Tracking Efficiencies for a cosmic sample

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Reminder from two weeks ago

- I re-did Muhammads work on tracking efficiencies for a primary anti-muon sample (10K events).
  - Observed that disambiguation was main place where improvement could be made. Cheated disambiguation with pandora close to 100% above 40 cm.
- Martin form Durham showed an analogous analysis he and Jon (Sheffield) had done. Got similar results to me.

Definition of Efficiency (Recap)

Cleanly separated numerator and denominator so both can be expressly defined in code.

Numerator defined as;

MCTruth information for matched tracks.

Reconstructed track length of 75% or more of MC track length, which is non-zero.

Only one track to be filled per MCTruth GEANT4 ID.

Denominator defined as;

MCTruth particle information.
Only Anti-muons with non-zero track length in the detector.

Can also be extended to all charged particles (this has been done, but decided to show anti-muons).

Definition of a matched track

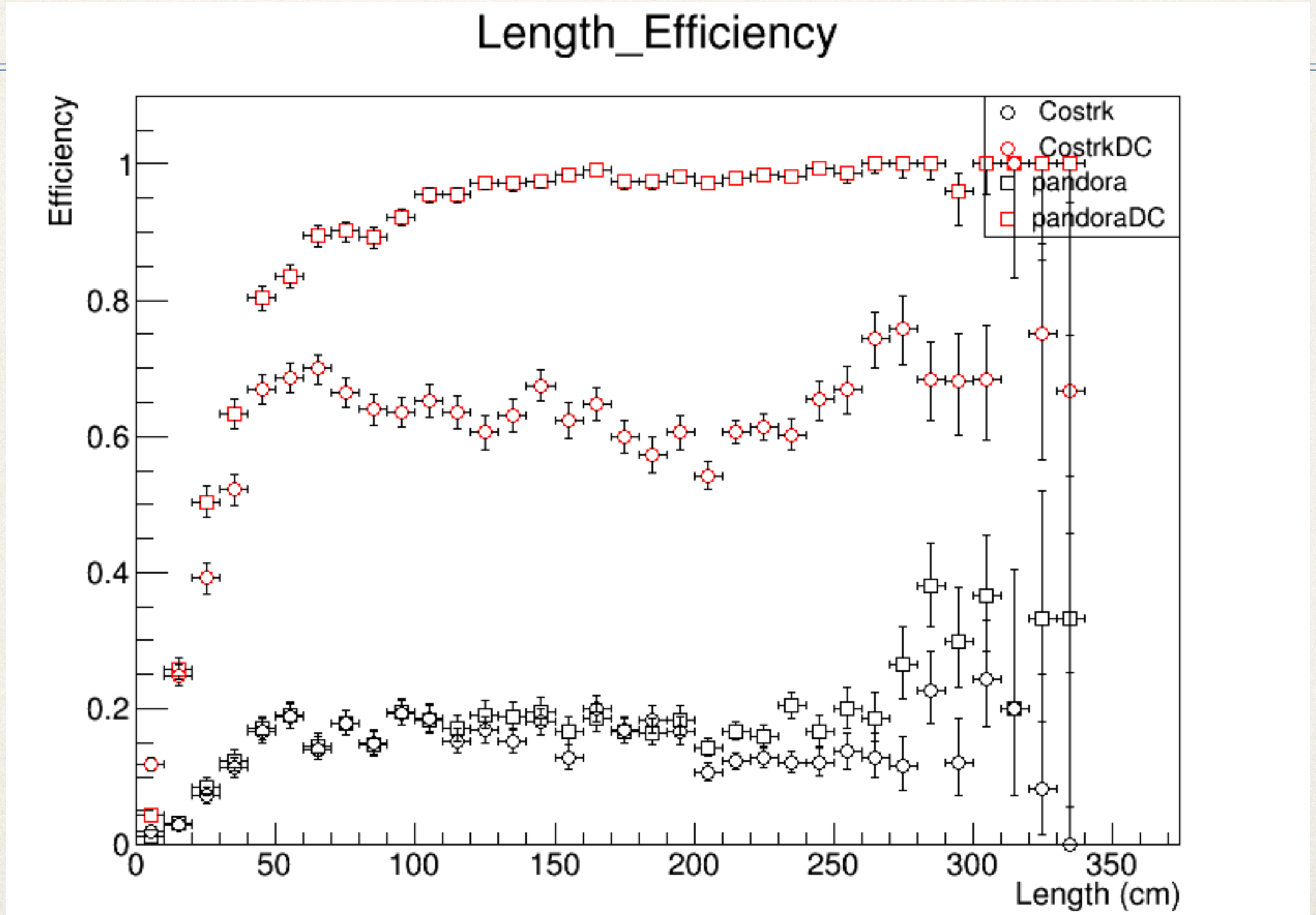
- Loop through each track
  - Loop through each MCParticle
    - If GEANT4 trackId of track which caused track is equal to MCParticle then are matched.
- I get GEANT4 trackId from backtracker, using the MCTruthT0 calculation.

New work

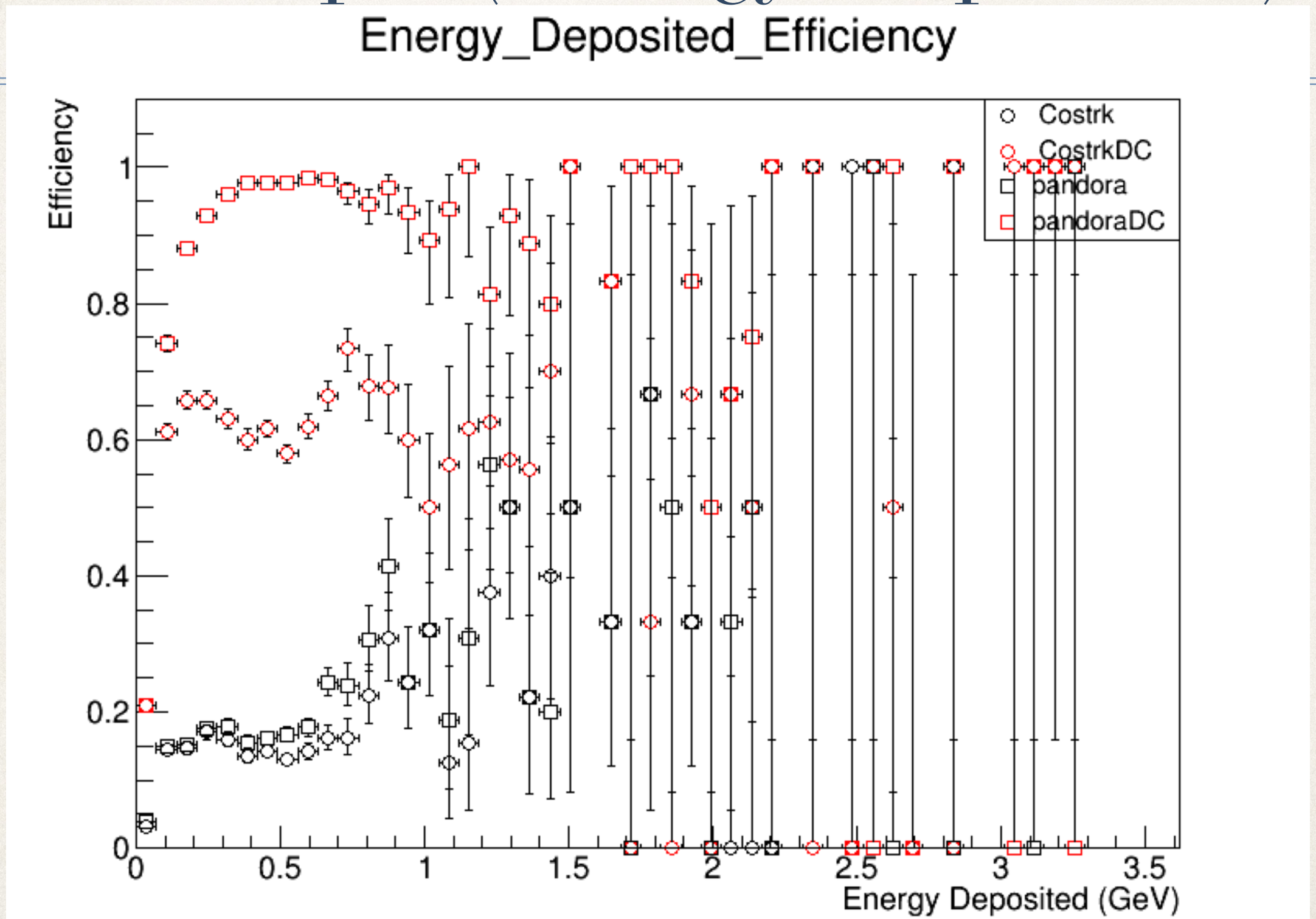
- Tingjun has been working on improving cosmic tracker. I have made new efficiency plots for that, and is greatly improved!
  - Talk next week…..
- I made a sample of 1K 10 drift window CRY events, and observed that efficiencies are very low for both cosmic tracker and pandora.
  - Had hoped to get this fixed this week, but didn't have time.
- Again I have lots of plots, so I invite to look at;

/lbne/app/users/php13tkw/LarDevelop/workspace/TrackingEfficiencies/

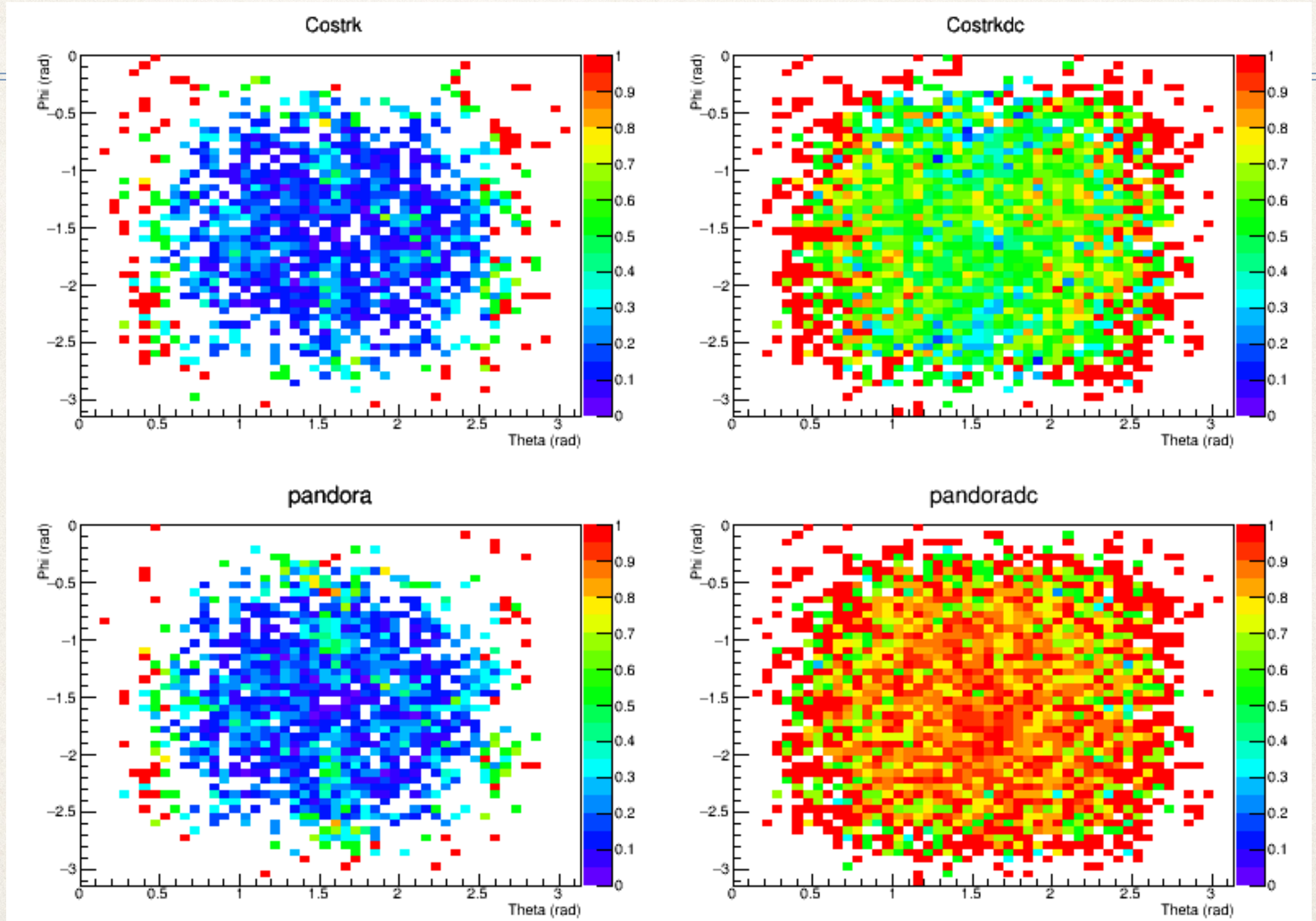
CRY sample(Length)



CRY sample (Energy Deposited)



Theta and Phi dependence



What is wrong?

- Upon looking at disambiguation algorithm it became apparent it is only selecting biggest cluster in each TPC.

- Re-writing this currently so as to select all clusters in each TPC which have unique time ranges.

- Was originally written for single particles - does this perfectly.

- After doing this should hopefully get a much improved efficiency.

- Will show this improvement next week along with Tingjun's improved cosmic tracker.