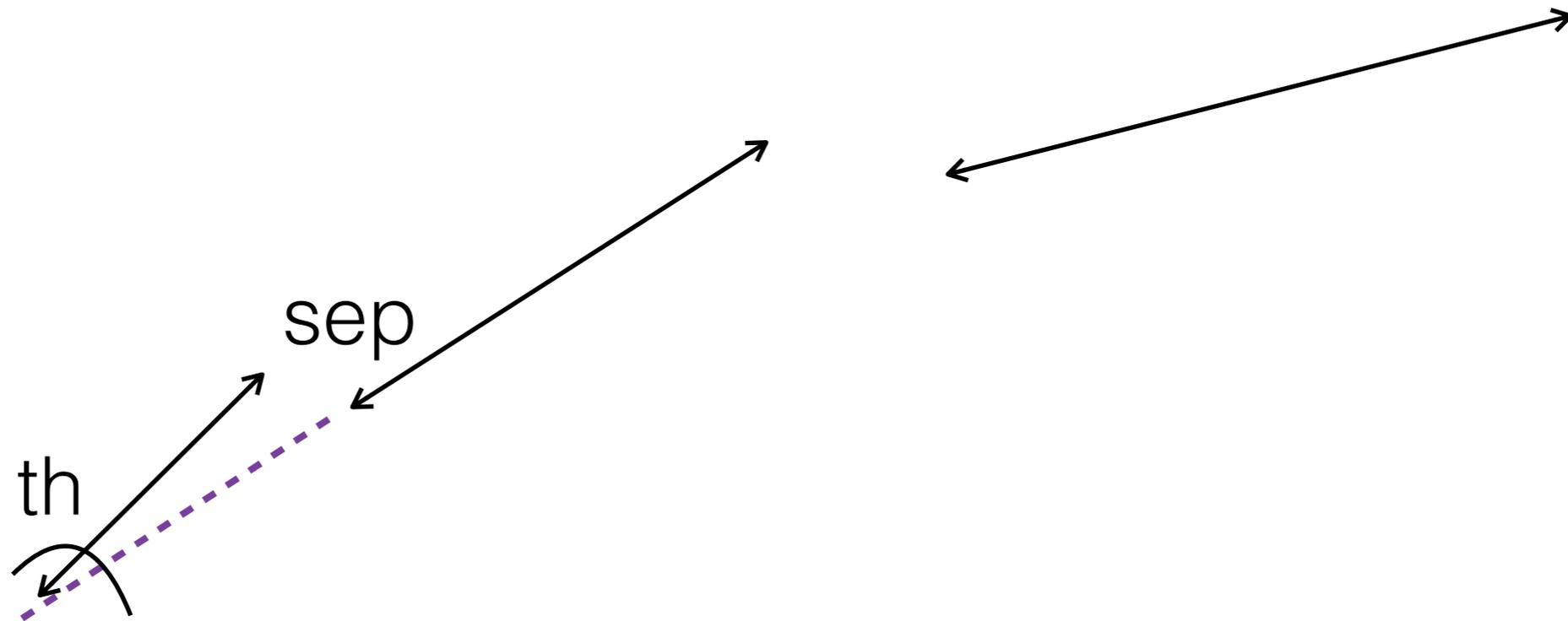


TrackStitching Update

17-July-2014

Eric Church

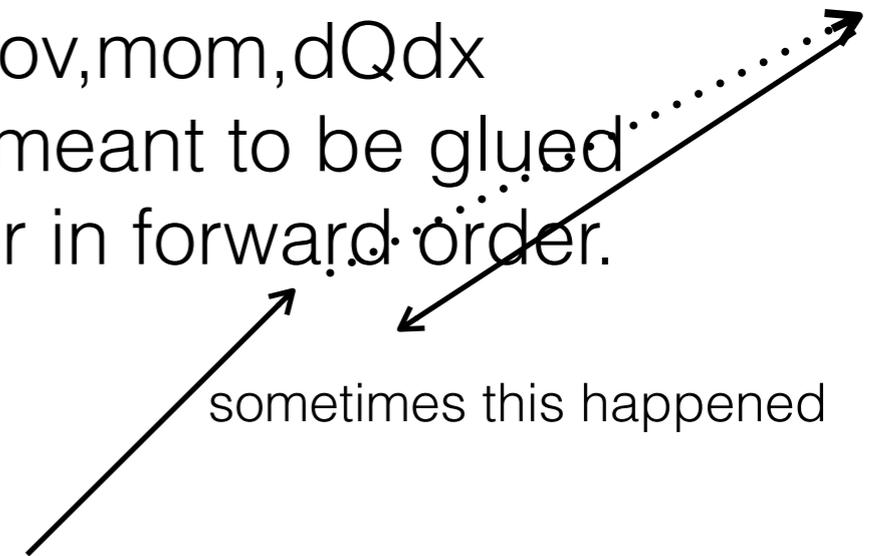
- Runs on the output of any Tracking module and concatenates tracks that point at each other and are separated by user specified tolerance.



- Outputs a `vec<Tracks>` and a `vec<vec<Tracks>>` and, as well as `Assn<SpacePoints,Track>` and `Assns<Hits,Track>`. (Assns used by Calorimetry.)

- This is handy for algorithms which depend, e.g., on clustering to produce, via contiguous hits, clusters and thus vectors of spacepoints through which to track. If clustering breaks a track's hits into more than one cluster, we get multiple tracks that in fact belong to a common particle: TrackKalman3DSPS, CosmicTracker, Track3DSppts
- TrackKalman3DHit/BezierTracker are rather immune to clustering, but still may split up tracks which can be stitched.
- I've worked with this on the following chain: ClusterCrawler +SpacePointFinder+TrackKalman3DSPS+TrackAna (with fcl parameter stitchAnalyze=true)

- Bug fixes:
 - corrects some obvious mis-matches in previous version
 - allows multi (3+) segment stitching now; did not before
 - enforces best match now; used to do first match
 - concatenates all Track::XYZ,dXdYdZ,cov,mom,dQdx members in the order in which they're meant to be glued together. Used to just slap 'em together in forward order.
 - Algorithm-ified
 - TrackAna cleaned up and embellished to plot properties of stitching ... erm, I will actually show them this someday....



- Keep track of 2 quantities for every track: the head of the track's best match, and the tail's best match. For each keep a `std::tuple` containing whether it's a HT, HH, TT, TH match and the trackID and match's trackID
- Walk from Head, stitching. Then walk from Tail, prepending matches.
- Check composites within stitched tracks for redundancy, delete those components.
- Check Aggregates (stitched tracks) for further stitching needed, stitch again. (under construction still)

- I ran 40 cosmic overlay + stopping muon evts
 - with the now-customary 1-big 9600 tick window
 - runs in sub-tenths of sec/evt w no big focus on improving performance. (Not new.)
- Diagnostics are EVD and text output mainly right now. Histos still to come

Link

- [http://argo-microboone.fnal.gov/
#entry=4&filename=/uboone/app/users/echurch/
lgm/prof.slf6.v02_02_01/run/
stoppingMuonsTrkAna.root&selection=1](http://argo-microboone.fnal.gov/#entry=4&filename=/uboone/app/users/echurch/lgm/prof.slf6.v02_02_01/run/stoppingMuonsTrkAna.root&selection=1)

Begin processing the 28th record. run: 1 subRun: 0 event: 28 at 16-Jul-2014 23:27:37 CDT

There are 10 Tracks in this event before stitching.

There are 4 Tracks in this event after stitching.

TimeModule> run: 1 subRun: 0 event: 28 stitch2 TrackStitcher 0.0465069

TimeModule> run: 1 subRun: 0 event: 28 TriggerResults

TriggerResultInserter 6.41346e-05

%MSGTrackAna: Number of clumps of Spacepoints from Assn for all Tracks: 10-w

TrackAna: TrackAna:trackana 16-Jul-2014 23:27:37 CDT run: 1 subRun: 0 event: 28

TrackAna read 4 vectors of Stitched PtrVectorsof tracks.

%MSG

TrkAna: New Stitched Track *****

TrackAna: Number of Spacepoints from Track.NumTrajPts(): 19

TrackAna: Number of Spacepoints from Assns for this Track: 39

TrkAna: TrkId mode for this component track is ***** 15

TrackAna: Number of Spacepoints from Track.NumTrajPts(): 40

TrackAna: Number of Spacepoints from Assns for this Track: 81

TrkAna: TrkId mode for this component track is ***** 15

TrackAna: Number of Spacepoints from Track.NumTrajPts(): 10

TrackAna: Number of Spacepoints from Assns for this Track: 570

TrkAna: TrkId mode for this component track is ***** 15

TrackAna: Number of Spacepoints from Track.NumTrajPts(): 57

TrackAna: Number of Spacepoints from Assns for this Track: 116

TrkAna: TrkId mode for this component track is ***** 15

TrackAna: Number of Spacepoints from Track.NumTrajPts(): 25

TrackAna: Number of Spacepoints from Assns for this Track: 57

TrkAna: TrkId mode for this component track is ***** 15

TrkAna: New Stitched Track *****

TrackAna: Number of Spacepoints from Track.NumTrajPts(): 90

TrackAna: Number of Spacepoints from Assns for this Track: 178

TrkAna: TrkId mode for this component track is ***** 149125

TrackAna: Number of Spacepoints from Track.NumTrajPts(): 41

TrackAna: Number of Spacepoints from Assns for this Track: 213

TrkAna: TrkId mode for this component track is ***** 149125

TrkAna: New Stitched Track *****

TrackAna: Number of Spacepoints from Track.NumTrajPts(): 6

TrackAna: Number of Spacepoints from Assns for this Track: 29

TrkAna: TrkId mode for this component track is ***** 2

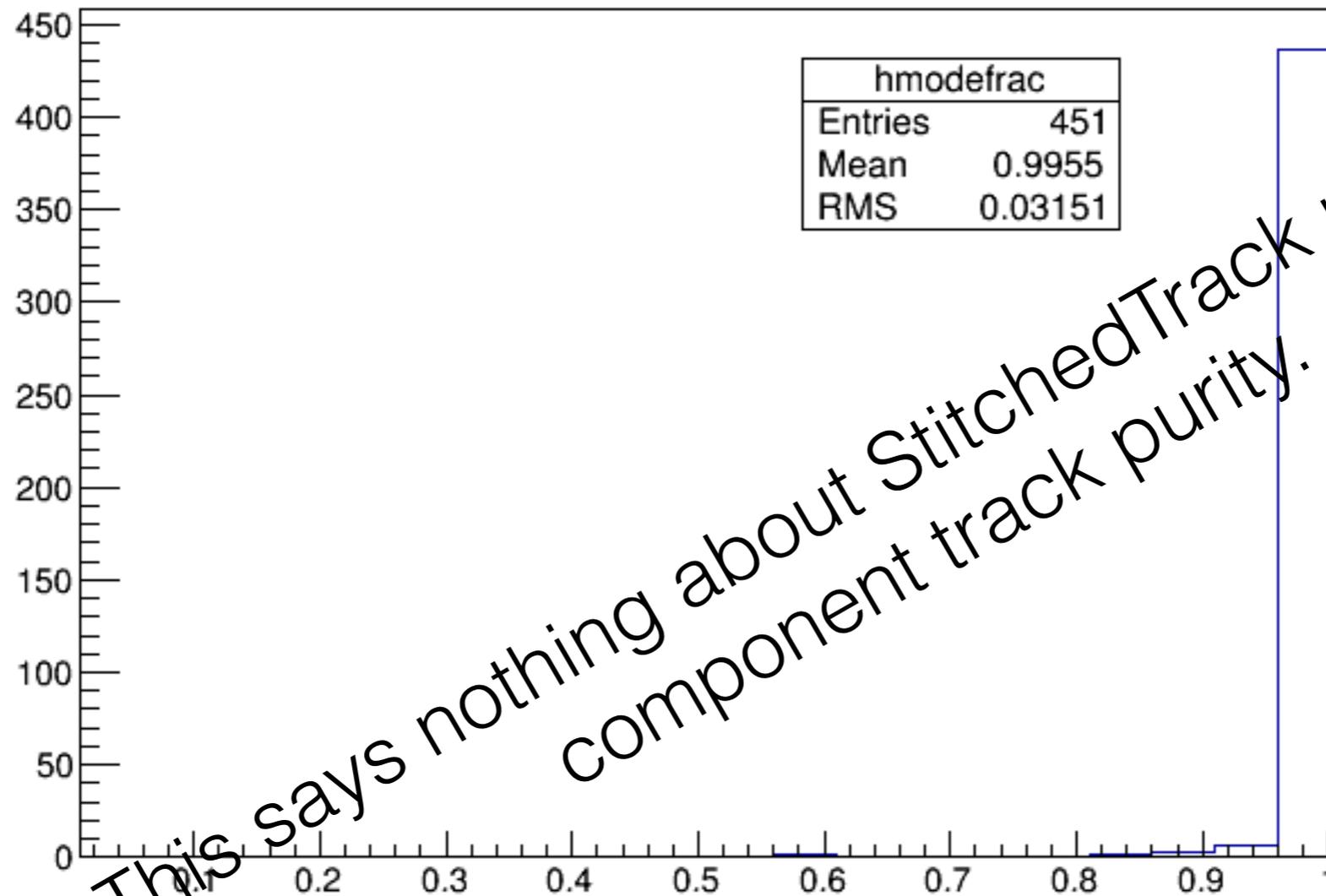
TrackAna: Number of Spacepoints from Track.NumTrajPts(): 9

TrackAna: Number of Spacepoints from Assns for this Track: 13

TrkAna: TrkId mode for this component track is ***** 2

Histos (quasi-purity)

quasi-Purity: Fraction of component tracks with the Track mode value



find dominant trkID for a track component, ask what fraction of Assd hits have that trkID.

- Documentation coming!
- I need to debug this last stitch method where a component track is shared, one by its head, one by its tail in two separate composite tracks. That shared track needs to be thrown out in one of 'em and both then stitched. Working on it now.
- Need eff, purity histograms for Stitched Tracks
- What's checked in now on develop is much improved over previous version, and should be useful. I advocate that it go into MCC5.