

Millepede II MC: Shrinkages

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Hamburg Alignment Chat
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CMSSW_3_1_X Cosmics MC

/TkCosmics38T/Summer09-STARTUP31X_V3_StreamTkAlCosmics0T-v1/ALCARECO

- Still using RecHit2D in TIB and TOB.
- $p > 5 \text{ GeV/c}$, $N_{hit} \geq 14$, $N_{2D-hit} \geq 3$, $N_{hit-pede} \geq 10$
- $S/N > 18$, $\phi_{sensor \rightarrow track} > 0.35$, pixel quality flags
- use only first 250 000 events per file: $\Rightarrow 2.26 \cdot 10^6$ tracks in pede

Alignment Parameters

- u, w, γ for strip units, in TIB also α , β
 - u, v, w, γ in Pixel, **except γ in FPIX**
- $\Rightarrow$ 55 980 parameters (about 1000 without hits: simulated dead modules [?])
- BPIX as reference
 - **Private misalignment of (and APE for) aligned parameters only!**
 - BPIX not misaligned - but APE > 0 .

Reminder of last week's Settings

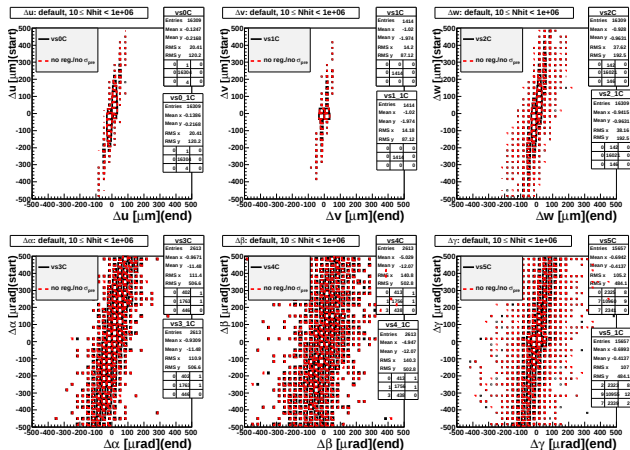
Millepede II

- V03-00-00
- 3 iterations “sparseMINRES”
- χ^2 -cut (“30.0 4.5”), no down-weighting
- regularisation to improve matrix condition against weak modes:
add $1 \cdot \sum_i \left(\frac{\text{param}_i}{\sigma_i^{\text{pre}}} \right)^2$ to χ^2
- Using soft $\sigma^{\text{pre}}(\alpha, \beta, \gamma) = 500 \text{ } \mu\text{rad}$, $\sigma^{\text{pre}}(u, v, w) = 500 \text{ } \mu\text{m}$
- ≥ 10 entries per parameter
Note: not per hit, i.e. pixel w + angles get 2 entries per hit!

Track Refitting etc.

- Pixel hits and errors:
TrackAngles (not templates) since TrackRefitterP5-default
- GlobalTag MC_3XY_V21.
- Trajectory: **BrokenLinesCoarse**.

Pede Corrections

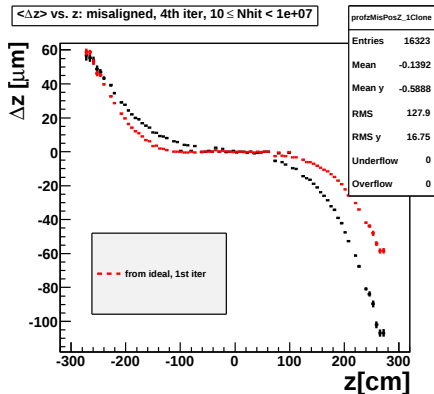
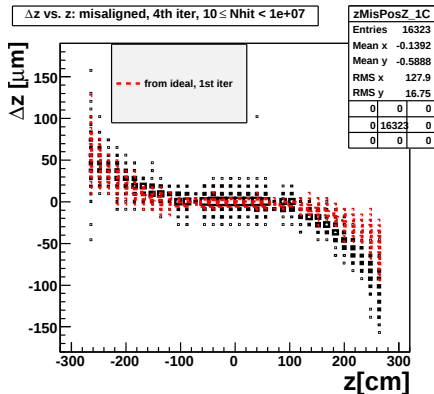


Pede corrections being too small independent of regularisation parameter τ (checked $\tau = 1, 0.1, 0.001$) or even switching off any σ_{pre} .

Few changes:

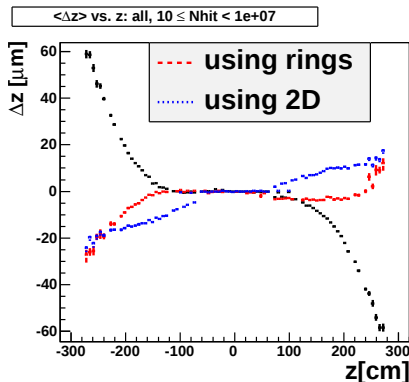
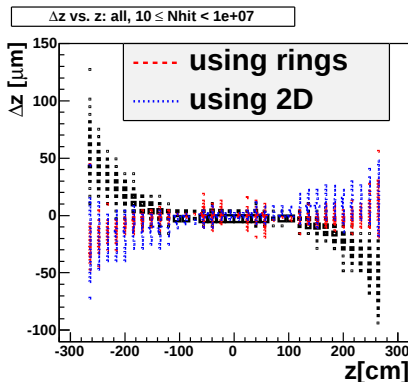
- Switch off misalignment.
- No individual σ_{pre} (but regularisation).
- BrokenLines**Fine**.
- Full statistics (not intended...)

Compare with New Setup



No other relevant change than slightly different z -shrinkage.

Higher Level Structures, Use of 2D Modules

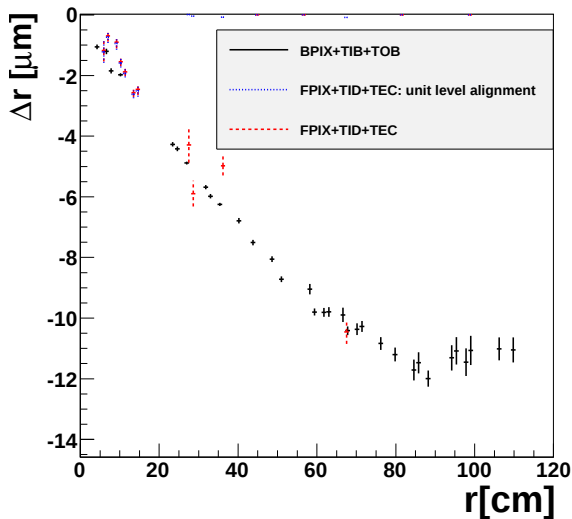


New Setup **Ladders/Strings/Rods, Rings** **TID/TEC: DS 111001**

- Expansion instead of shrinkage?
- Only **blue** looks like the weak mode I expect in z ...
- The other look more like biases...

Use of 2D Modules: Barrel vs Endcap

$\langle \Delta r \rangle$ vs. r : using 2D, $10 \leq N_{hit} < 1e+07$



- Barrel and 2D endcap modules shrink radially the same way!
- FPIX radial shrinkage independent of TID/TEC 2D treatment.

- Fix track angles: r -shrinkage and z -expansion (!) are related.
- Track model results in radial shrinkage everywhere.
- 'Usual' TID/TEC 2D treatment (2×3 param.) cannot shrink radially.
- First Adun step in CRAFT08: 2D modules without radial freedom (?)
 $\Rightarrow z$ -expansion?
- Why do I see shrinkage in MC?
- Mixture of track angles leads to funny $\Delta z(z)$ shape?
- Overlaid by weak mode?
- Work on better starting point (with kinks measured by Kalman) for BLfine: First debug phase (χ^2 even in CMSSW different. . .)