

Global Track Reconstruction

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MICE Collaboration Meeting 46
Rutherford Appleton Laboratory

Global Track Reconstruction

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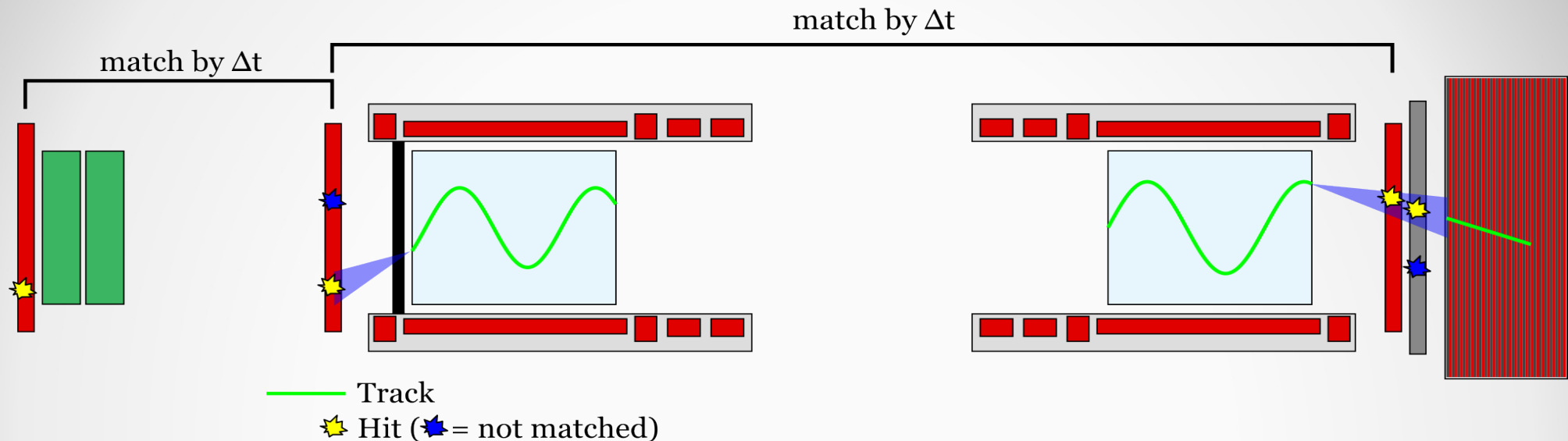
- Track Matching – Determine which detector hits belong to the same track and combine them so that PID (and later analysis) can be run on them
- Track Fitting – Improve the matched trackpoints using information from all detectors as well as provide the possibility of inter- and extrapolation to uninstrumented sections of the beamline

Track Matching

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- Propagate track point between detectors
- Compare agreement between propagated and measured track point
- → Accept / Reject
- Different method (Δt based) for TOF0 and US/DS matching

Track Matching

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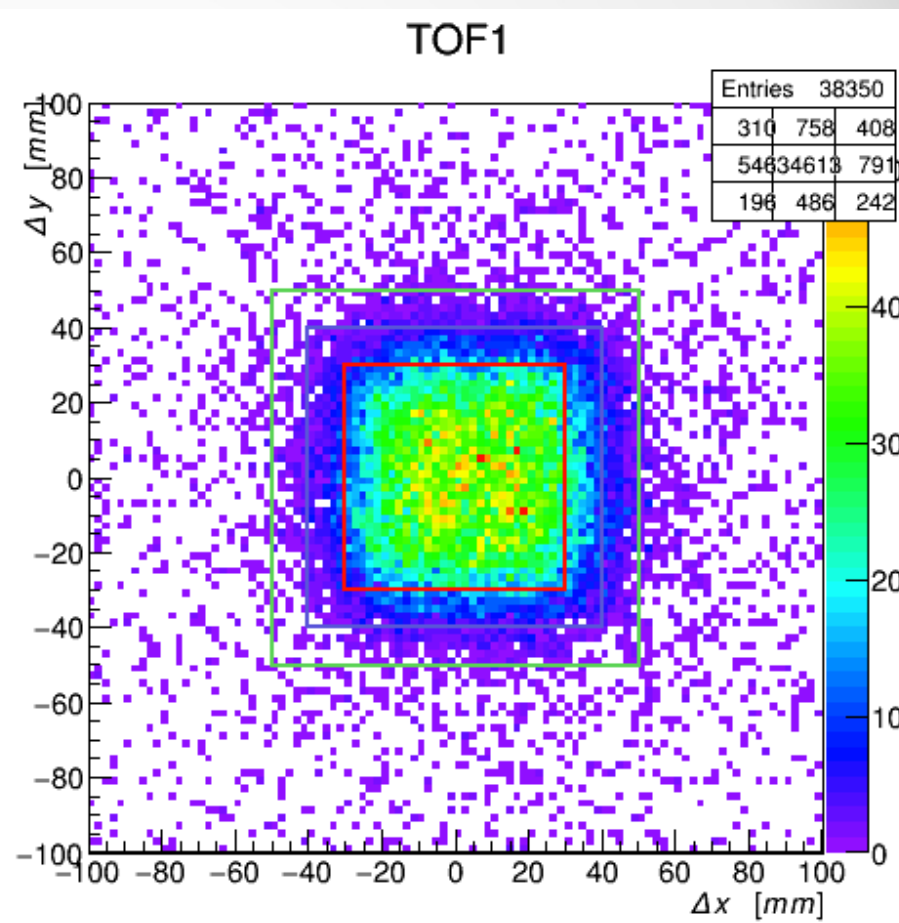
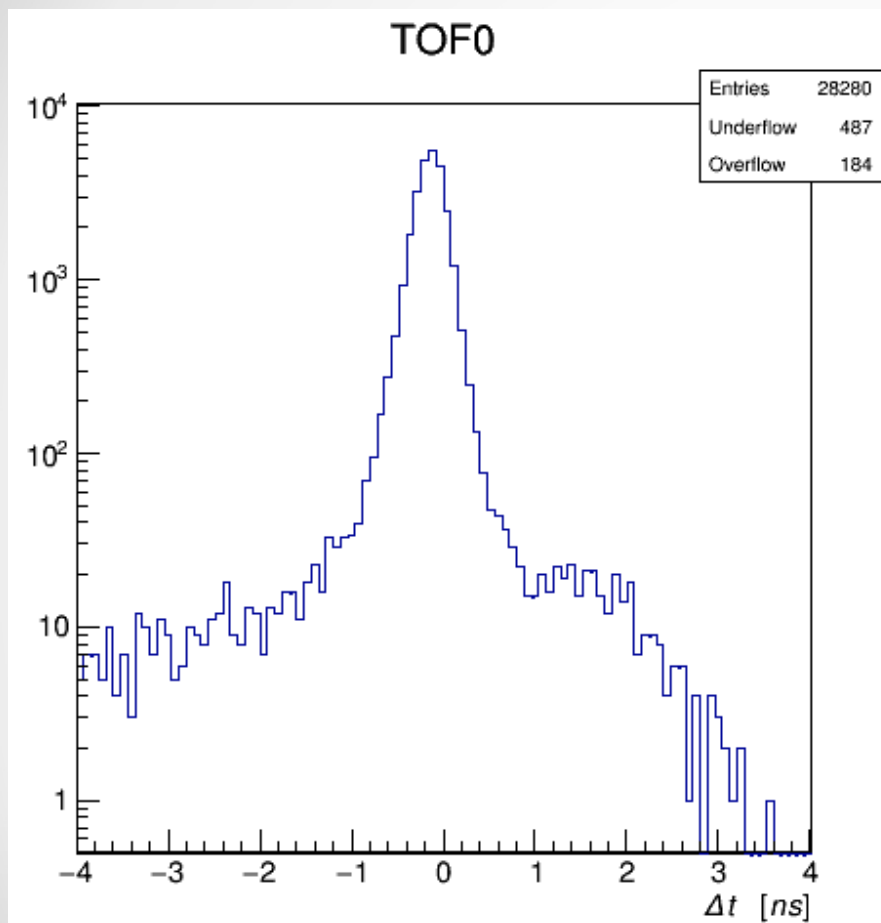
- Propagation requires mass and charge to be known, so track matching creates 3 or 6 tracks for each particle tagged with a PID hypothesis. Celeste's PID code then picks out the correct one

Residuals (Run 7469)

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Performance Improvements

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- No repeated propagation to different detectors on same side of cooling channel
- Only use propagation if any detector in the section (US or DS) has more than one space point, otherwise assume match
- Optimize step sizes and approach to material boundaries
- Data unpacking including Track Matching now faster than datataking

TrefArray Issues

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- Discovered an issue with the global data structure which results in a failure to import global tracks with trackpoints into MAUS.
- Difficult to track down and caused significant delays, but fixed as of MAUS 2.6.0

KL Cell Merge

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- KL local reconstruction produces one spacepoint per cell hit, i.e. particles passing through multiple cells will create multiple spacepoints
- Modified the import into the global datastructure to merge adjacent cell hits, with averaged position weighted by charge deposit (y error calculated appropriately)

Future Work

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- Clear structure required for storing and accessing tracks and trackpoints from every step of Globals (Matching, PID, Fitting)
- PrimaryChain object as originally (early 2013) implemented unfit for purpose → rewrite
 - Access tracks and spacepoints as originally imported into the global datastructure
 - Access tracks from the various globals steps by a string (documentation will be provided), for any combination of US/DS/Through, Matching/PID/Fitting, PID hypothesis where applicable
 - Will make it possible for analyst to follow up the chain for tracks of interest, e.g. in order to better understand edge cases and set cuts

Future Work

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- Working towards including Track Matching in the standard unpacking script
- Track Fitting: Chris Rogers has been doing some work on this in the meantime, fit this into the current data flow and work from there.