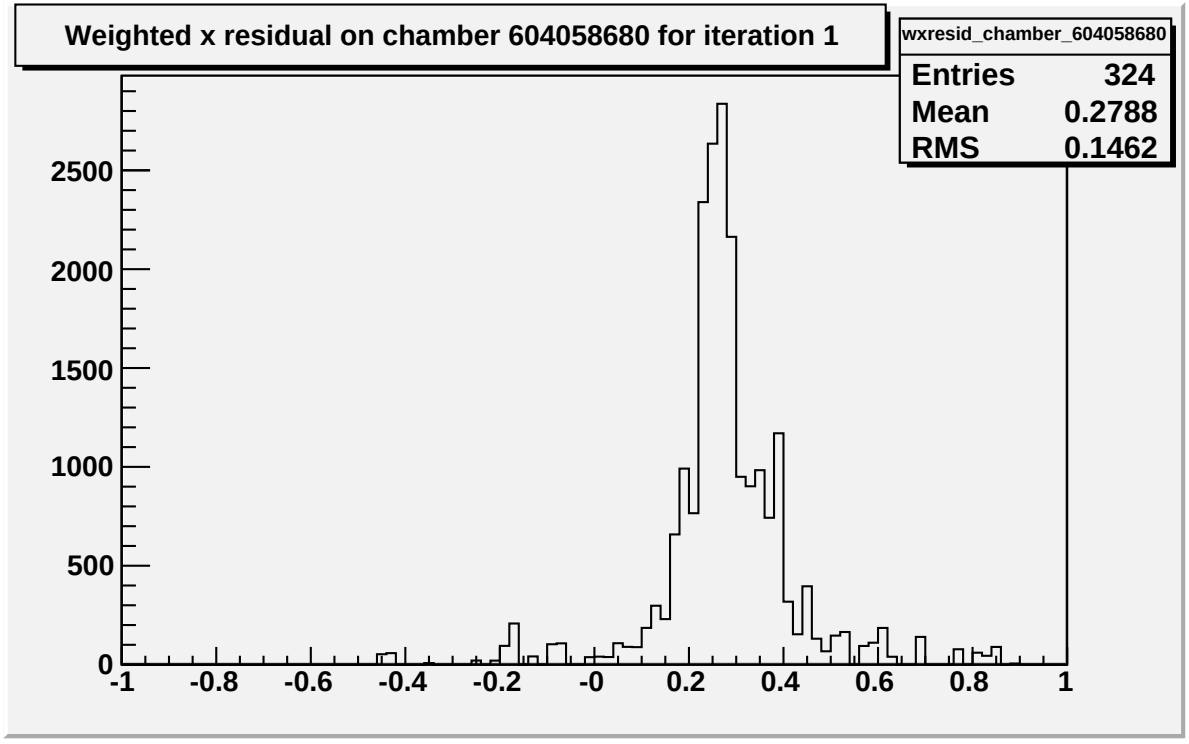


Short-term

Red short-term is a quickie alignment: x and ϕ_z only, chamber-by-chamber, one iteration ($\sim$300/790 chambers aligned).

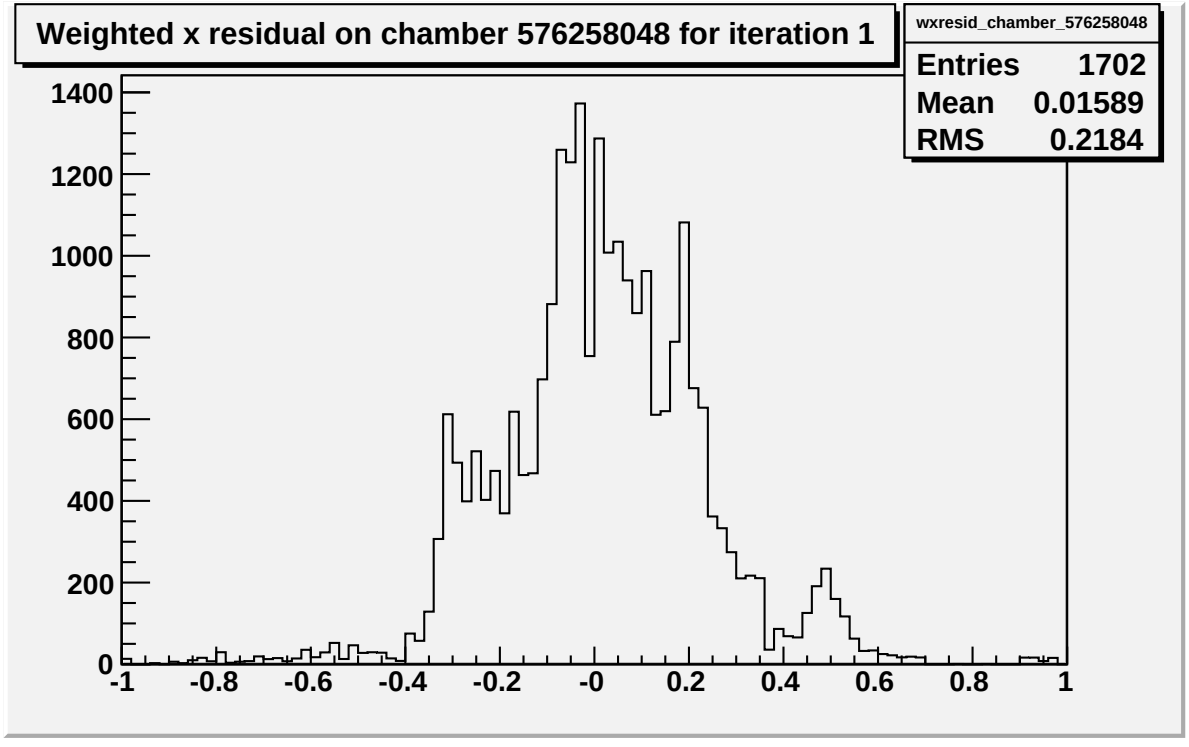
RMS from 2.3 mm $\longrightarrow$ 1.8 mm, with ideal being 0.6 mm

Typical single-chamber residuals distribution #1



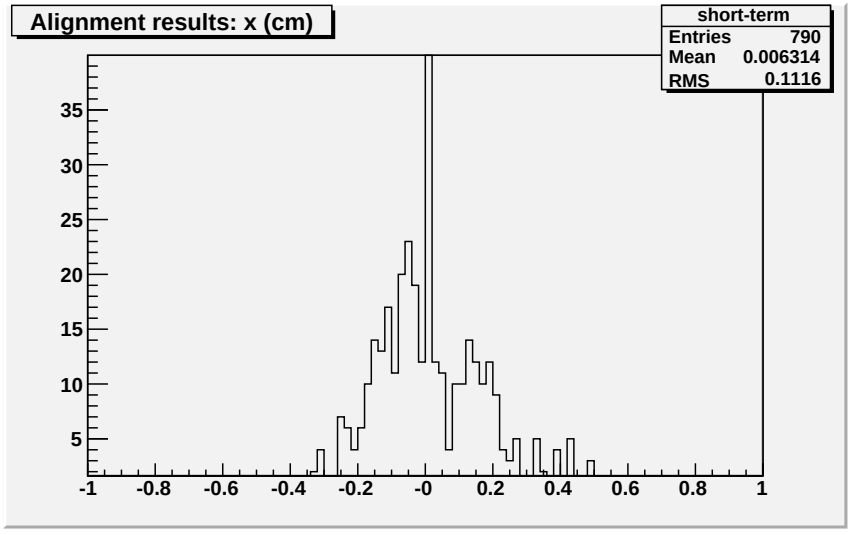
Cleanly misaligned

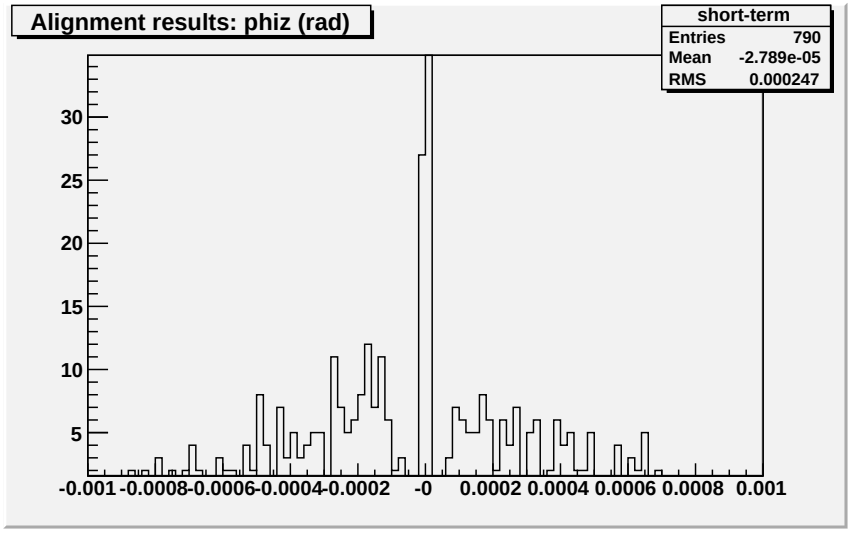
Typical single-chamber residuals distribution #2



Internal structure. Muon alignment short-term scenario does not include internal (layer) misalignment. Does calibration?

Is this the right amount of misalignment?





Yes: x misalignment dominated by wheel/disk, 0.2–0.25 cm

Yes: ϕ_z both wheel/disk and chamber, 0.25 mrad

(Majority of chambers did not align because they didn't have the minimum number of required hits)

Conclusions

- The samples look fine!
- AlCaRecofying will take some work, because of I/O problems.
  - The one-file-per-job method successfully reads, but many of the files it writes are broken.
  - There are over 2000 files! It's easy enough to put 2000 jobs on the CAF queue, but I couldn't test each of them for the "Standard library allocation" error separately.
  - Any suggestions would be welcome!