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# TRACK-CLUSTER MATCHING ... AGAIN

TRACKING MEETING

NOV 18 2018



# TRACK-CLUSTER MATCHING

- Several recent merges (potentially) change track-cluster matching results
  - Fieldmap & detector
  - Extrapolator
  - MOUSE cuts on tracks
- Magnitude of the changes also depends on what sample you assess (e.g. FEEs vs low-momentum)
- With new master finally created, changes can be assessed more reliably
- Changes for 2016 V0s are bigger than I had thought (oops!)

# TRACK-CLUSTER MATCHING

- Track-cluster matching (TrackClusterMatcher, called by ReconParticleDriver) uses TrackState@ECal, created by TrackDataDriver using TrackUtils extrapolator
- Matching uses cluster-track residuals parameterization
- Results change **fairly little** with extrapolator/fieldmap, because matching criterion is so loose
- But, could consider tightening criterion and re-doing parameterization (again)

hps-recon ▶ src/main/java ▶ org.hps.recon.utils ▶ TrackClusterMatcher ▶

```

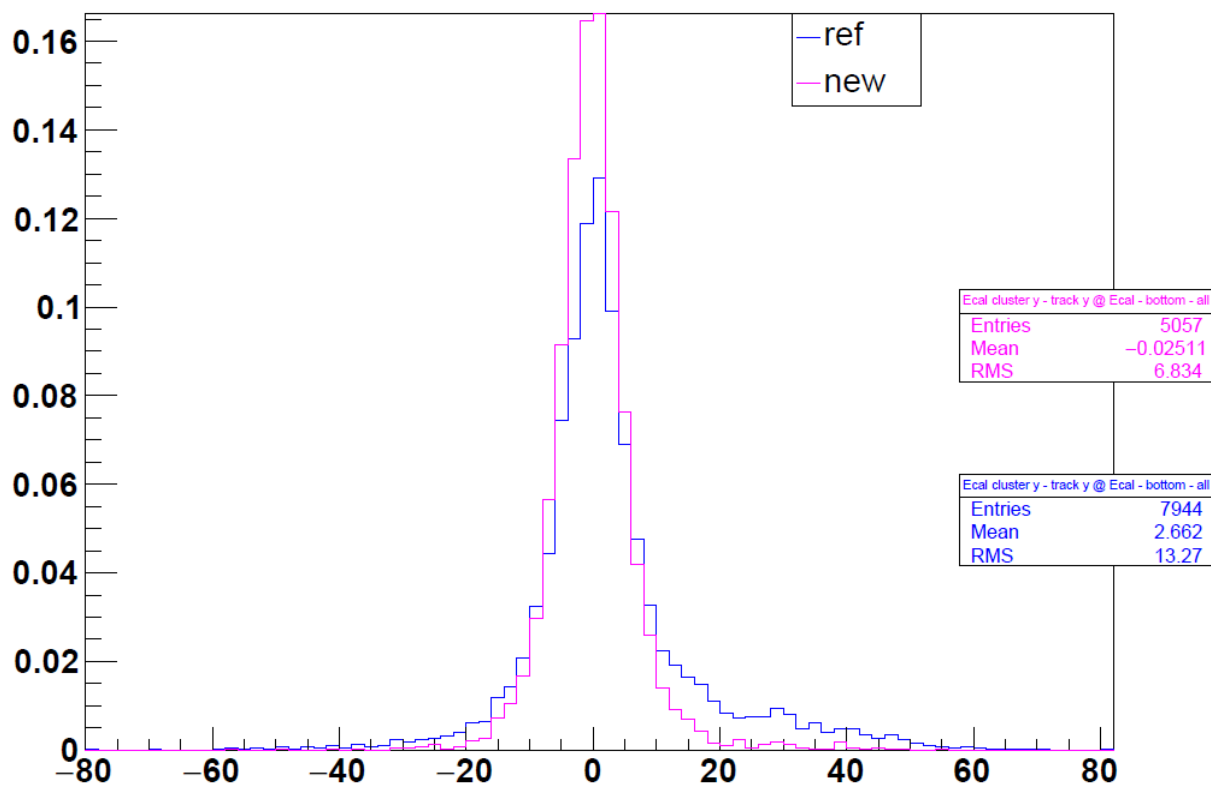
/**
 * These cuts are set at +/- 4 sigma extracted from Gaussian fits to the
 * track-cluster residual distributions. The data used to determine these
 * limits is a pass 2 test file (t2.6) using run 5772.
 */
private double topClusterTrackMatchDeltaXLow = -14.5; // mm
private double topClusterTrackMatchDeltaXHigh = 23.5; // mm
private double bottomClusterTrackMatchDeltaXLow = -19.5; // mm
private double bottomClusterTrackMatchDeltaXHigh = 16.5; // mm

private double topClusterTrackMatchDeltaYLow = -21.5; // mm
private double topClusterTrackMatchDeltaYHigh = 28; // mm
private double bottomClusterTrackMatchDeltaYLow = -28; // mm
private double bottomClusterTrackMatchDeltaYHigh = 24; // mm

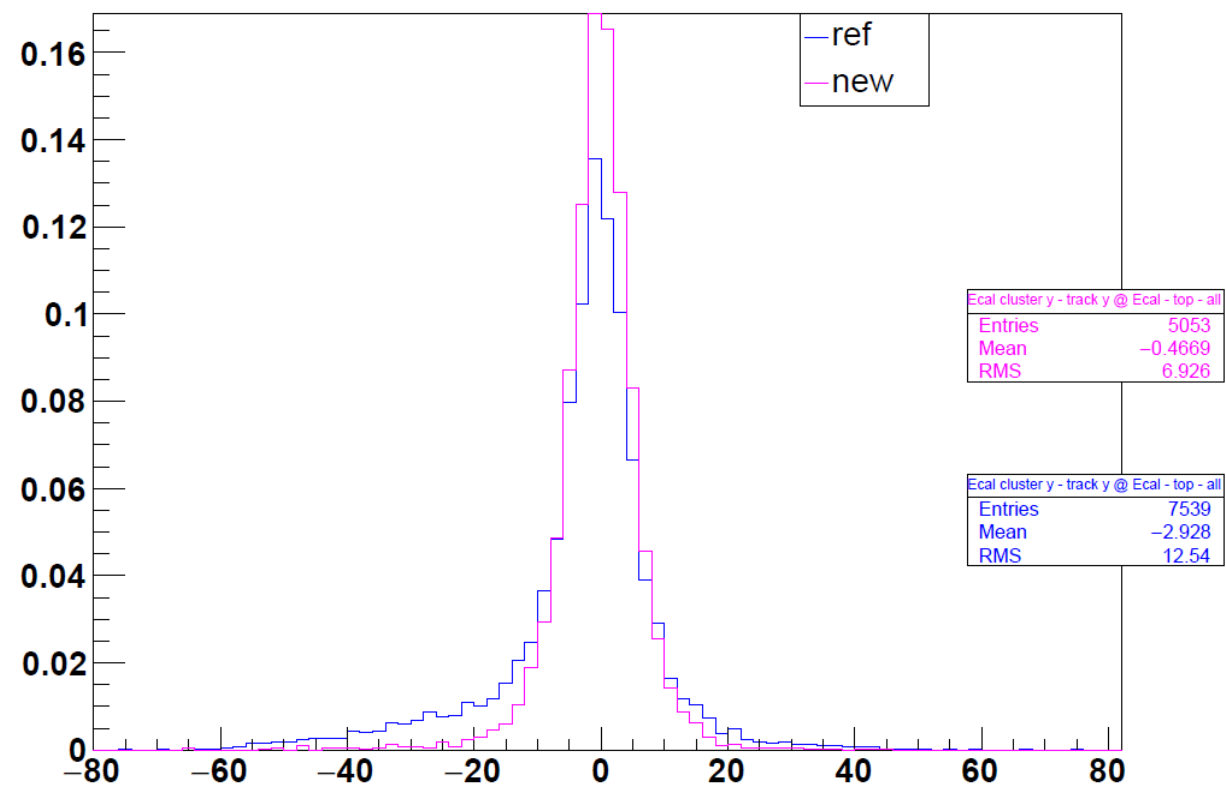
/**
 * Rafo's parameterization of cluster-seed x/y position residuals as function of energy.
 *
 * Derived using GBL/seed tracks, non-analytic extrapolation, uncorrected cluster positions,
 * and EngRun2015-Nominal-v4-4-fieldmap detector.
 *
 * f = p0+e*(p1+e*(p2+e*(p3+e*(p4+e*p5)))
 */
private static final double dxMeanTopPosiGBL[] = { 6.67414, -9.57296, 5.70647, 27.4523, -28.110
private static final double dxSigmTopPosiGBL[] = { 52.6437, -478.805, 1896.73, -3761.48, 3676.7
private static final double dxMeanBotPosiGBL[] = { 4.13802, 15.8887, -74.2844, -9.78944, 308.54
private static final double dxSigmBotPosiGBL[] = { 37.6513, -294.851, 1002.15, -1639.08, 1228.0

```

Ecal cluster y - track y @ Ecal - bottom - all



Ecal cluster y - track y @ Ecal - top - all



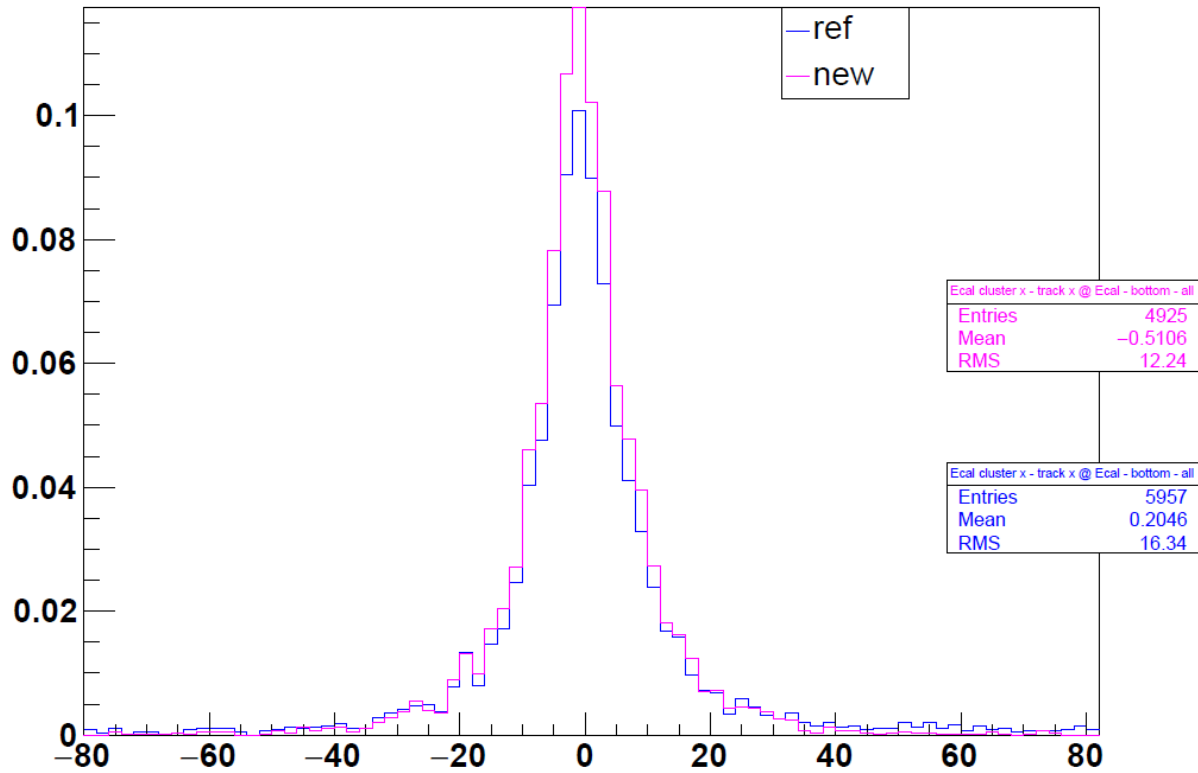
new = master from Nov 16

ref = master from Sept 4

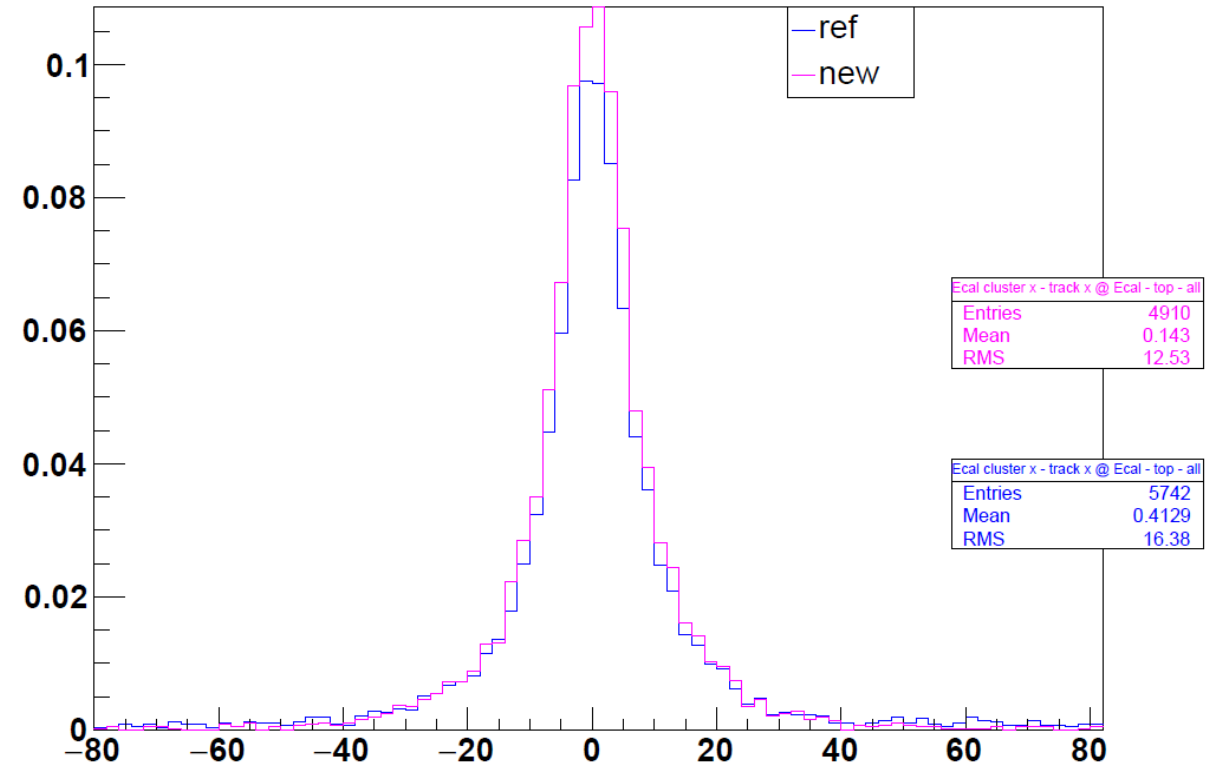
Note, tails have vanished



Ecal cluster x - track x @ Ecal - bottom - all



Ecal cluster x - track x @ Ecal - top - all




new = master from Nov 16  
 ref = master from Sept 4

Note, RMS has shrunk



# CONCLUSIONS

- Once 10% of the 2016 data is cooked using the new master, perhaps Rafo should redo the parameterization before the full cooking?
- iss331 (PR 335) makes it easier to change parameterization, by putting it in a resource file rather than hard-coding

 Showing **4 changed files** with 215 additions and 303 deletions.

 [recon/src/main/java/org/hps/recon/particle/ReconParticleDriver.java](#)

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 [recon/src/main/java/org/hps/recon/utils/TrackClusterMatcher.java](#)

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 [recon/src/main/resources/org/hps/recon/utils/ClusterParameterization2015.dat](#)

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 [recon/src/main/resources/org/hps/recon/utils/ClusterParameterization2016.dat](#)