

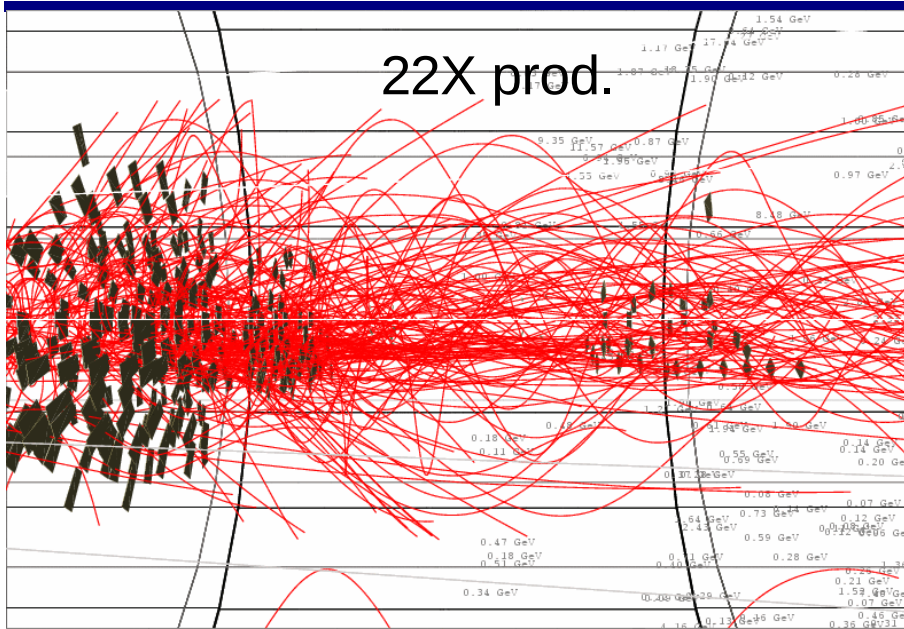
Beam Halo MC in 22X

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10/02/2009

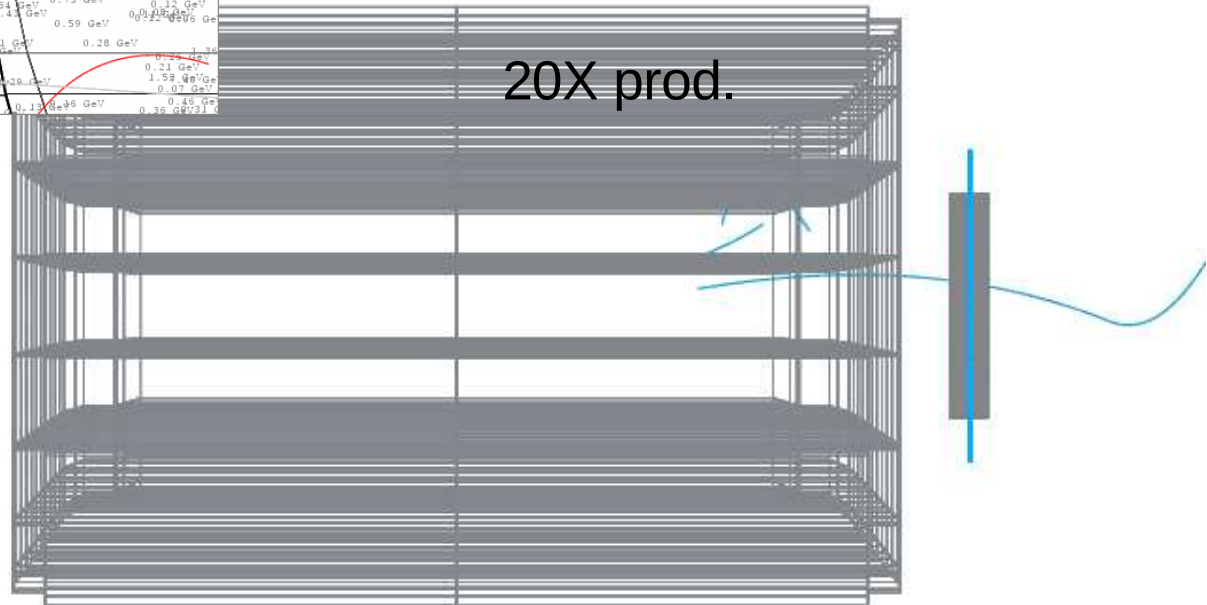
List of samples

- 22X: full simulation + BSC L1+ technical trigger
 - rfio:/castor/cern.ch/user/b/boudoul/220/BH/BSCTrigger/Alcareco/TkAlBeamHalo_1.root, ...
- 22X: filter based event selection
 - rfio:/castor/cern.ch/user/b/boudoul/220/Bh/Reco/TkAlBeamHalo_1_1.root, ...
- 20X sample (“reference sample”):
 - rfio:/castor/cern.ch/cms/store/mc/CSA08/TkBeamHalo/ALCARECO/STARTUP_V2_TkAlBeamHalo_v3/0017/7648E9B0-AF59-DD11-8269-001E0B487196.root, ...

Event displays



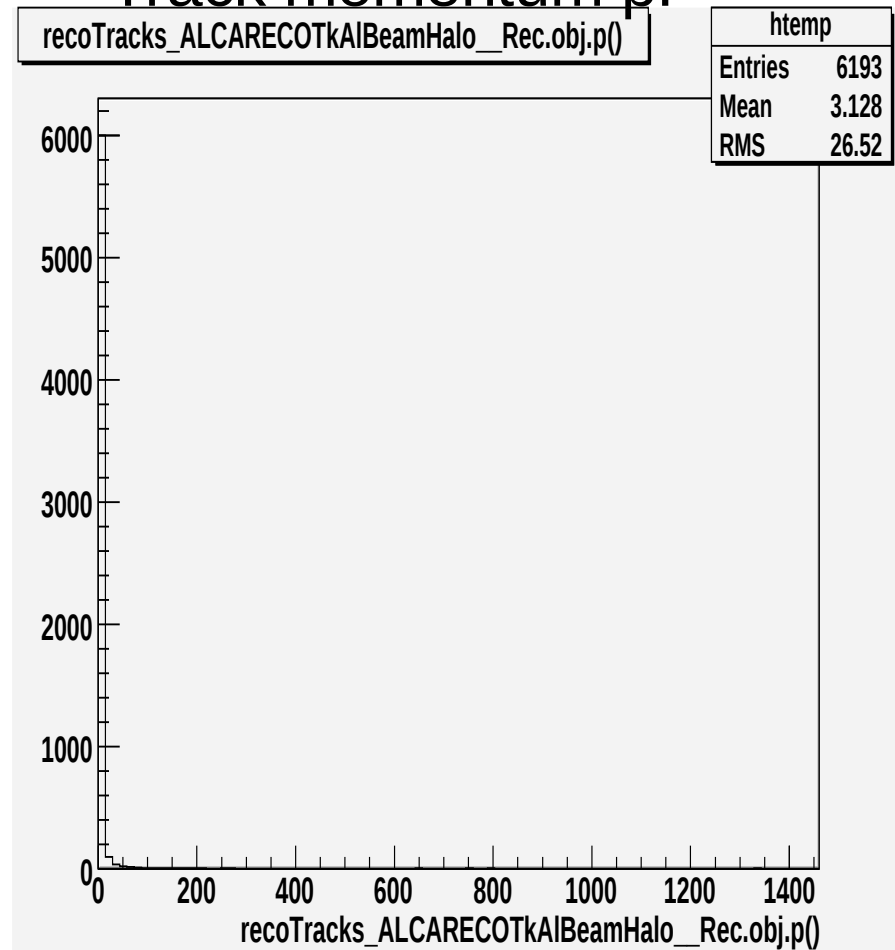
- By looking at the event display, 22X have a lot of soft tracks: a cut on minimum p was therefore introduced.



Distributions (no cuts)

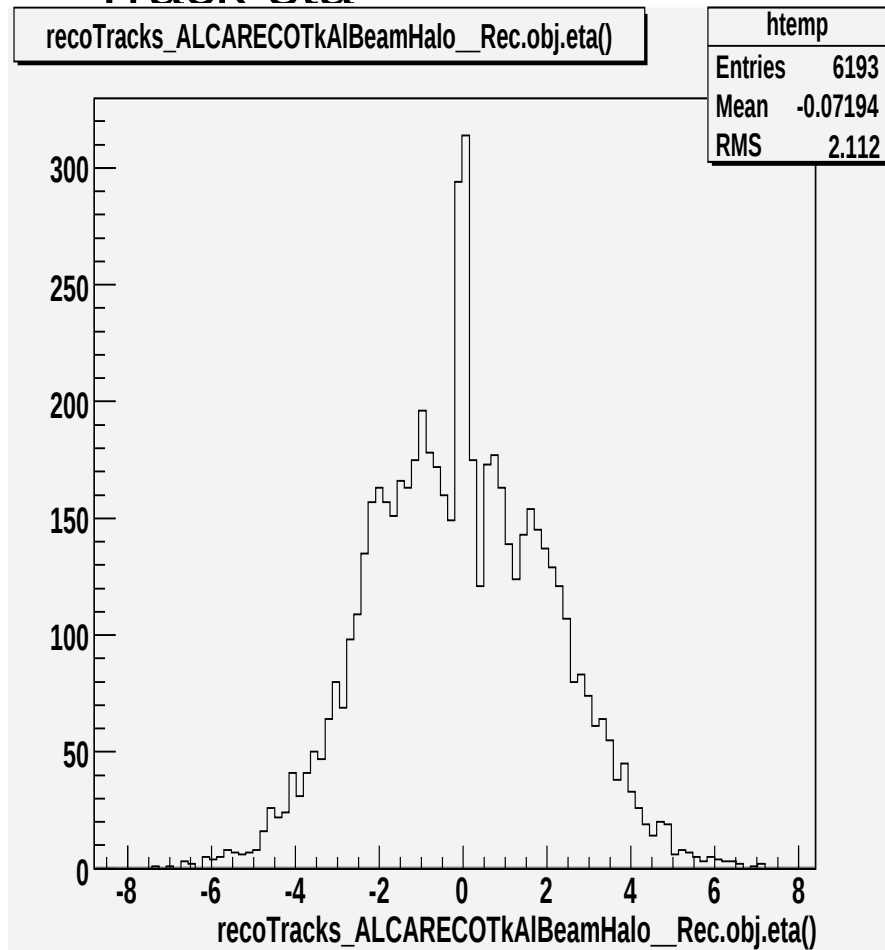
- From one of the MC files (filter case):
 - 210 events
 - 6193 tracks
 - ~30 tracks/event

- Track momentum p:

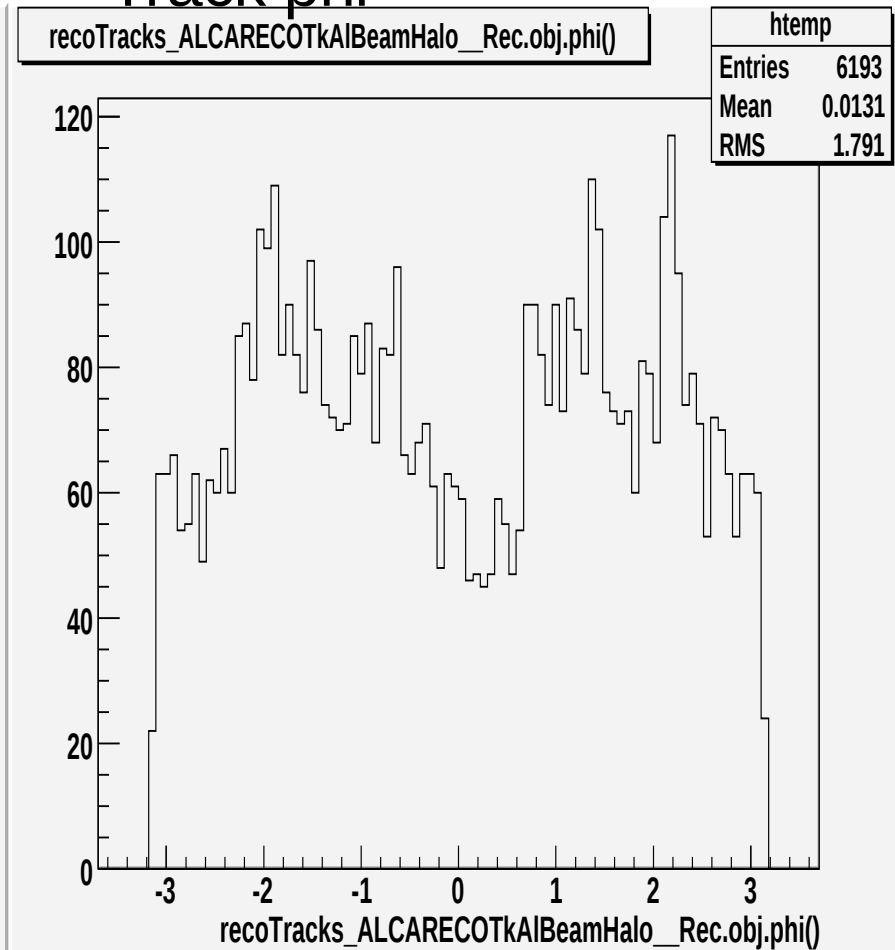


Distributions (no cuts)

- Track eta



- Track phi

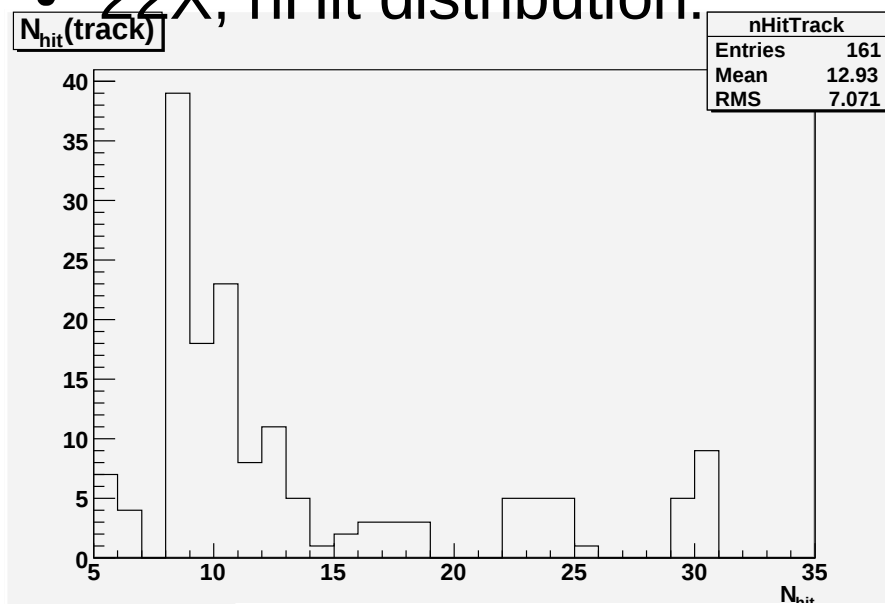


Track selection

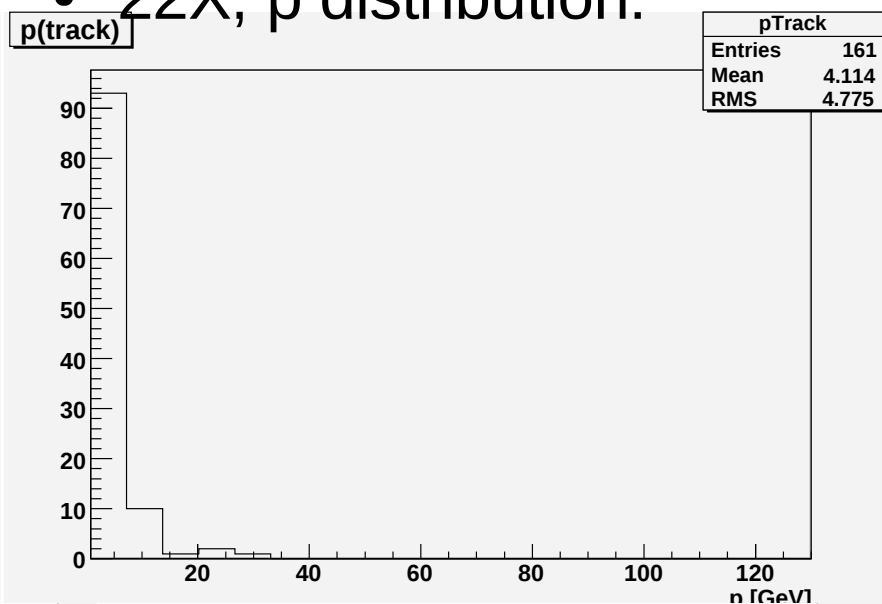
- Track collection: ALCARECOTkAlBeamHalo
- Track selection:
 - $p_{\text{Min}} = 1.$ (22X sample only)
 - $\eta_{\text{Min}} = -999.$ / $\eta_{\text{Max}} = +999.$
 - $n_{\text{HitMin}} = 8$ / $n_{\text{HitMin2D}} = 2$
 - $\chi^2_{\text{nMax}} = 50.$
 - $\text{minMultiplicity} = 1$
- Number of events: 57 (61873 in 20X)
- Nb. of selected tracks: 161 (21474 in 20X)
- Nb. of used tracks: 161 (21312 in 20X)

Distributions

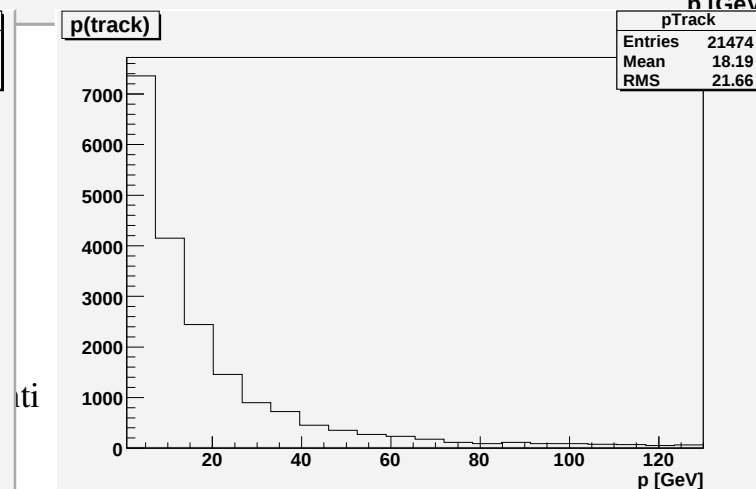
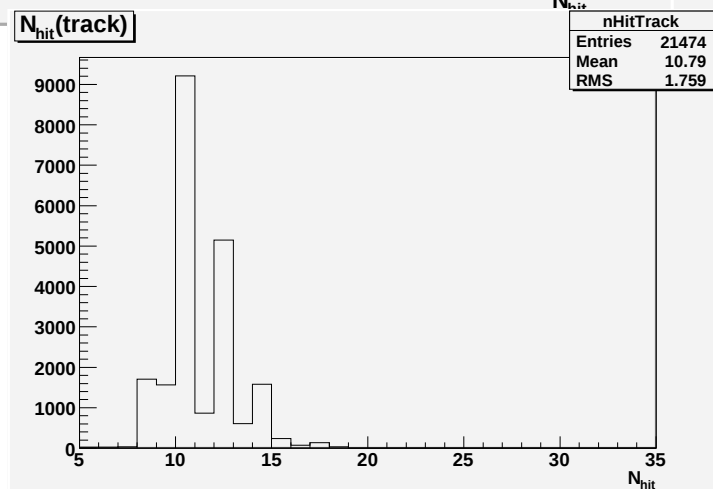
- 22X, nHit distribution:



- 22X, p distribution:



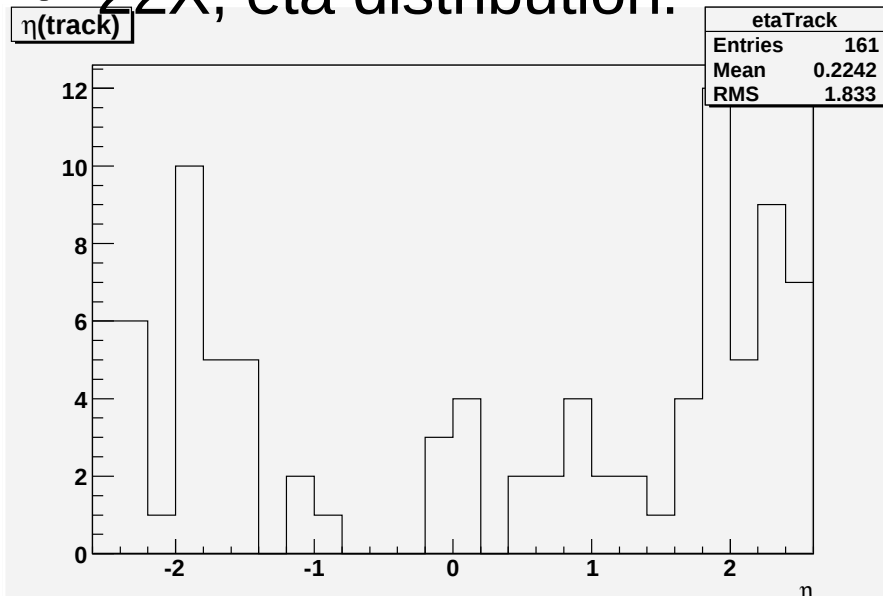
- 20X:



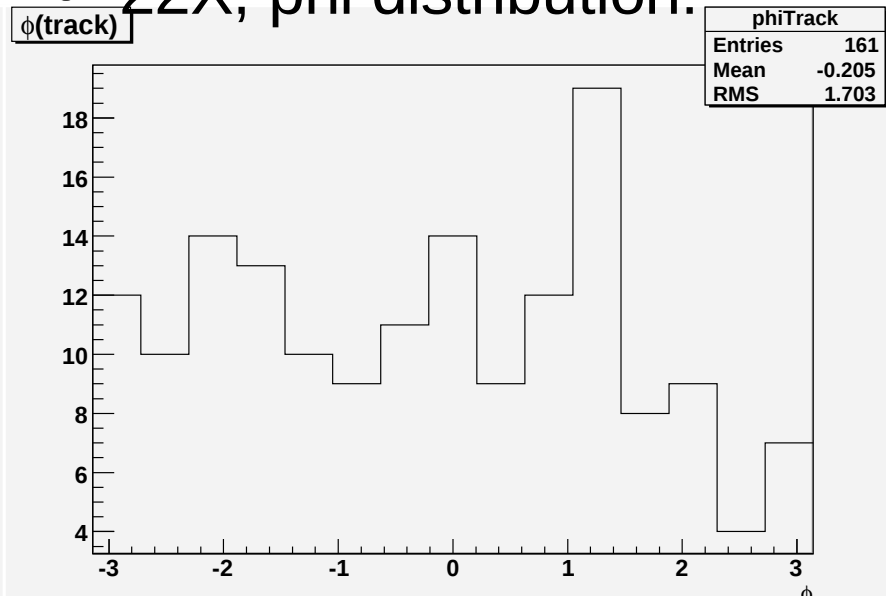
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Distributions

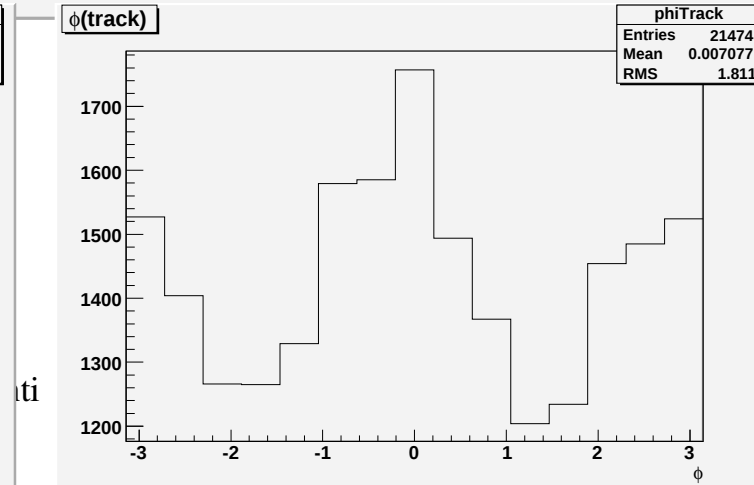
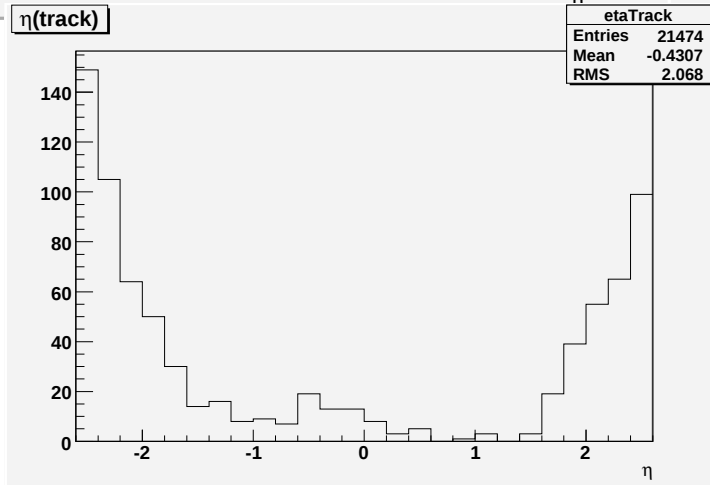
- 22X, eta distribution:



- 22X, phi distribution:



- 20X:



Comments (1)

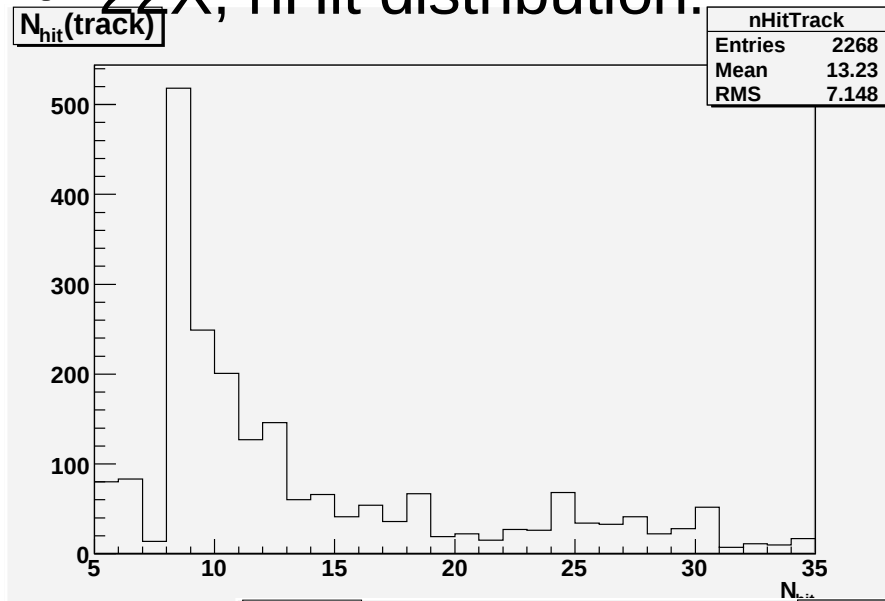
- After harder cleaning cuts, few tracks are left in the test production... so we cannot say much
- The number of tracks per event is still higher in 22X:
 - ~ 0.3 (20X)
 - ~ 3 (22X)
- Distributions for those tracks look anyway reasonable (maybe some cleaning still needed)
- The study has been done also on 22X “filter” sample:
 - better statistics (1966 events, 2268 tracks)
 - distributions are similar to the ones in previous pages (plots are in the backup)

Track selection (22X filter)

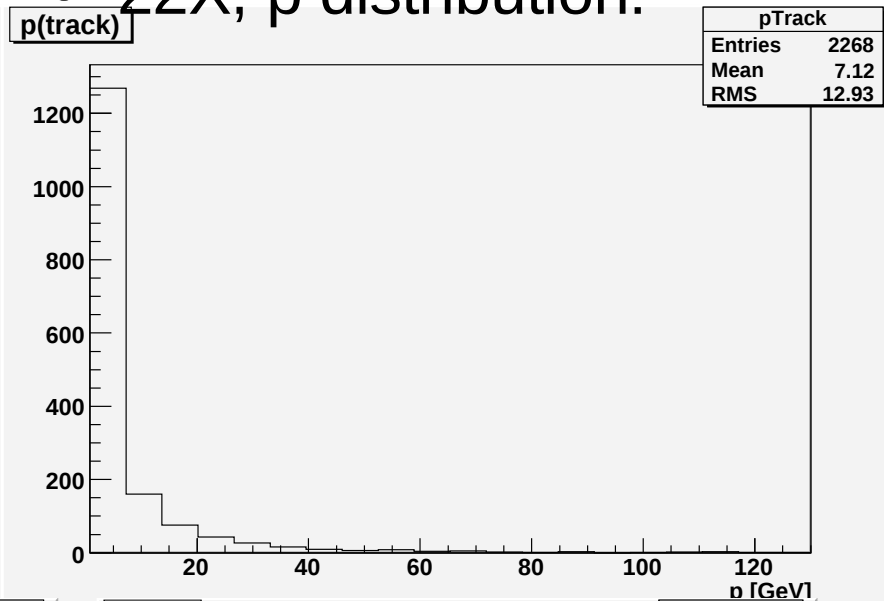
- Track collection: ALCARECOTkAlBeamHalo
- Track selection:
 - $p_{\text{Min}} = 1.$
 - $\eta_{\text{Min}} = -999.$ / $\eta_{\text{Max}} = +999.$
 - $n_{\text{HitMin}} = 8$ / $n_{\text{HitMin2D}} = 2$
 - $\chi^2_{\text{nMax}} = 50.$
 - $\text{minMultiplicity} = 1$
- Number of events: 1966
- Nb. of selected tracks: 2268
- Nb. of used tracks: 2242

New distributions (filter case)

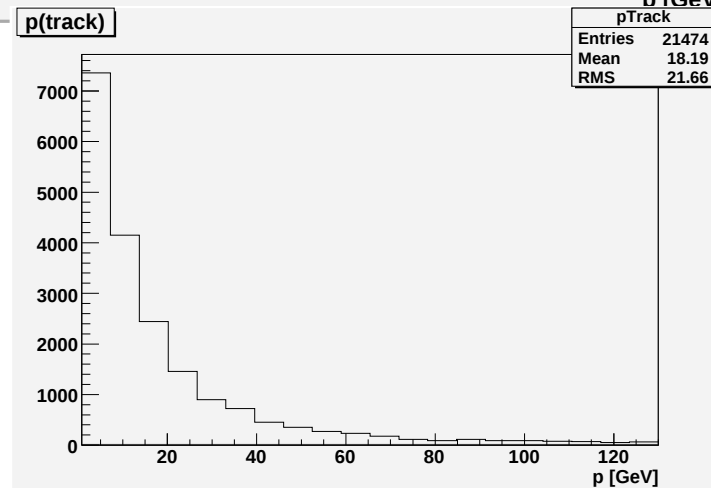
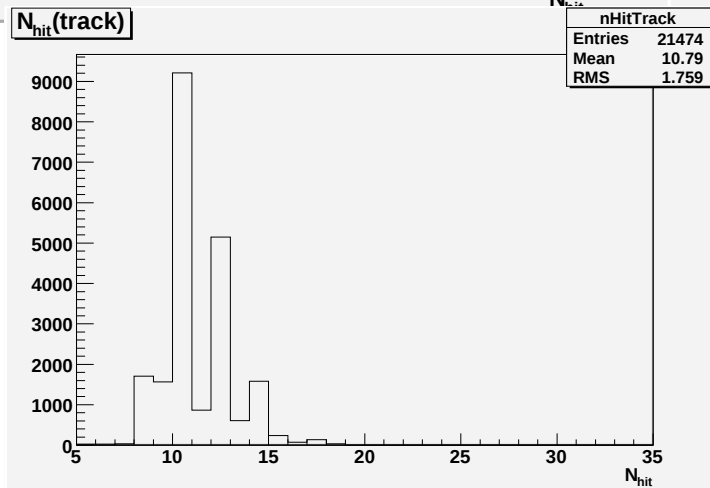
- 22X, nHit distribution:



- 22X, p distribution:

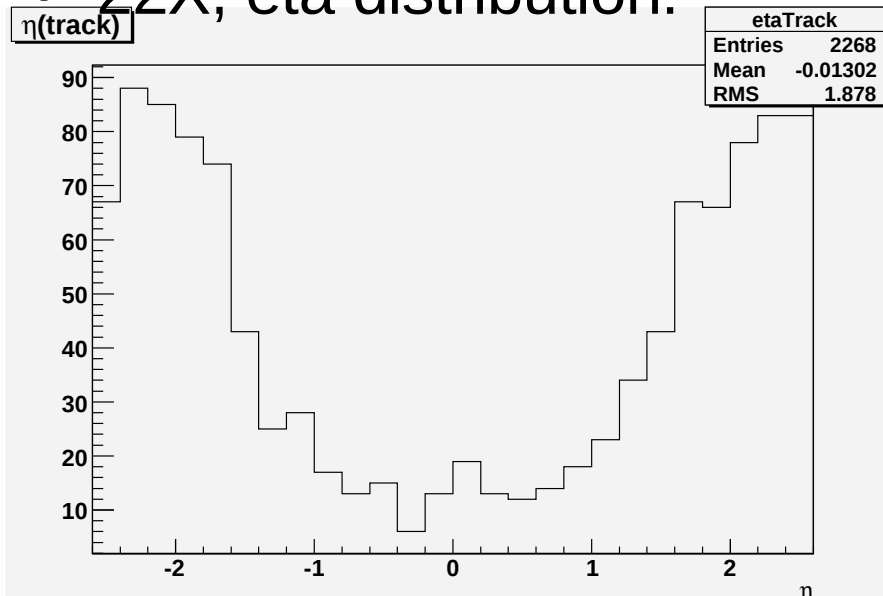


- 20X:

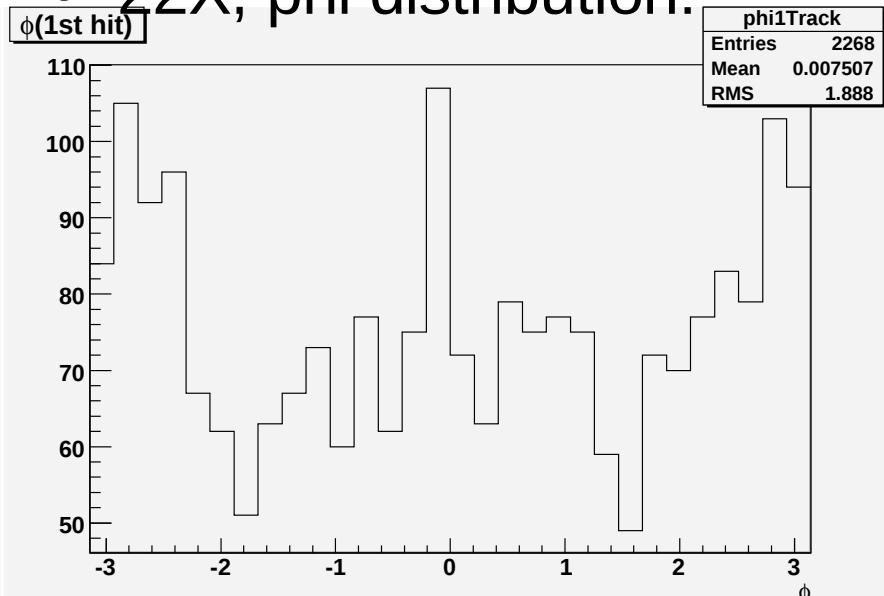


New distributions (filter case)

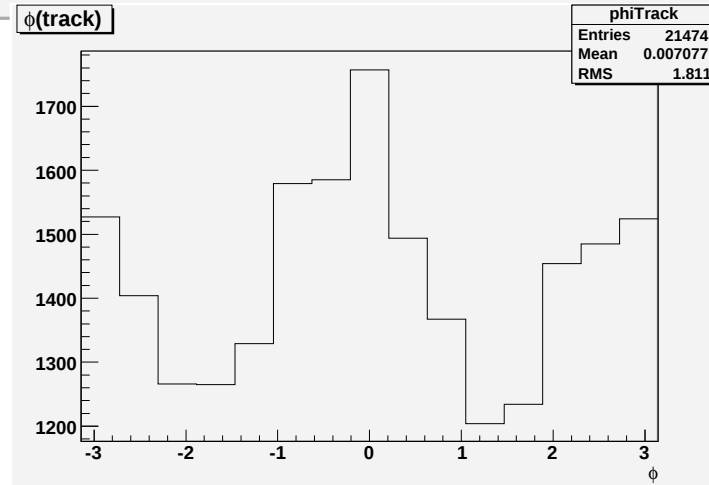
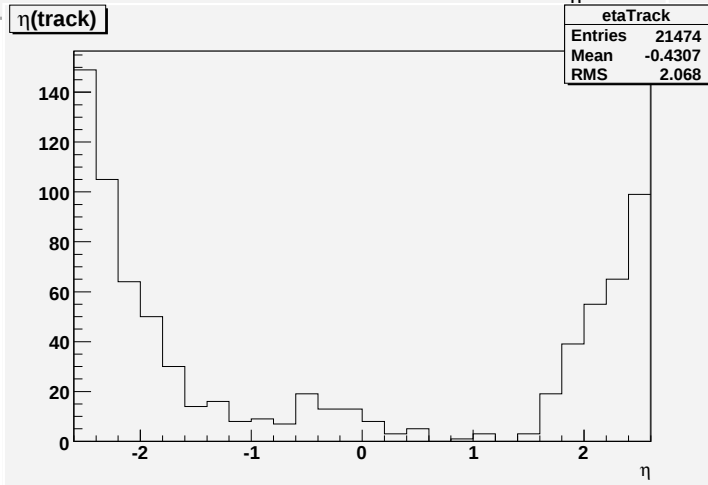
- 22X, eta distribution:



- 22X, phi distribution:



- 20X:



Comments (2)

- Distributions agree reasonably well in 22X and 20X
- The ratio tracks/event is still higher than in 20X, but less:
 - ~ 0.3 (20X)
 - ~ 3 (22X, BSC emulator)
 - ~ 1 (22X, filter)

Alignment with Beam Halo (20X)

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Alignment with beam halo

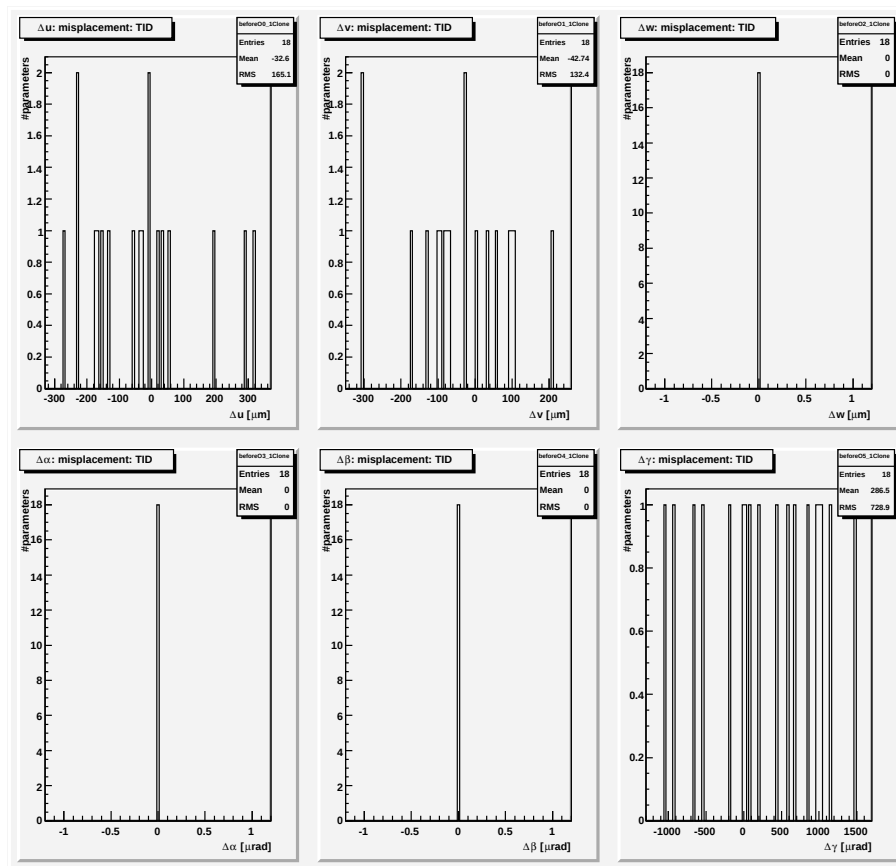
- Based on 20X beam halo Monte Carlo
 - still no usable newer beam halo MC
 - the statistics is limited: ~60k events
- Track collection: ALCARECOTkAlBeamHalo
- Track selection:
 - ptMin = 0.
 - etaMin = -999. / etaMax = +999.
 - nHitMin = 8 / nHitMin2D = 2
 - chi2nMax = 50.
 - minMultiplicity = 1
- Nb. of selected tracks: 22634 (22419 used by millepede)

Initial geometry and parameters

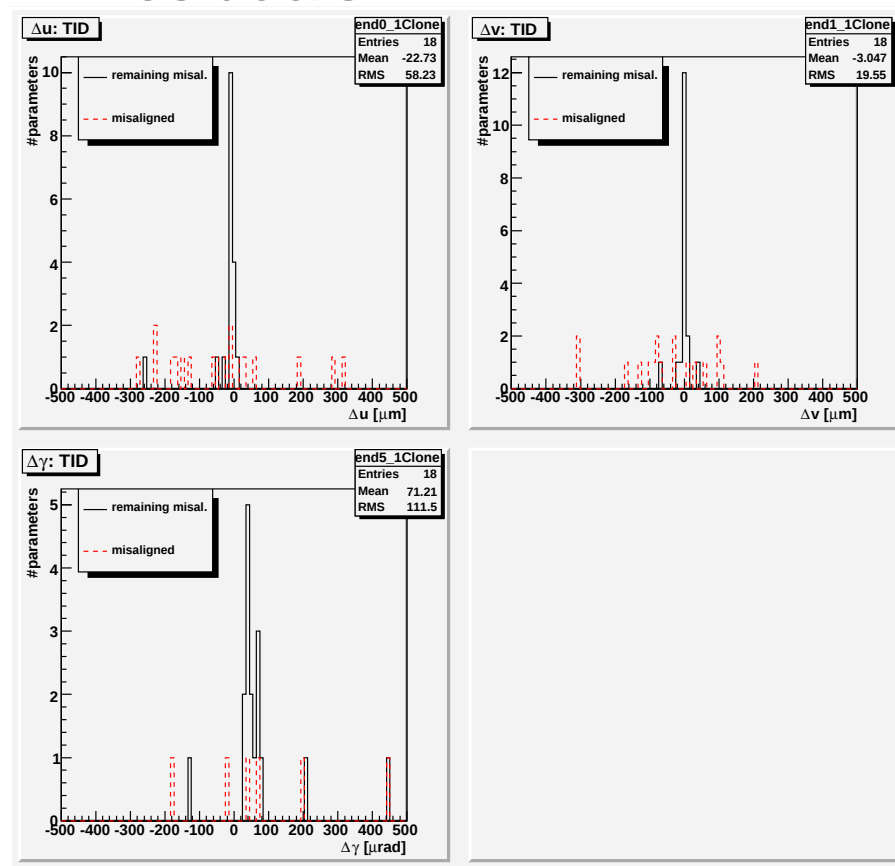
- Alignment is done of High level structures:
'TIDRingsLayers13,110001',
'TrackerTECDiskLayers11,cc000c',
'TrackerTECDiskLayers24,110001',
'TrackerTECDiskLayers55,cc000c',
'TrackerTECDiskLayers69,110001'
- Start from ideal geometry + custom misalignment
 - TIDRings & TECPetals as in 10pbScenario
 - TIDRings: 185 μm (u,v), 850 μrad (γ)
 - TECDisks: 70 μm (u,v), 30 μrad (γ)
 - No misalignment on TECDisk1 & TECDisk5
 - no misalignment applied on smaller structures, and on the barrel sub-detectors

TID Rings

- Misaligned geometry:

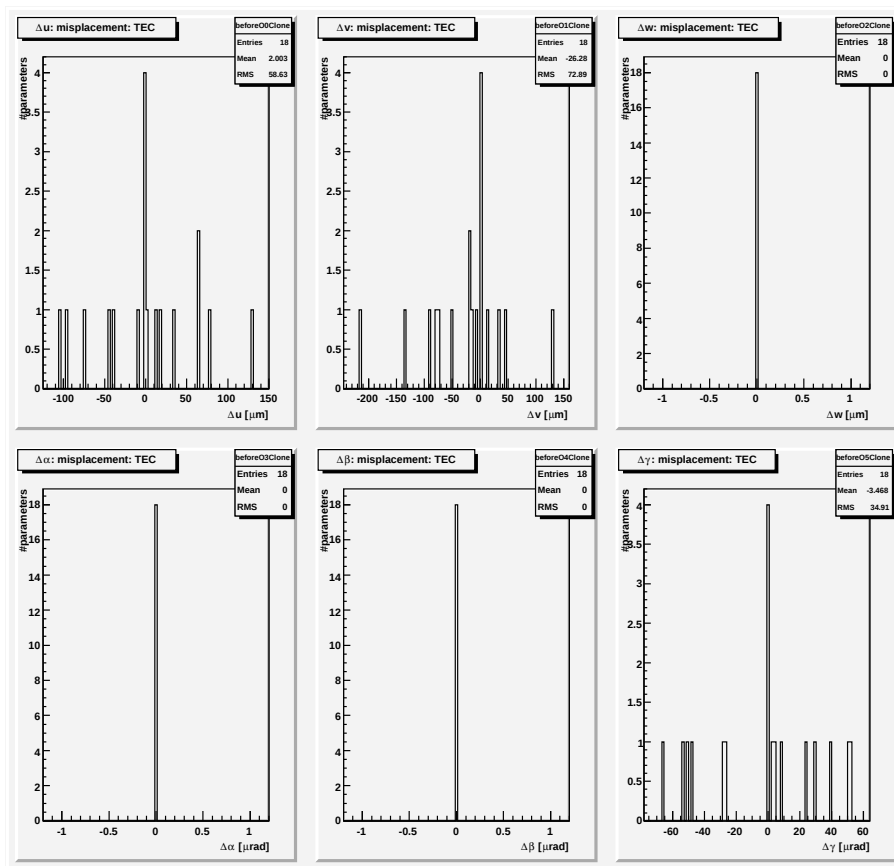


- Alignment parameter residuals:

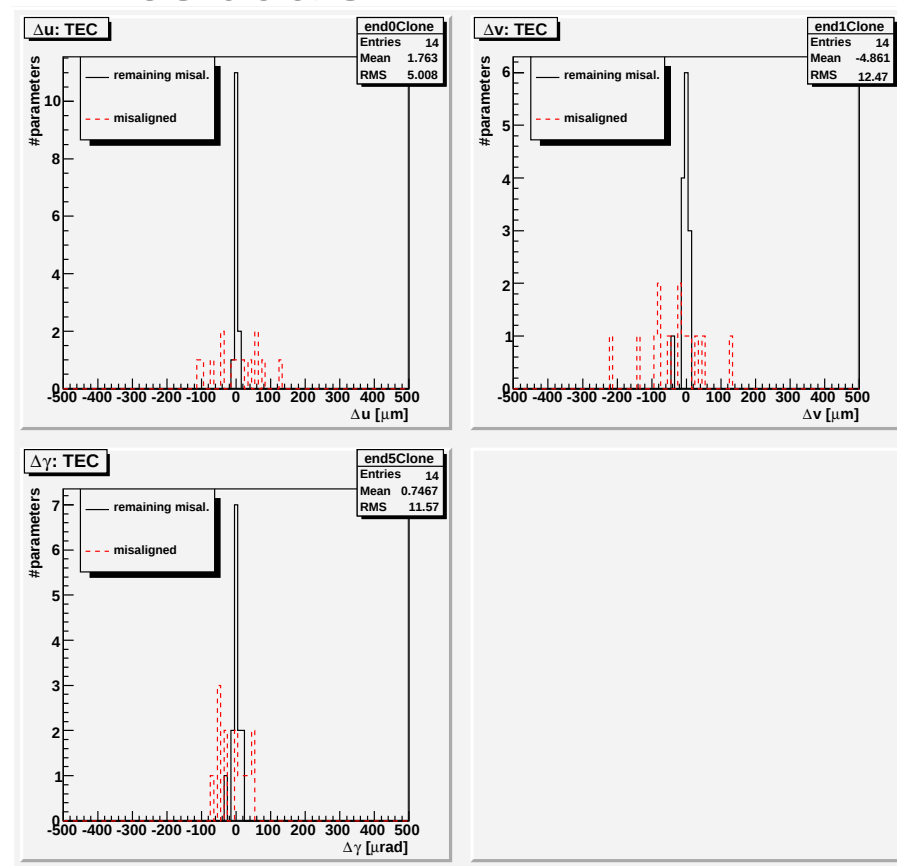


TEC Disks

- Misaligned geometry:



- Alignment parameter residuals:



Comments

- Alignment parameter residuals
 - TID: $\langle \Delta u \rangle = 58 \mu\text{m}$, $\langle \Delta v \rangle = 20 \mu\text{m}$, $\langle \Delta \gamma \rangle = 111 \mu\text{rad}$
 - TEC: $\langle \Delta u \rangle = 5 \mu\text{m}$, $\langle \Delta v \rangle = 12 \mu\text{m}$, $\langle \Delta \gamma \rangle = 12 \mu\text{rad}$
 - There some parameters left with large misalignment
 - For the TID, γ parameter is a bit shifted: $\langle \gamma \rangle = 70 \mu\text{rad}$
- In general, high-level endcap structures can be aligned with a small amount of beam halo events