INVESTIGATING TRACK CHI-SQUARED

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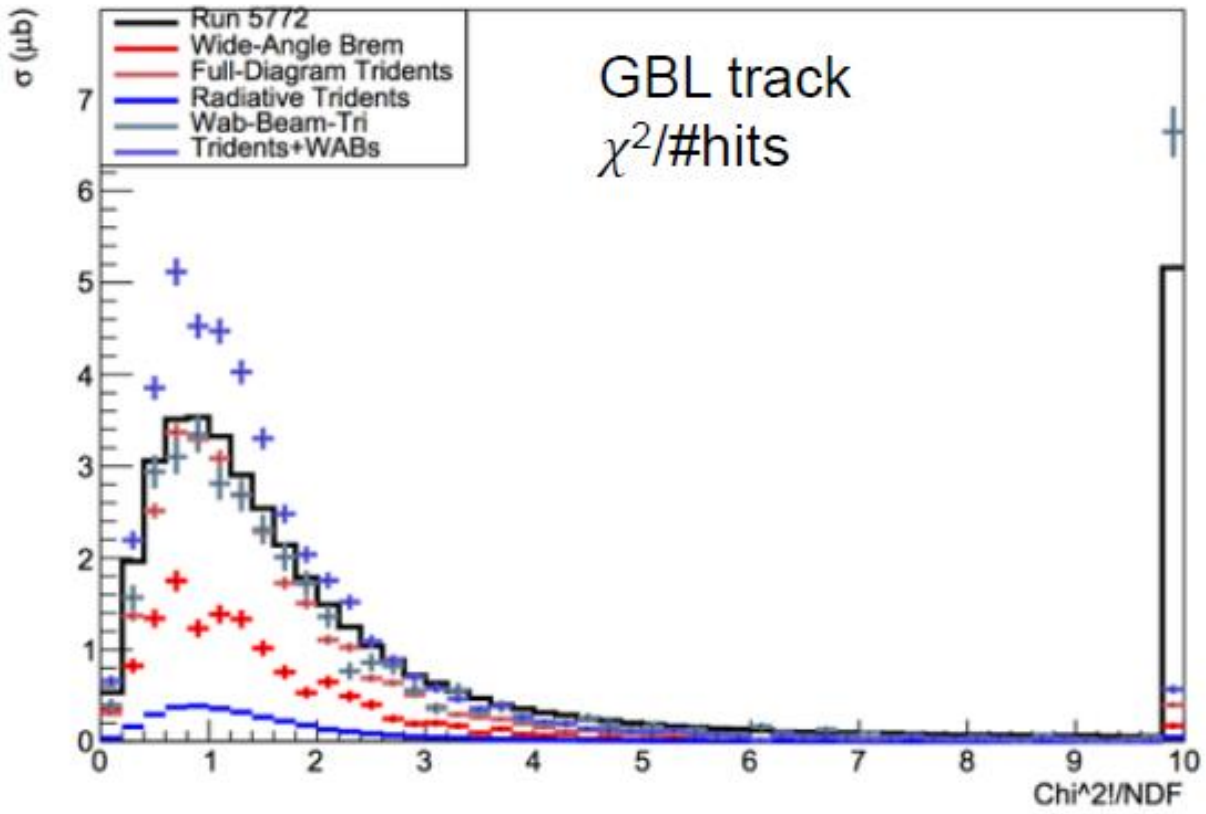
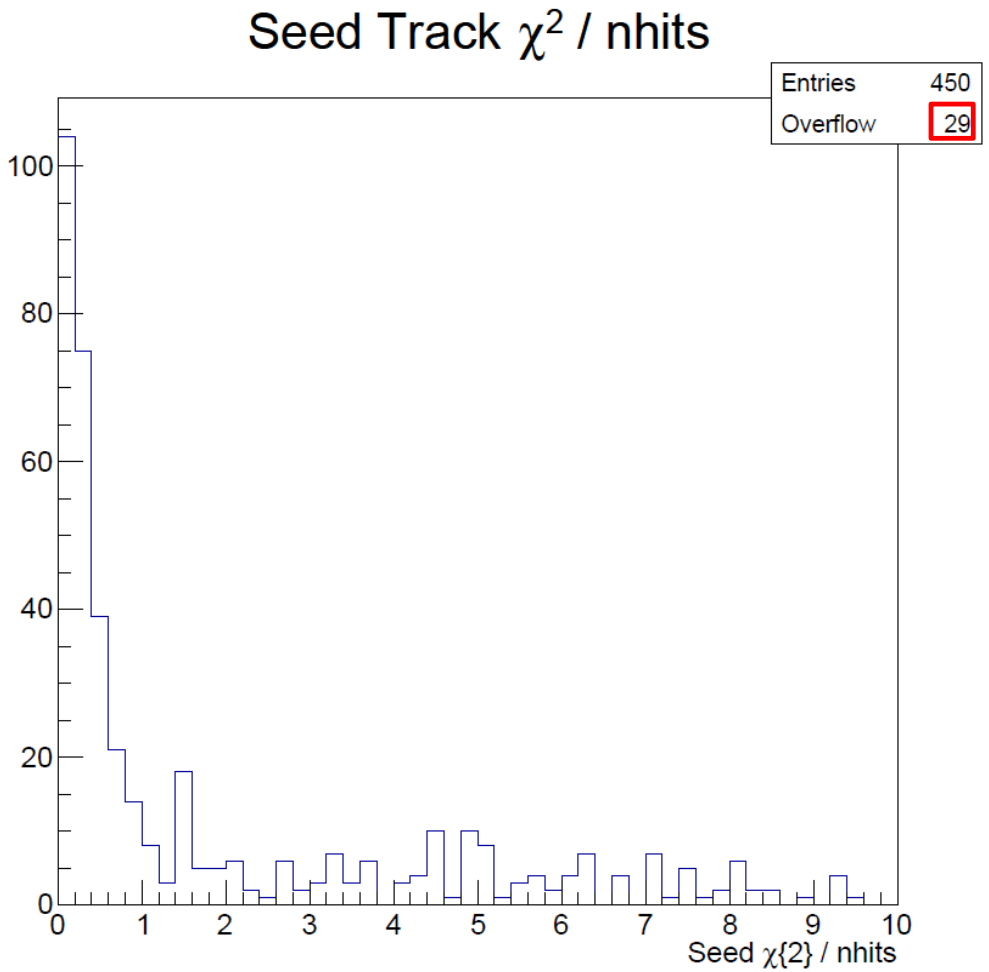
MATT'S RABBIT-HOLE (@ COLLABORATION MTG)

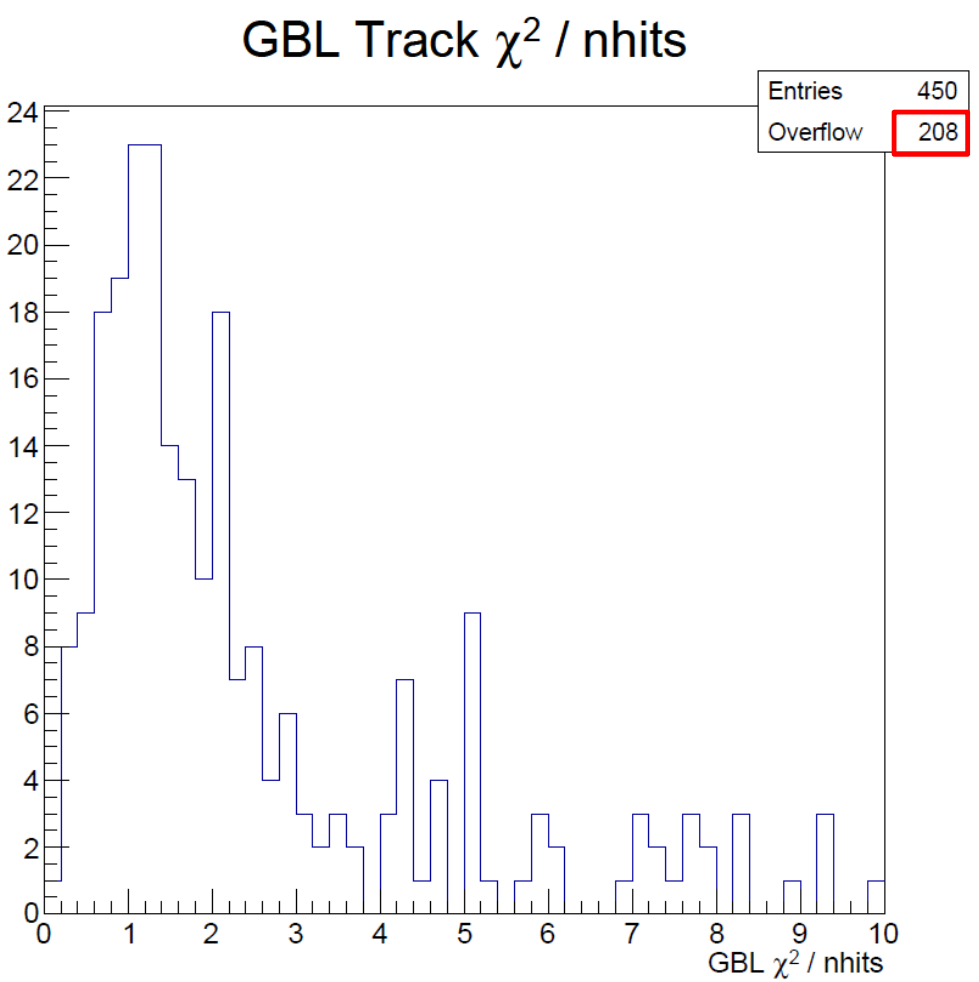
- Analysis performed using DSTs:
  - Data, tweakpass6: run5772.1* (111/471 files)
  - MC, tweakpass7: WAB, tritrig, RAD, wab-beam-tri
- Cuts:
  - top/bottom clusters within 2ns, with tracks matched
  - track momentum $0.05 \times E_{beam} < p < 1.1 \times E_{beam}$
  - track-cluster relative time <5.8ns



- Large χ^2/DOF overflow bin for Data, Wab-Beam-Tri ?!
- Hypothesis: Overflow bin composed of Beam tracks?
  - GBL is doing its job by identifying these as lousy?
  - These were OK in SeedTracker?
  - These have large GBL kinks?
- Need to test this hypothesis!

GBL VS SEEDTRACKER (WAB-BEAM-TRI)



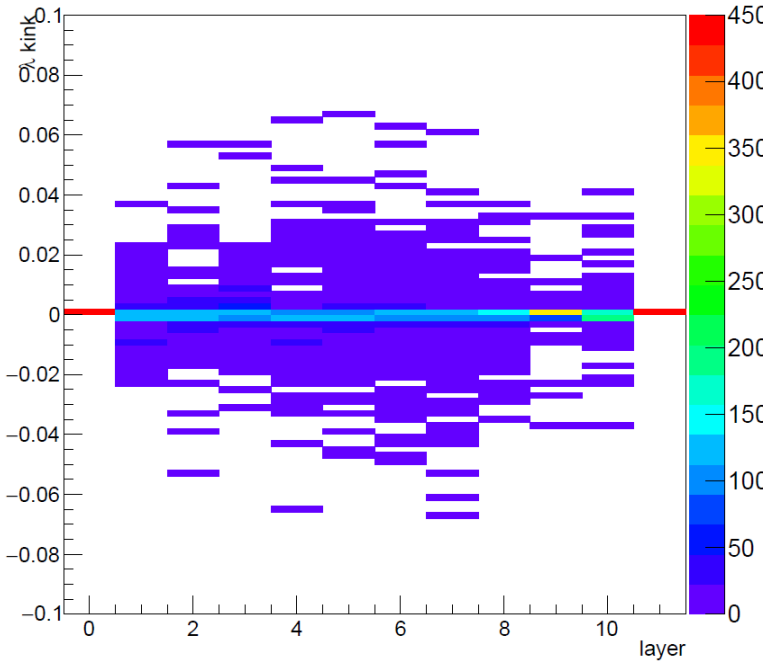


(plots shown for just one file, as example)

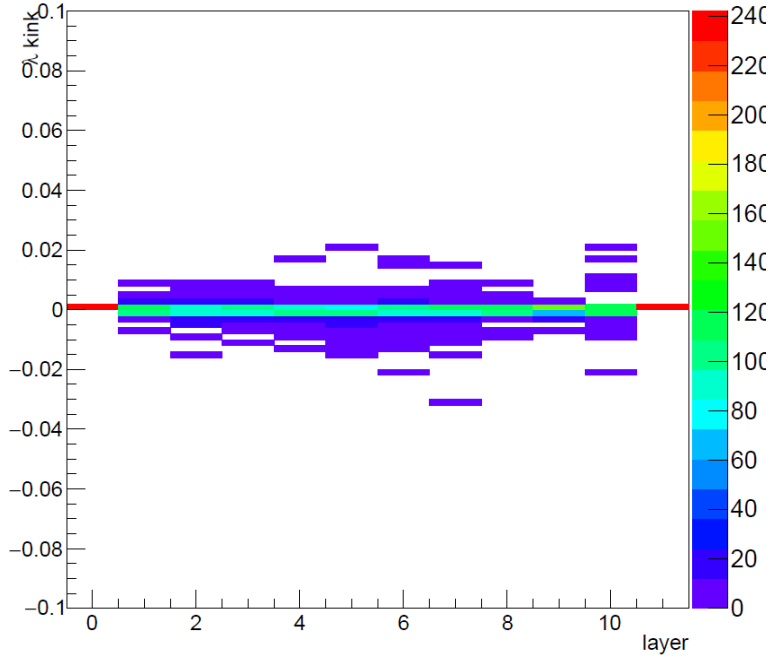
Indeed, χ^2 is *fine in SeedTracker* and gets *inflated in GBL*

LAMBDA KINKS (WAB-BEAM-TRI)

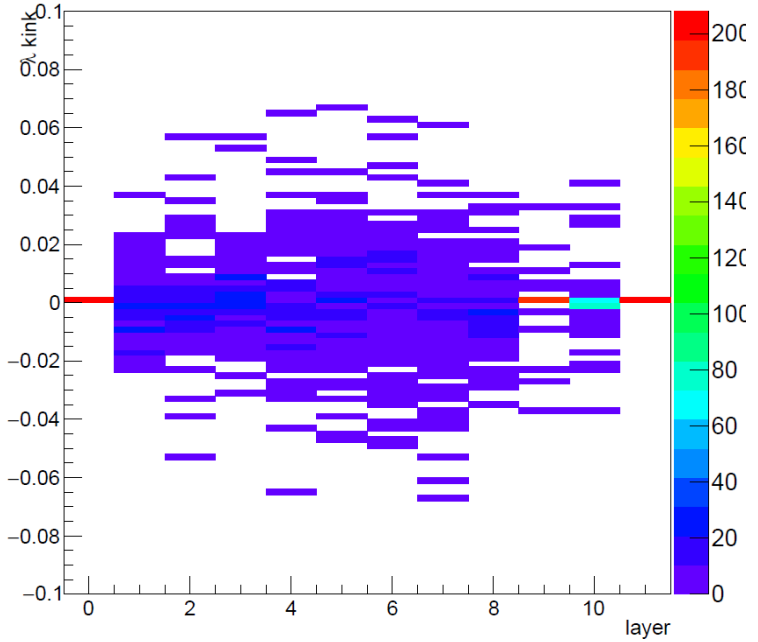
All Tracks



Track χ^2/DOF < 10



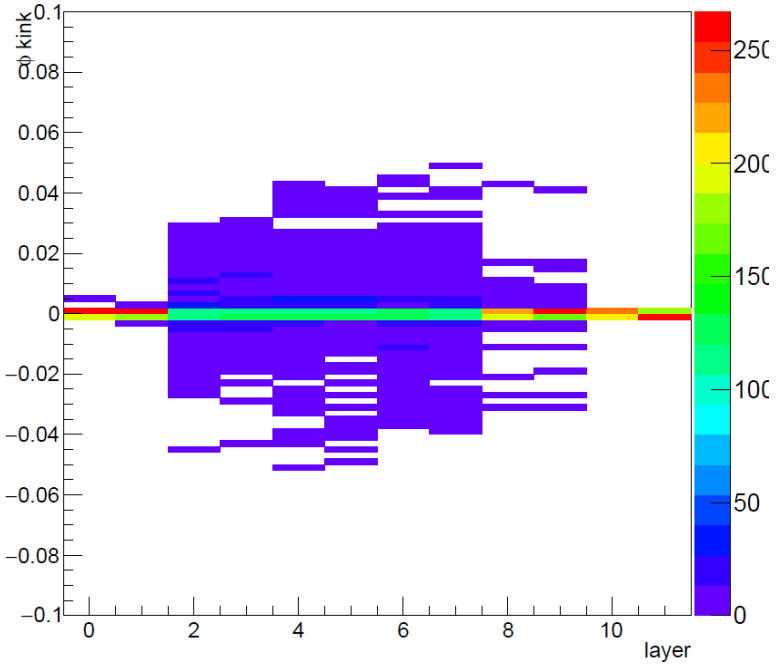
Track χ^2/DOF > 10



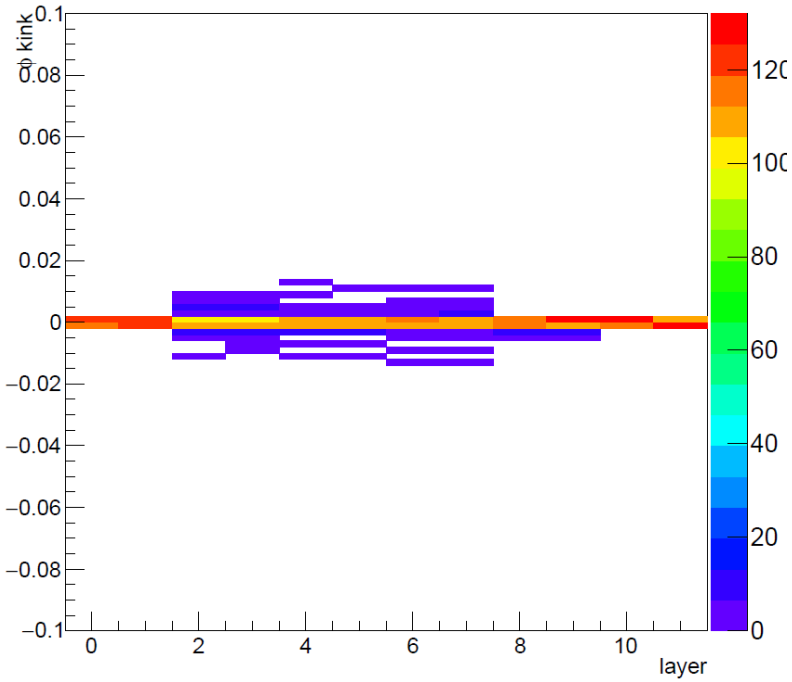
Indeed, GBL tracks with *large kinks in middle layers* are the ones with high χ^2

PHI KINKS (WAB-BEAM-TRI)

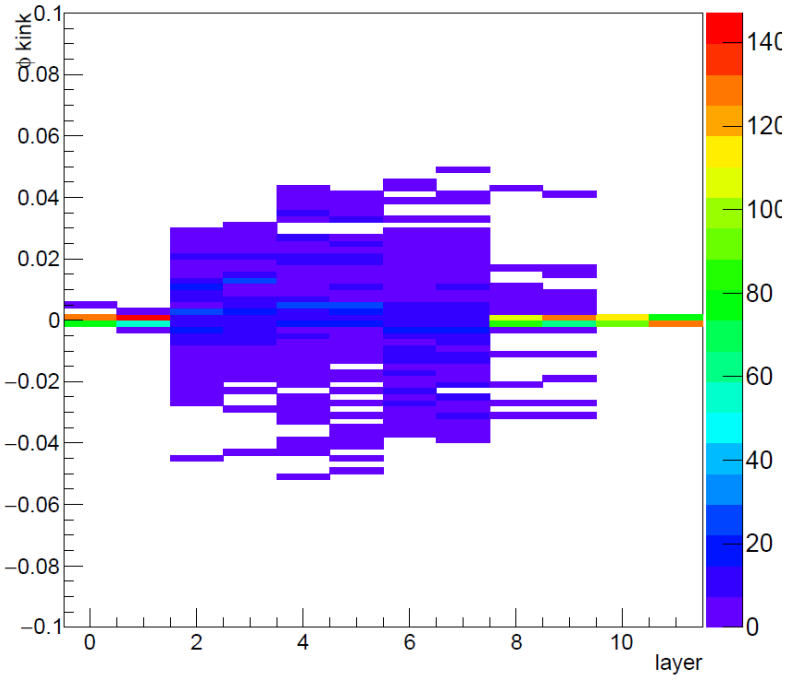
All Tracks



Track χ^2/DOF < 10



Track χ^2/DOF > 10



Indeed, GBL tracks with *large kinks in middle layers* are the ones with high χ^2

FURTHER TESTING

- We now have preliminary confirmation of hypothesis

- More tests to further confirm?
- Investigate other properties of the GBL tracks with high χ^2 ?
- Is the χ^2 really behaving the way we want?
  - Detailed investigation of relationship between kinks and χ^2 in GBL?