TRACKING UNIT TESTS

MIRIAM DIAMOND

JULY 24 2017

github issue 134

PR awaiting review, informally discussed last week:
https://github.com/JeffersonLab/hps-java/pull/144

Documentation underway:
https://confluence.slac.stanford.edu/display/hpsg/Installing+HPS+Java#InstallingHPSJava-Tests

CURRENT UNIT TESTS

- Unit tests that now work: hps-java / tracking / src / test / java / org / hps / recon / **tracking** /

ComparisonTest.java	**Derived: raw→reco lcio + plots + comparison to reference plots**
HoleCreatorTest.java	For my HoleCreation driver
MergeTrackCollectionsTest.java	For my MergeTrackCollections driver
RecoToRaw.java	Deletes reco containers in data lcio, to put it back in raw state
RecoToRawMC.java	Deletes reco containers in MC lcio, to put it back in raw state
ReconTestSkeleton.java	**Base: raw→reco lcio**
TrackReconWithPlotsTest.java	**Derived: raw→reco lcio + reco plots**
TrackingReconstructionPlotsTest.java	Creates plots from reco lcio
TruthResidualTest.java	**Derived: raw→reco lcio + residuals (truth vs MC)**

Orange tests activated by default, black tests inactive (input file name set to null) by default

For data (run 5772) and MC (prompt A'): one raw lcio + one reference plots file in http://www.lcsim.org/test/hps-java/

SPEED BOTTLENECKS IN RECON & HELIX INTERSECTION APPROXIMATIONS

MIRIAM DIAMOND

JULY 24 2017

github issues 117 & 133

PRs (with validation plots attached in comments) awaiting review, informally discussed last week:

https://github.com/JeffersonLab/hps-java/pull/162

https://github.com/JeffersonLab/hps-java/pull/163

MIN PT CUT IN TRACK SEEDING

MIRIAM DIAMOND

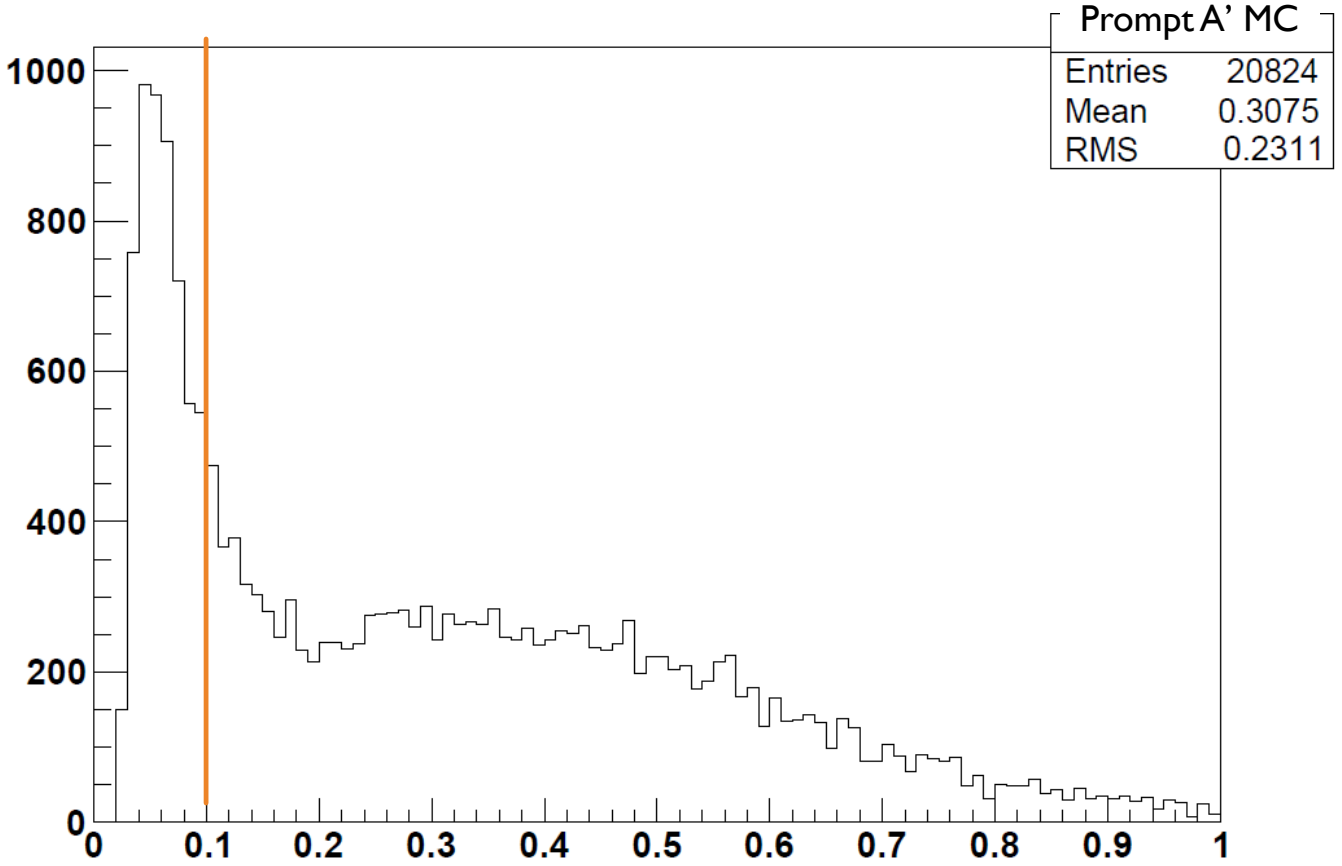
JULY 24 2017

github issue 157

PR awaiting review: https://github.com/JeffersonLab/hps-java/pull/165

MIN PT CUT IN TRACK SEEDING

- Strategy includes MinPT member
- This should impose min p_T for track seeds … but actually doesn't
- e.g. default Strategy specifies MinPT = 0.1 [GeV] , but plot of track seeds shows many with lower P_T



CURRENT CODE

- org.lcsim.recon.tracking.seedtracker.FastCheck converts minPT into Rmin
- Rmin appears as constraint in TwoPointCircleFitter (called by TwoPointCircleCheck), but not in ThreePointCircleFitter
- Each two-seed combination can pass the cut, but end up with three-hit seed that exceeds the cut

```
public boolean ThreePointHelixCheck(HelicalTrackHit hit1, HelicalTrackHit hit2, HelicalTrackHit hit3) {
    …
    _cfit2 = new TwoPointCircleFitter(_RMin);
    _cfit3 = new ThreePointCircleFitter();
    …
    if (!TwoPointCircleCheck(hit1, hit3, null)) return false;
    if (!TwoPointCircleCheck(hit2, hit3, null)) return false;
    …
    boolean success = _cfit3.fit(p[0], p[1], p[2]);
```

FIXING THE CODE

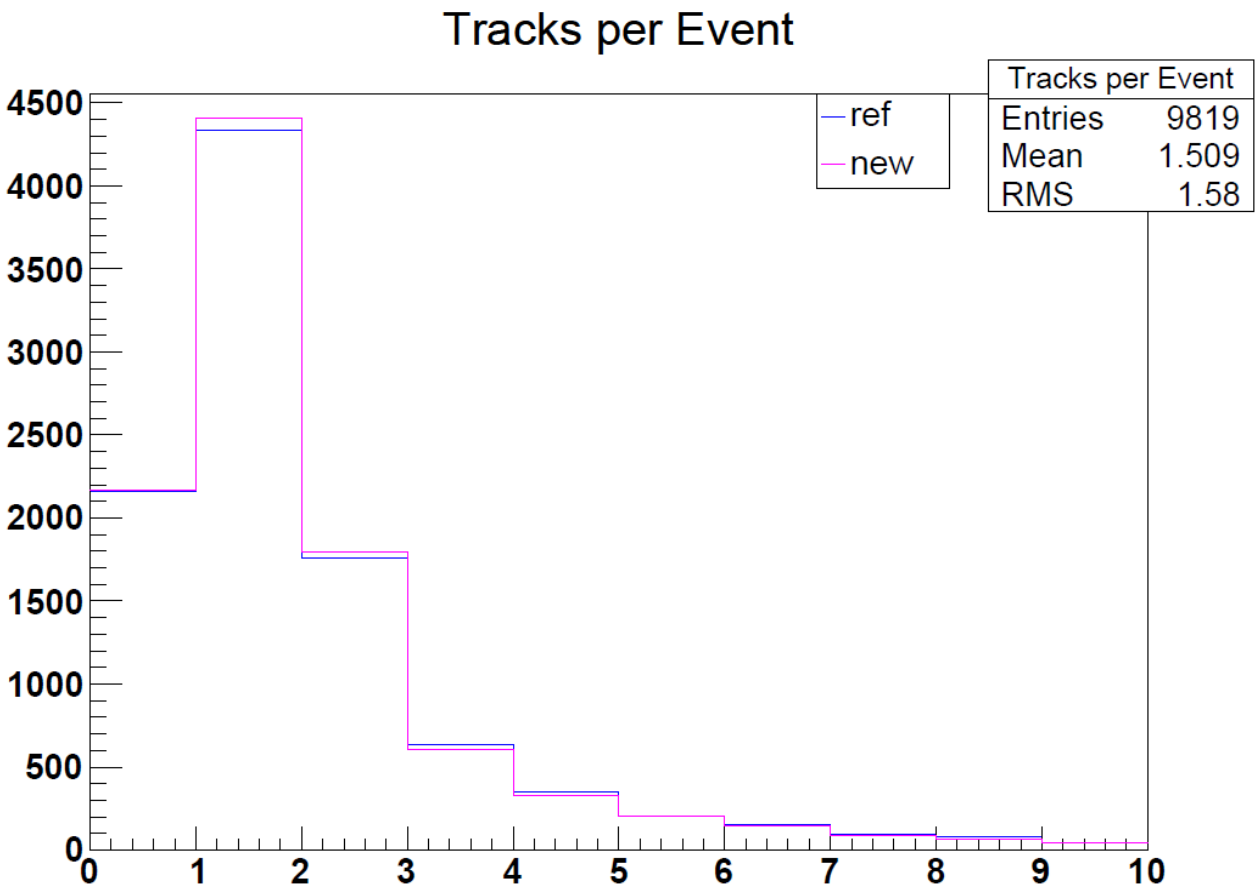
- In ThreePointHelixCheck, add radius check after three-point circle fit

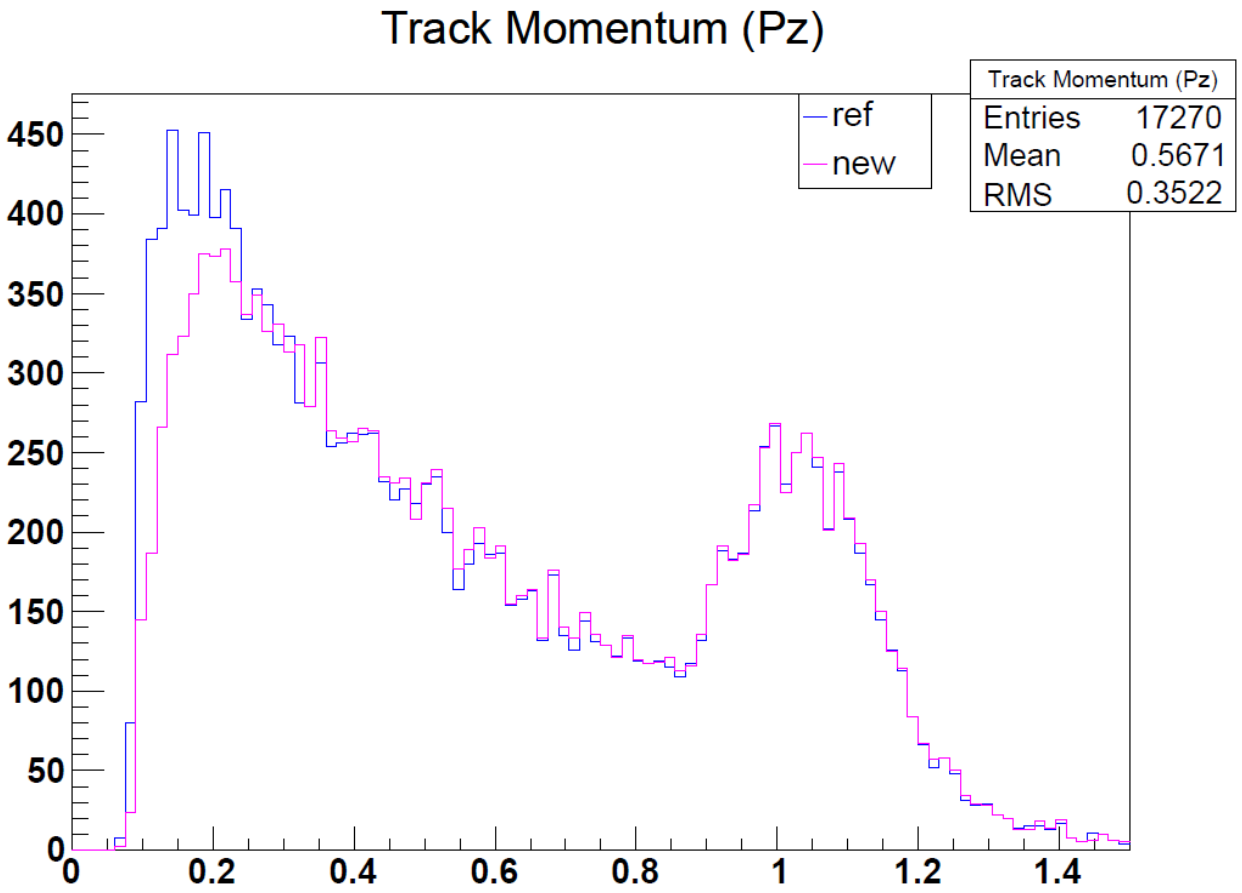
```
boolean success = _cfit3.fit(p[0], p[1], p[2]);
if (!success)
    return false;

//  Retrieve the circle parameters
CircleFit circle = _cfit3.getFit();
double xc = circle.x0();
double yc = circle.y0();
double rc = Math.sqrt(xc * xc + yc * yc);
double rcurv = circle.radius();

// min pT cut
if (rcurv < _RMin)
    return false;
```

VALIDATION PLOTS: DATA (RUN 5772)





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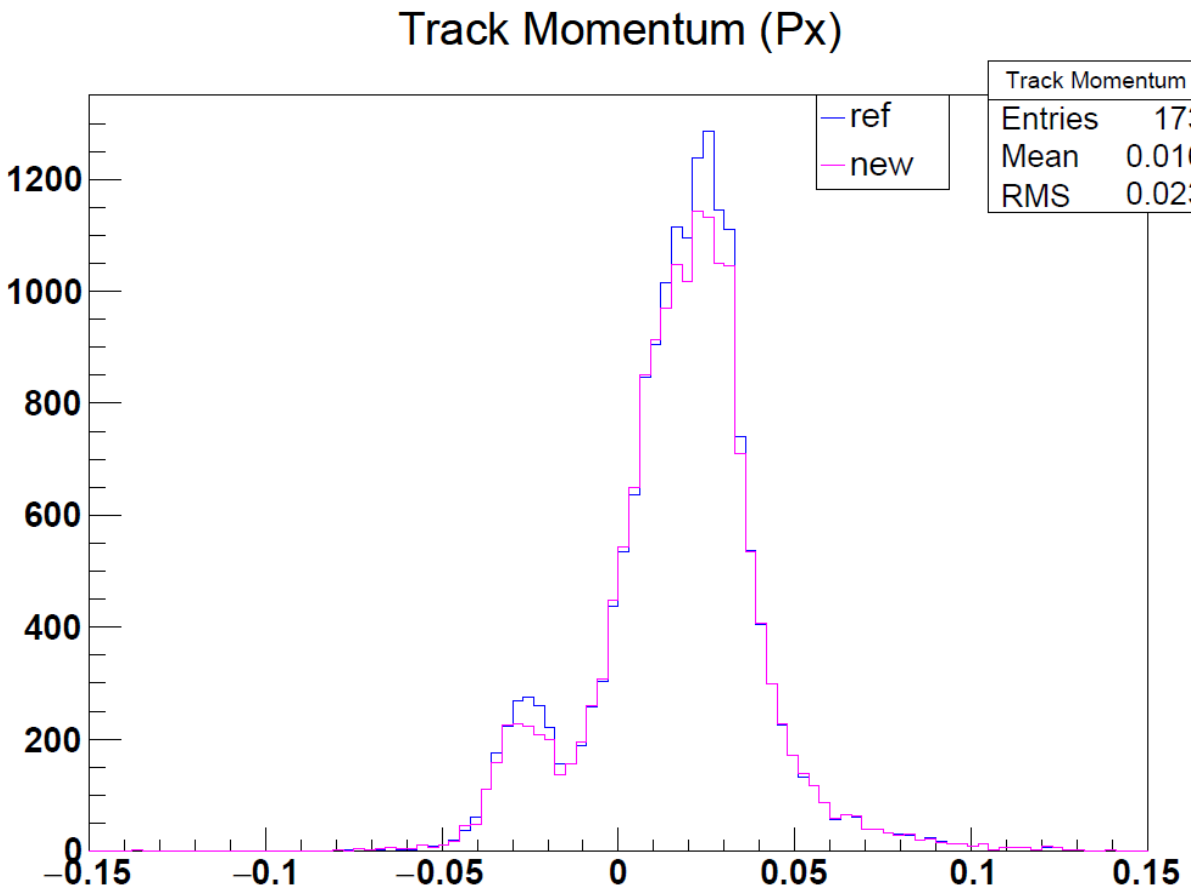

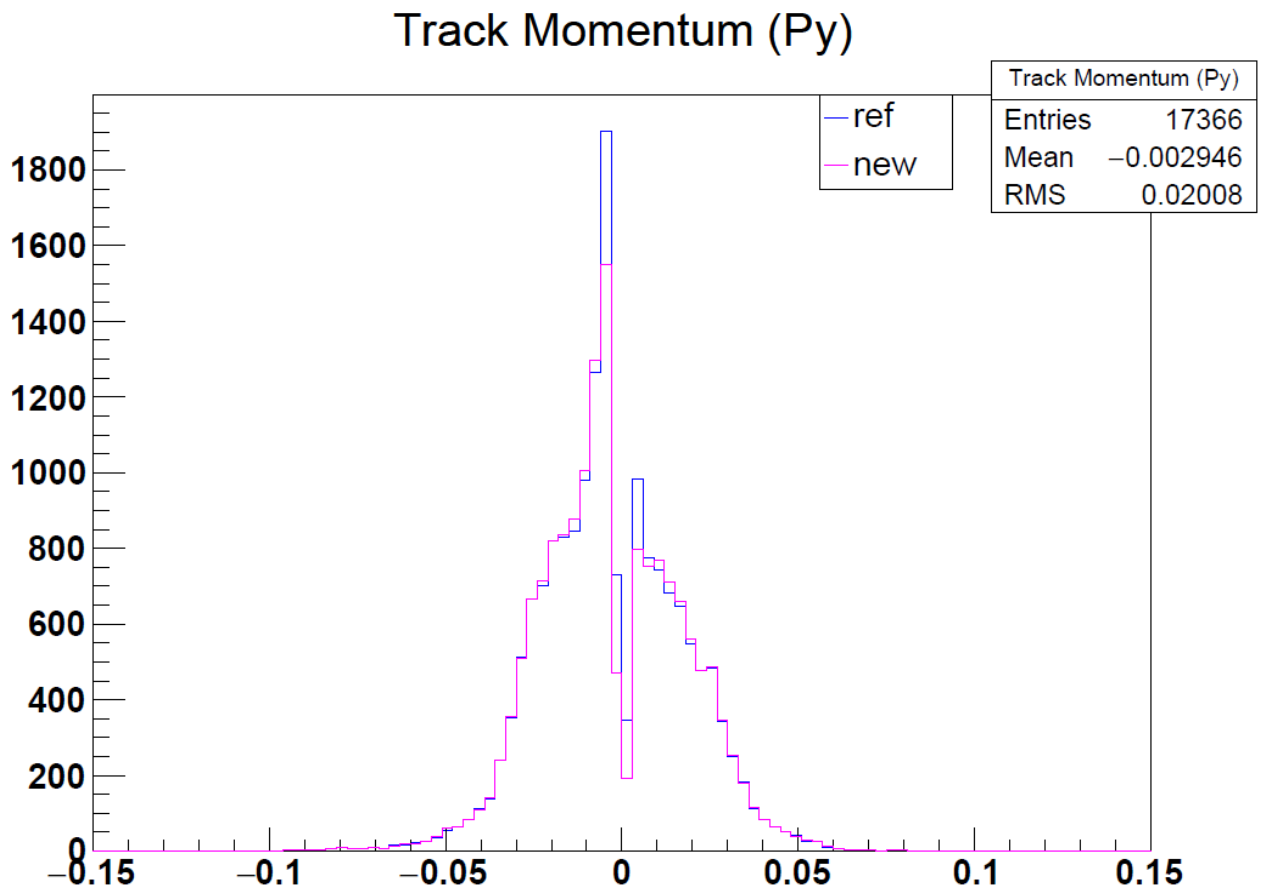

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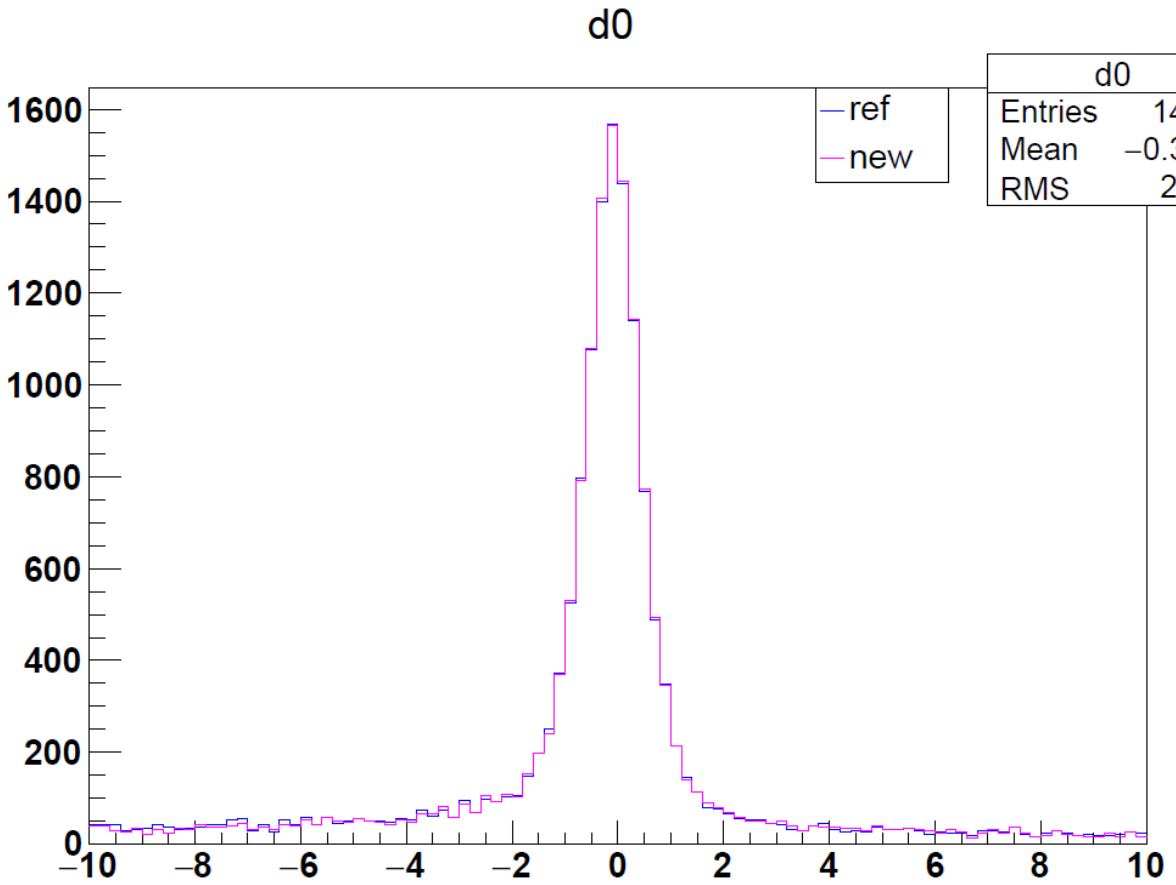

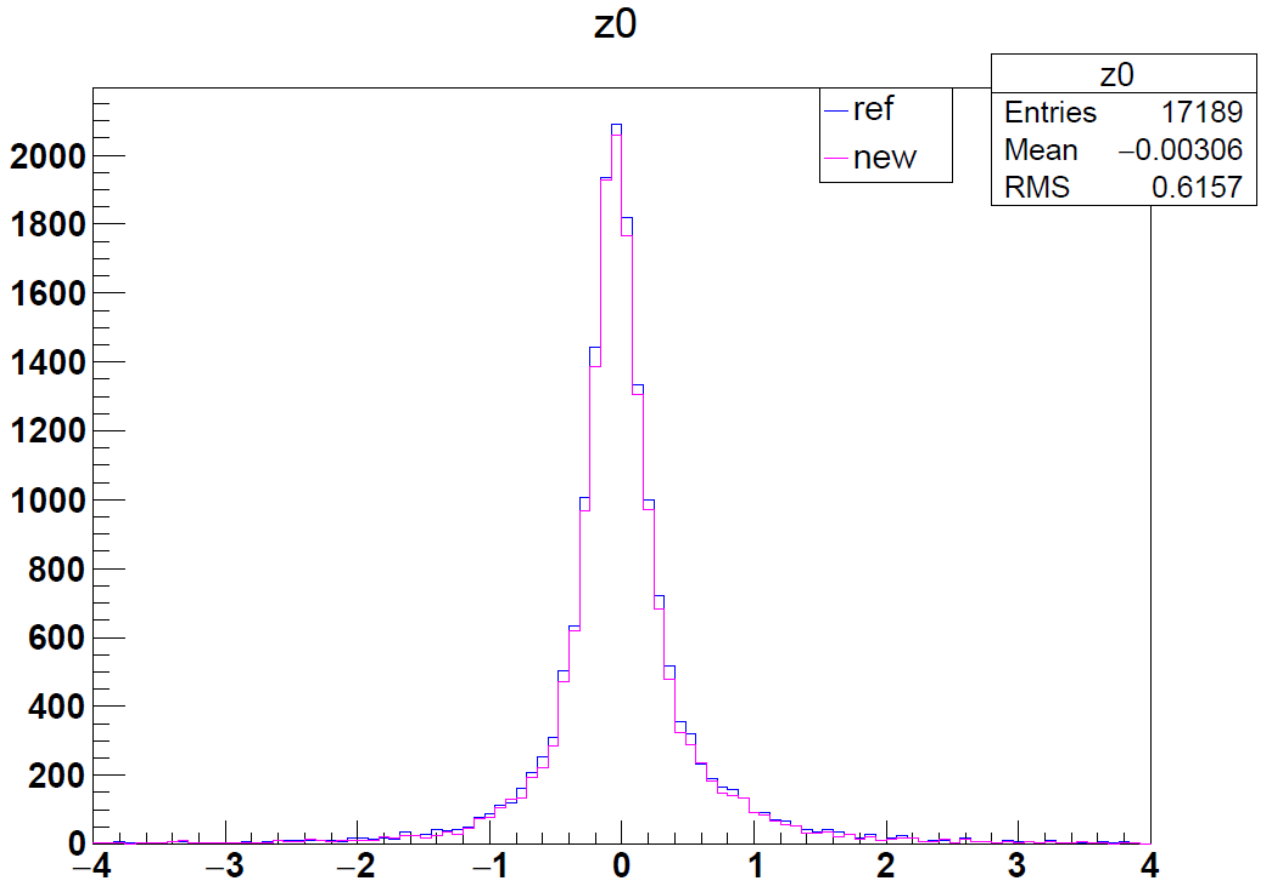

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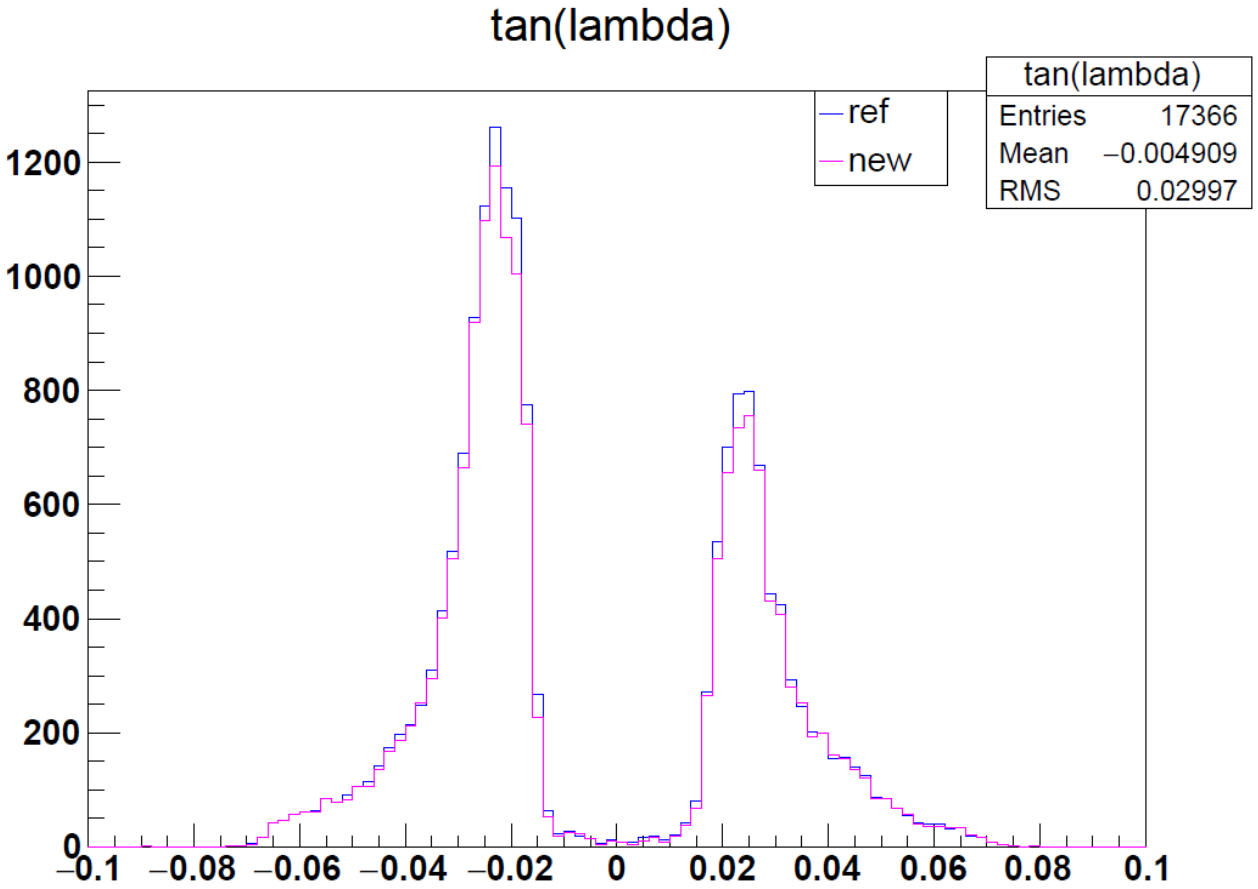

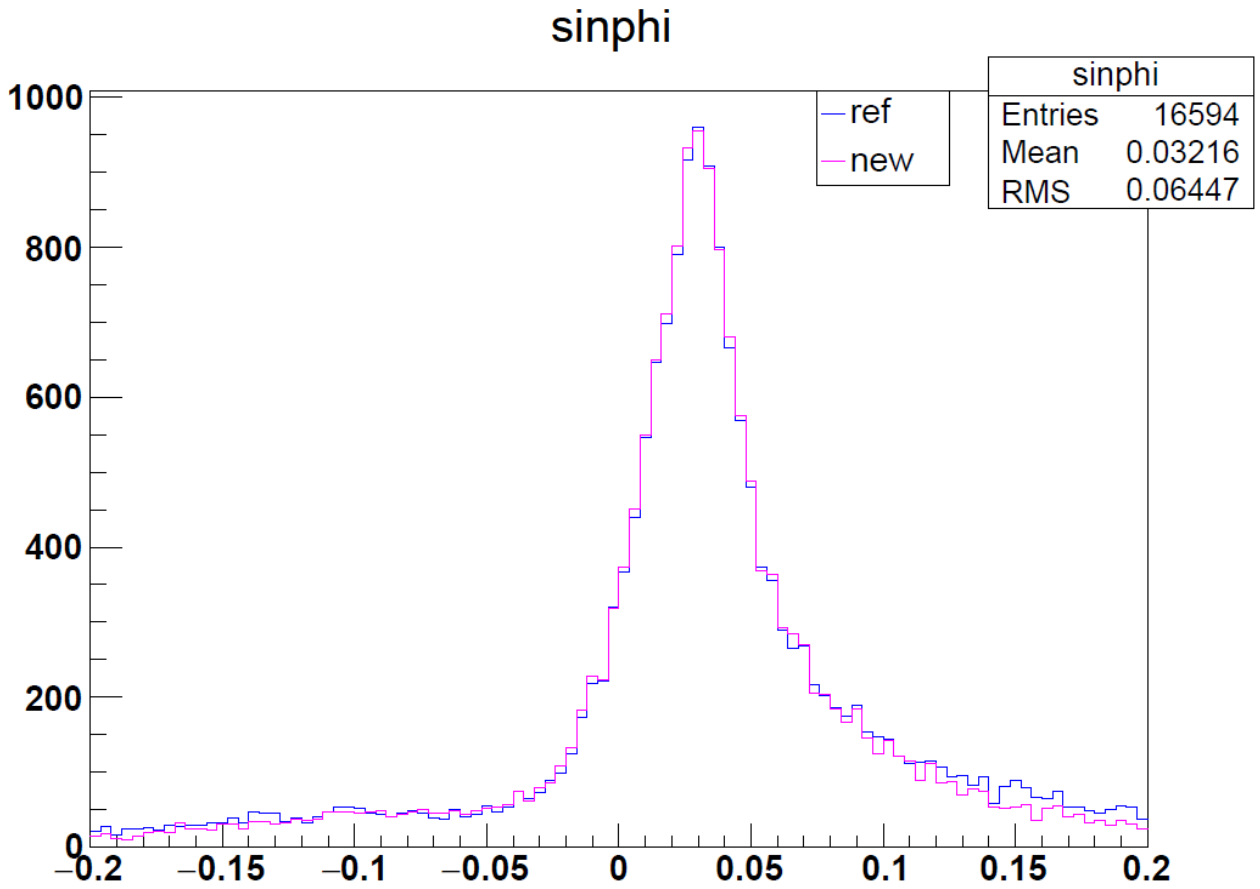

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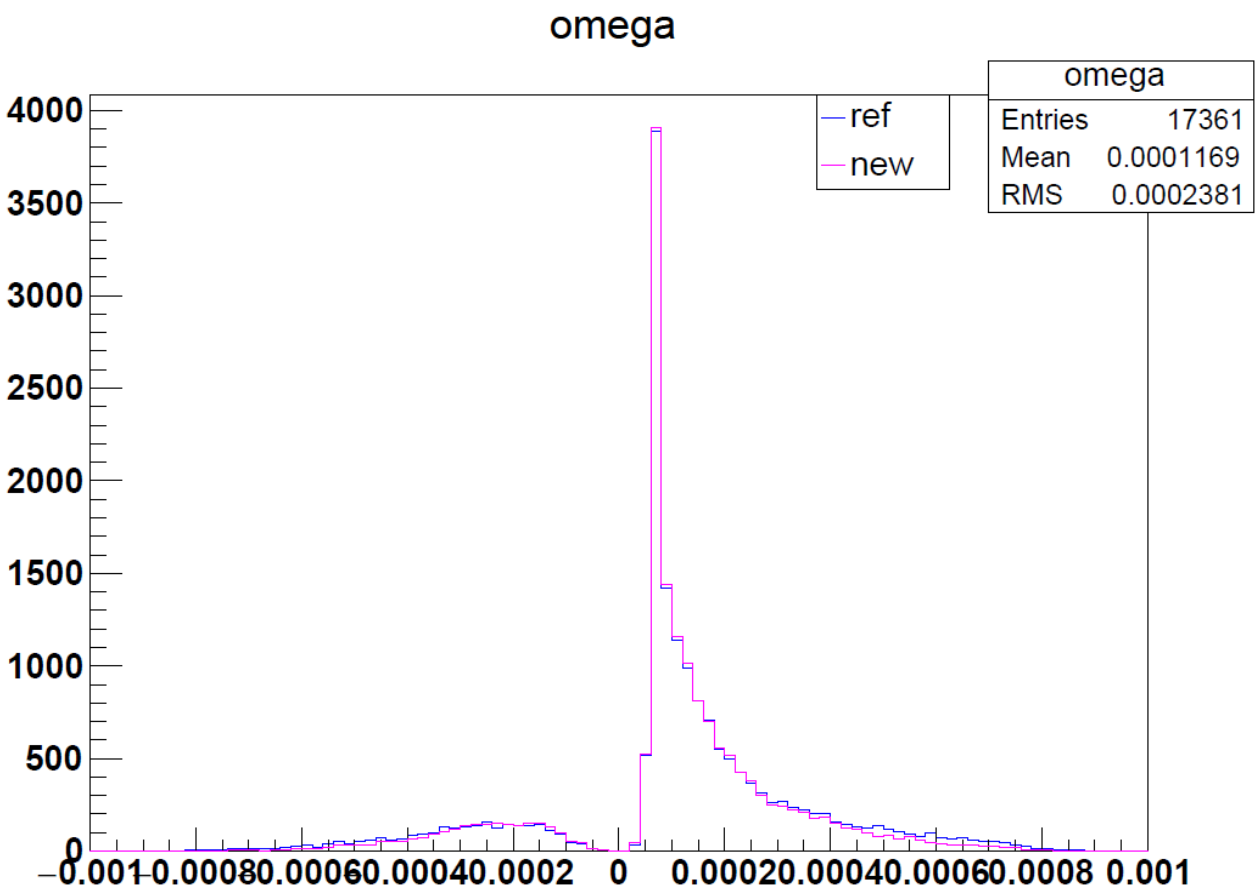
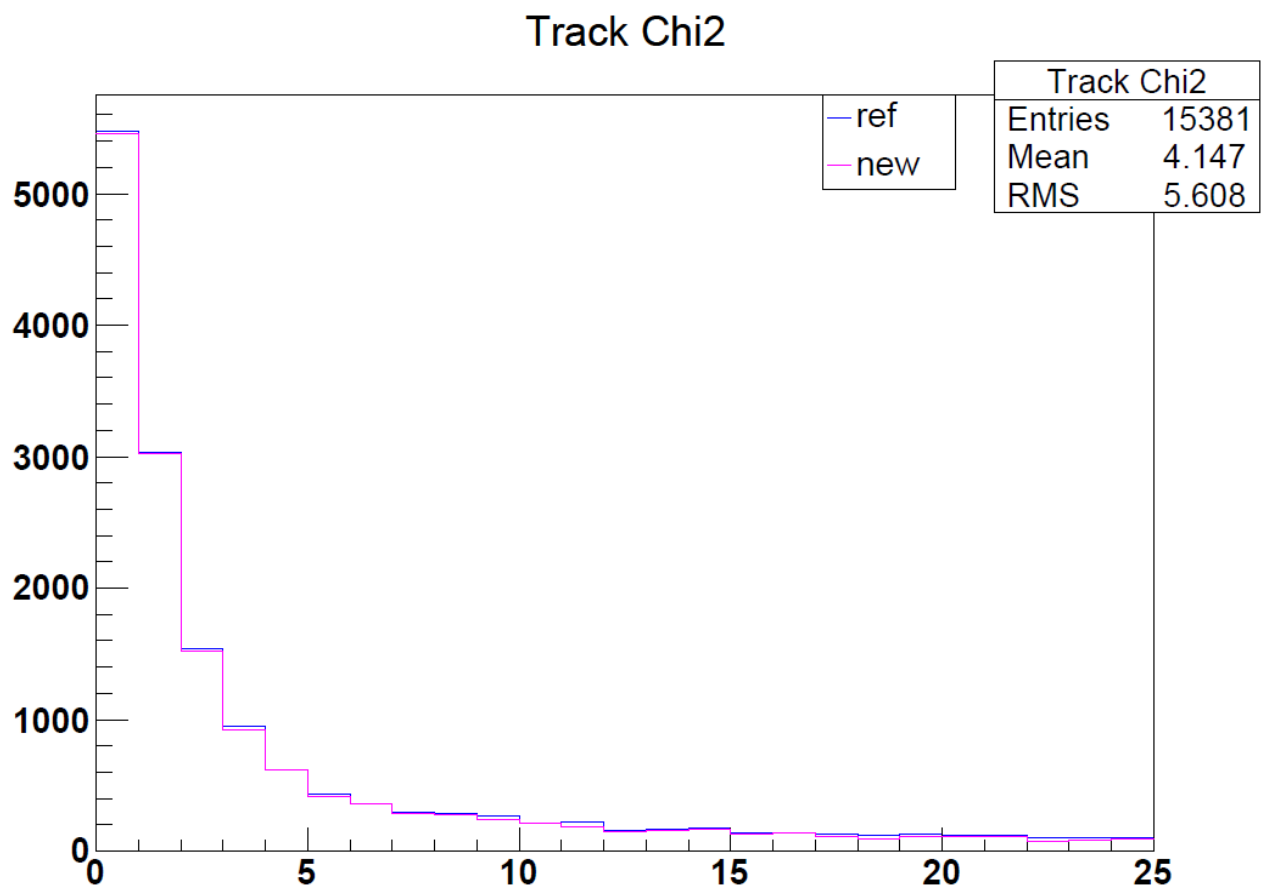
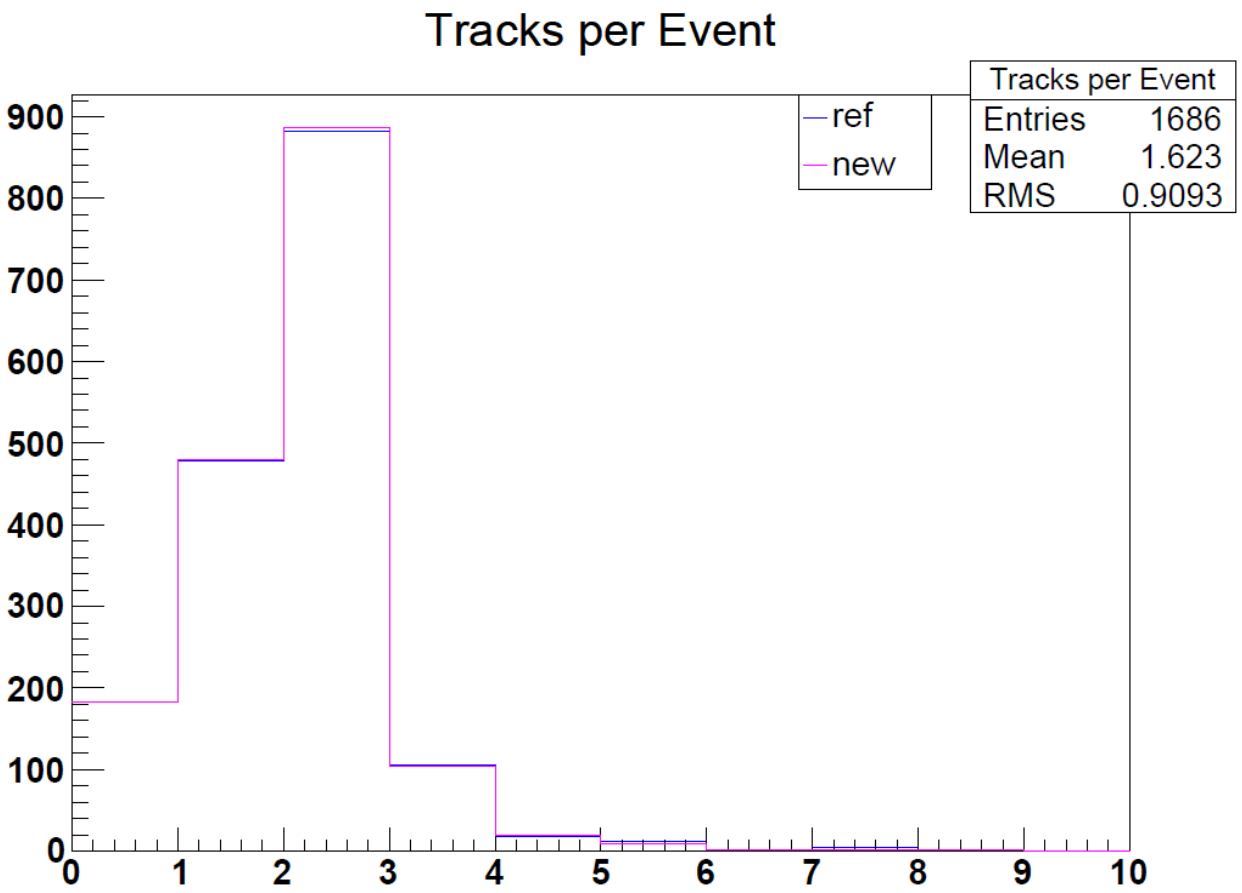
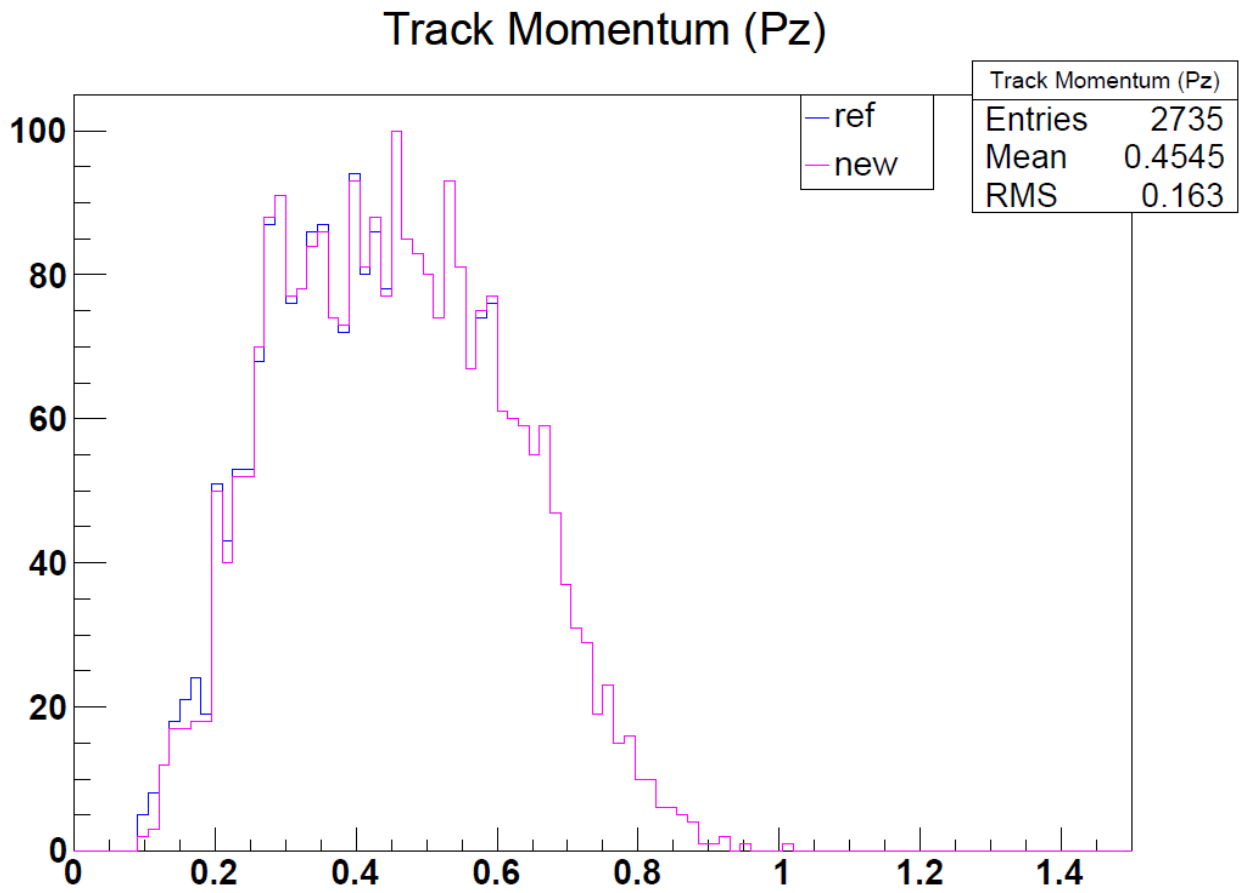




VALIDATION PLOTS: MC (A' PROMPT)





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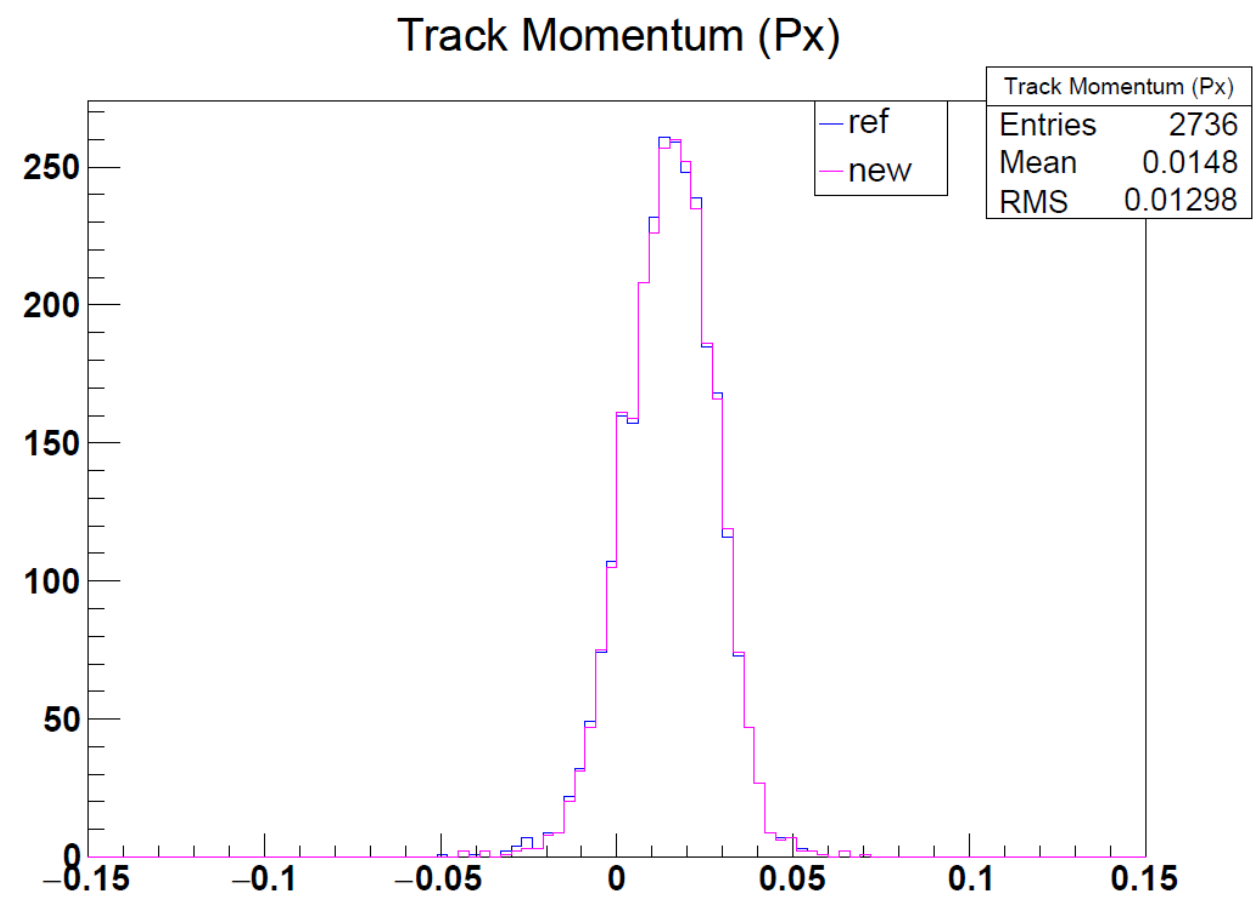

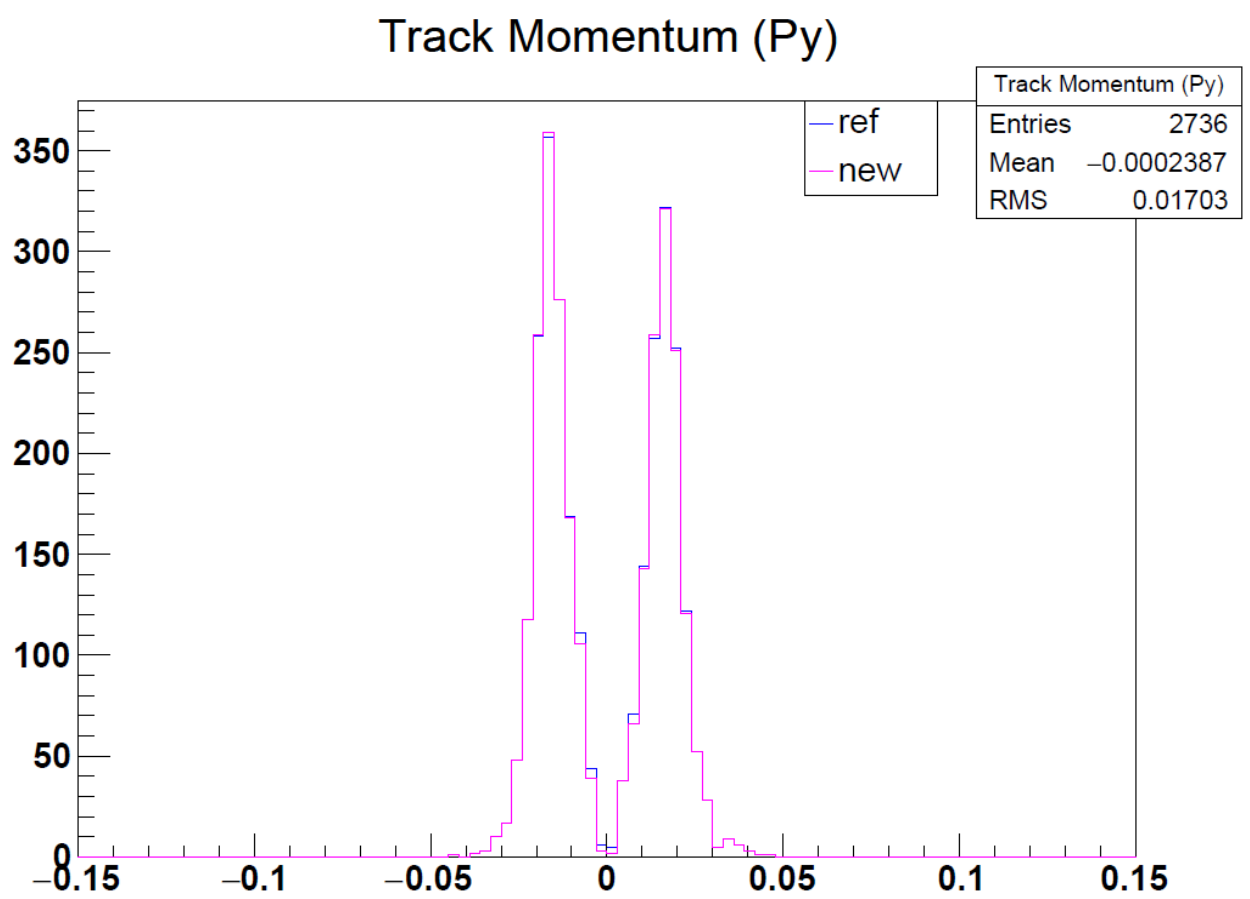

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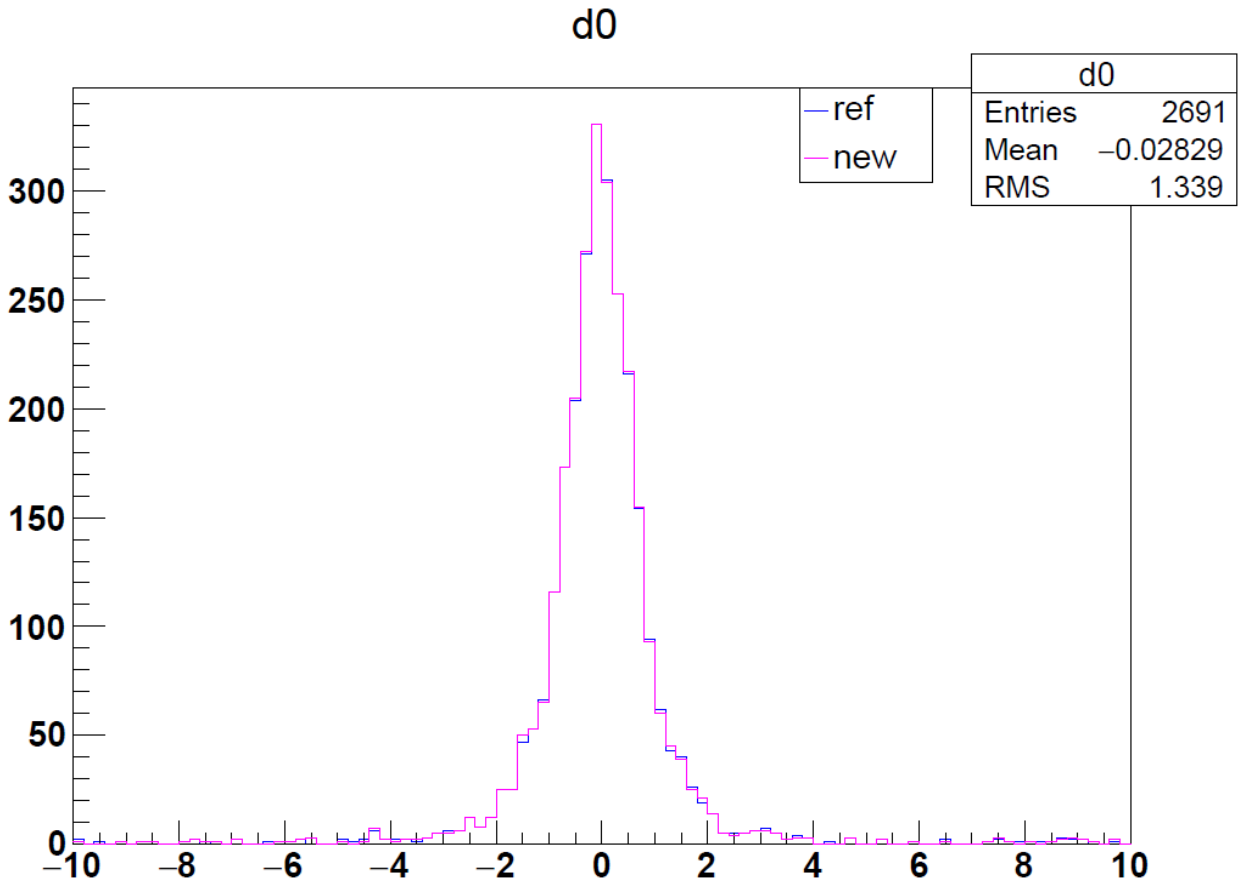

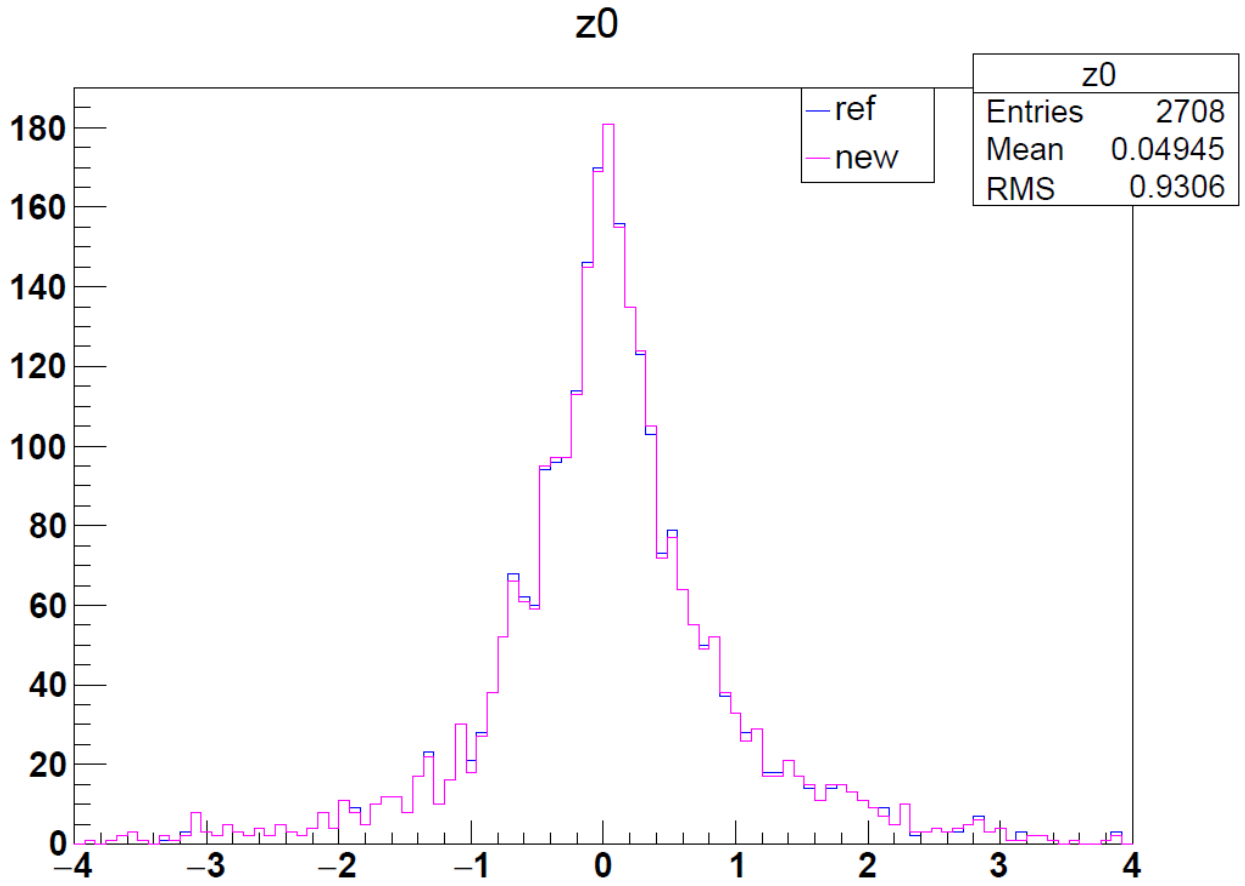

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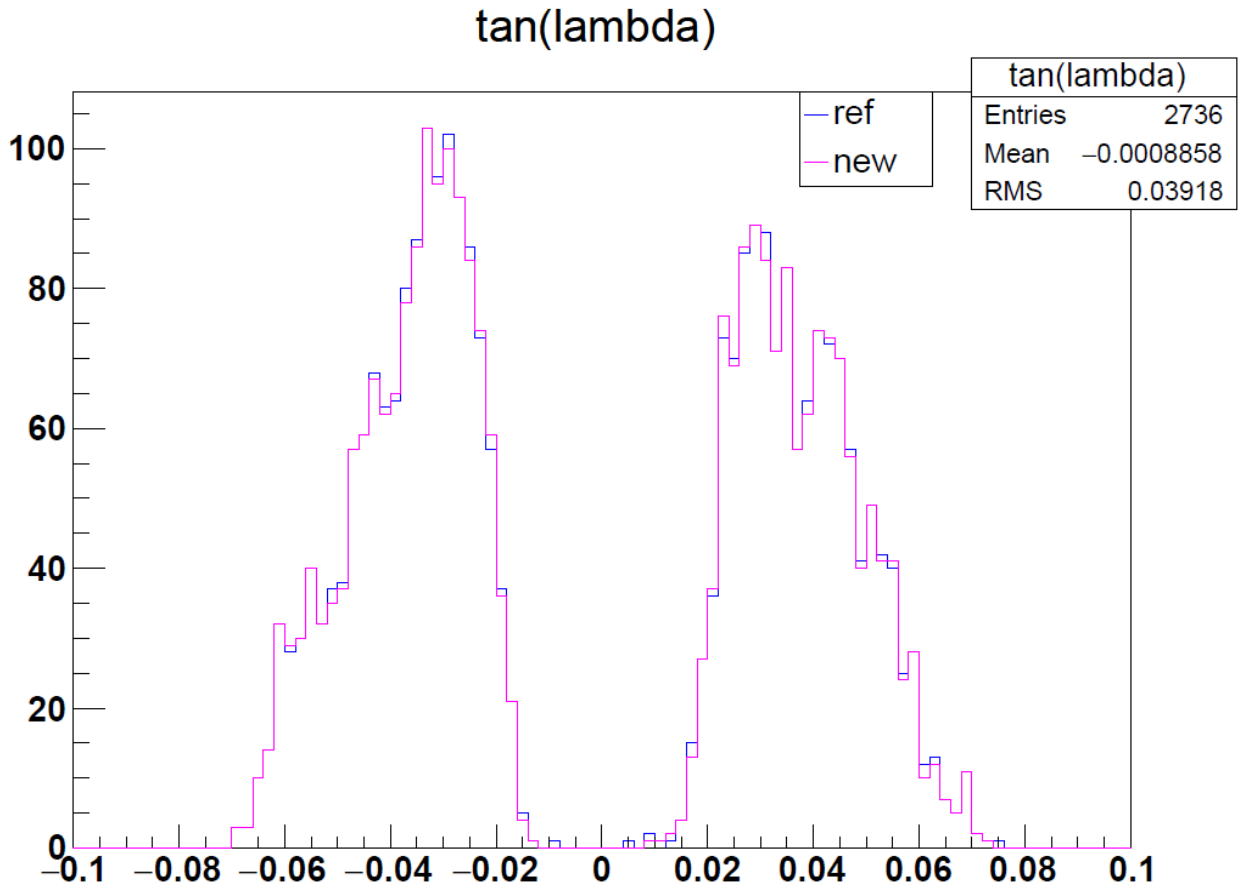

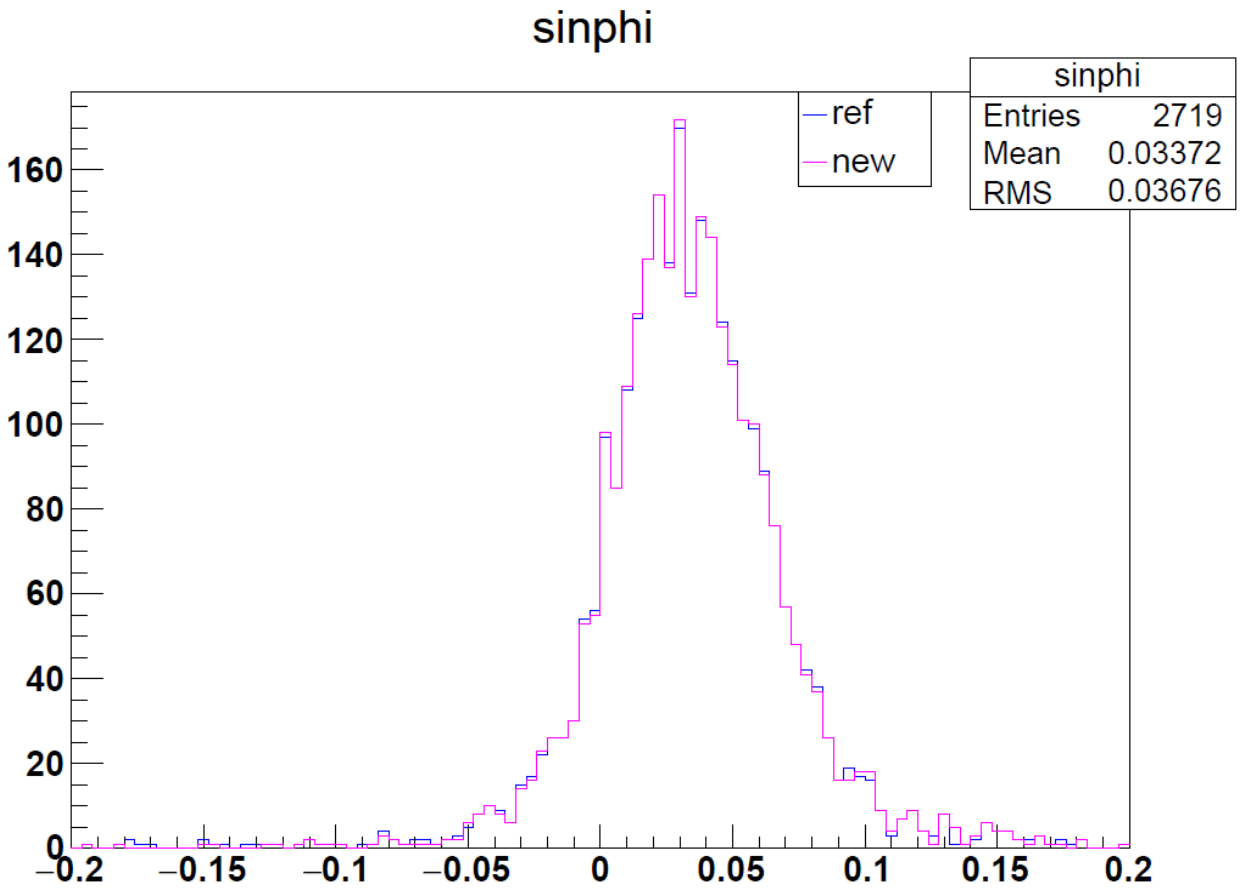

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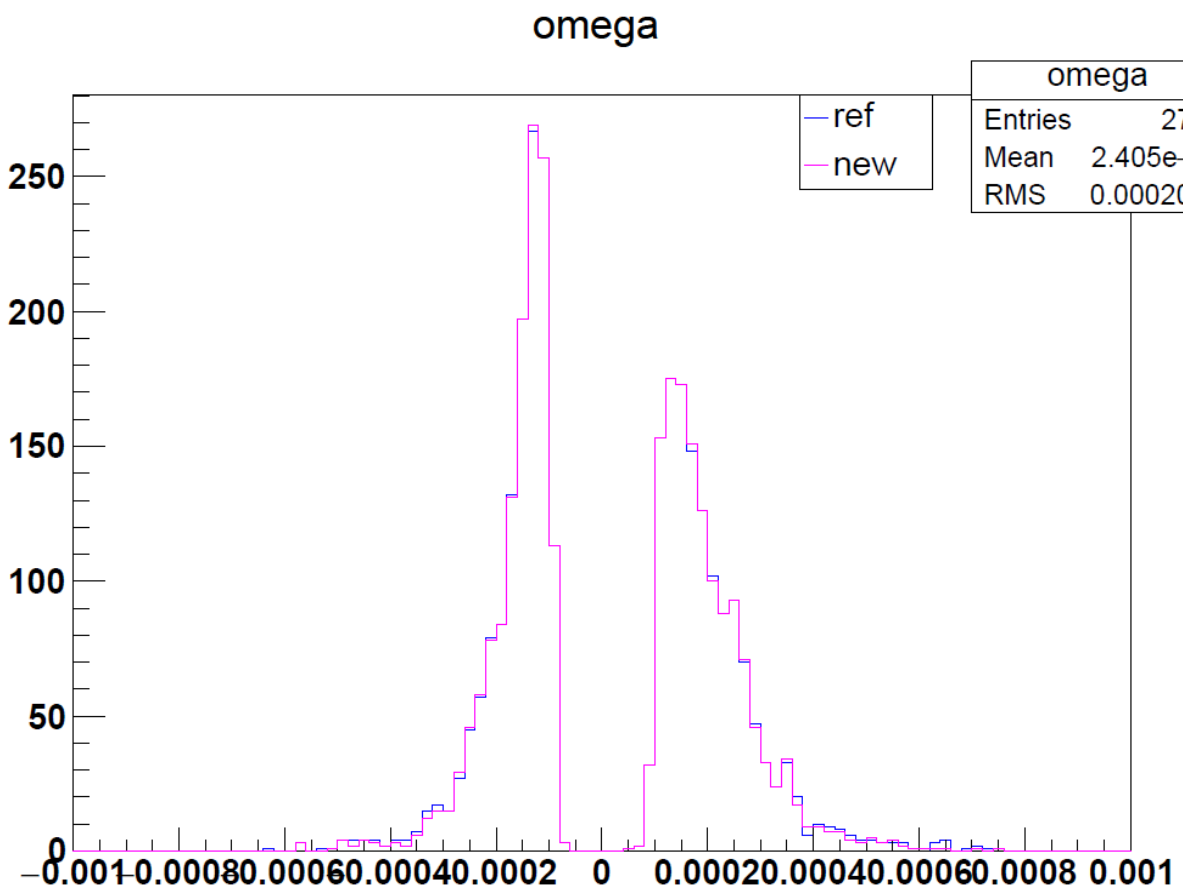
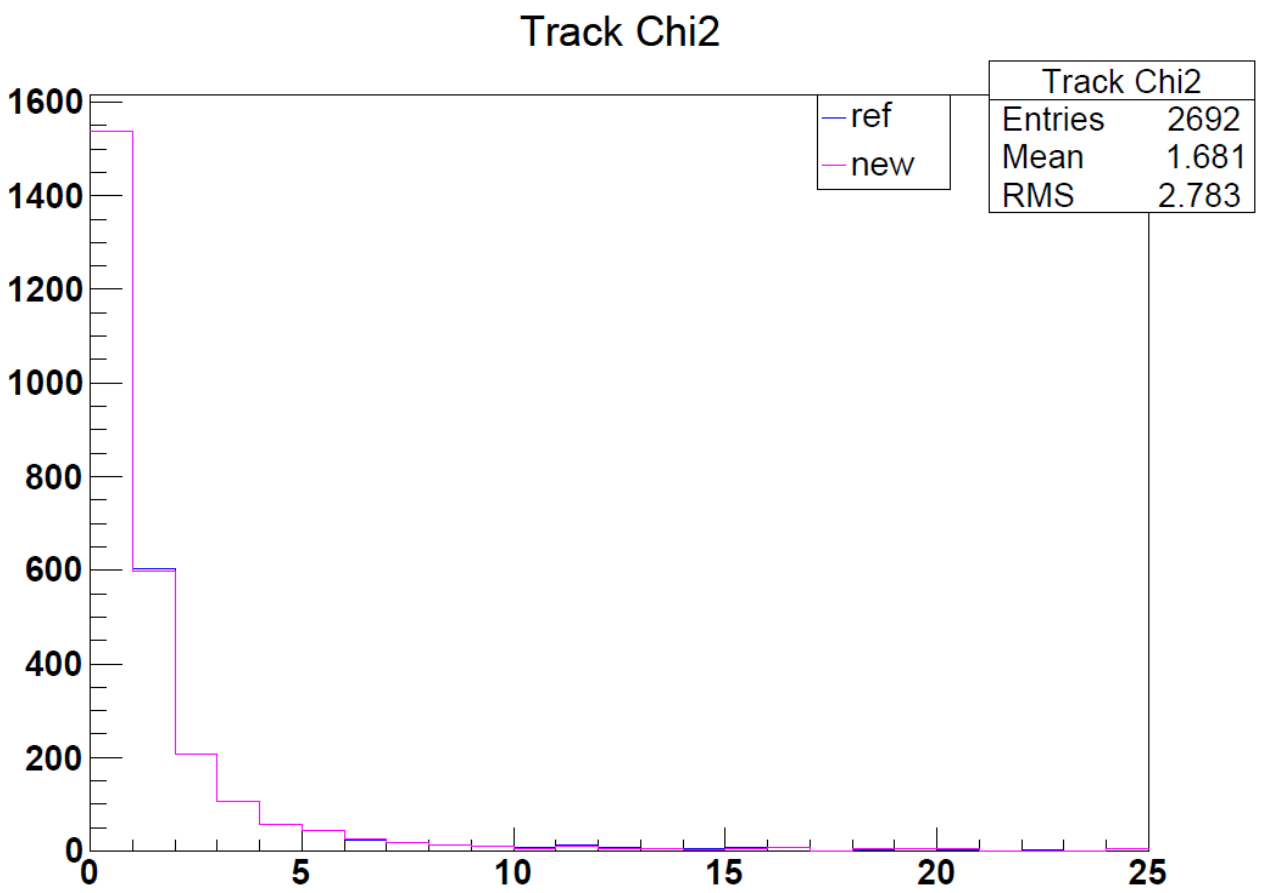




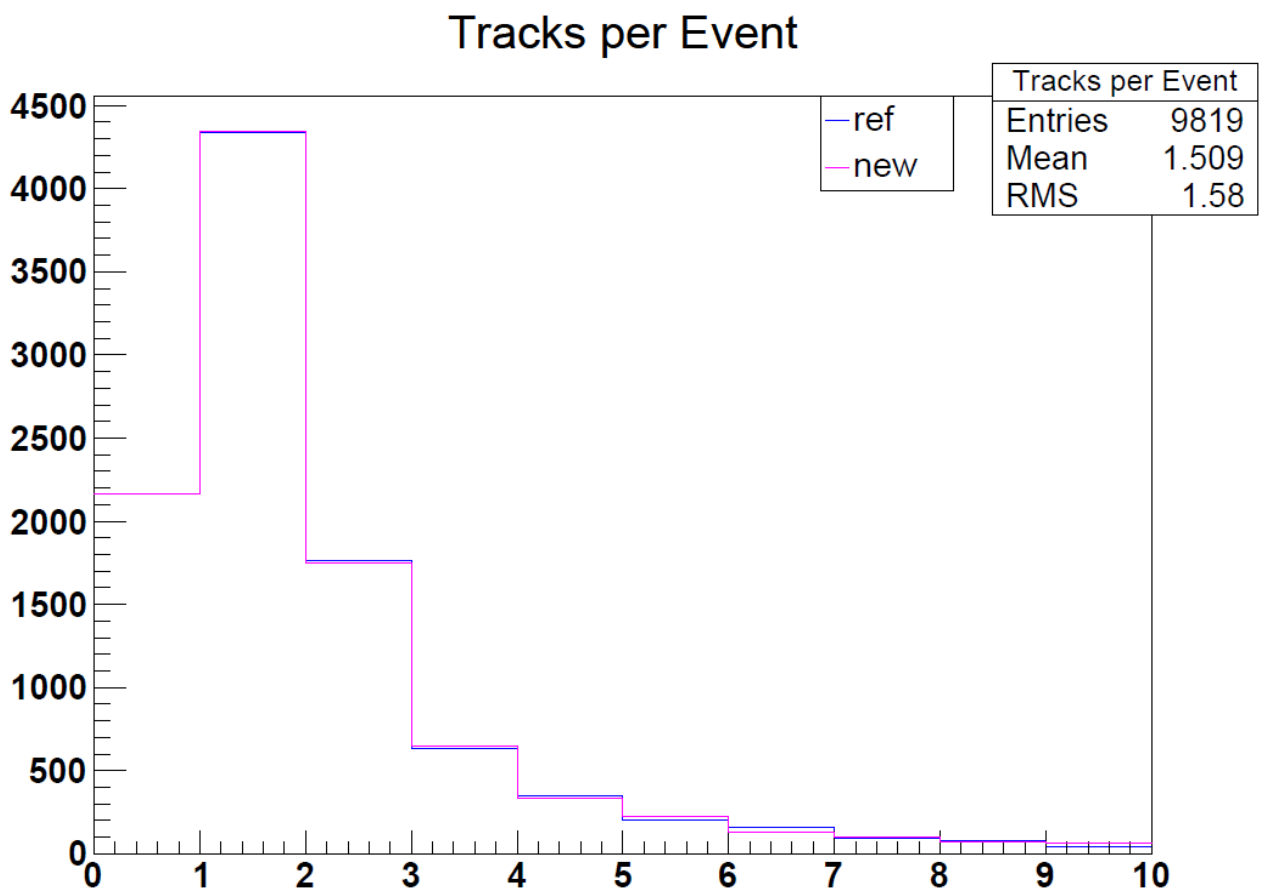
MULTIPLE SCATTERING ERROR

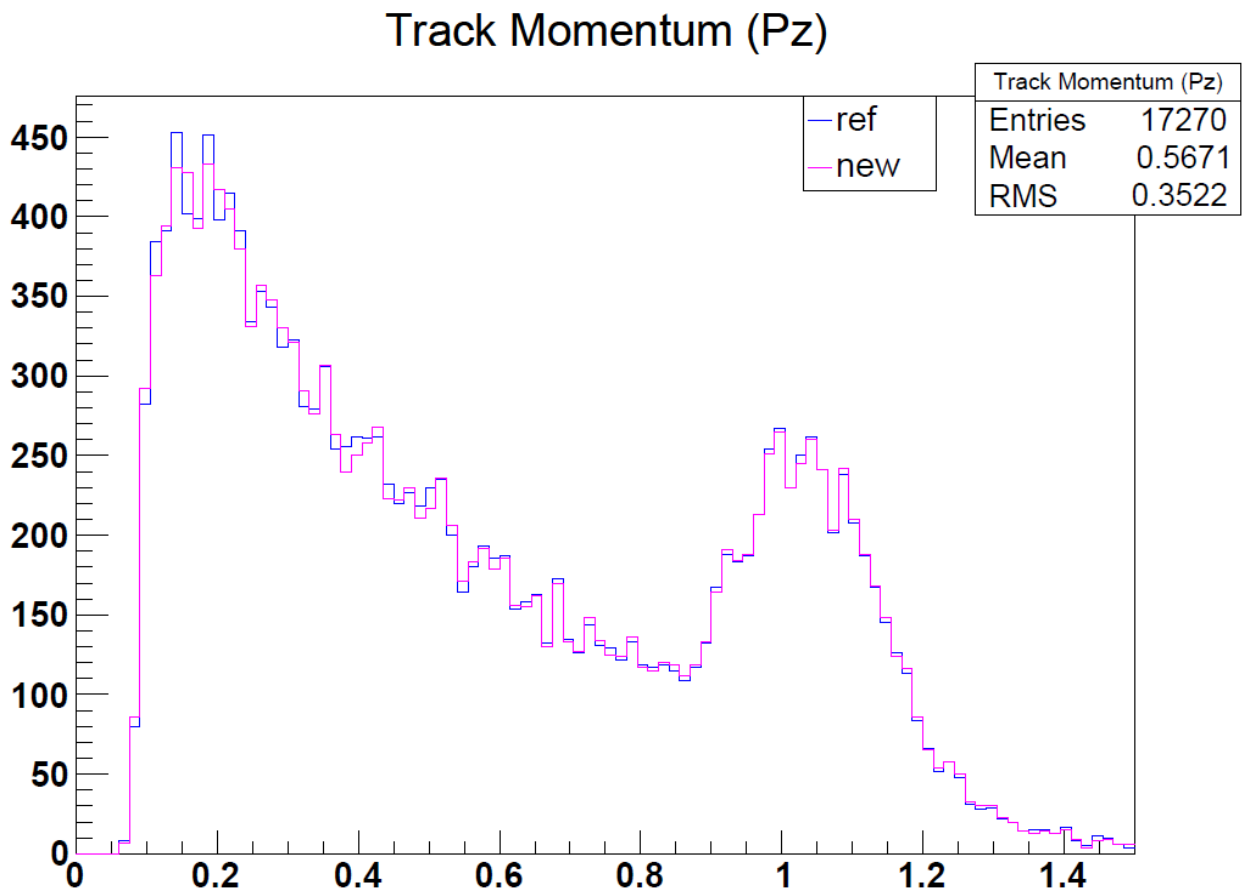
MIRIAM DIAMOND

JULY 24 2017

github issue 126

VALIDATION PLOTS: DATA (RUN 5772)





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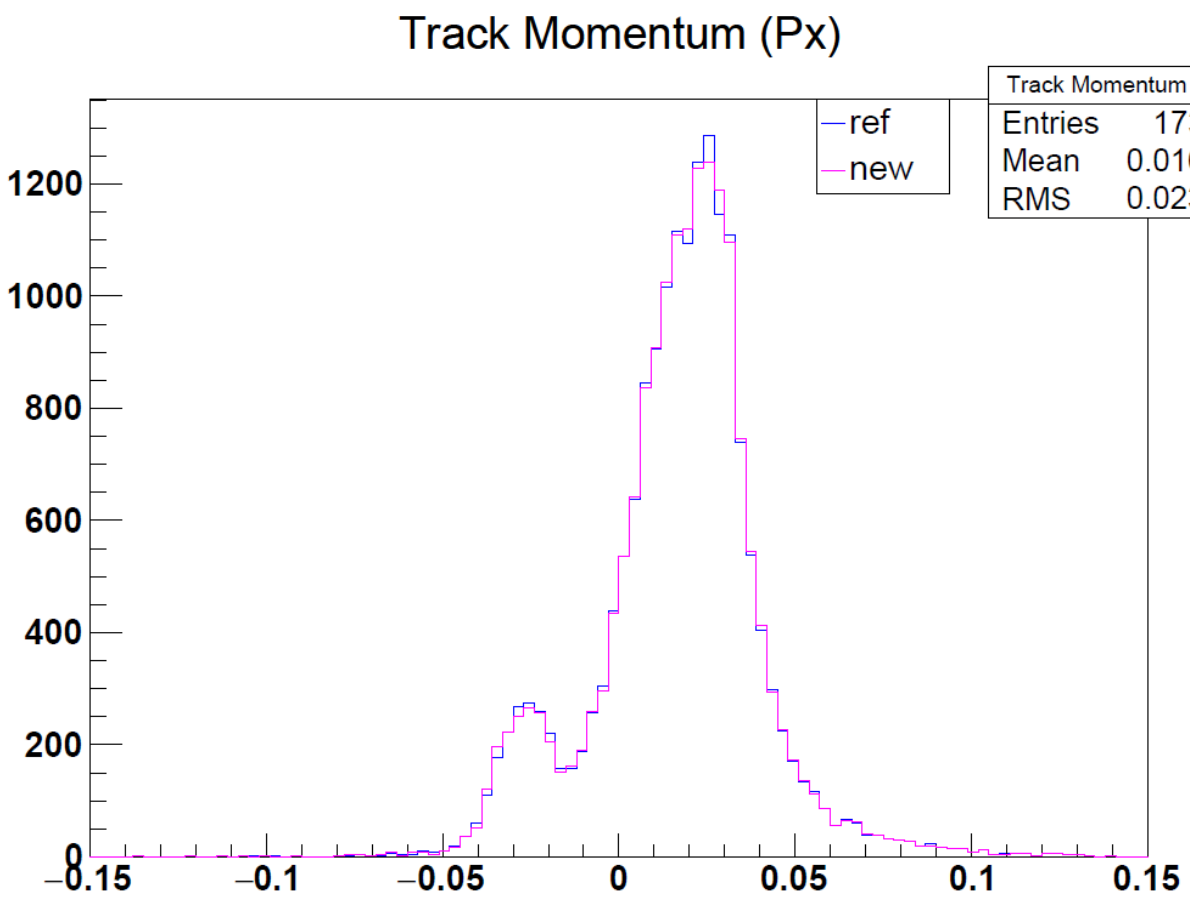

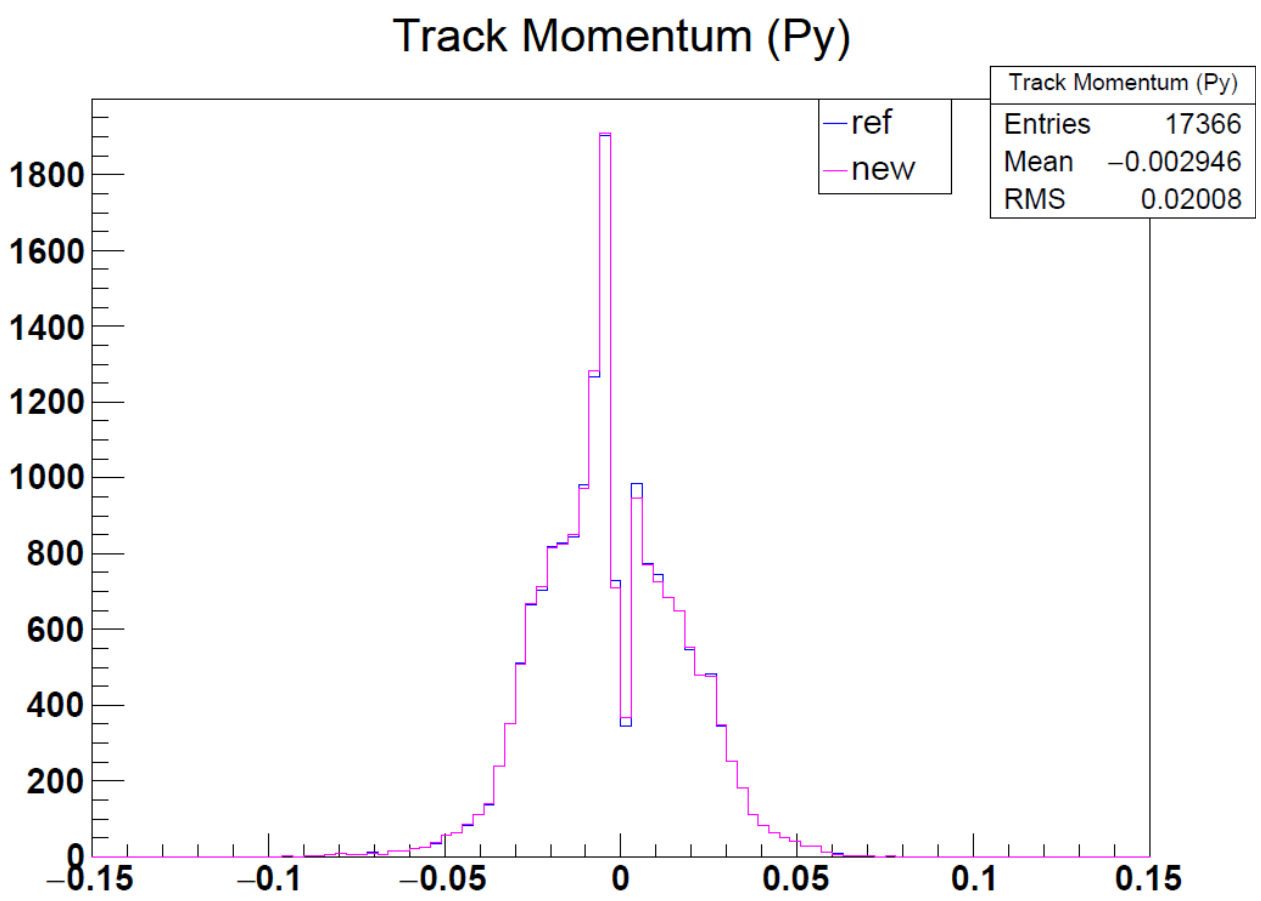

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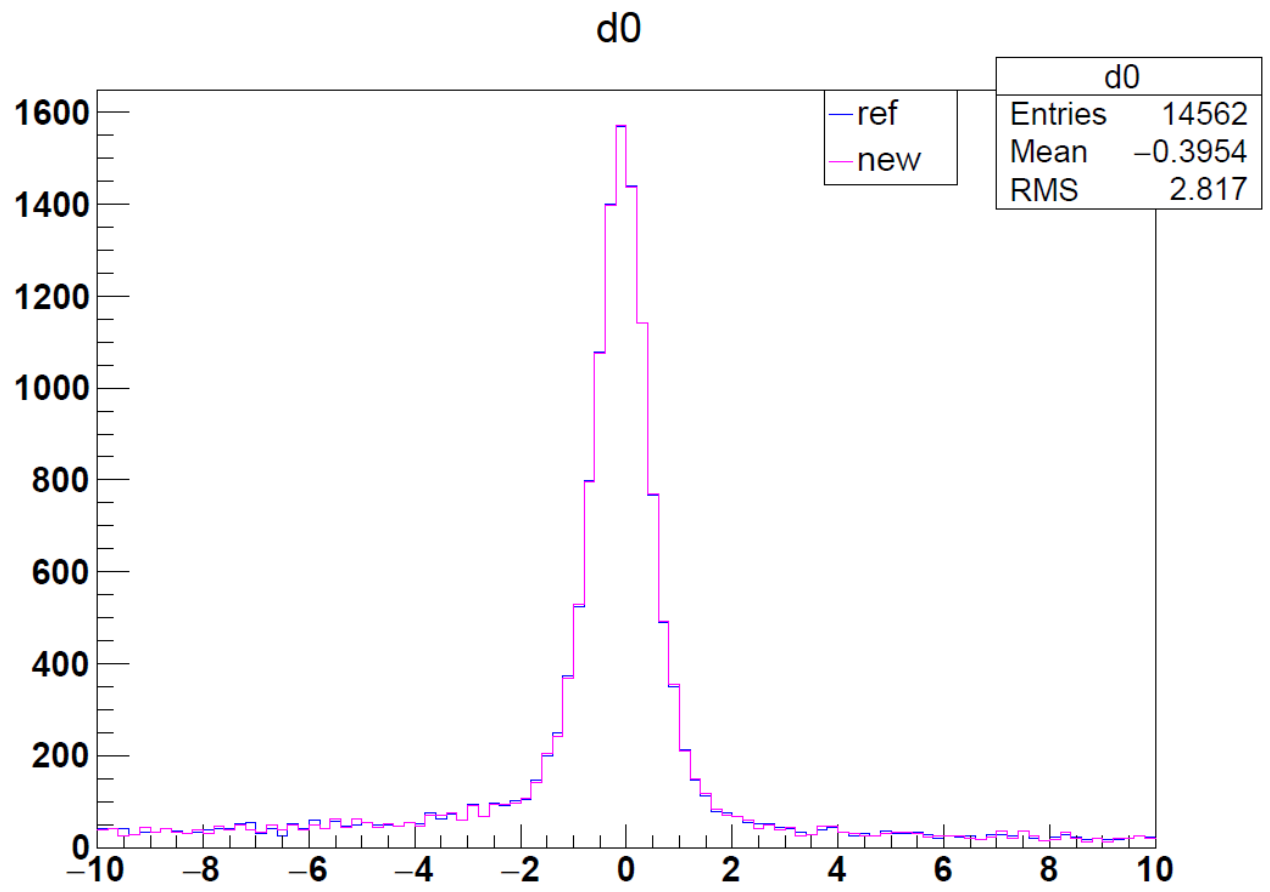

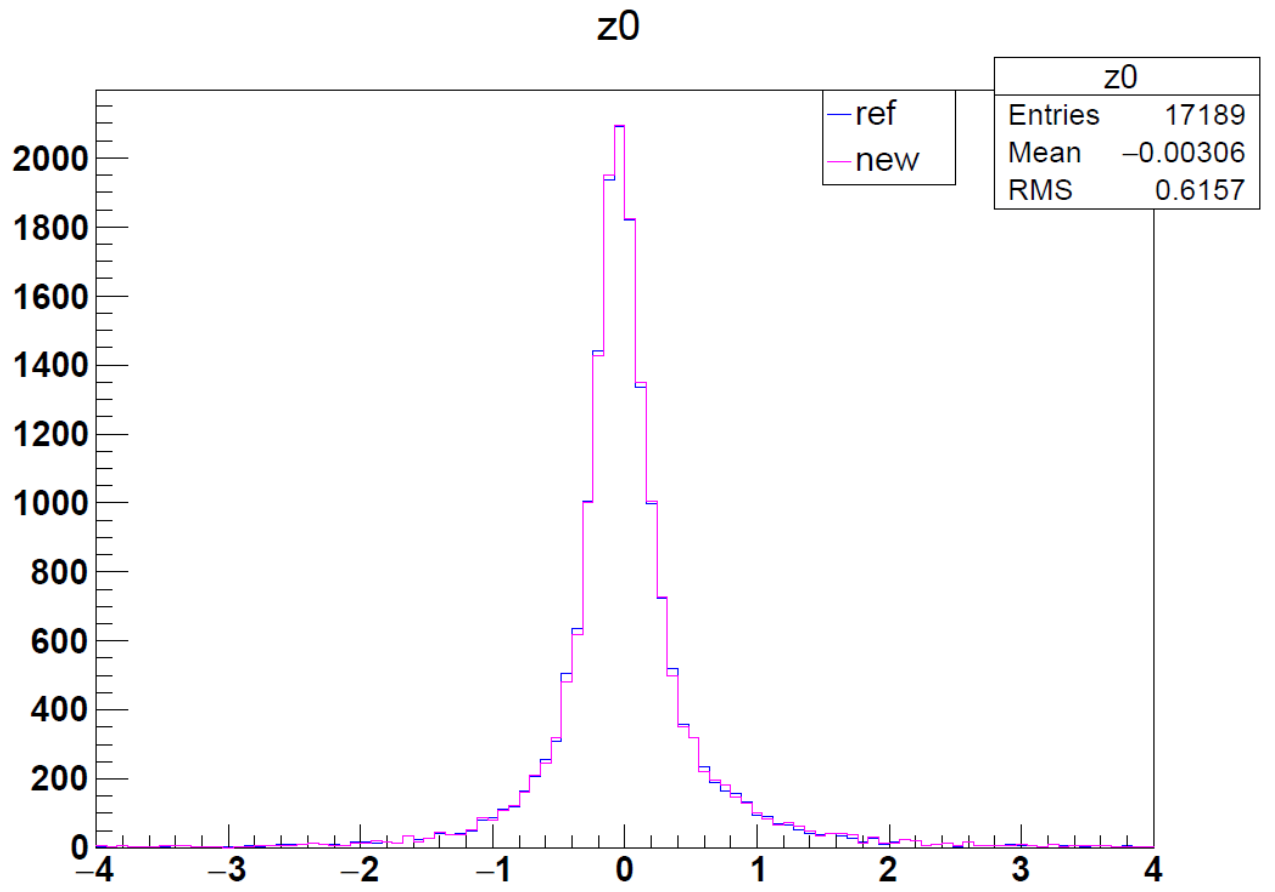

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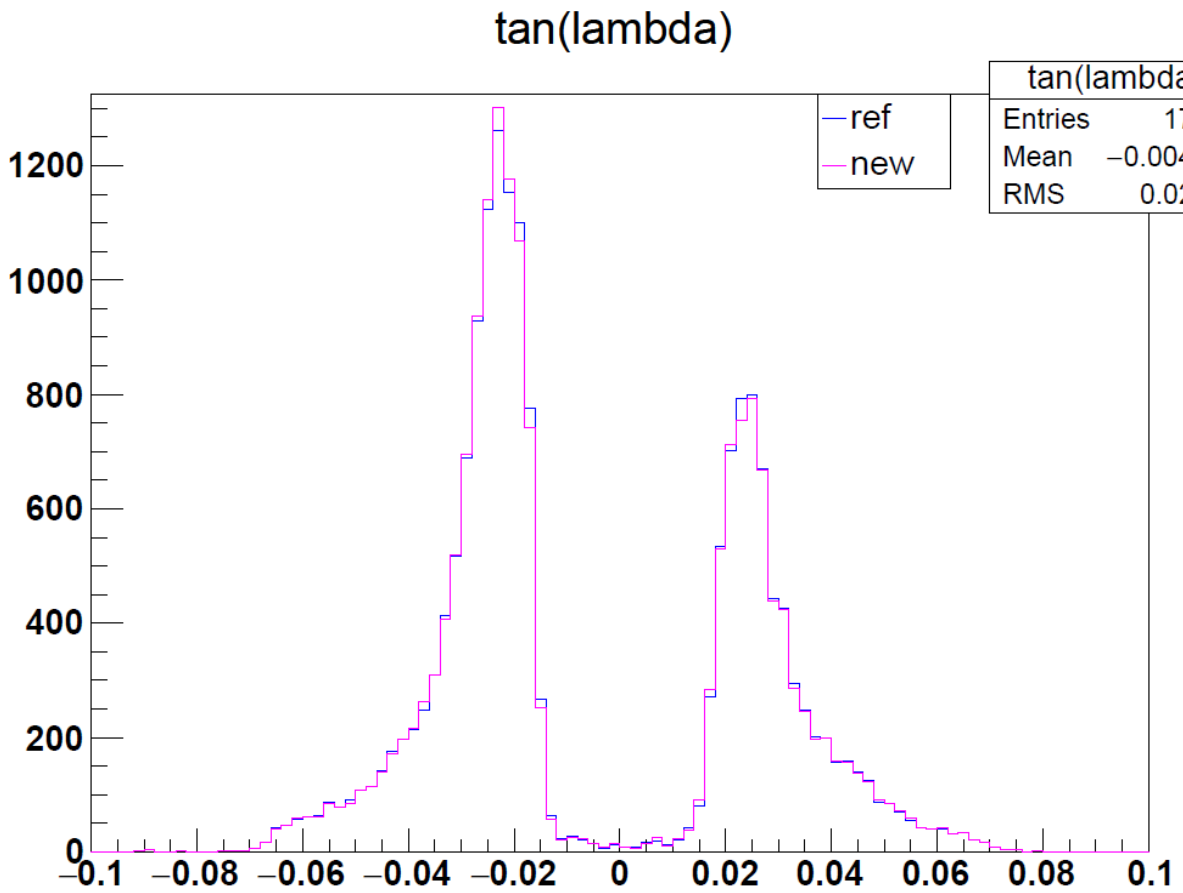

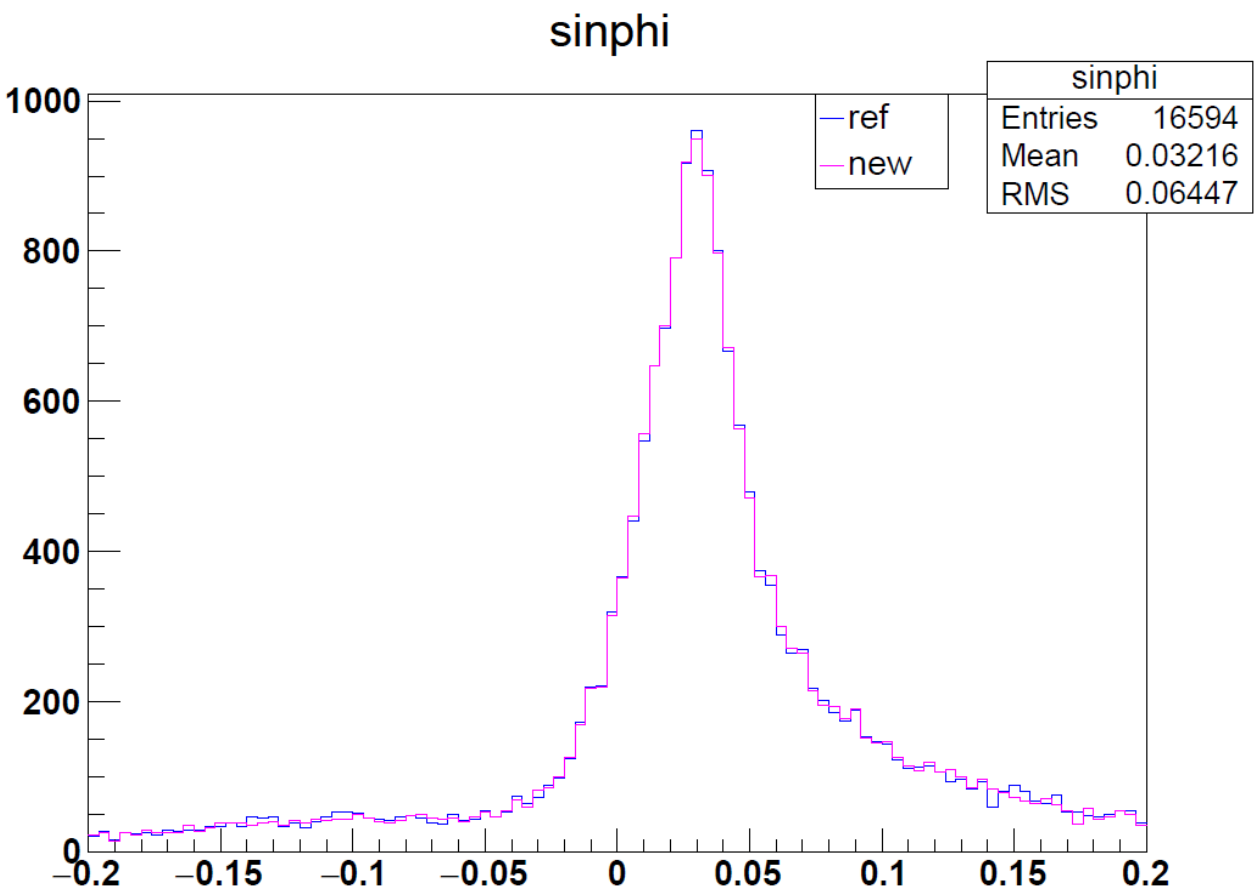

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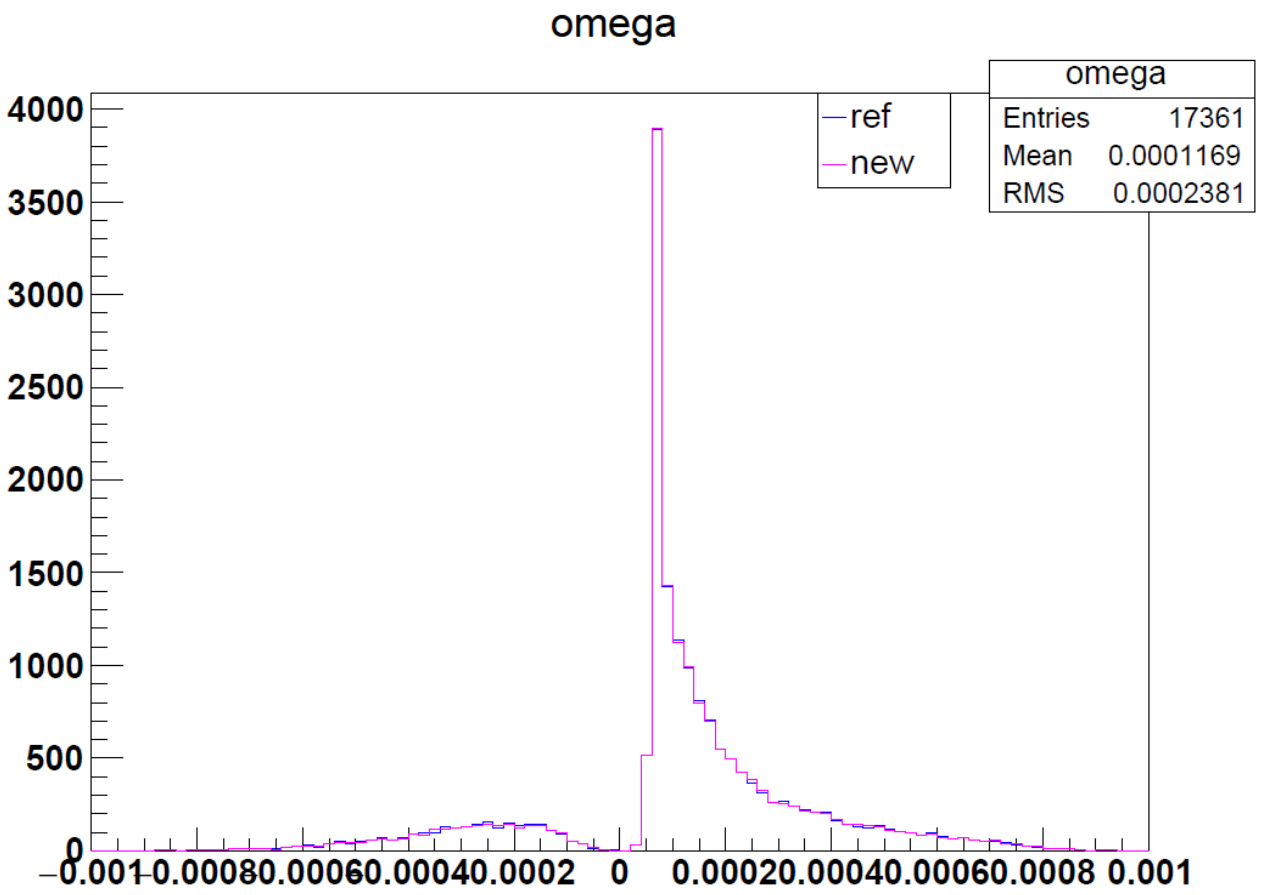
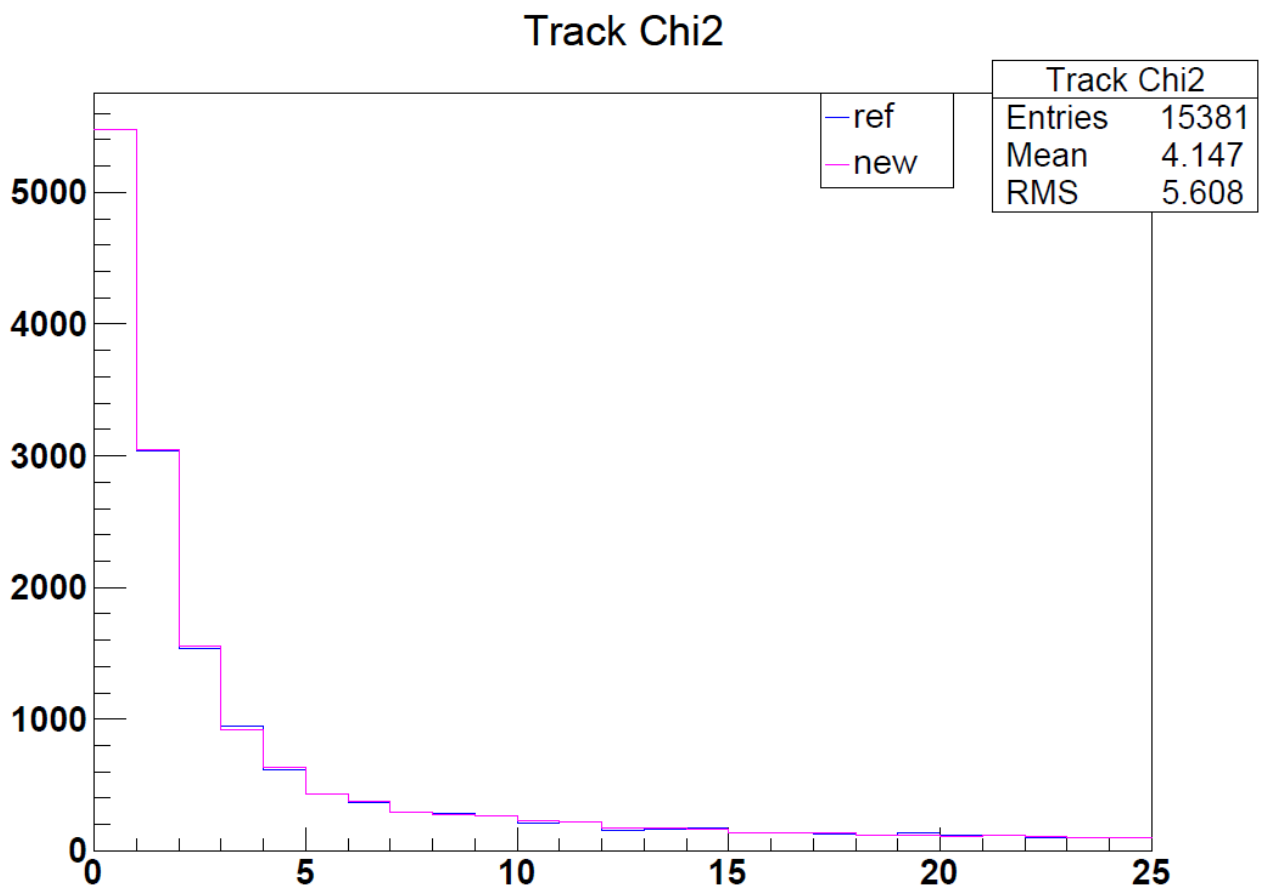
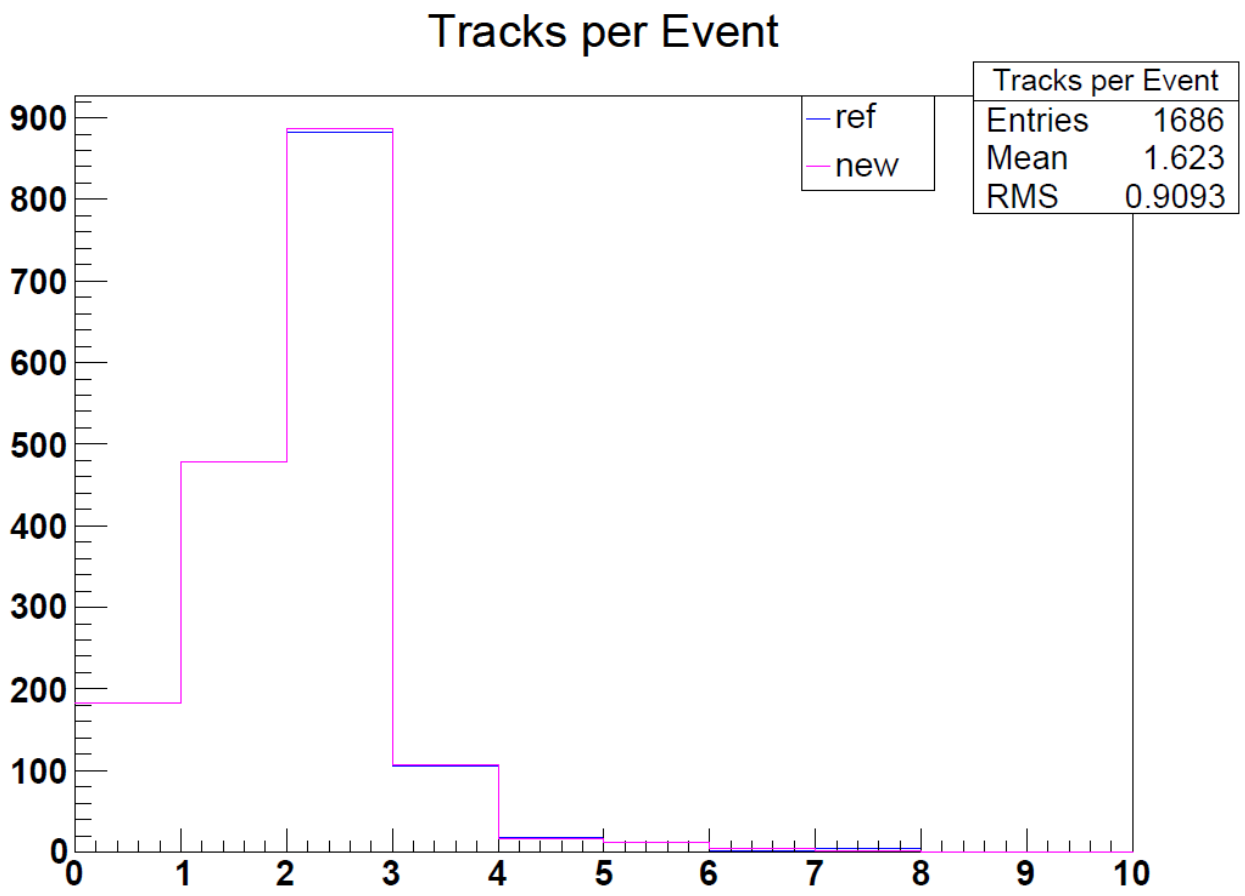
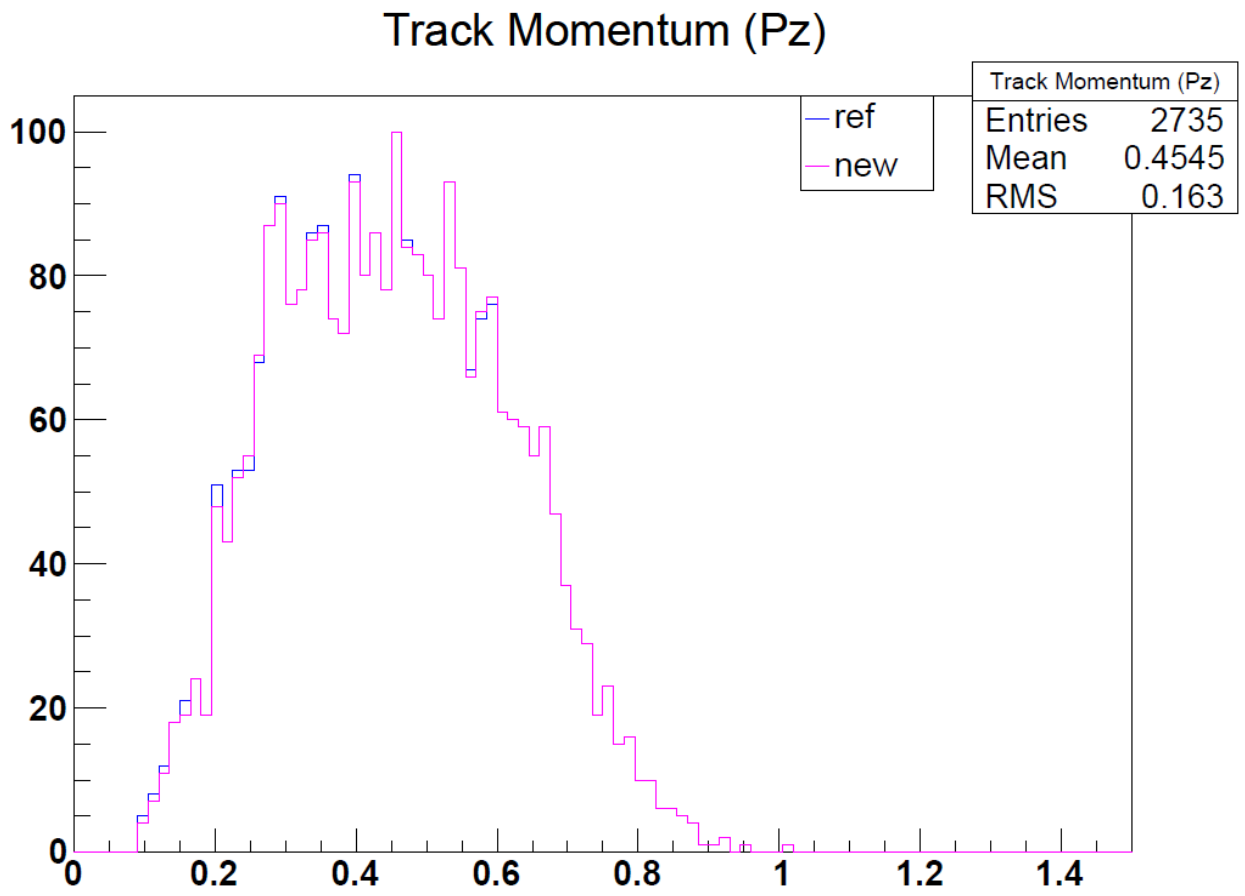


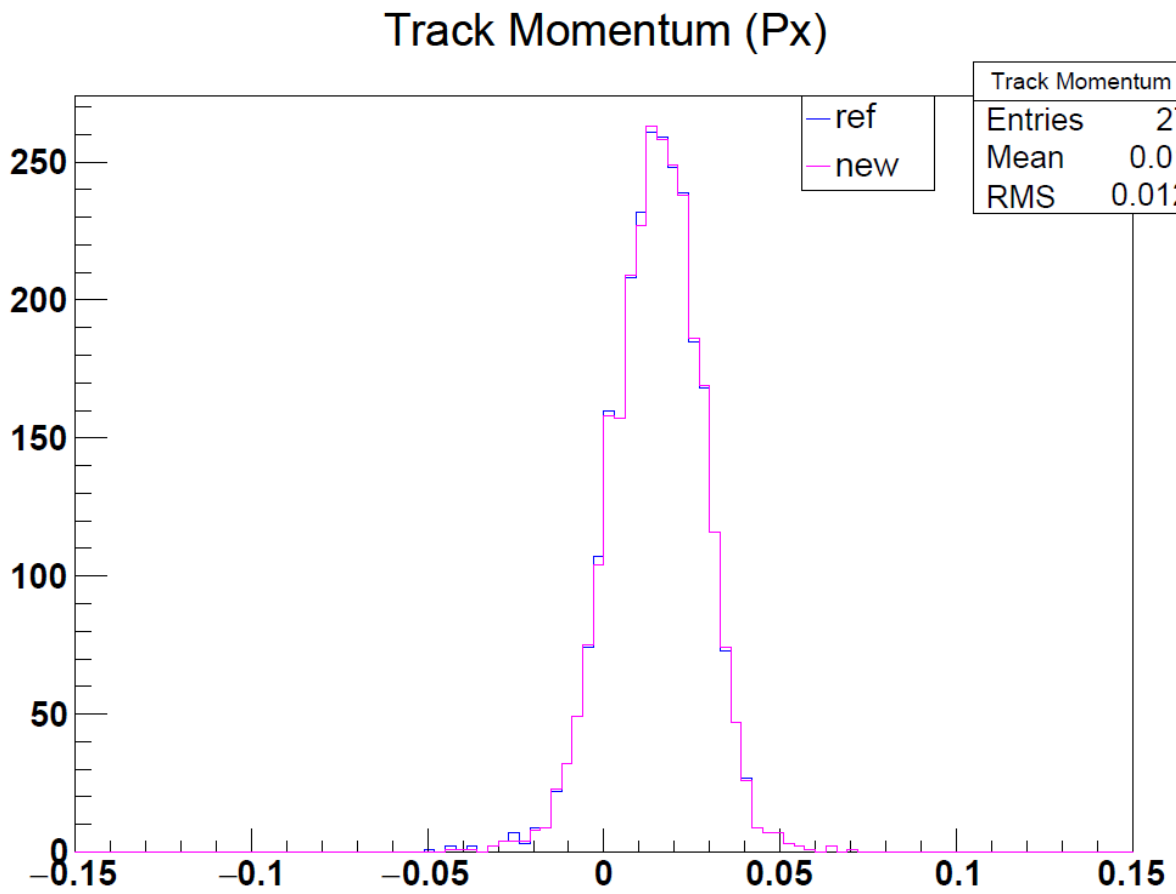


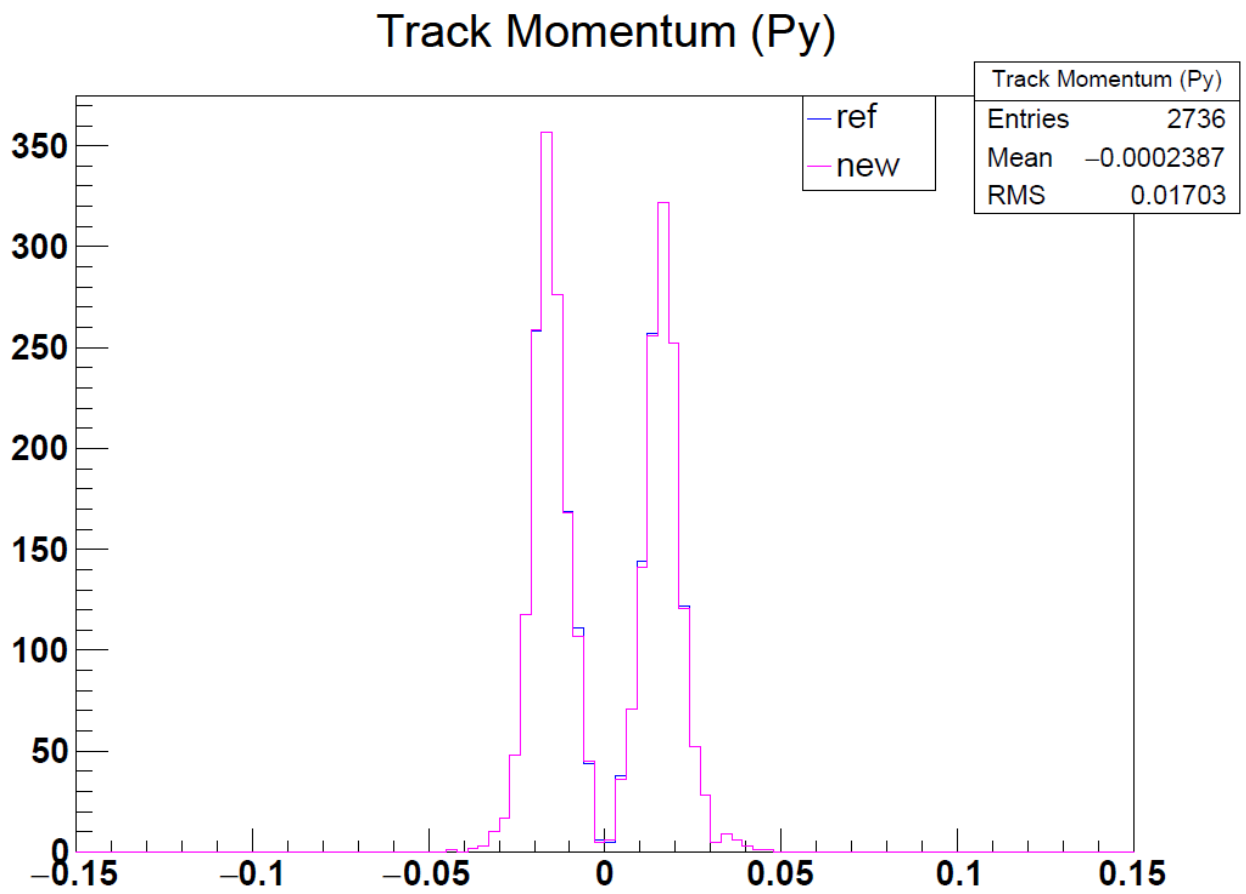
VALIDATION PLOTS: MC (PROMPT A')





VALIDATION PLOTS: MC (PROMPT A')





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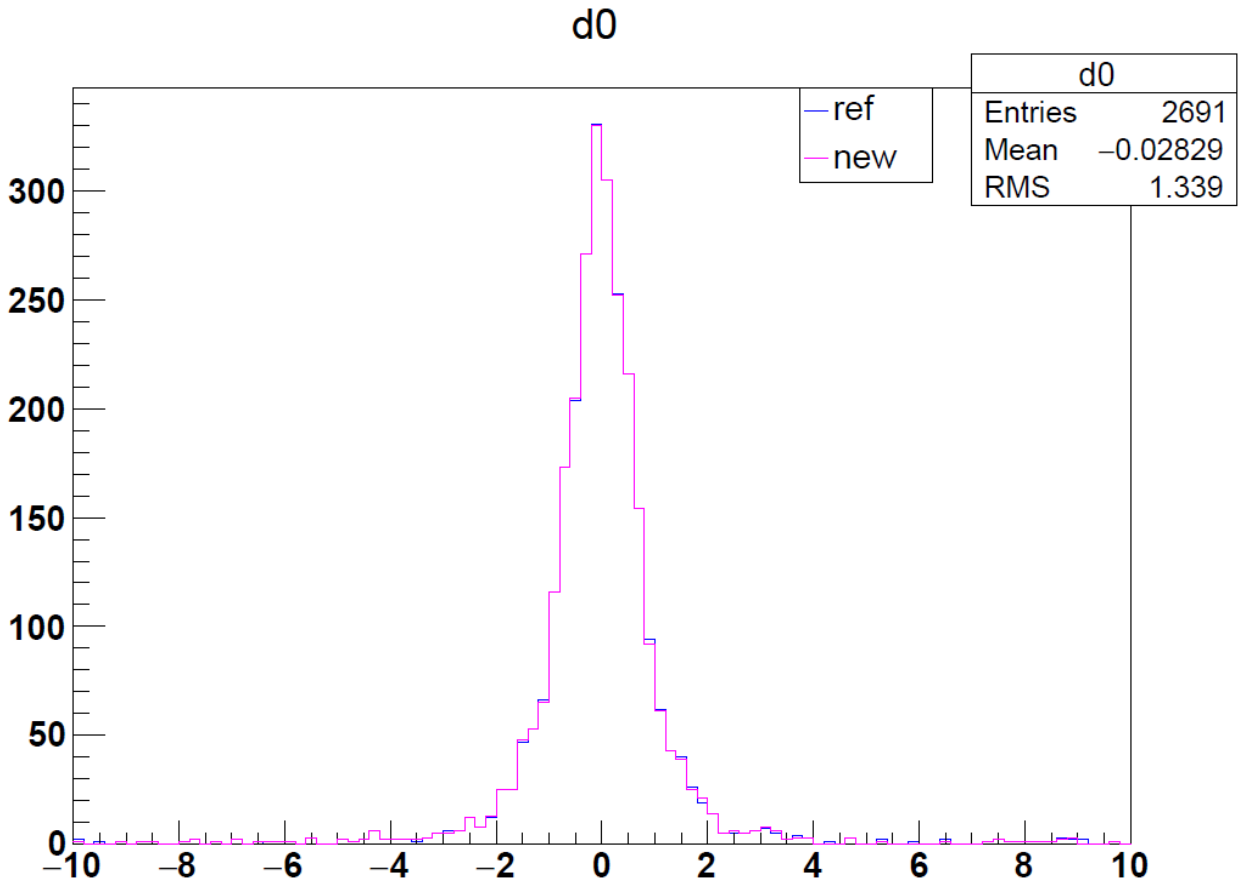

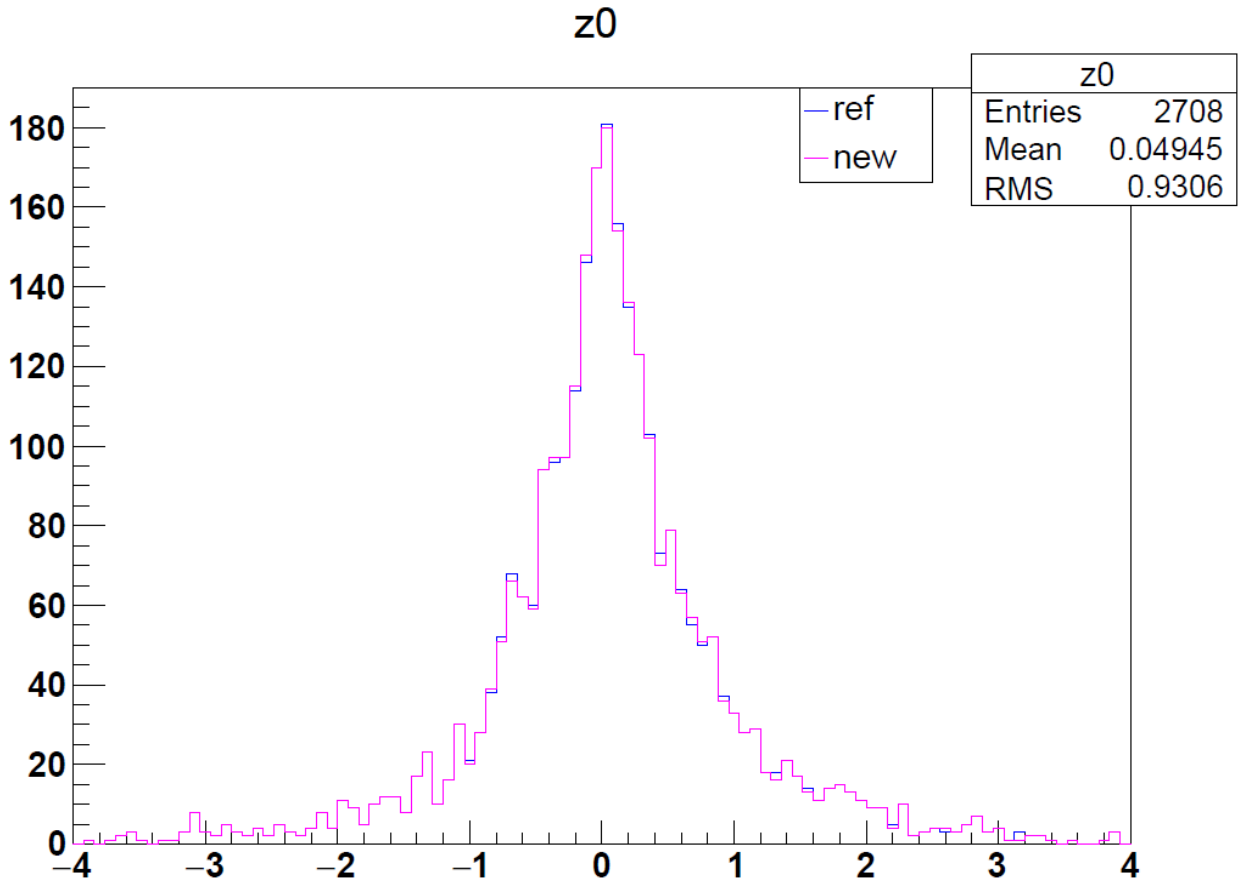

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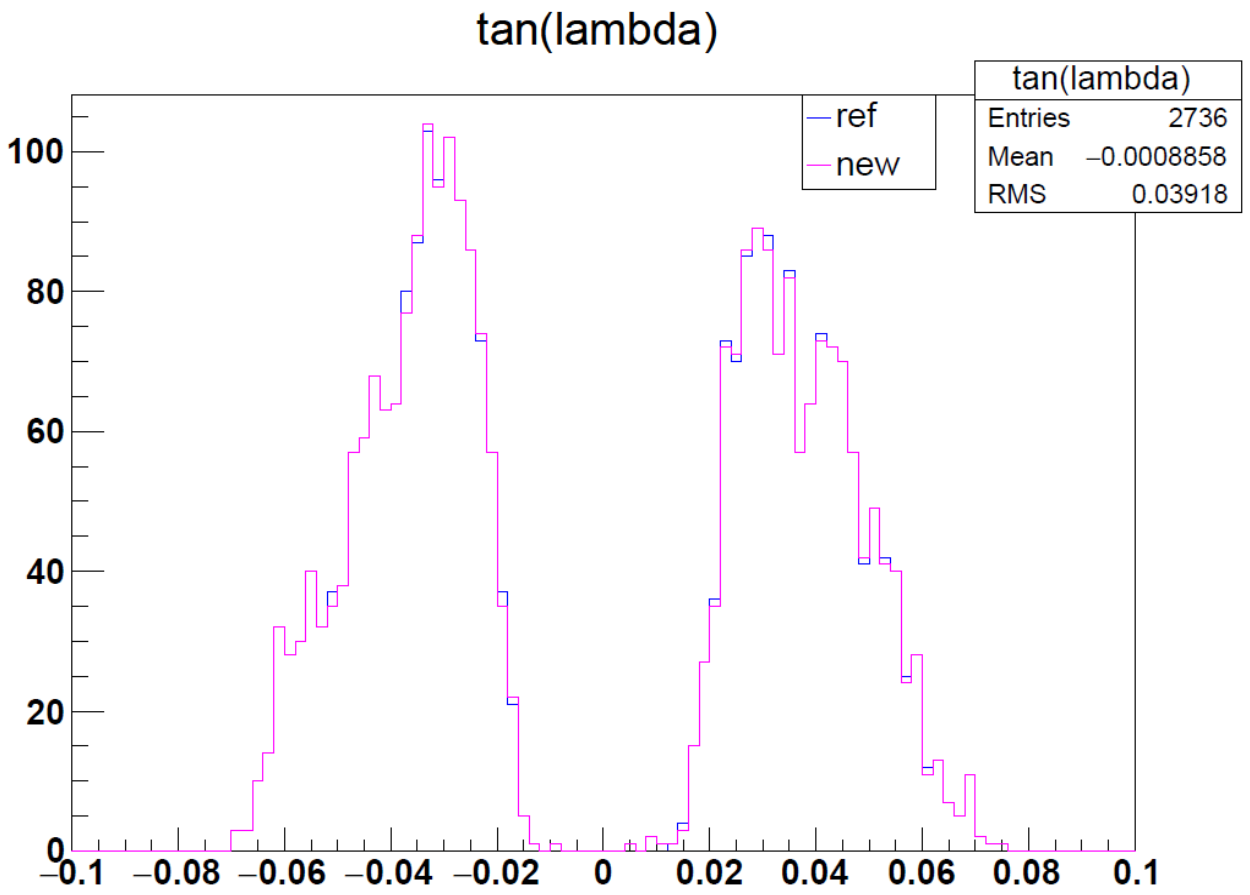

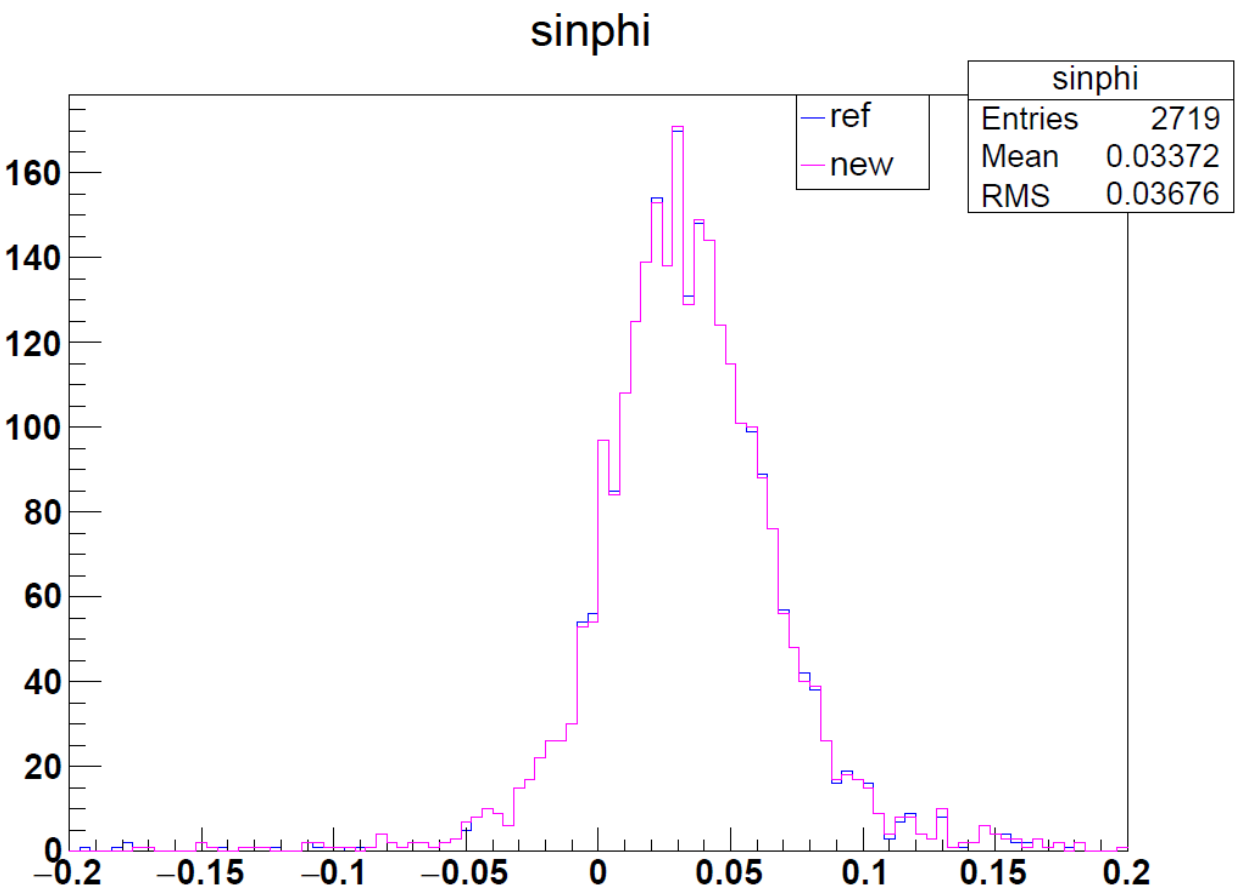

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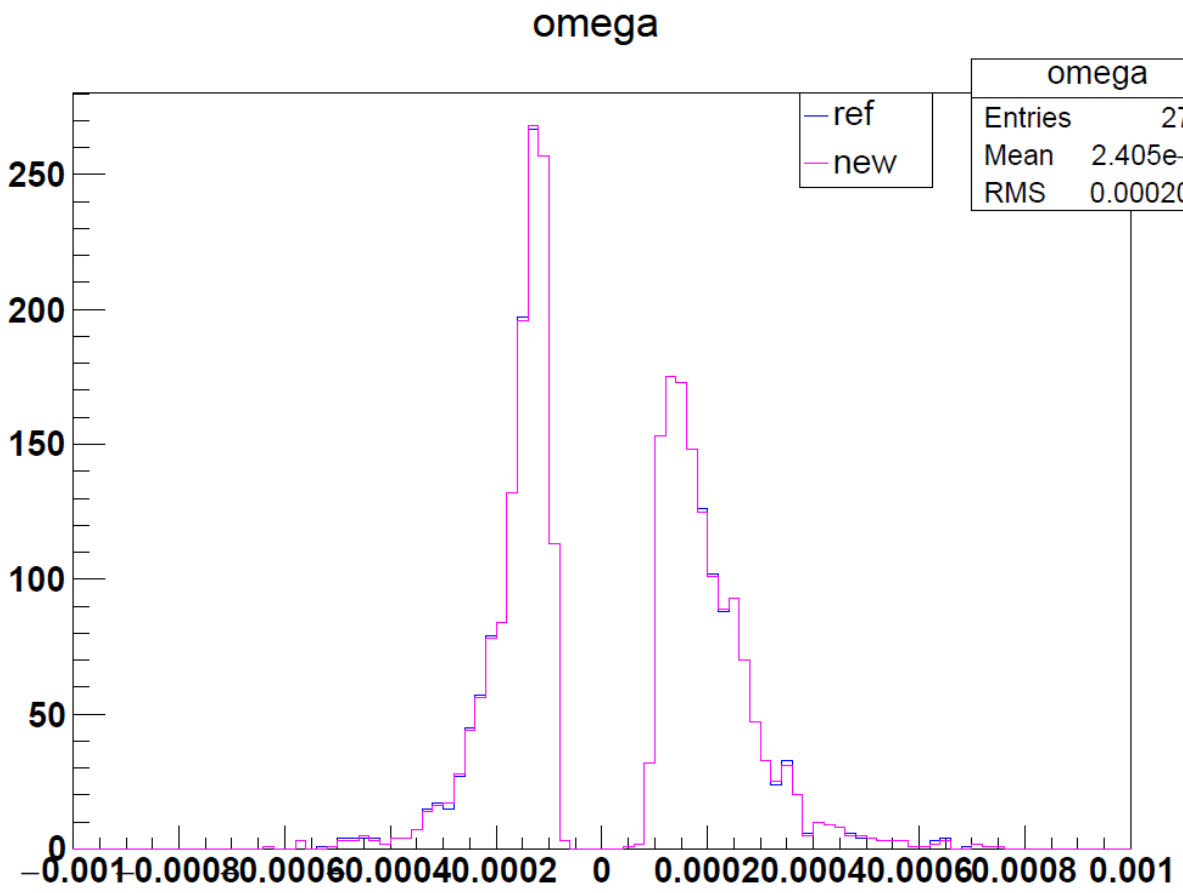
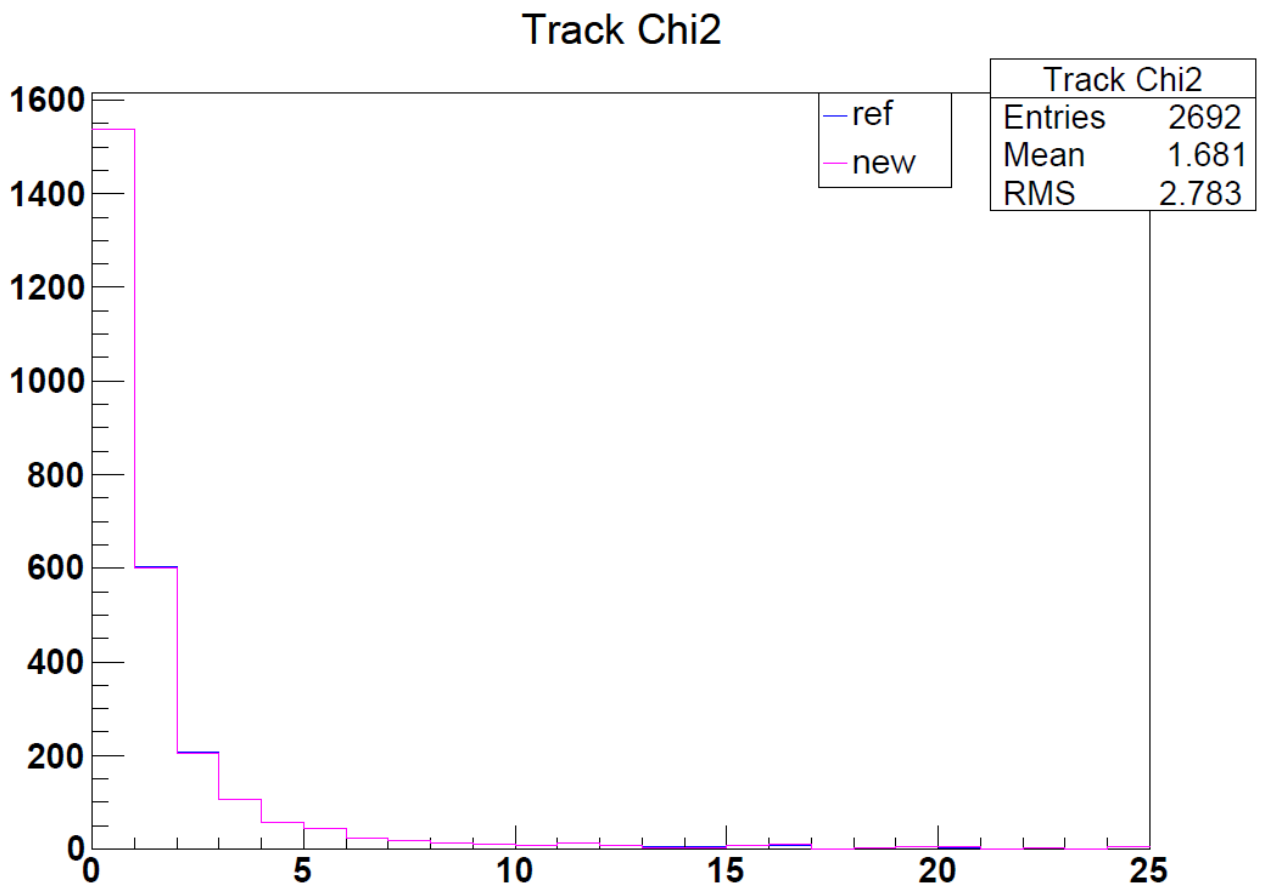




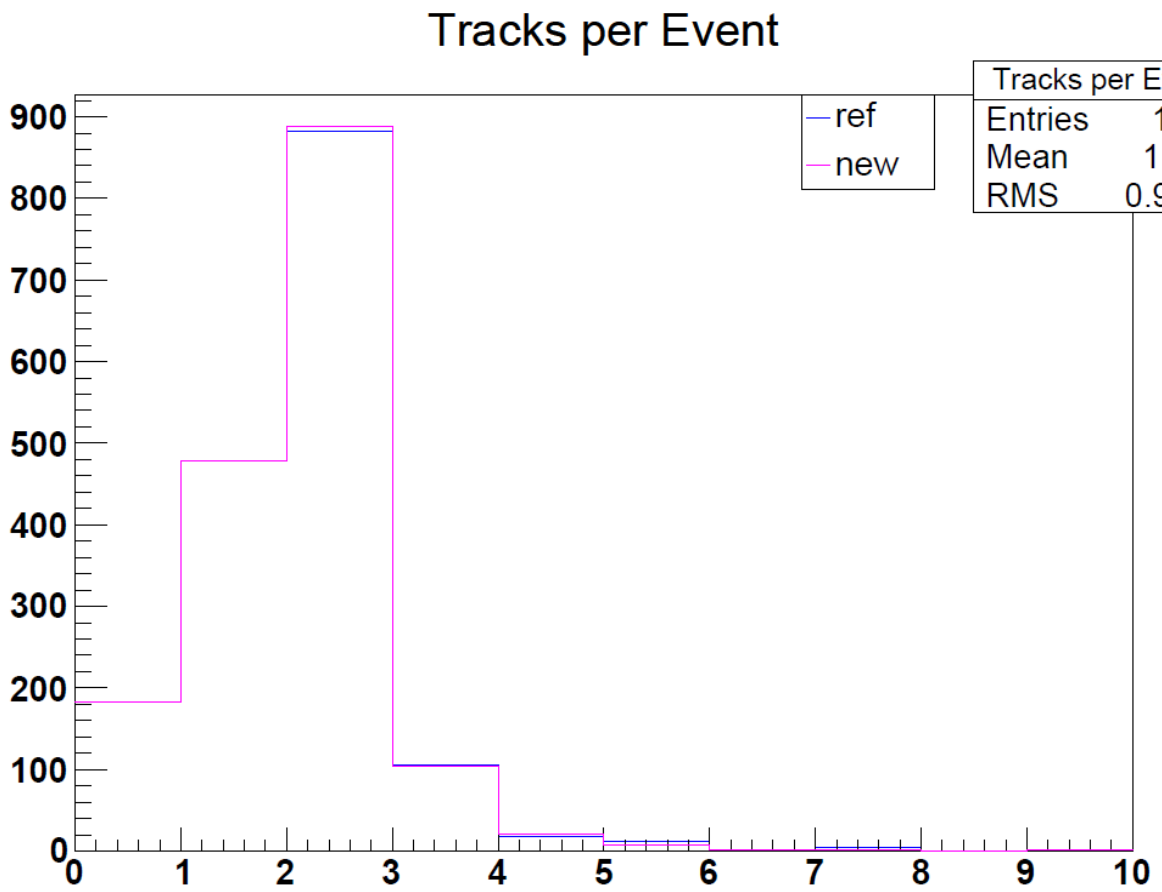
MULTIPLE SCATTERING ERROR + MIN PT IN TRACK SEEDING

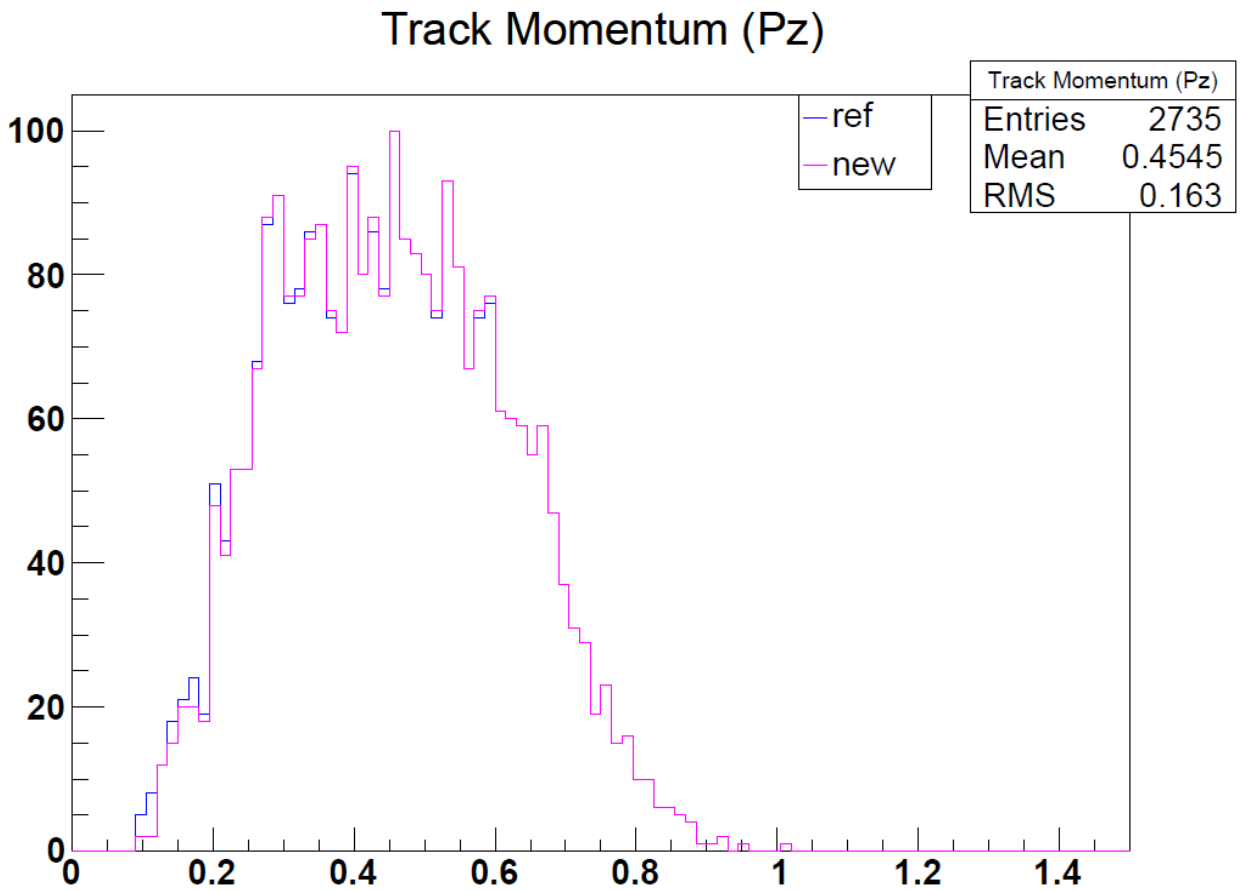
MIRIAM DIAMOND

JULY 24 2017

github issues 126+157

VALIDATION PLOTS: MC (PROMPT A')





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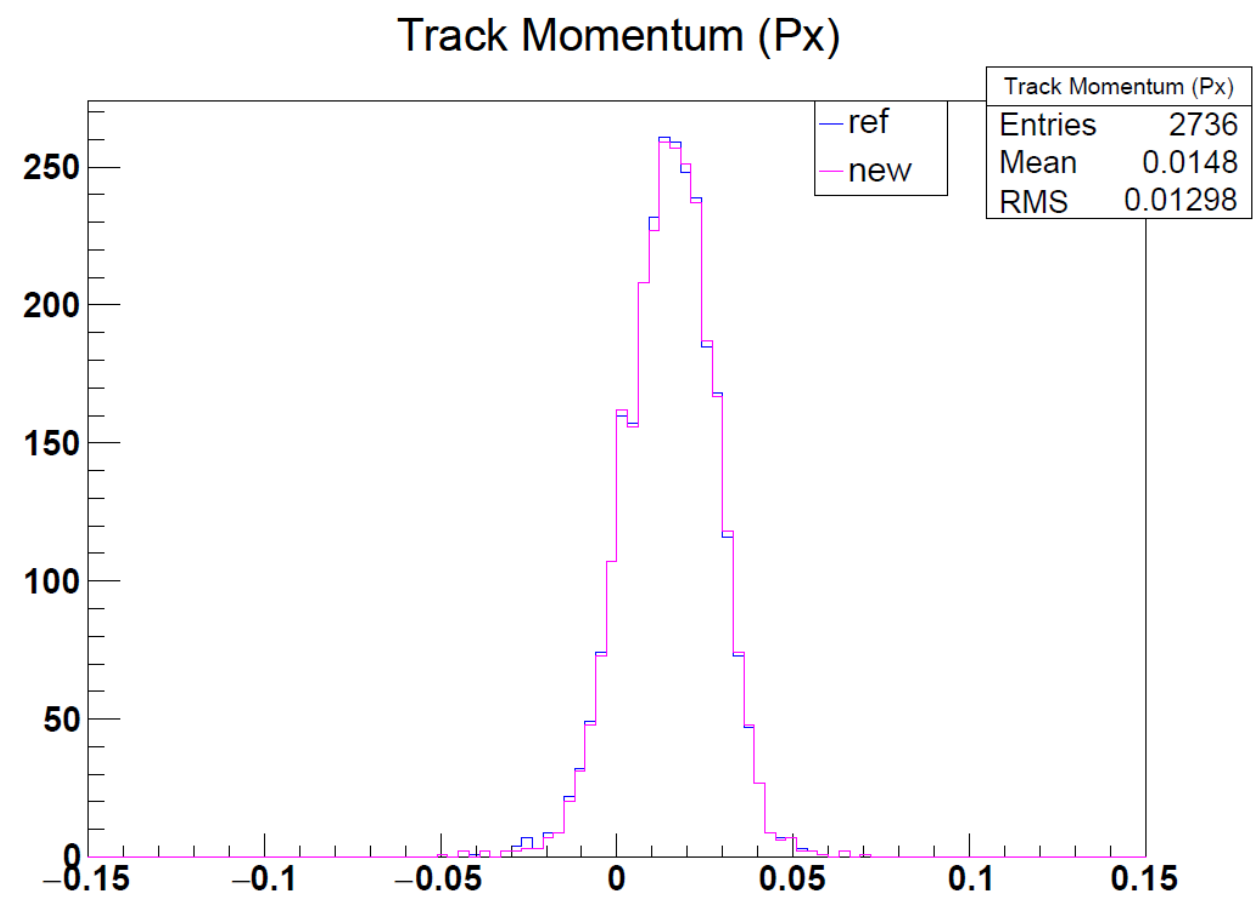

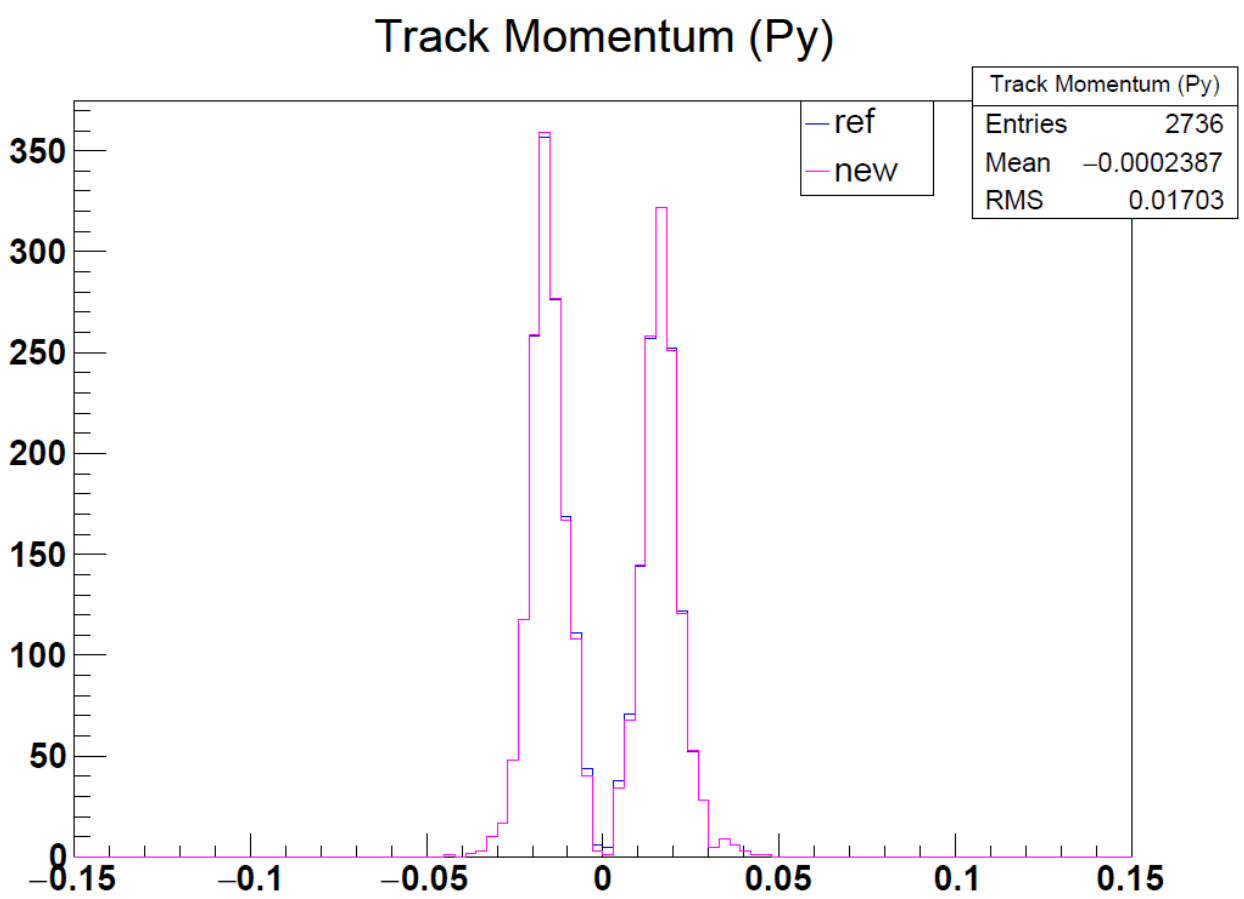

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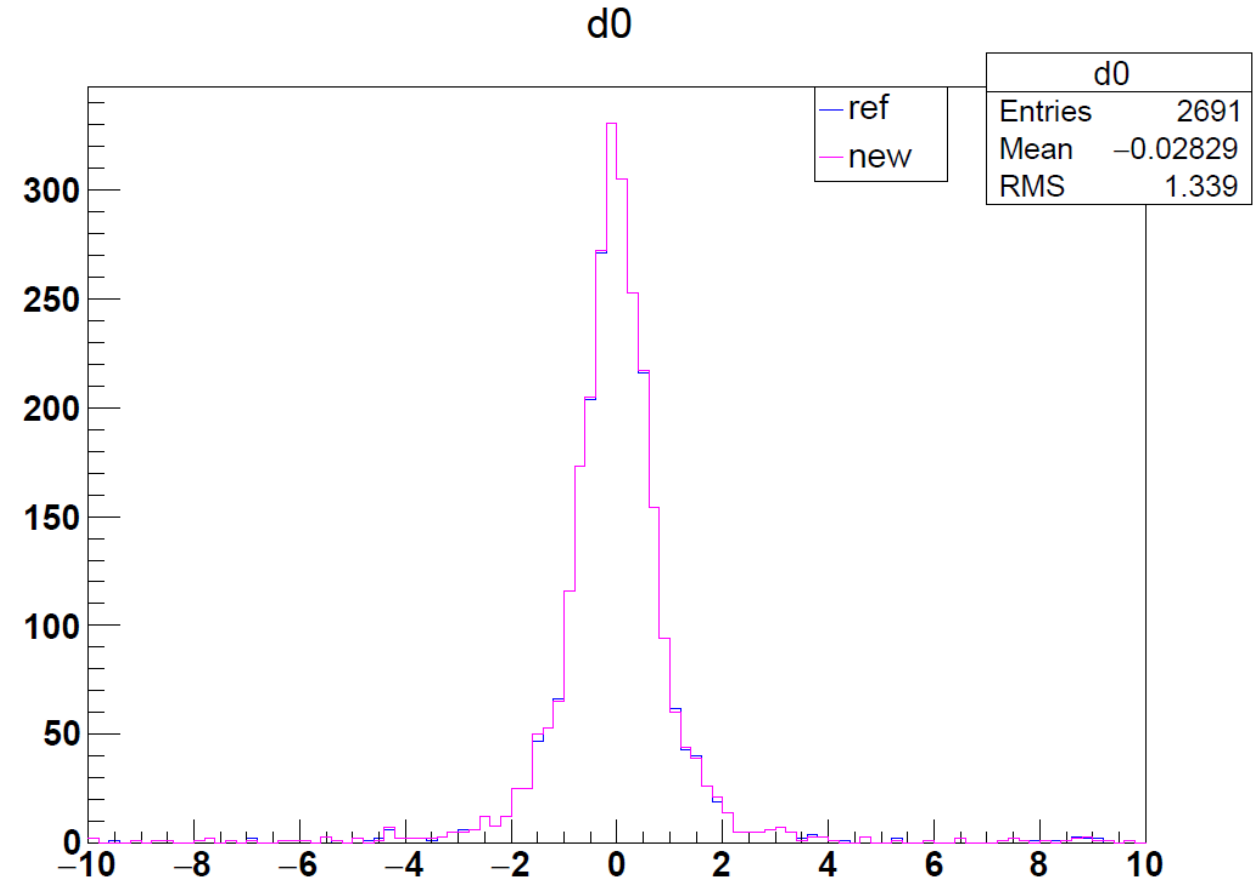

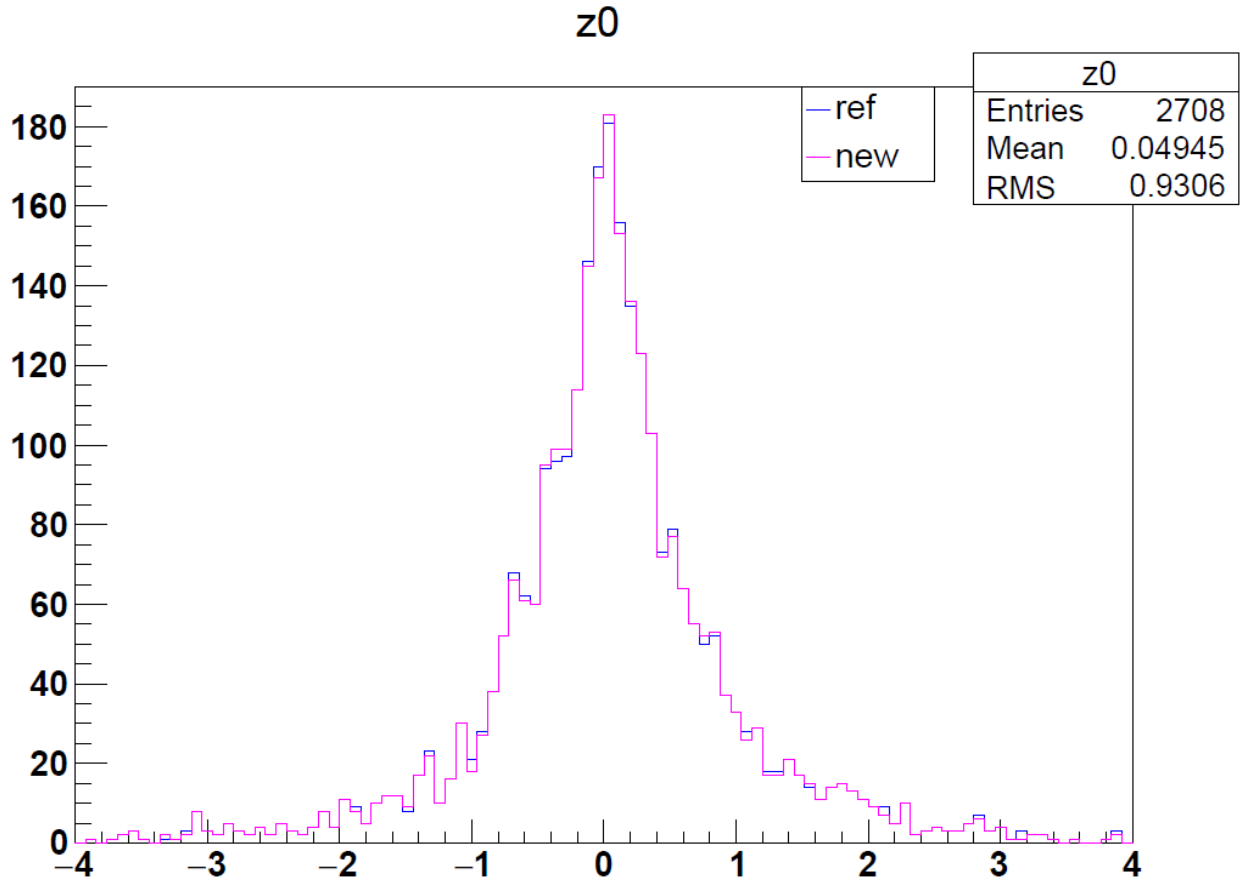

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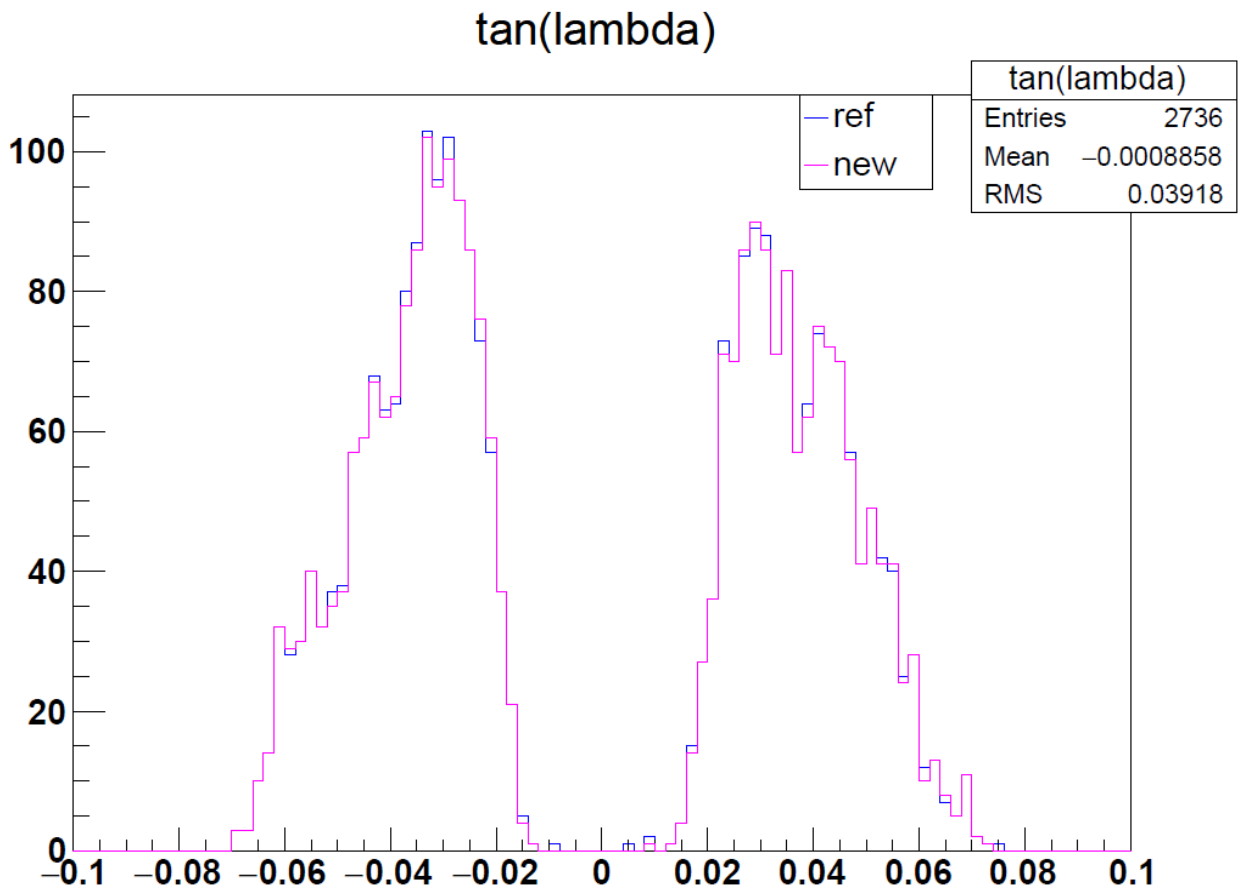
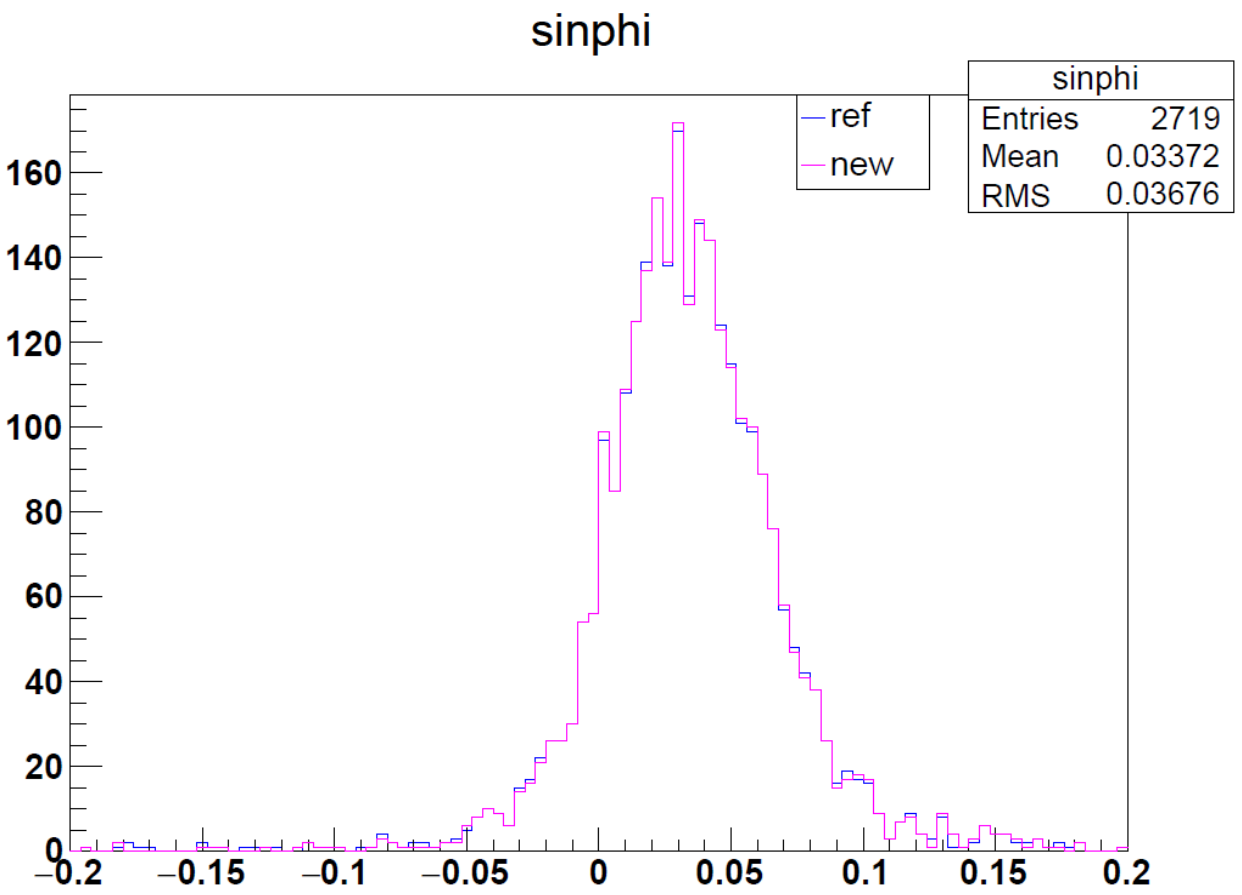
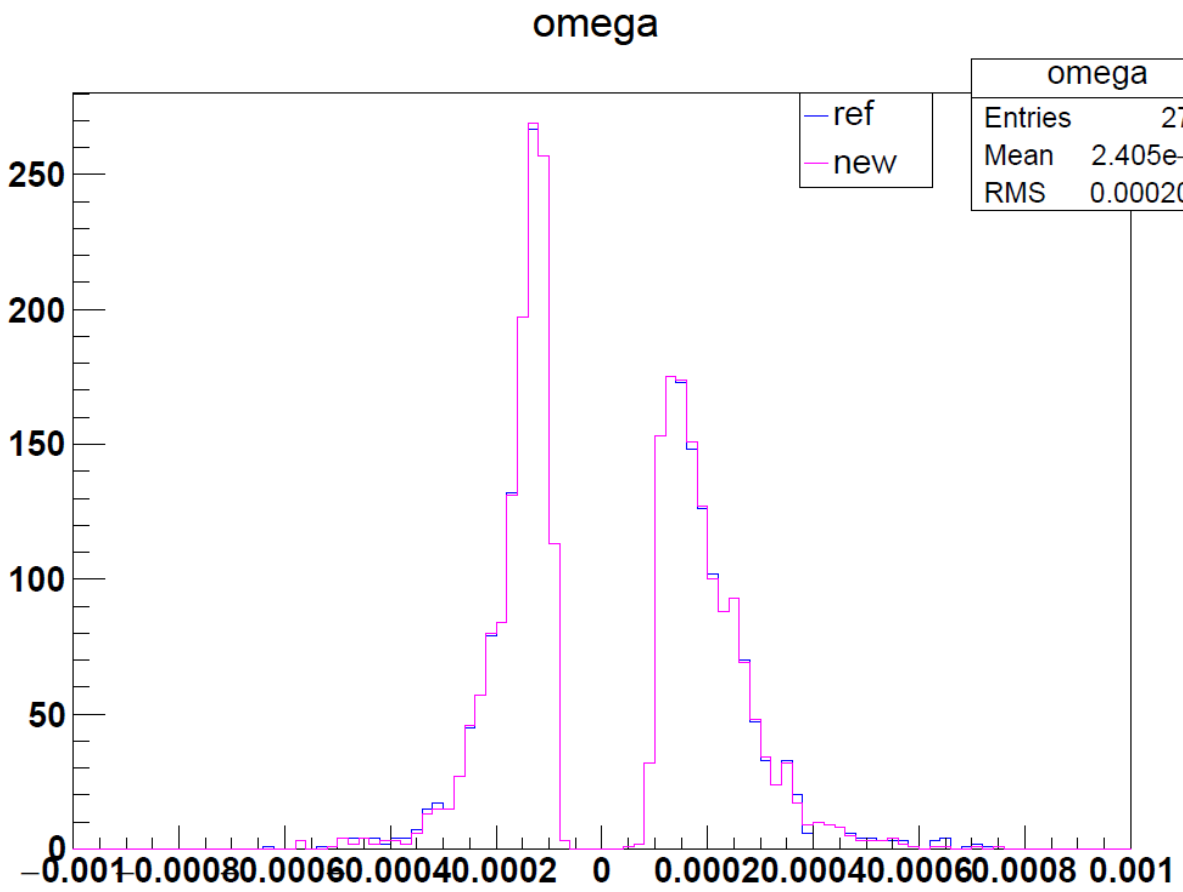
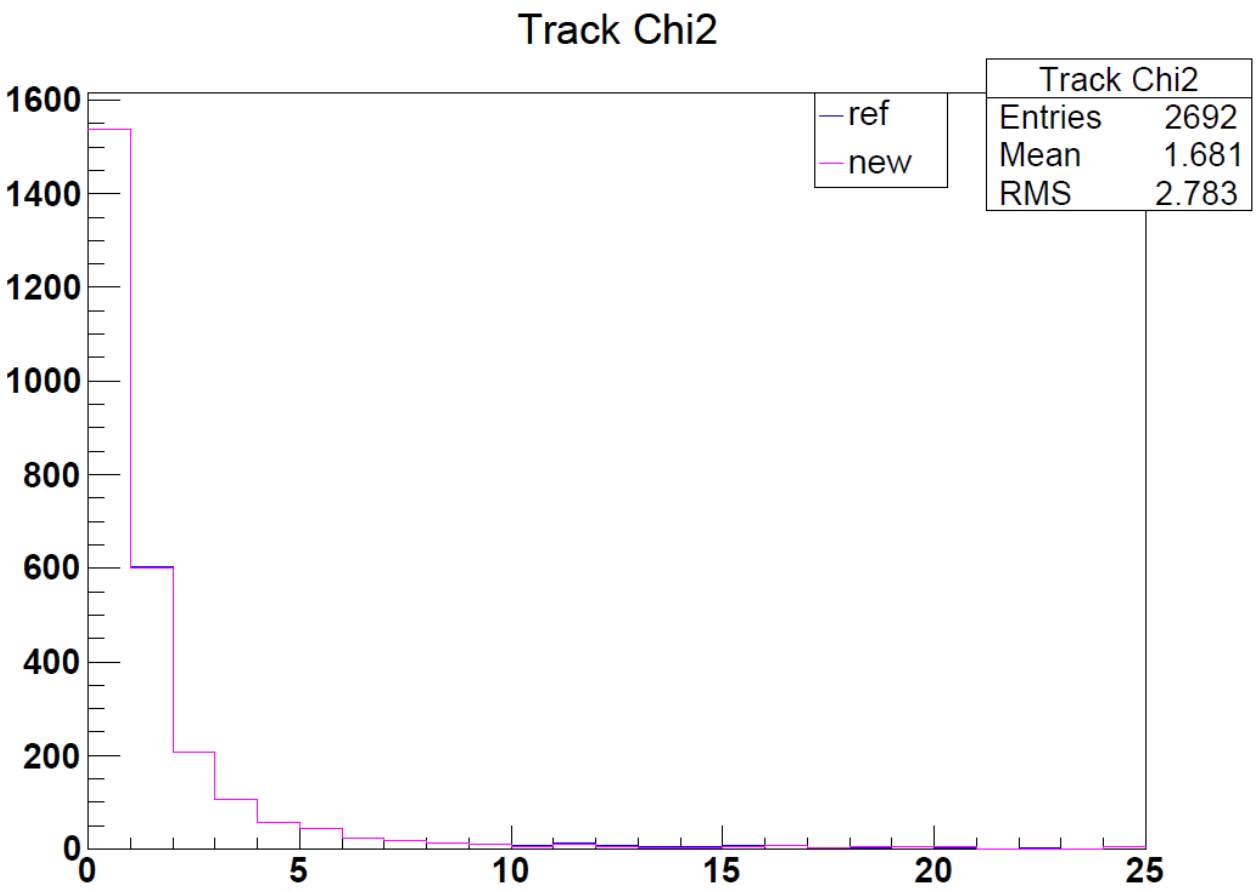


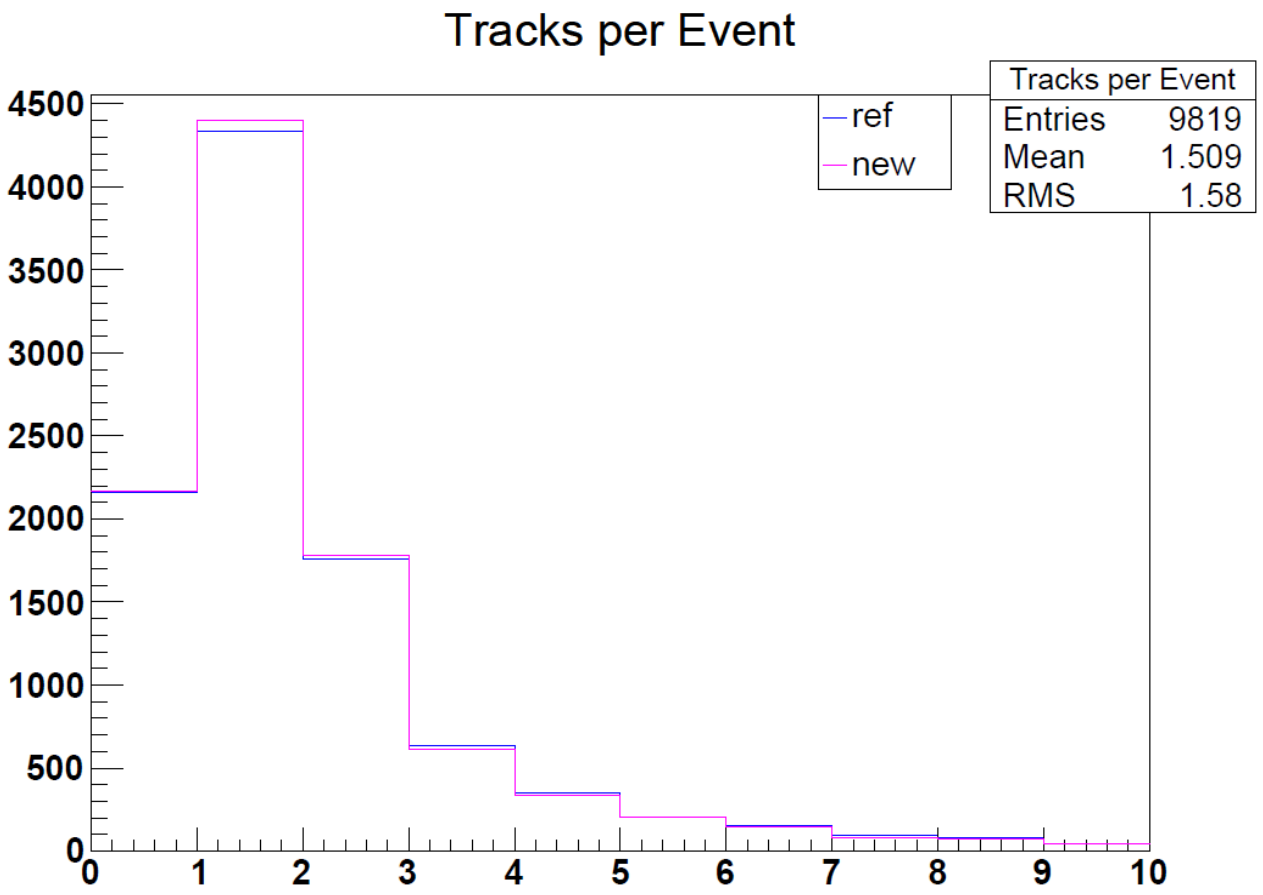


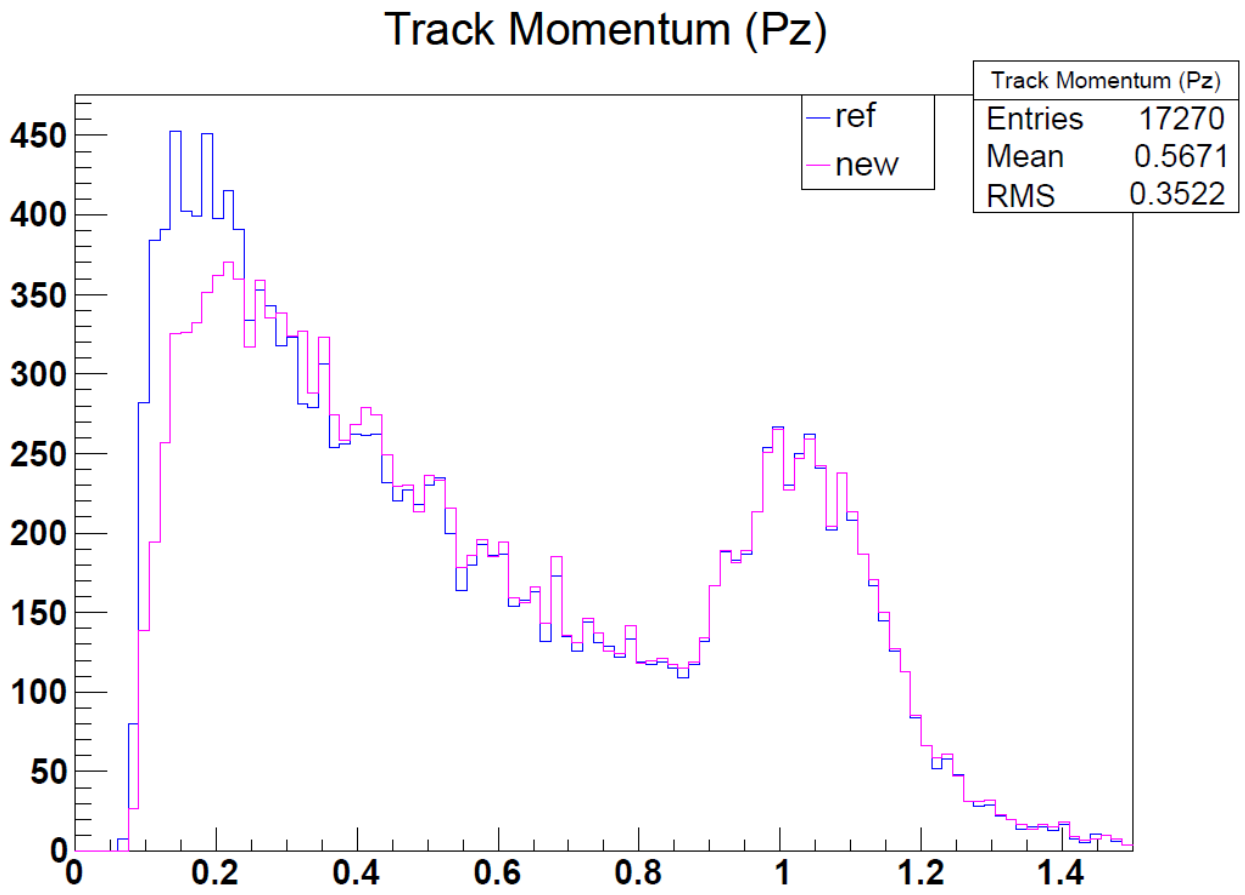
VALIDATION PLOTS: MC (PROMPT A')



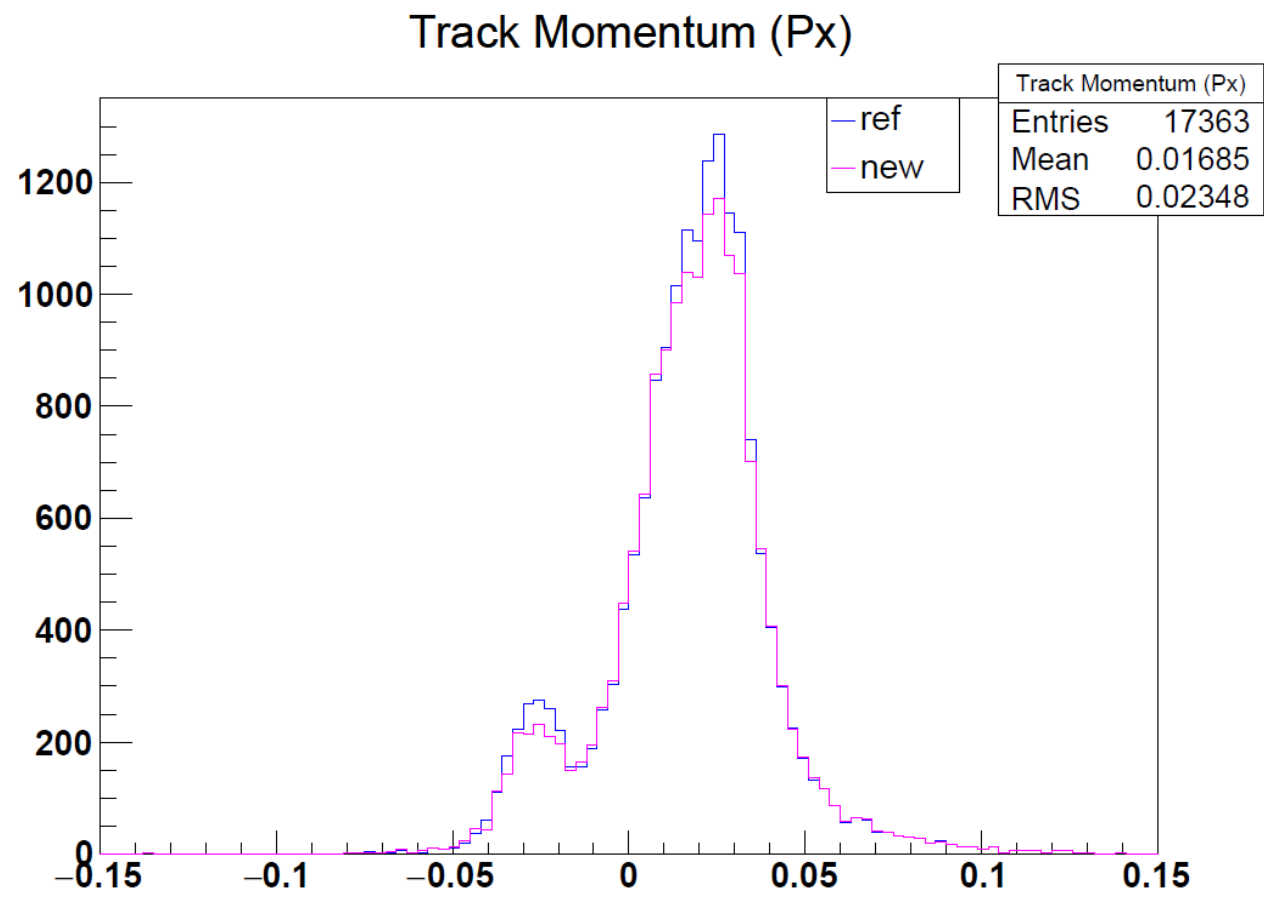


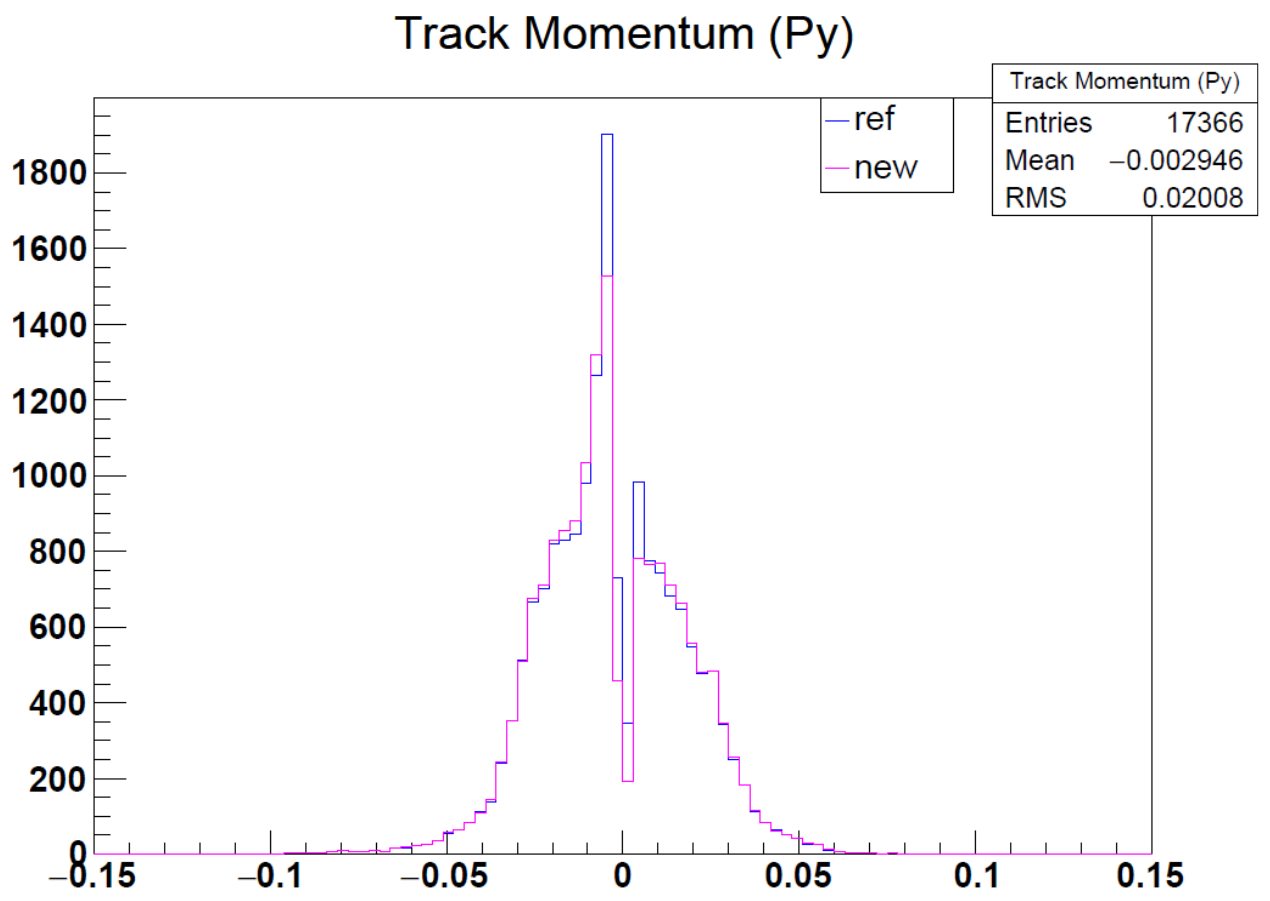
VALIDATION PLOTS: DATA (RUN 5772)



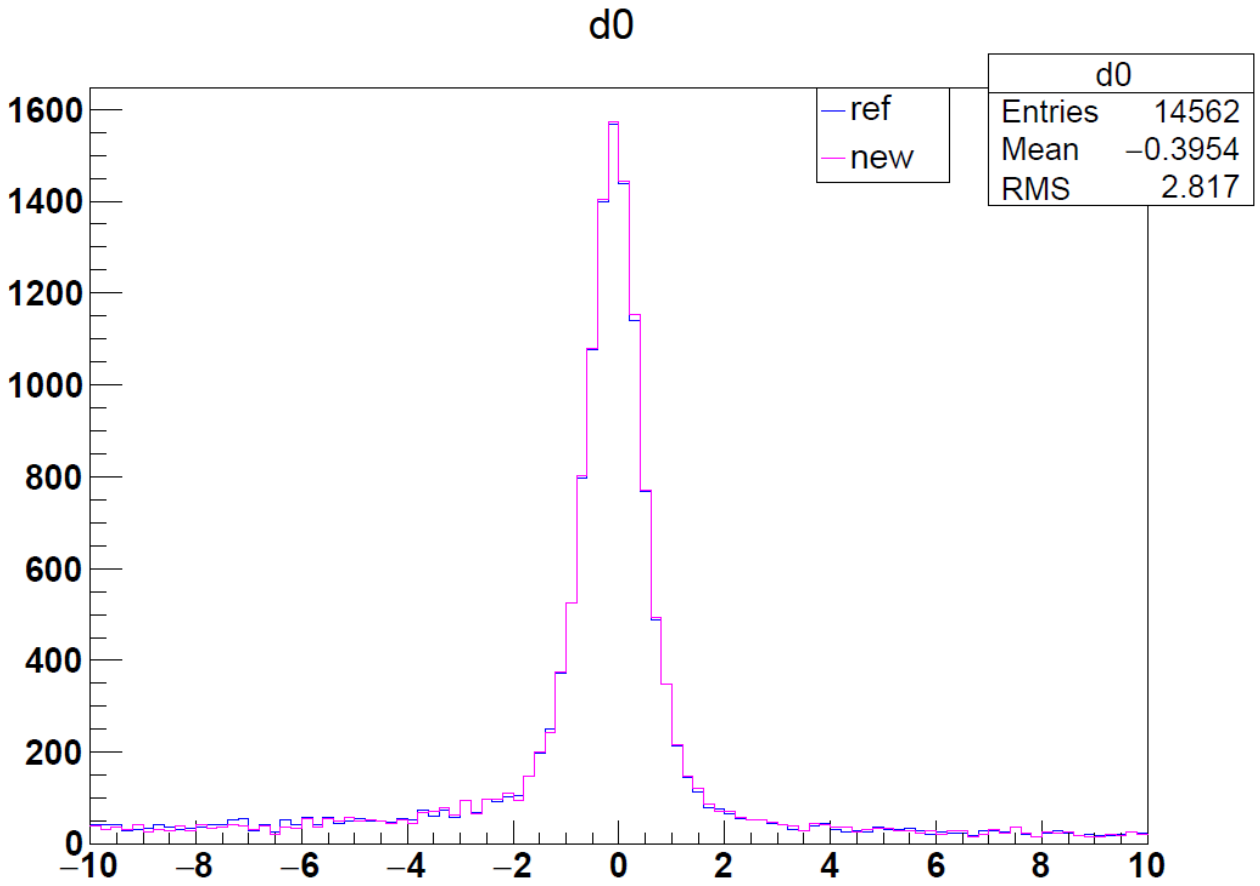


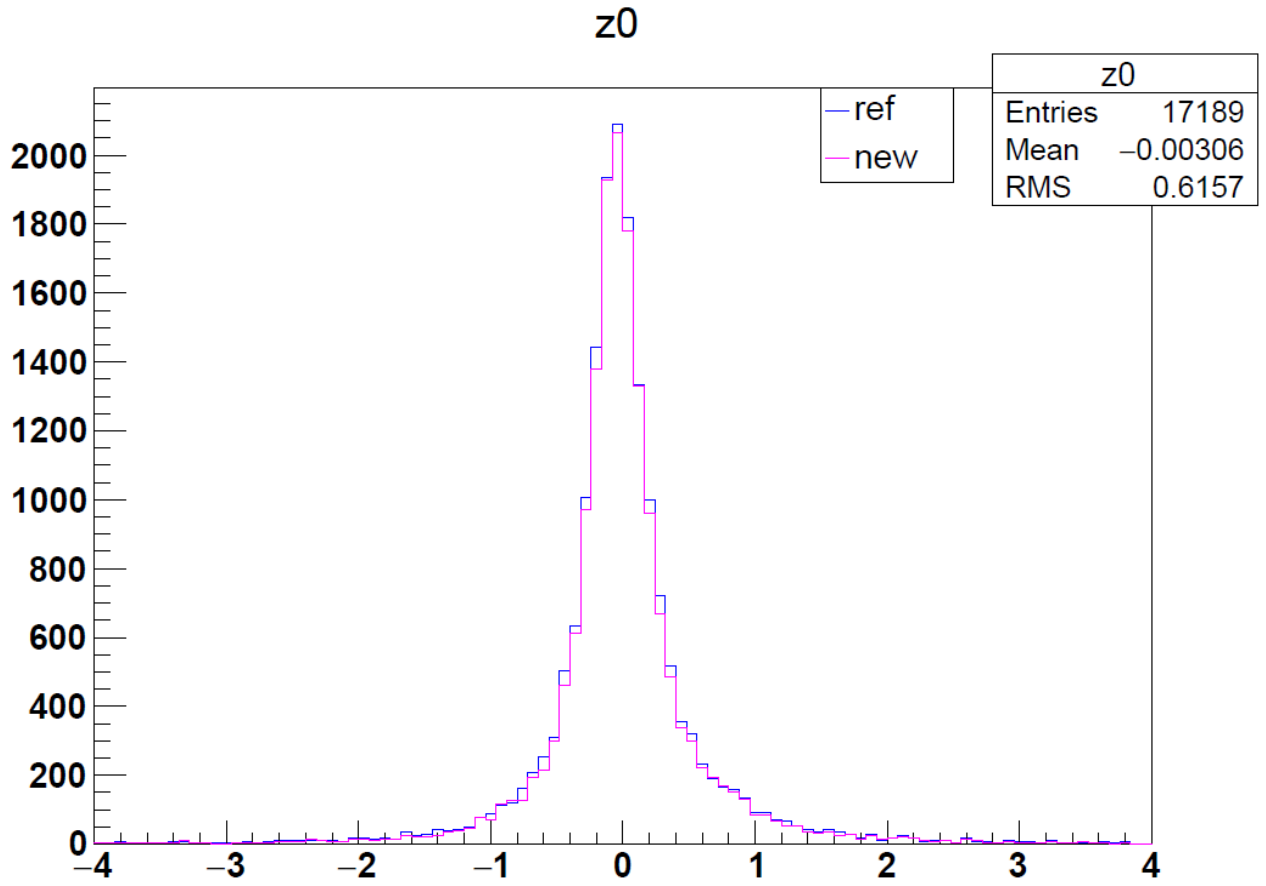
VALIDATION PLOTS: DATA (RUN 5772)



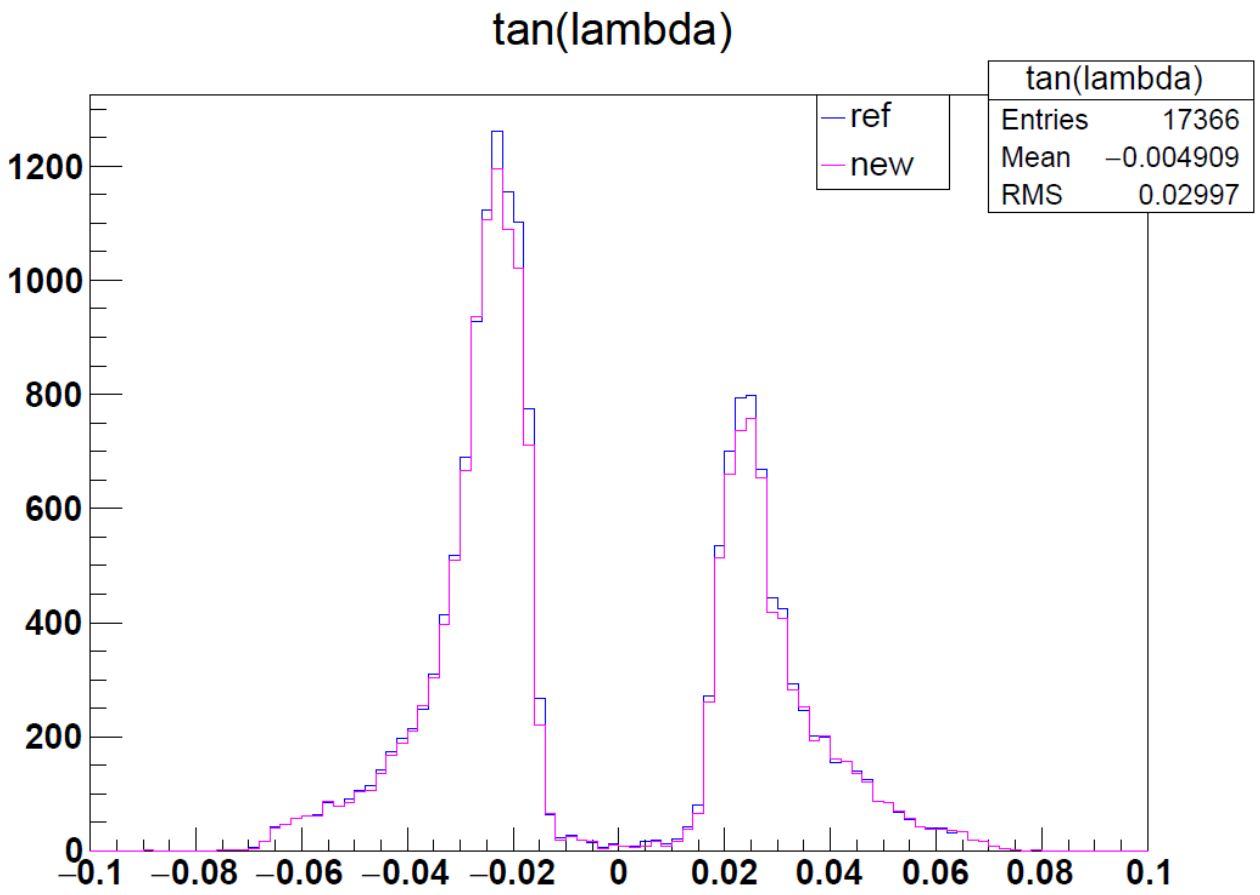


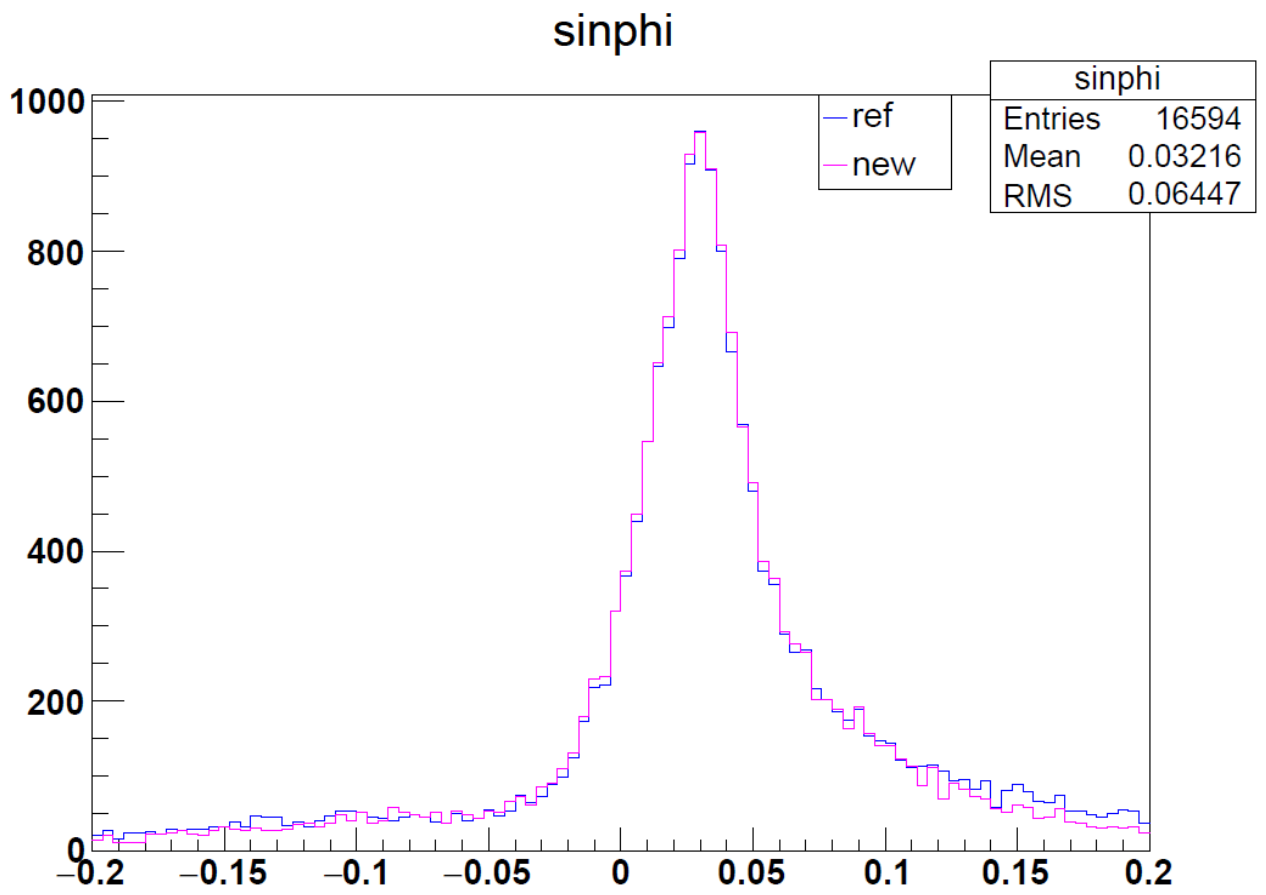
VALIDATION PLOTS: DATA (RUN 5772)





VALIDATION PLOTS: DATA (RUN 5772)





VALIDATION PLOTS: DATA (RUN 5772)