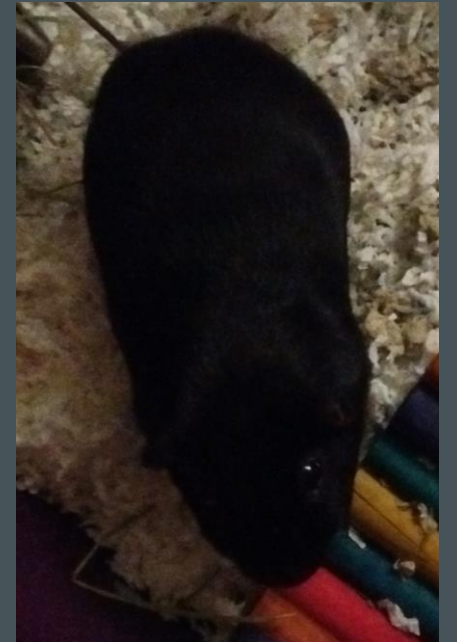# TRACK SEEDING CUTS

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SEPTEMBER 13 2017

github issue 126

(formerly "Three Point Helix Check error")

(my new helper for getting out of rabbit-holes)

MAKING SEEDING CUTS GREAT AGAIN

- org.lcsim.recon.tracking.seedtracker.FastCheck ►ThreePointHelixCheck
  at triplet-finding stage: current code doesn't actually cut out any seeds

  - For each of the 3 hits, calculates contribution to *z error* ← [lcsim z(hps y)]

    ```
    dztot += _nsig * Math.sqrt(hit.getCovMatrix()[5]);
    ```

  - Then
    ```
    // Add multiple scattering error here - for now, just set it to 1 mm
    dztot += 1.;  dztot += _nsig * MSerror;
    ```

  - Compares *total z error* to *(predicted – actual) z position* of middle hit

    ```
    if (Math.abs(zpred - z[1]) > dztot) return false;
    ```
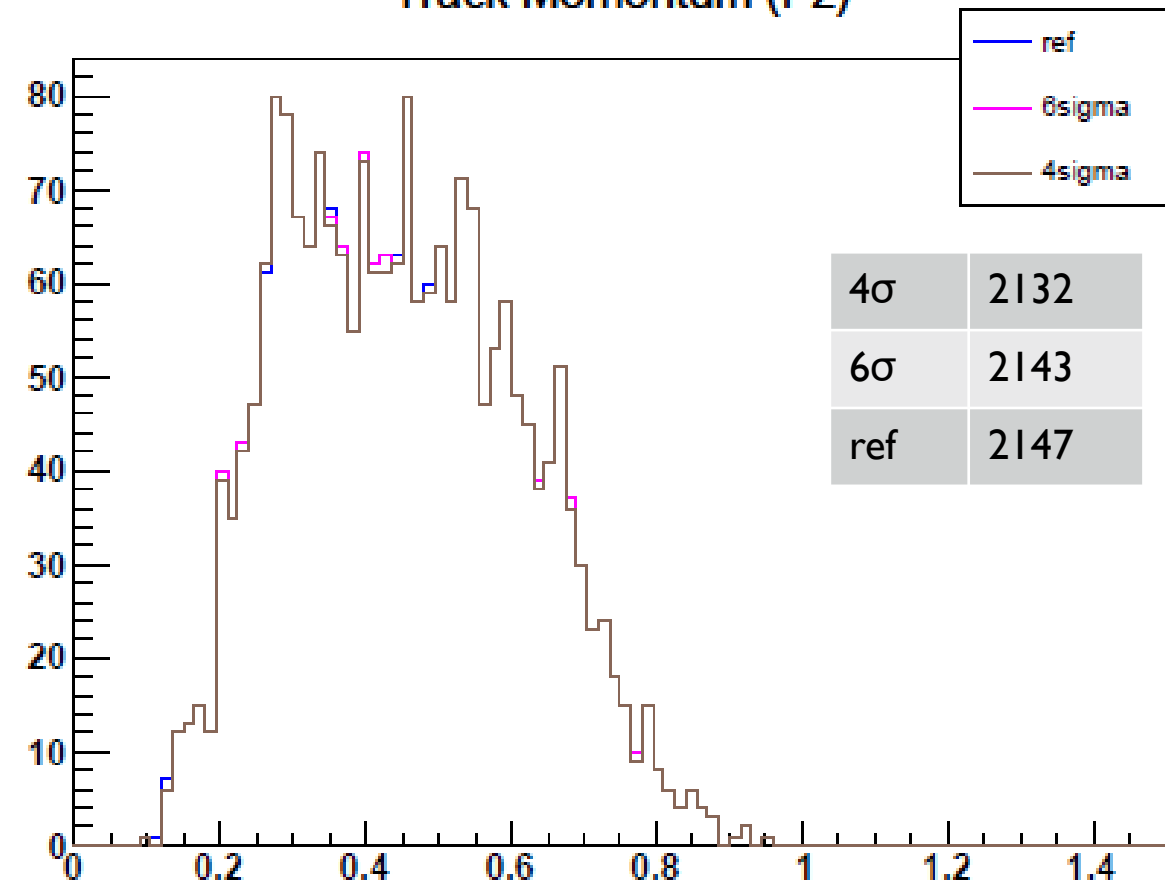   ← [currently never happens]

- Could skip the check (to still keep all seeds), *or* use seeding cuts with proper

  - Hit contribution to z error (value from un-corrected covariance matrix is too big)

  - MSerror function

  - Value of _nsig (default was 10)

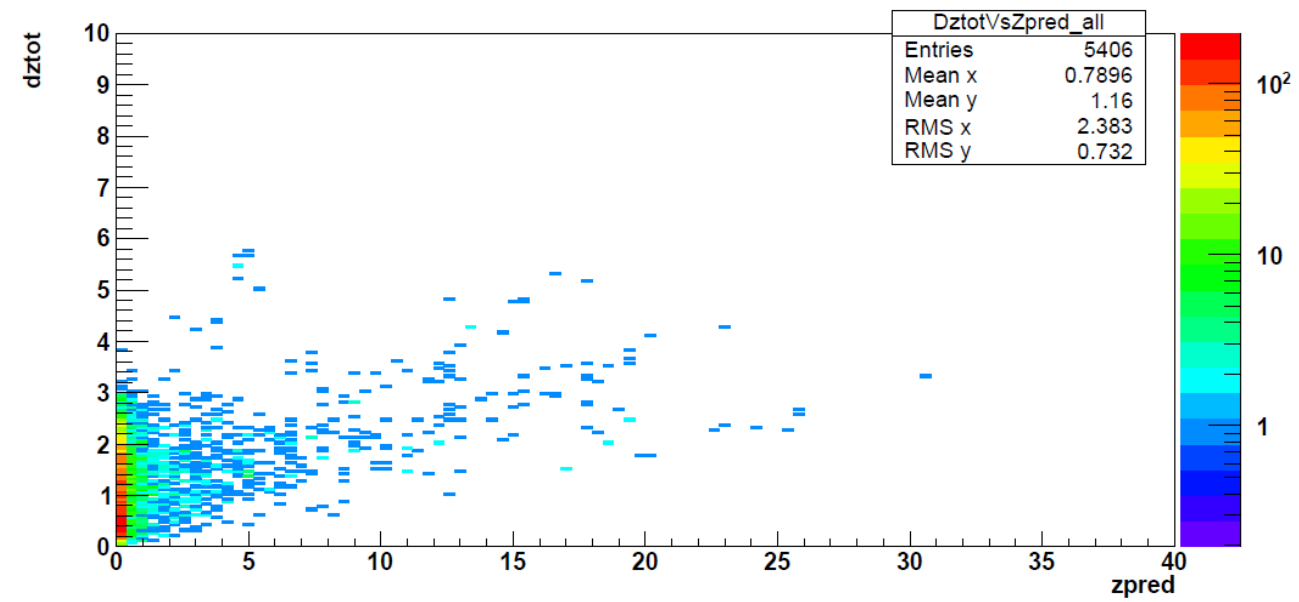 - Addition of hit contributions and MSerror in quadrature (not linearly)
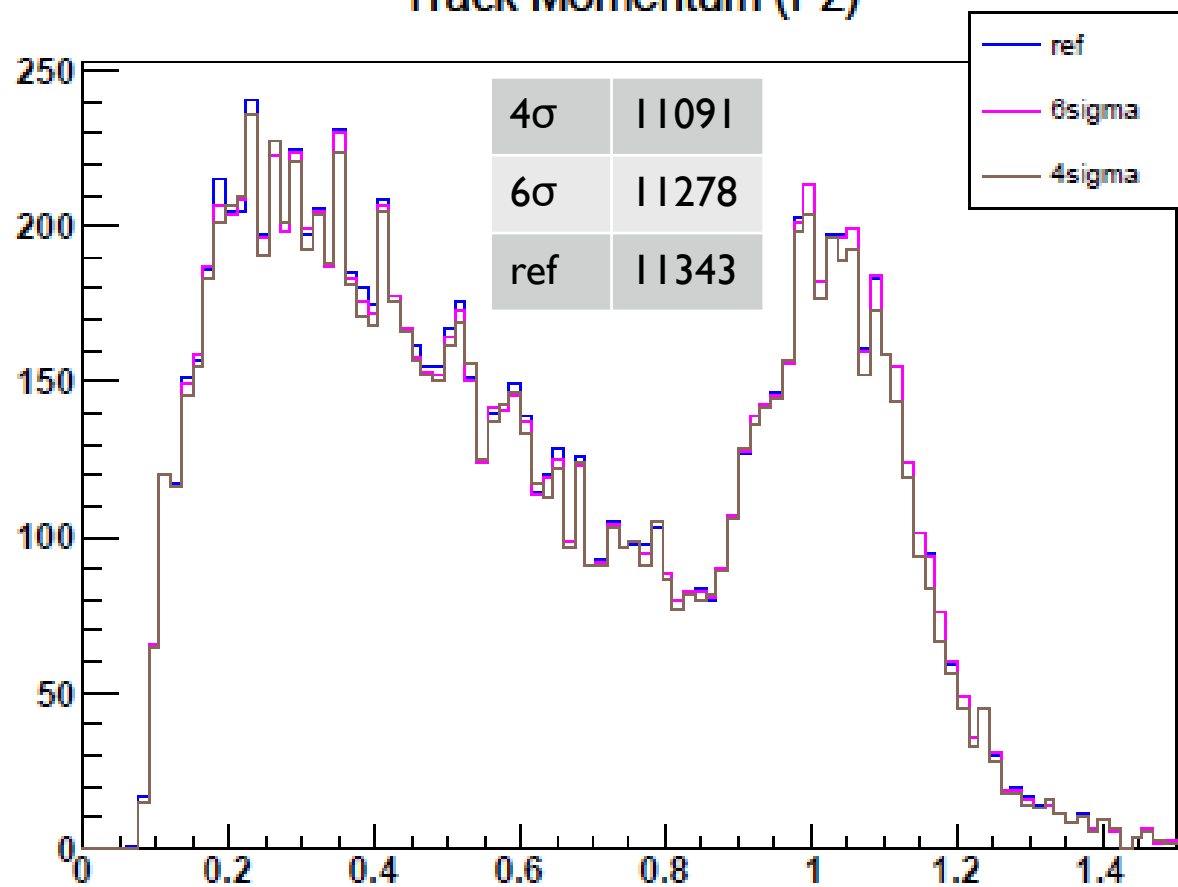
2

Final tracks:

Track Momentum (Pz)

4σ	2132
6σ	2143
ref	2147

Seeds:
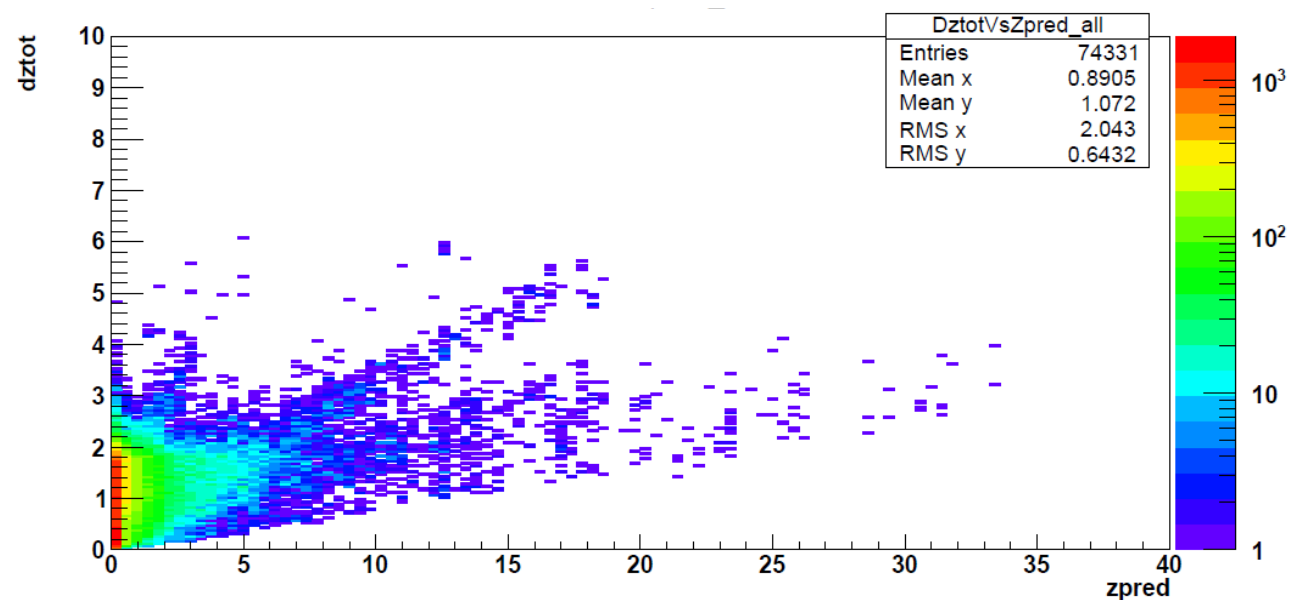
Final tracks:

Seeds:

RUN 5772 DATA

Final tracks:

Track Chi2
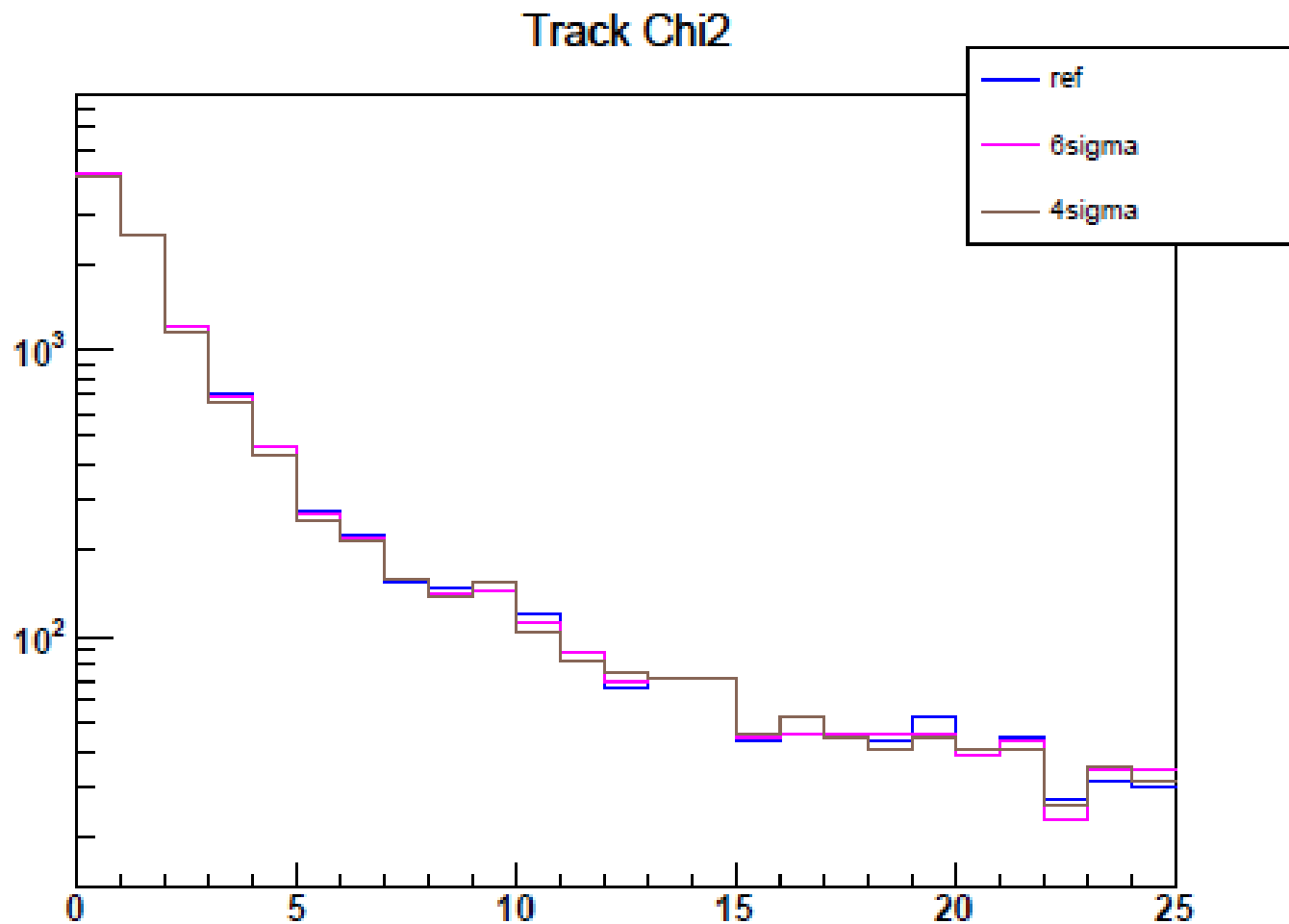
Seeds:

nsig	Seeds total	Seeds failed	Tracking strategy
4σ	74331	16165	123
6σ	63385	12241	345

RUN 5772 DATA

⊟ 🐾 org.hps.recon.tracking.TrackerReconDriver.**process** (org.lcsim.event.EventHeader)	31,158 ms
⊟ 🐾 org.lcsim.util.Driver.**process** (org.lcsim.event.EventHeader)	31,150 ms
⊟ 🐾 org.lcsim.util.Driver.**processChildren** (org.lcsim.event.EventHeader)	31,150 ms
⊟ 🐾 org.lcsim.util.Driver.**doProcess** (org.lcsim.event.EventHeader)	31,149 ms
⊟ 🐾 org.hps.recon.tracking.SeedTracker.**process** (org.lcsim.event.EventHeader)	31,148 ms
⊟ 🐾 org.lcsim.recon.tracking.seedtracker.SeedTrackFinder.**FindTracks** (org.lcsim.recon.tracking.seedtracker	29,259 ms
⊞ 🐾 org.lcsim.recon.tracking.seedtracker.ConfirmerExtender.**Extend** (org.lcsim.recon.tracking.seedtrack	19,600 ms
⊞ 🐾 org.lcsim.recon.tracking.seedtracker.ConfirmerExtender.**Confirm** (org.lcsim.recon.tracking.seedtrac	5,048 ms
⊞ 🐾 org.lcsim.recon.tracking.seedtracker.HelixFitter.**FitCandidate** (org.lcsim.recon.tracking.seedtracker	3,995 ms
⊞ 🐾 org.hps.recon.tracking.FastCheck.**ThreePointHelixCheck** (org.lcsim.fit.helicaltrack.HelicalTrackHit,	431 ms

no cut

⊟ 🐾 org.hps.recon.tracking.TrackerReconDriver.**process** (org.lcsim.event.EventHeader)	28,598 ms
⊟ 🐾 org.lcsim.util.Driver.**process** (org.lcsim.event.EventHeader)	28,591 ms
⊟ 🐾 org.lcsim.util.Driver.**processChildren** (org.lcsim.event.EventHeader)	28,590 ms
⊟ 🐾 org.lcsim.util.Driver.**doProcess** (org.lcsim.event.EventHeader)	28,589 ms
⊟ 🐾 org.hps.recon.tracking.SeedTracker.**process** (org.lcsim.event.EventHeader)	28,588 ms
⊟ 🐾 org.lcsim.recon.tracking.seedtracker.SeedTrackFinder.**FindTracks** (org.lcsim.recon.tracking.seedtracker.S	26,759 ms
⊞ 🐾 org.lcsim.recon.tracking.seedtracker.ConfirmerExtender.**Extend** (org.lcsim.recon.tracking.seedtracker	18,229 ms
⊞ 🐾 org.lcsim.recon.tracking.seedtracker.ConfirmerExtender.**Confirm** (org.lcsim.recon.tracking.seedtracke	4,414 ms
⊞ 🐾 org.lcsim.recon.tracking.seedtracker.HelixFitter.**FitCandidate** (org.lcsim.recon.tracking.seedtracker.S	3,448 ms
⊞ 🐾 org.hps.recon.tracking.FastCheck.**ThreePointHelixCheck** (org.lcsim.fit.helicaltrack.HelicalTrackHit, o	490 ms

6 sigma