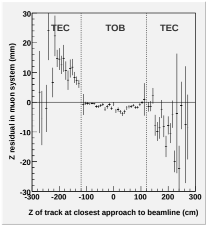
News and Announcements

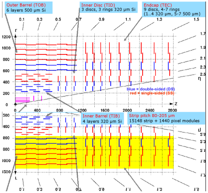
- Conversion of photogrammetry results to CSCAlignmentRcd: ongoing
  - Karoly and Oleg are doing a proper accounting of the z heights of pins to determine all z positions and ϕ_x angles
- Jim Bellinger's database comparison tool: done, maybe minor fixes
  - compares alignment of chambers relative to a ring or disk between two prospective geometries: ideal for comparing track-based and hardware alignments in a local system
  - In CVS: `Alignment/MuonAlignment/plugins/MuonGeometryArrange`
- Further developments in tracker alignment as seen from the muon system (slide 2)
- Today: track-based validation and track-based diagnostics (slides 3–4)

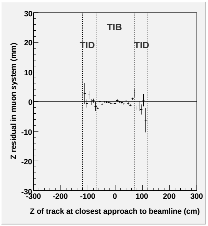
Muon Z residuals vs. Z_{PCA}

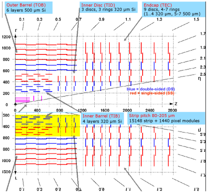
- "Outer" plots require $R_{PCA} > 58$ cm, "inner" plots require $R_{PCA} < 58$ cm and APE = 1000 cm ($\approx \infty$) in TOB and TEC
- Muon Z residuals in mm: tracker displacements are smaller

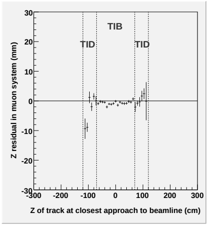
	minus TEC	plus TEC	TOB	TIB	TID
bottom	+9	−4	−1.3	−0.4	not a good
top	−0.6	+3	+2	−0.9	track-fit?

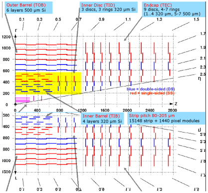


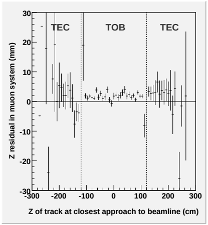


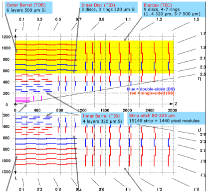












Validation and diagnostics

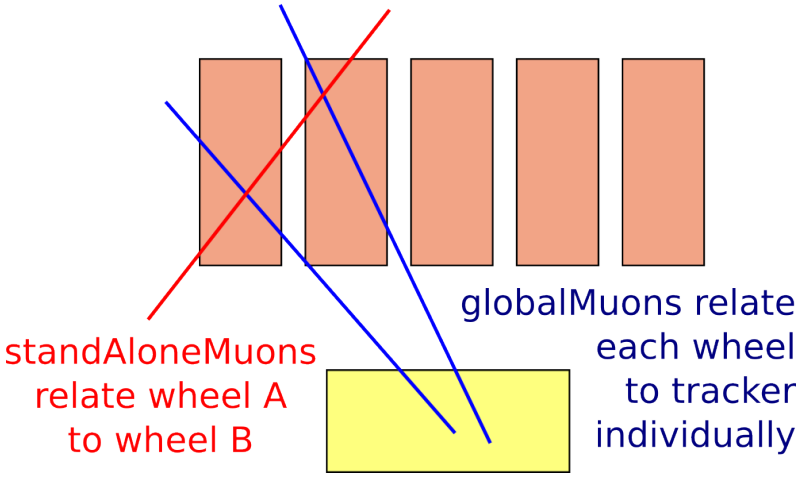
Before starting this discussion and Nick's talk...

1. I would distinguish
   - validation: check for surprises on a routine basis in DQM $\longrightarrow$ a safety net for catching mistakes
   - diagnostics tool: check parts of the alignment in different ways
2. While the residuals RMS or track χ^2 is a good measure of misalignment in the tracker, it isn't in the muon system
   - track error matrices $\gg$ misalignments due to propagation in iron
   - makes residual $\sim$ intrinsic error ($\oplus$ internal layer misalignments) by construction, after the first hit in each chamber
   - segment residuals overcomes this issue, but then there are only four "hits" in the track-fit: they each have significant pull
3. Only good measure of misalignment in muon system that I know of: mean of residuals from hits excluded from fit
   - distribution of means is much more sensitive than RMS of combined distribution, though we don't have many alignables...
4. Ideally, validation and diagnostics should refit AlCaReco

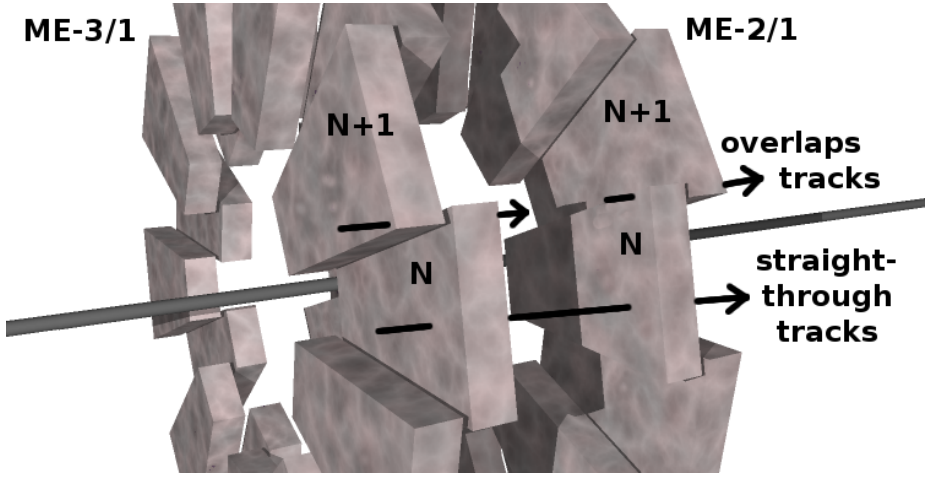
Examples of cross-checks

(Didn't fit on the previous slide)

globalMuons vs. standAloneMuons



CSC overlaps vs. straight-through tracks



- StandAloneMuon positions of wheels A and B must be equal to the difference of globalMuon positions
- Helps us track down potential sources of bias in globalMuons measurement