

Alignment with 31X MC

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cms-hamburg-align meeting

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Cosmic track selection

- Sample produced with CMSSW 31X by Gaelle B.
 - /TkCosmics38T/Summer09-STARTUP31X_V3_StreamTkAlCosmics0T-v1/ALCARECO
- Track collection: ALCARECOTkAlCosmicsCTF0T
- Track refitter: TrackRefitterP5
- Track selection:
 - $ptMin = 0.$ / $pMin = 5.0$
 - $etaMin = -999.$ / $etaMax = +999.$
 - $nHitMin = 14$ / $nHitMin2D = 3$
 - $chi2nMax = 50.$
- Nb. of events / selected tracks: 9.1M / 4.7M

Beam Halo track selection

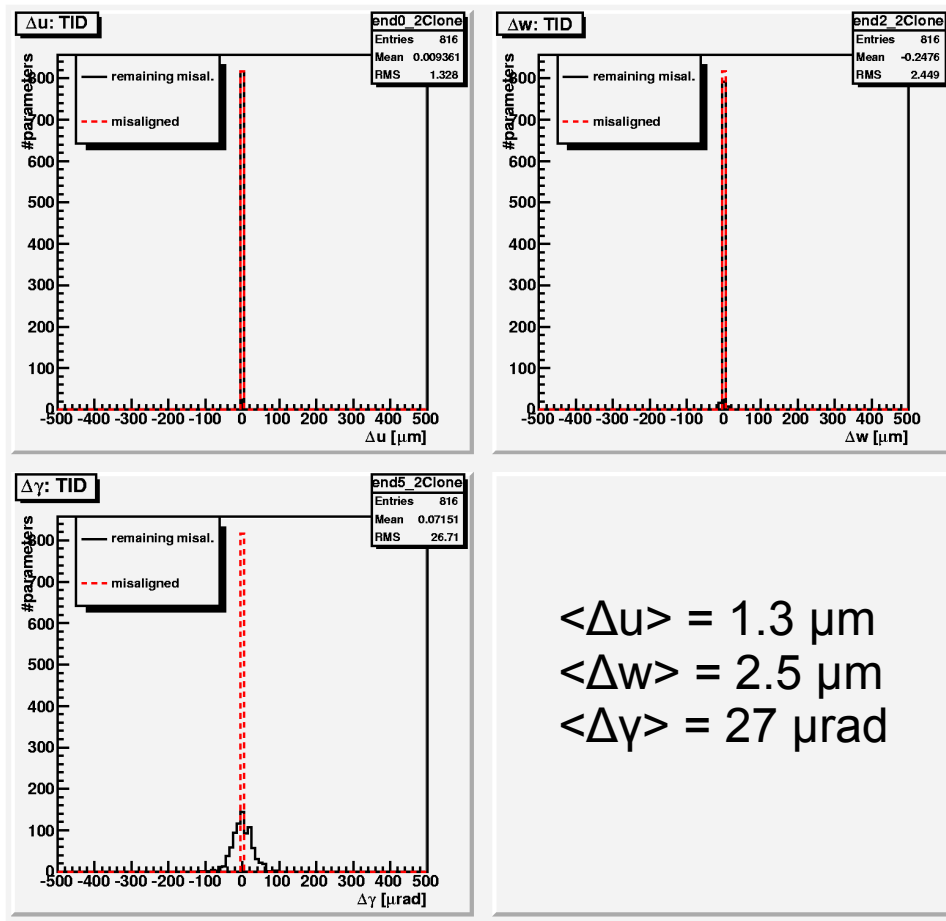
- CSC sample produced with CMSSW 31X by Jim P.
 - /BeamHalo/Summer09-STARTUP31X_V7_StreamTkAlBeamHalo-v1/ALCARECO
- Track collection: ALCARECOTkAlBeamHalo
- Track refitter: TrackRefitterBHM
- Track selection:
 - $pt_{Min} = 0.$ / $p_{Min} = 2.5$
 - $eta_{Min} = -999.$ / $eta_{Max} = +999.$
 - $nHit_{Min} = 14$ / $nHit_{Min2D} = 3$
 - $chi2n_{Max} = 50.$
- Nb. of evts / tracks / selected tracks: 3.0M / ~5M / 0.69M

1. Cosmics tracks only, Module Unit Level

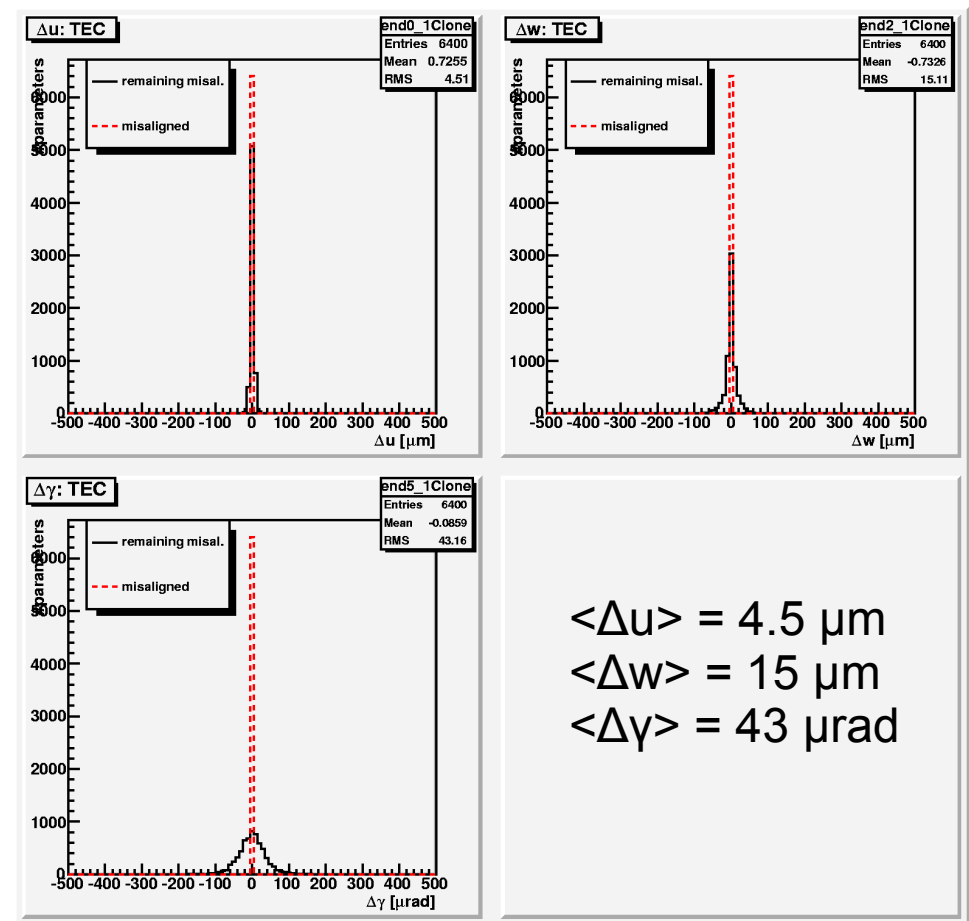
- Common SW area:
`/afs/cern.ch/cms/CAF/CMSALCA/ALCA_TRACKERALIGN/MP/hamburg/CMSSW_3_3_2_withBLwithRK`
- Alignment is done to module unit level:
 - 'PixelHalfBarrelDets,rrr00r', 'TrackerTPEModule,111001', 'TIBSSDets,101111', 'TrackerTIBModuleUnit,101111', 'TOBSSDets,101001', 'TrackerTOBModuleUnit,101001', 'TIDDets,101001,endCapSS', 'TrackerTIDModuleUnit,101001', 'TECDets,101001,endCapSS', 'TrackerTECModuleUnit,101001',
- Starting geometry: ideal.
- 4.7M cosmic trks, selected as in the previous slides

Residual misalignment

- TID residual misalign.

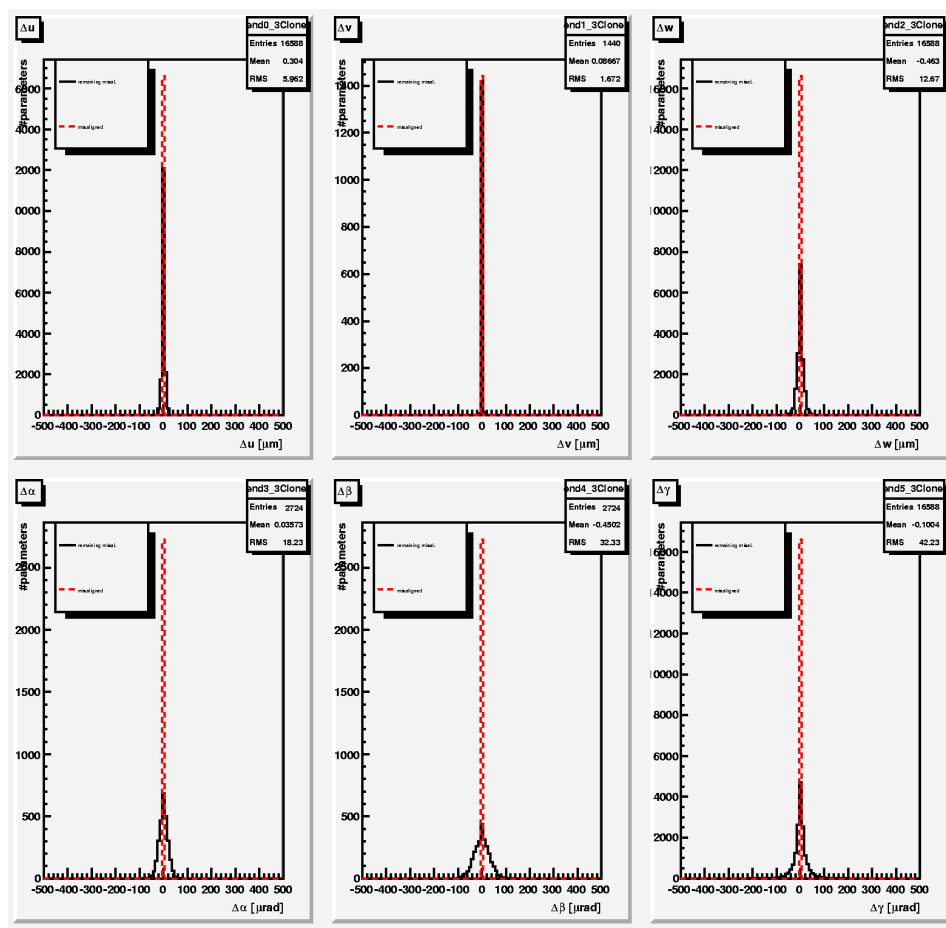


- TEC residual misalign.



Residual misalignment

- Residual misalign. (all)



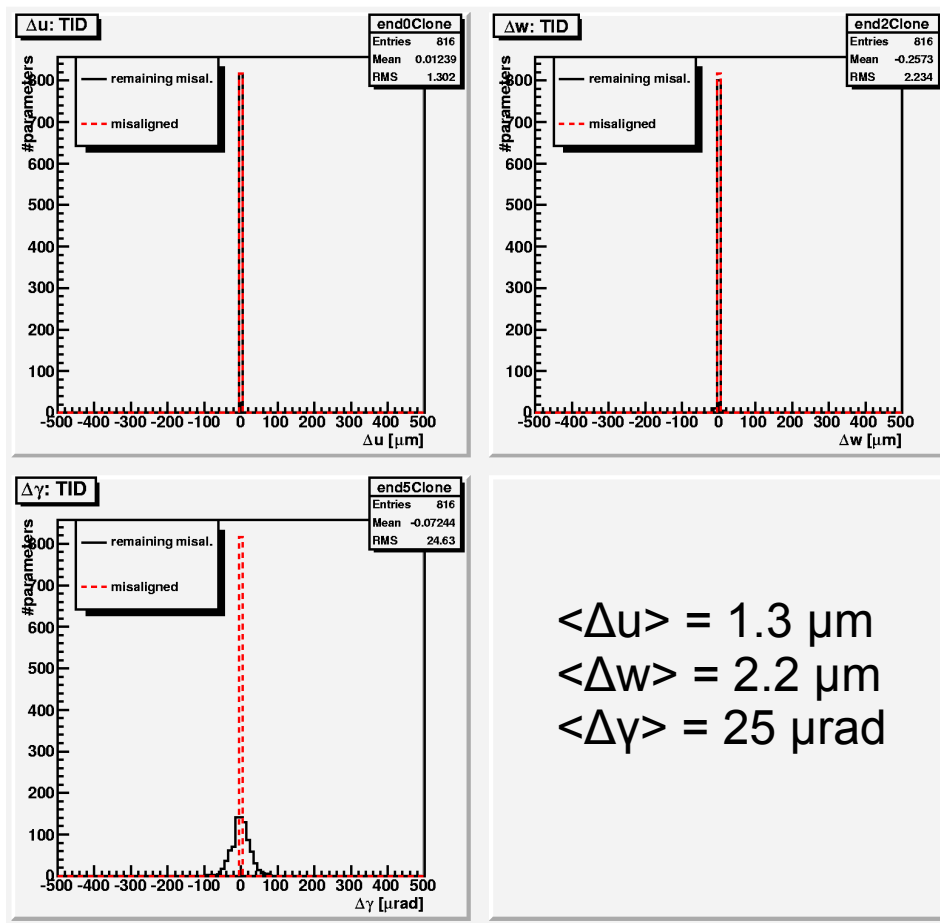
$$\begin{aligned}
 \langle \Delta u \rangle &= 6.0 \text{ } \mu\text{m} \\
 \langle \Delta v \rangle &= 1.7 \text{ } \mu\text{m} \\
 \langle \Delta w \rangle &= 13 \text{ } \mu\text{m} \\
 \langle \Delta \alpha \rangle &= 18 \text{ } \mu\text{rad} \\
 \langle \Delta \beta \rangle &= 32 \text{ } \mu\text{rad} \\
 \langle \Delta \gamma \rangle &= 42 \text{ } \mu\text{rad}
 \end{aligned}$$

2. Cosmics tracks only, Module Unit Level

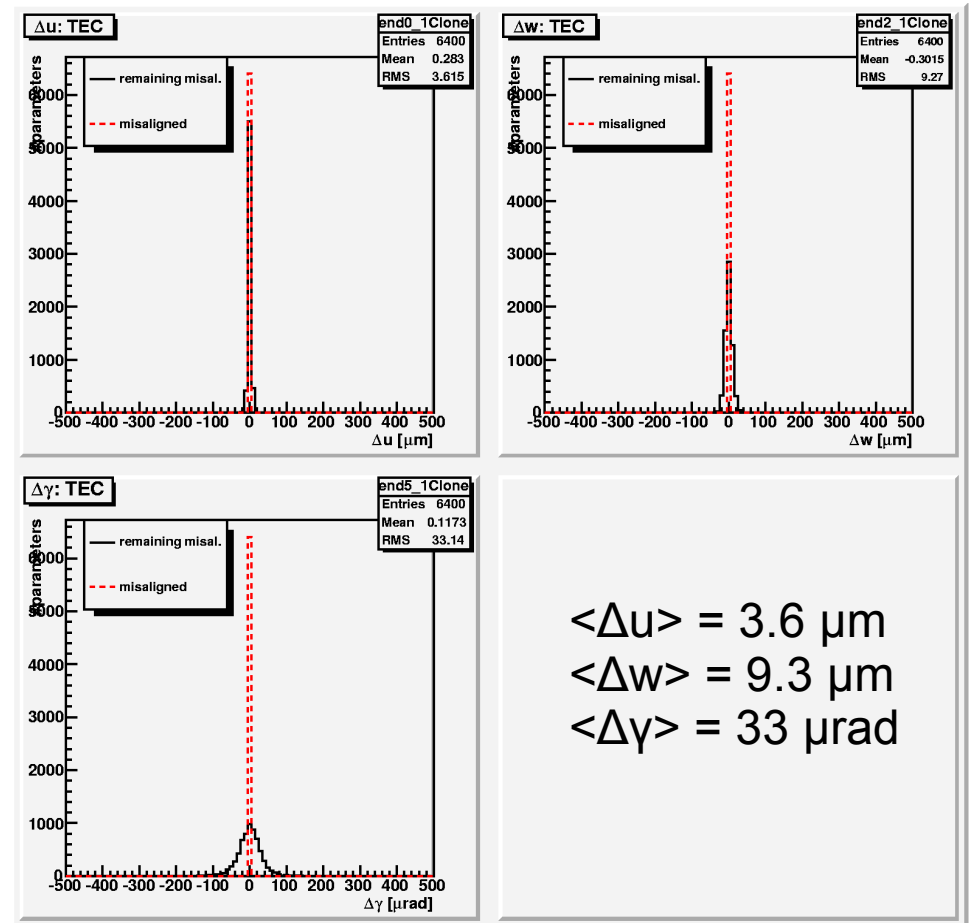
- Common SW area:
`/afs/cern.ch/cms/CAF/CMSALCA/ALCA_TRACKERALIGN/MP/hamburg/CMSSW_3_3_2_withBLwithRK`
- Alignment is done to module unit level:
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- Starting geometry: ideal.
- 4.7M cosmic trks, selected as in the previous slides
- 0.69M beam halo tracks in addition

Residual misalignment

- TID residual misalign.

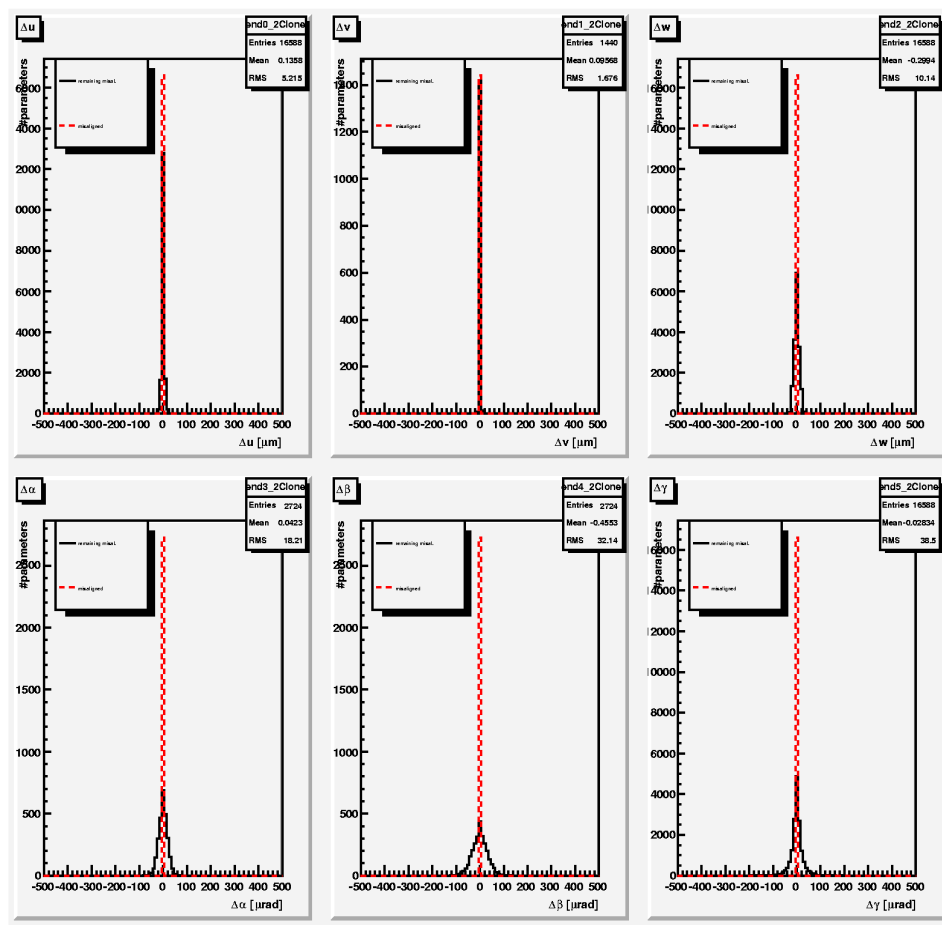


- TEC residual misalign.



Residual misalignment

- Residual misalign. (all)



$$\begin{aligned}
 \langle \Delta u \rangle &= 5.2 \text{ } \mu\text{m} \\
 \langle \Delta v \rangle &= 1.7 \text{ } \mu\text{m} \\
 \langle \Delta w \rangle &= 10 \text{ } \mu\text{m} \\
 \langle \Delta \alpha \rangle &= 18 \text{ } \mu\text{rad} \\
 \langle \Delta \beta \rangle &= 32 \text{ } \mu\text{rad} \\
 \langle \Delta \gamma \rangle &= 39 \text{ } \mu\text{rad}
 \end{aligned}$$

Conclusions

- First use of CMSSW_3_3_2 common area
- Cosmics MC
 - an alignment test has been done on Module Unit Level, starting from ideal geometry
 - residual misalignment is under control
- Attempt to combine Cosmics and Beam Halo MC
 - almost no effect in TID
 - slight improvement in TEC
- Next step: start from misaligned geometry