

Update on ν_e CC reconstruction

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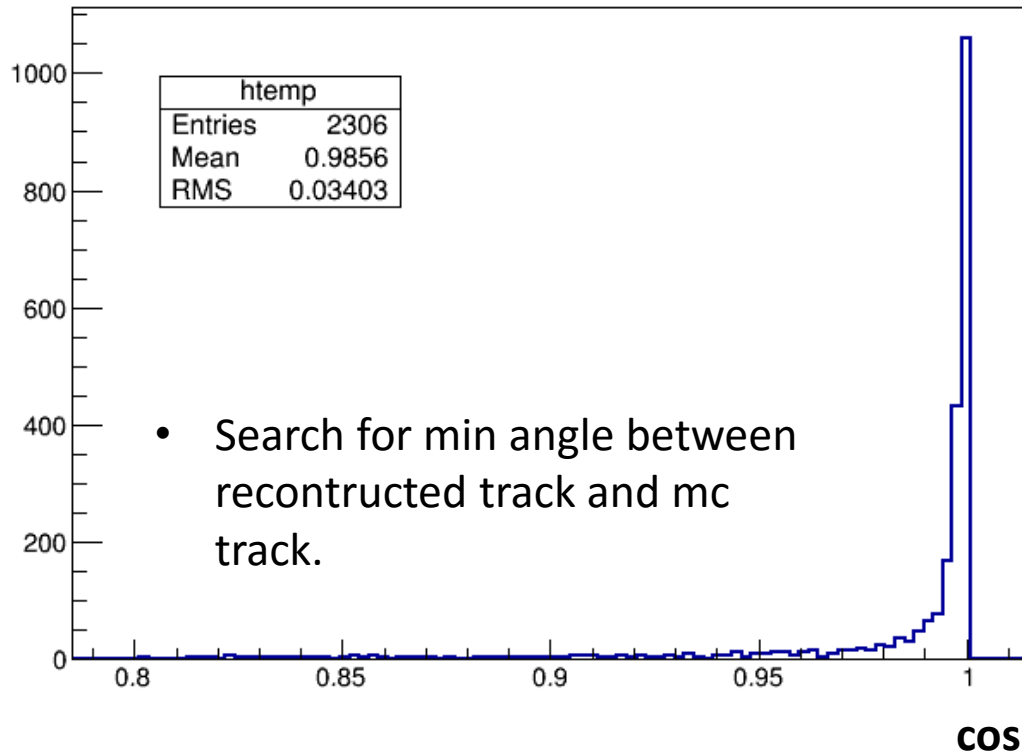
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Introduction

Electron in ν_e CC events

- Selection of electron.
- Distance between reconstructed electron track and primary vertex.
- Understand the inefficiency for electron tracking.
- dE/dx of the first part of electron cascade.

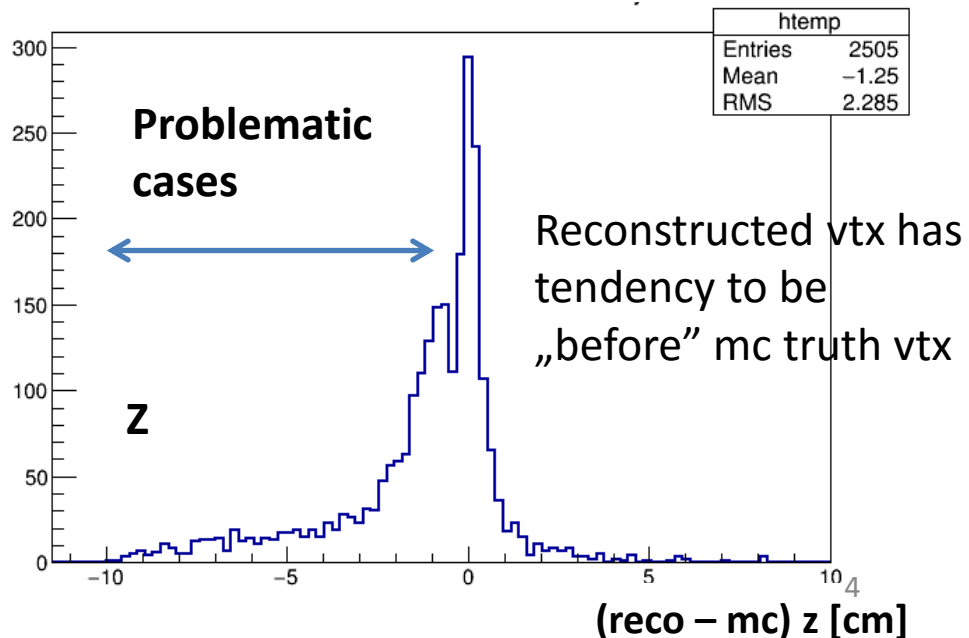
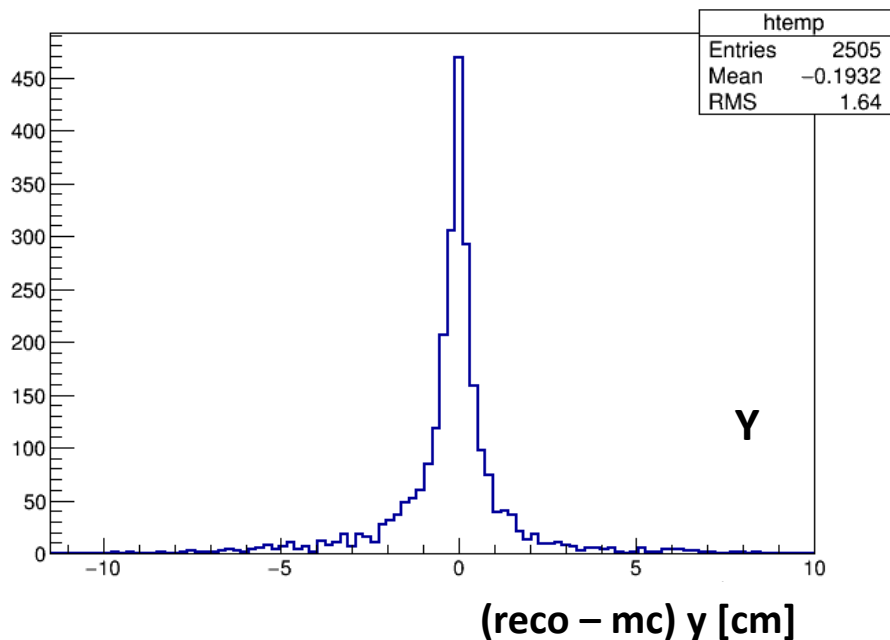
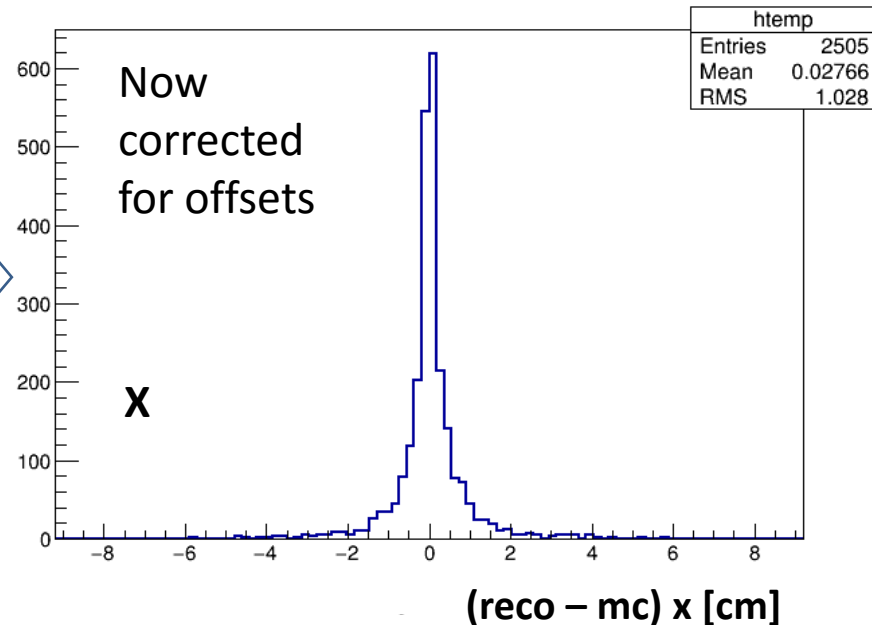
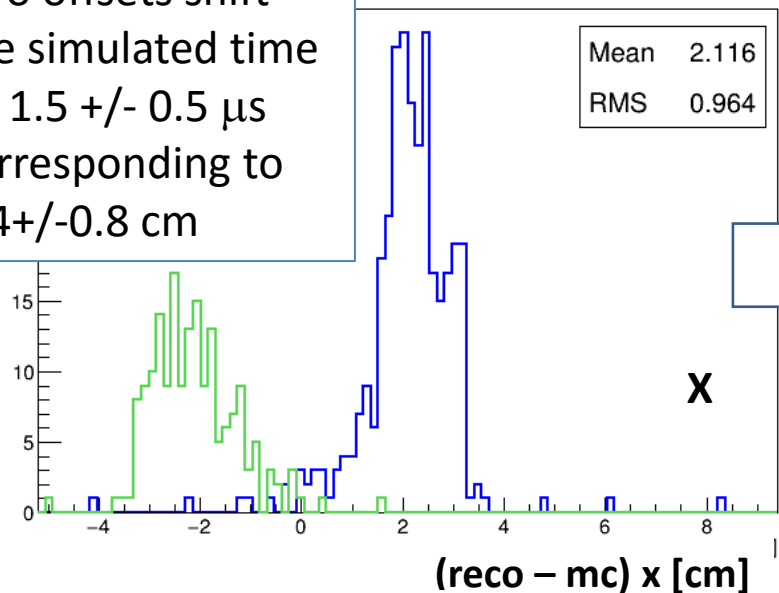
Electron track selection



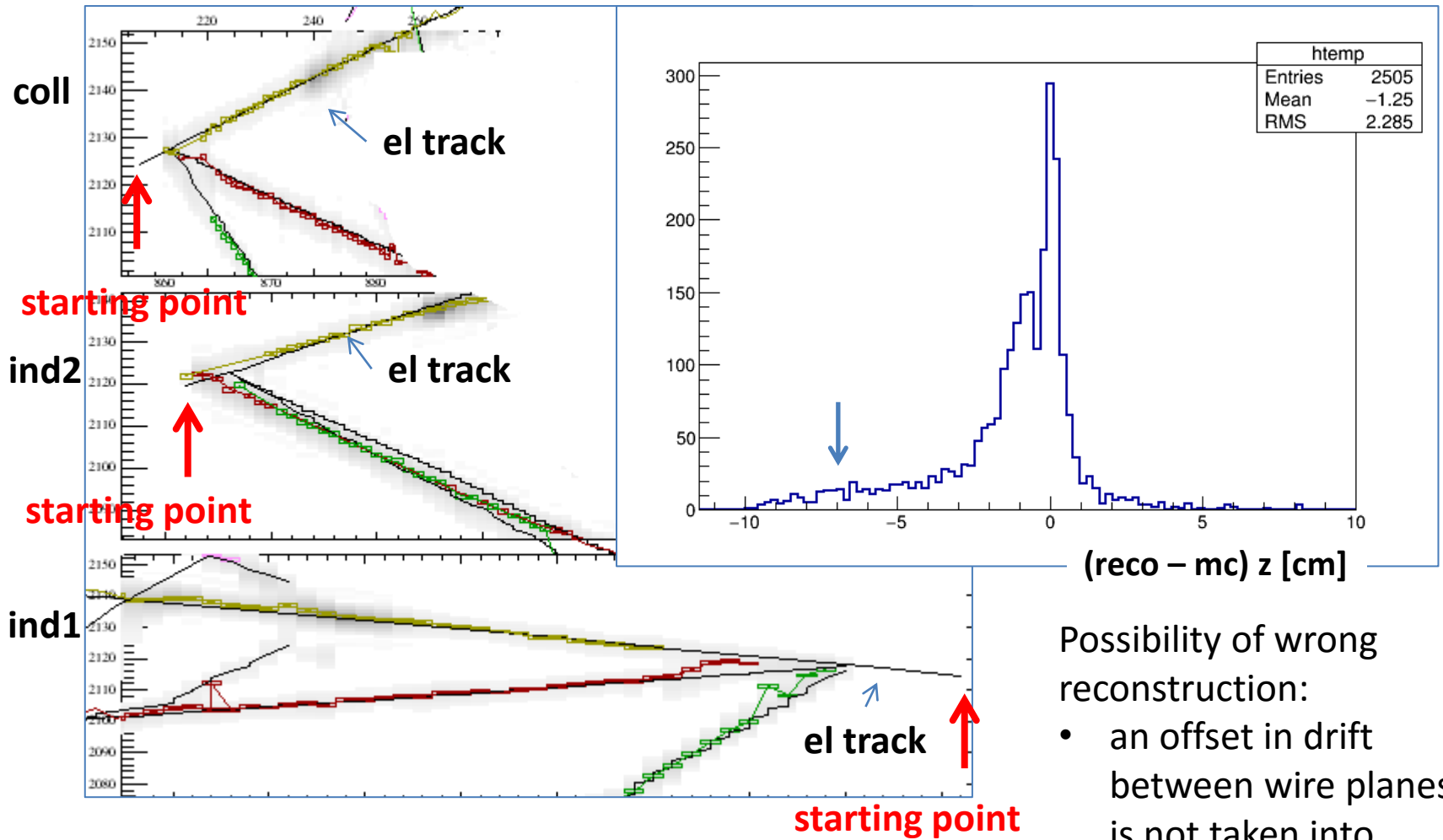
- Older version of reconstructed events by Tingjun (used LArSoft v 23).
- Use reconstructed tracks (recob::track object).
- Identification of electron track is based on mc truth: geometrical conditions decide (angle and distance).

Position of first hit of the reconstructed electron track

Two offsets shift the simulated time by $1.5 \pm 0.5 \mu\text{s}$ corresponding to $2.4 \pm 0.8 \text{ cm}$



Example of a track from a tail

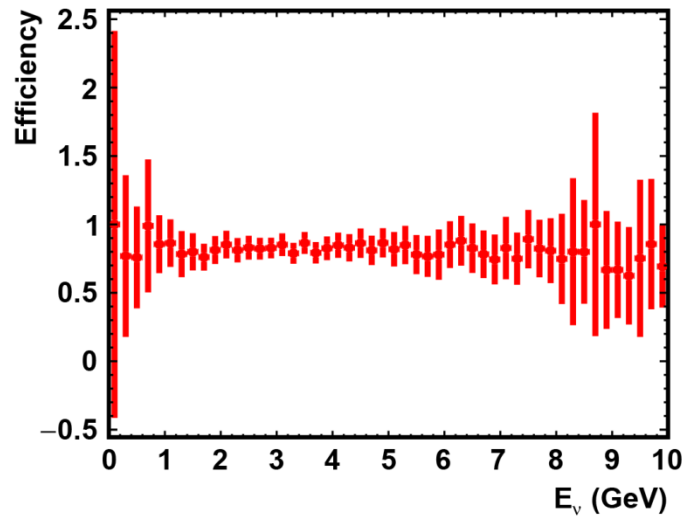
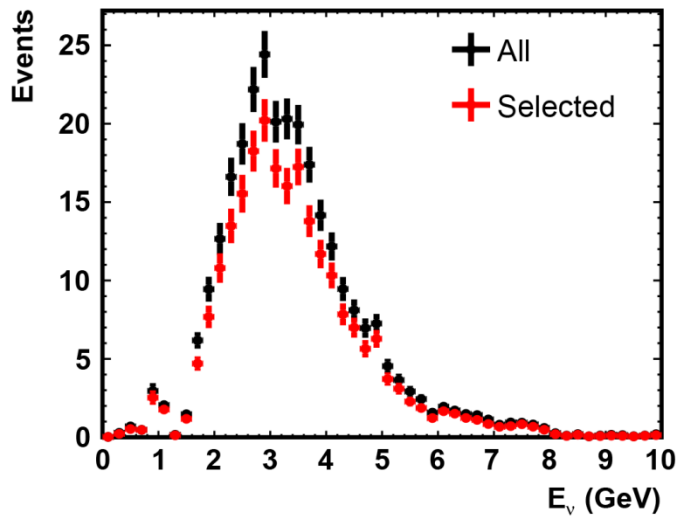
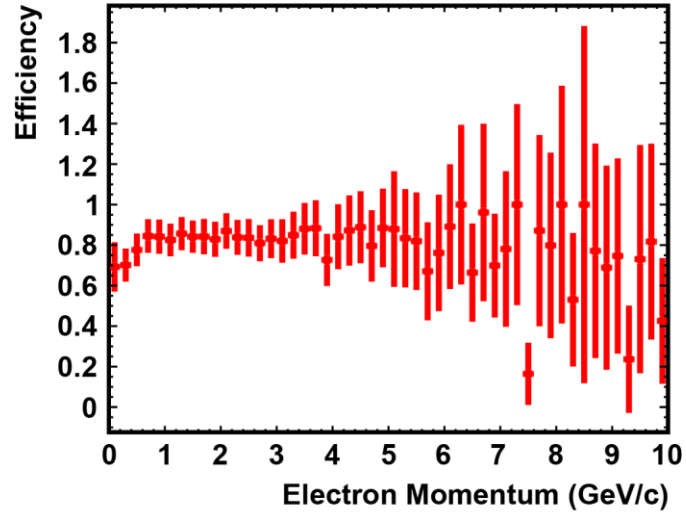
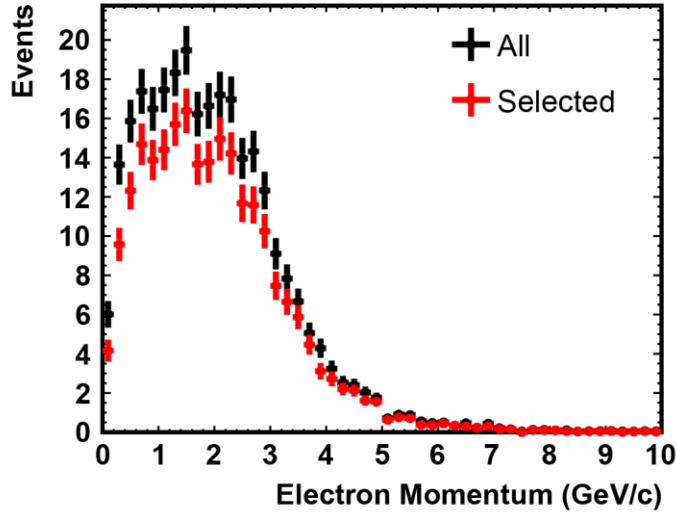


Possibility of wrong reconstruction:

- an offset in drift between wire planes is not taken into account correctly
- reconstruction itself

Reminder: Tingjun's plots

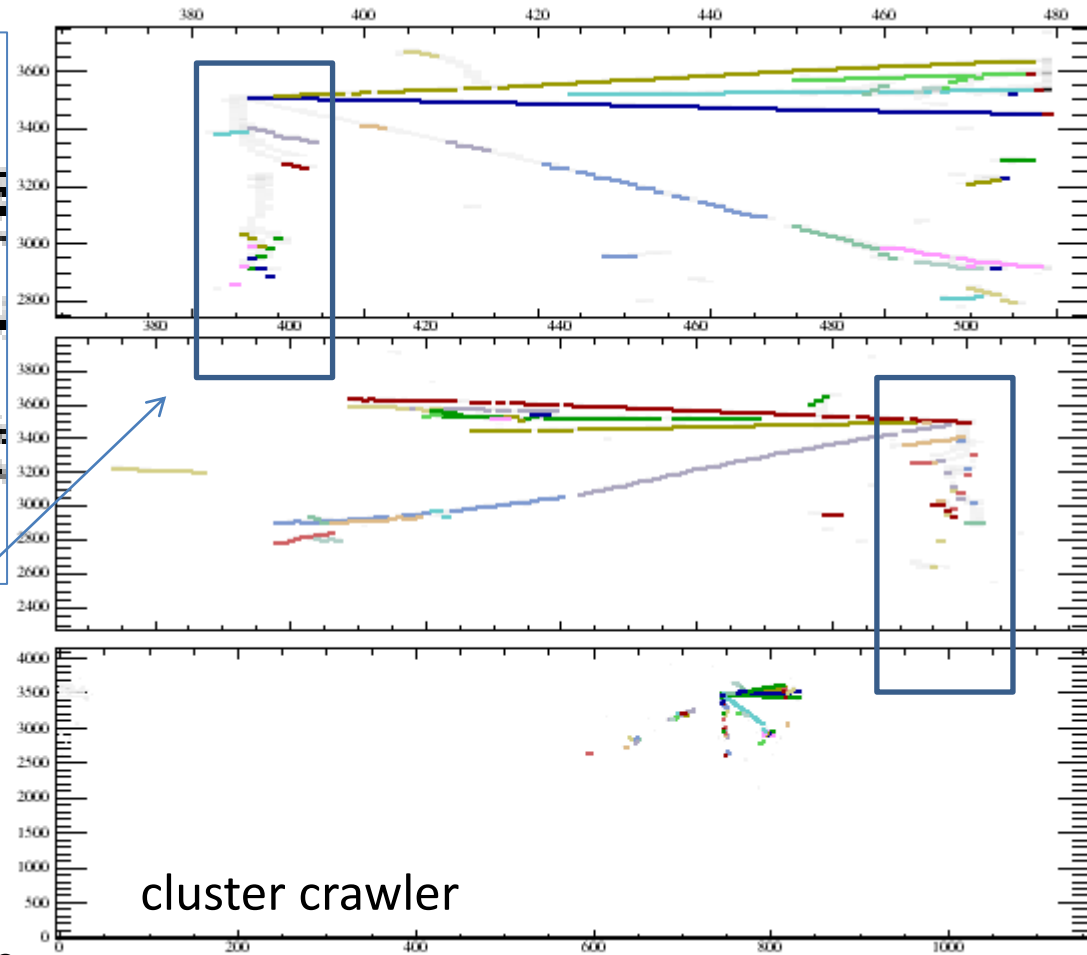
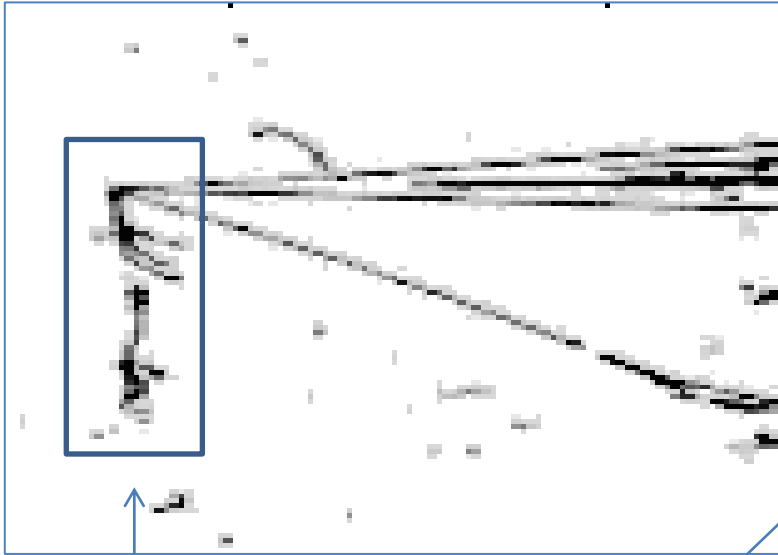
Tracking efficiency for electrons 80%



Here, definition of efficiency:

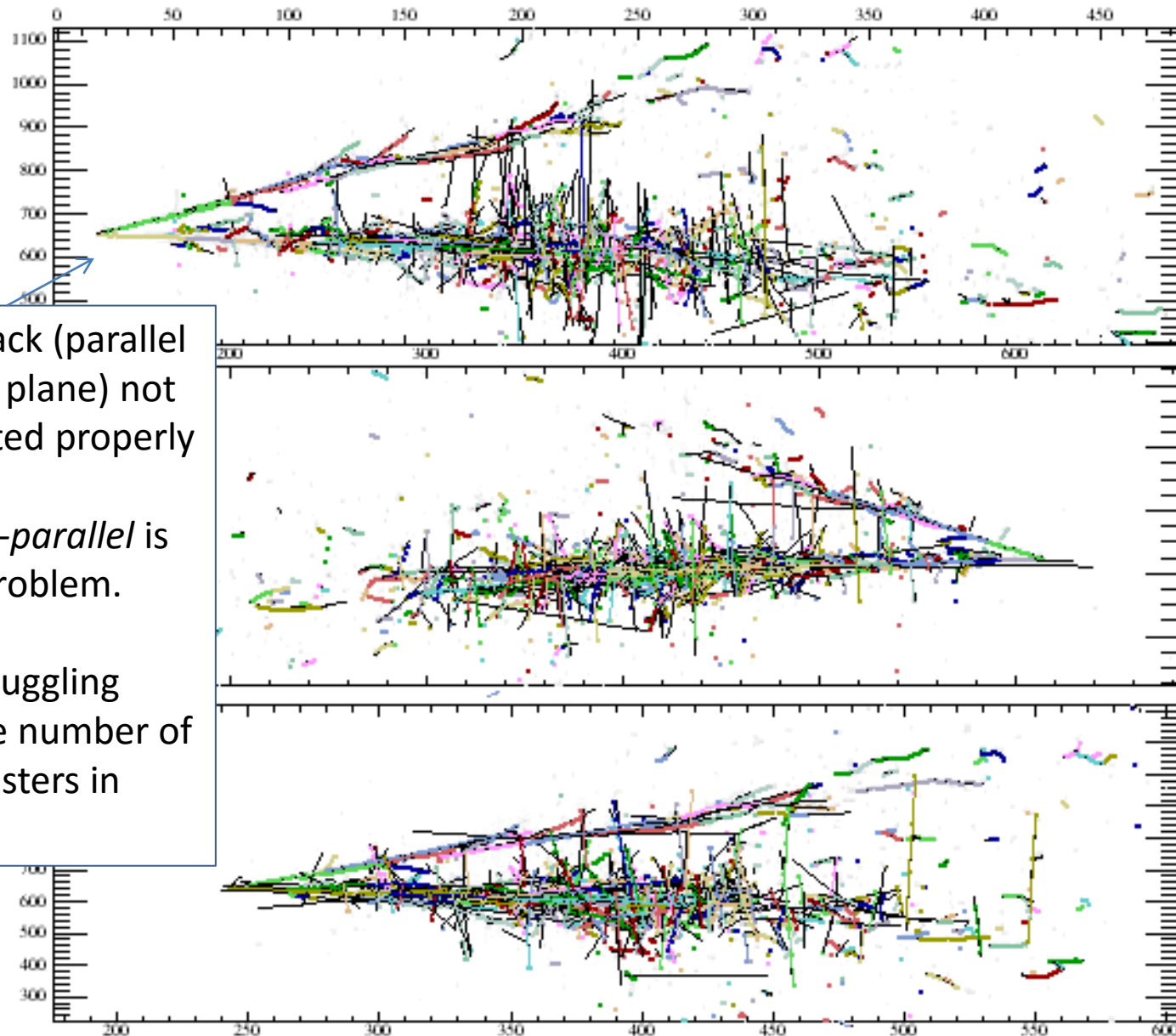
- Electron track reconstructed within 10 cm from the mc truth
- Next slides illustrate the reason of inefficiency

Source of inefficiency 1



- Electron
- Hits are reconstructed
- Clusters are not reconstructed
- Resolution of wire pitch can be the original source of problem

Source of inefficiency 2

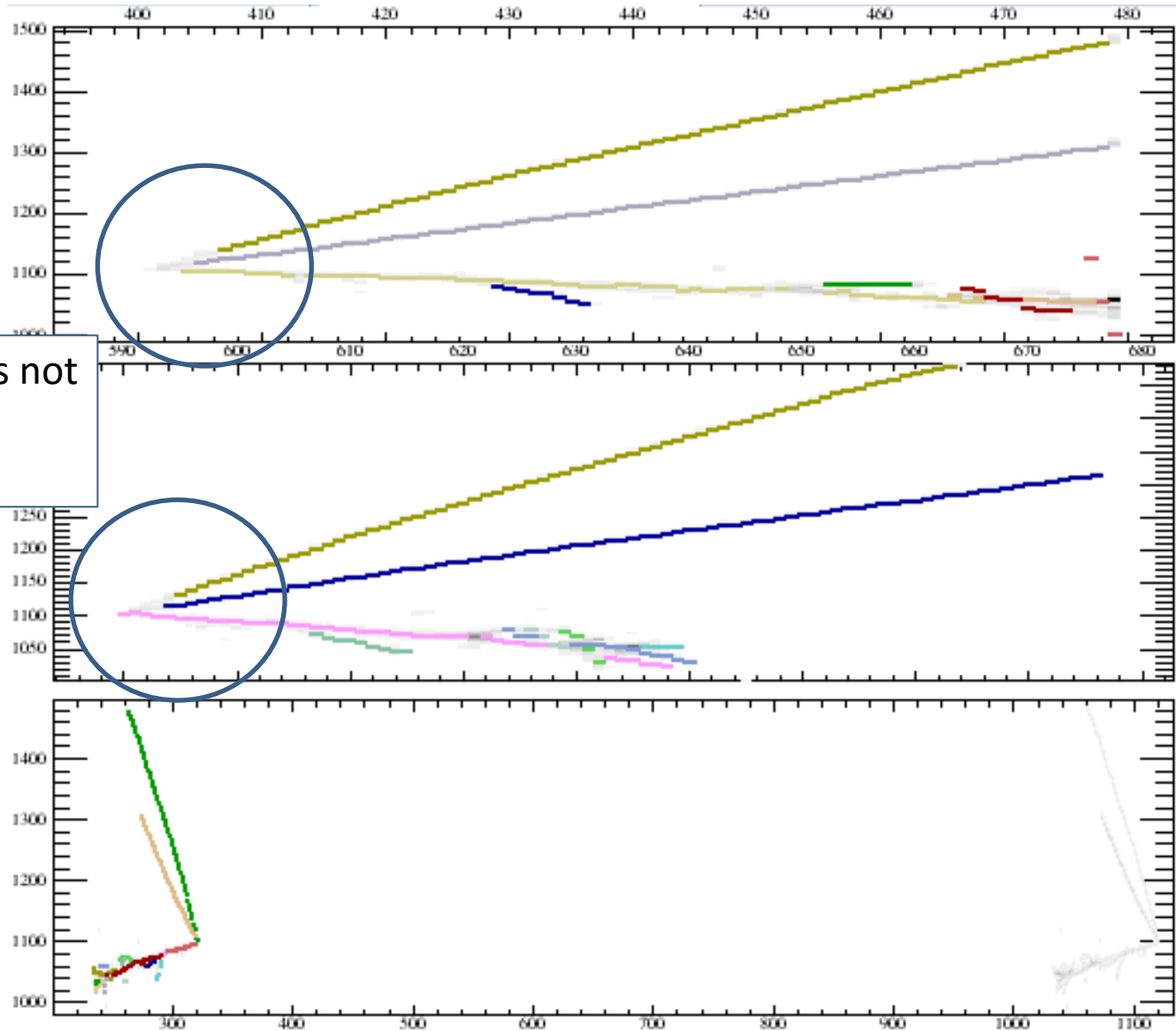


Electron track (parallel to the wire plane) not reconstructed properly

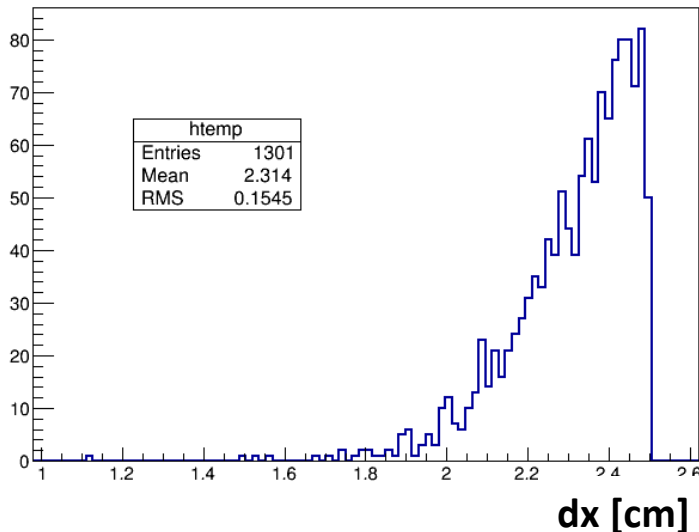
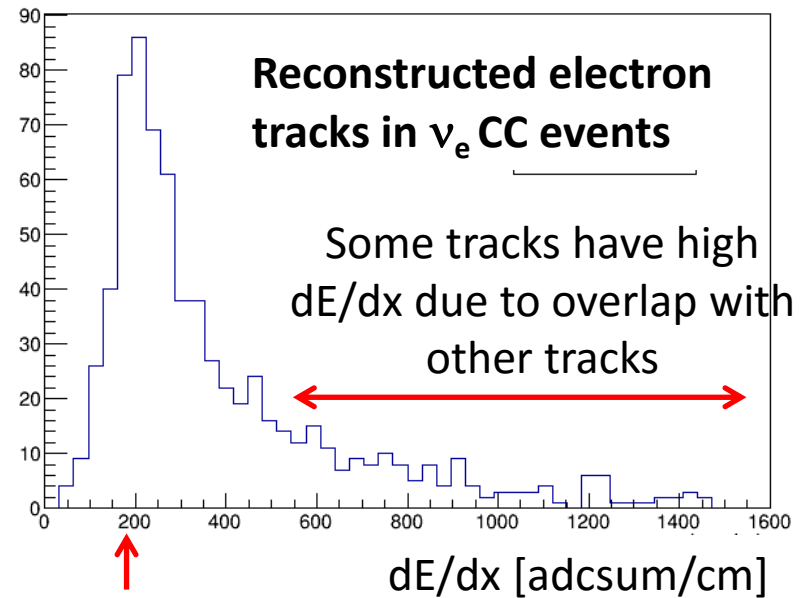
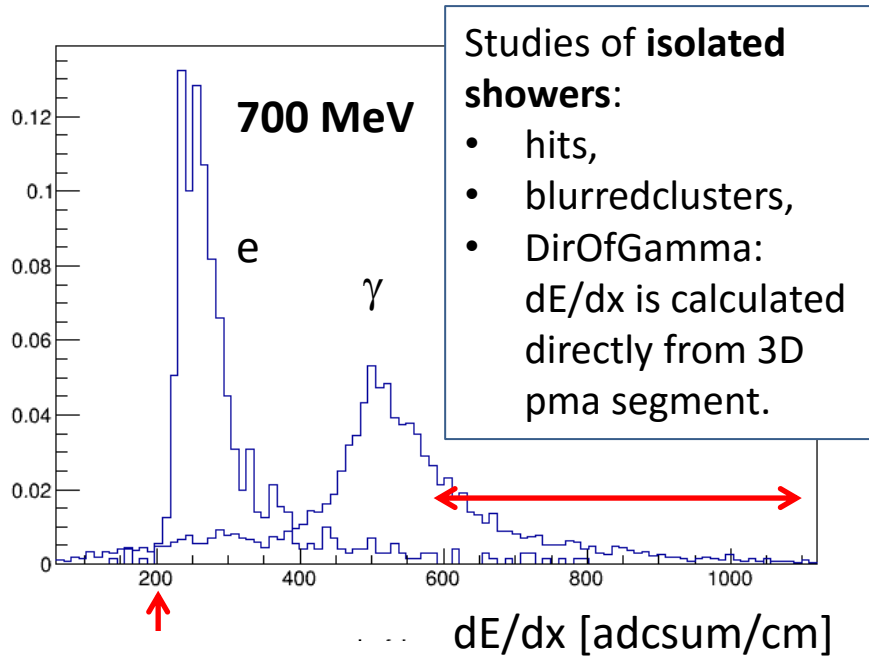
Wire-plane-parallel is the main problem.

It lost in struggling with a large number of random clusters in cascade

Source of inefficiency 3



dE/dx studies



- Recob::track: lack of information about dQ, and dx separately for each hit.
- Recalculated dE/dx from recob::track.
- Use only hits from coll, but no protection against too big gaps between hits (charge too small w.r.t. length).
- Better approach: use metadata, dq,dx stored during pma track reconstruction.

short term plans

- Correct dE/dx calculation.
- Find the reason of not perfect reconstruction in Z coordinate, add vertex reco to join tracks in a more accurate point.
- Run the same analysis on different wire pitch, wire orientation.
- Algorithm which splits between shower-like and track-like is on the way.