35T TRACK RECONSTRUCTION

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Introduction

- Track reconstruction is done using the CosmicTracker_module in LArSoft
- CT was made to reconstruct tracks for the Bo prototype
- The CT reconstructs a straight track between the first and the last spacepoint
  - 35t will be mostly cosmics (Muons, straight tracks)
- As such we need to evaluate the goodness of the CosmicTracker for the 35t prototype

Dataset

- 6 GeV single muon/event
- 1000 events
  - Tried 10k events interactively; getting killed. Will start using the batch system
- Using frozen release S2013.10.21
- Using Bo analysis module from Michelle
  - It creates vanilla root trees
- Event generator:
  [lbne35t_singlep, lbne35t_largeant, lbne35_simwire, rns]
- Reco[]:
  - [lbne35t_calwire, lbne35t_hitcheater, lbne35t_gaushitfinder, lbne35t_fuzzycluster, standard_spacepts, standard_cosmictracker]
- TrackCheater_module Reco[]:
  - [lbne35t_calwire, lbne35t_hitcheater, standard_clustercheater, standard_trackcheater]
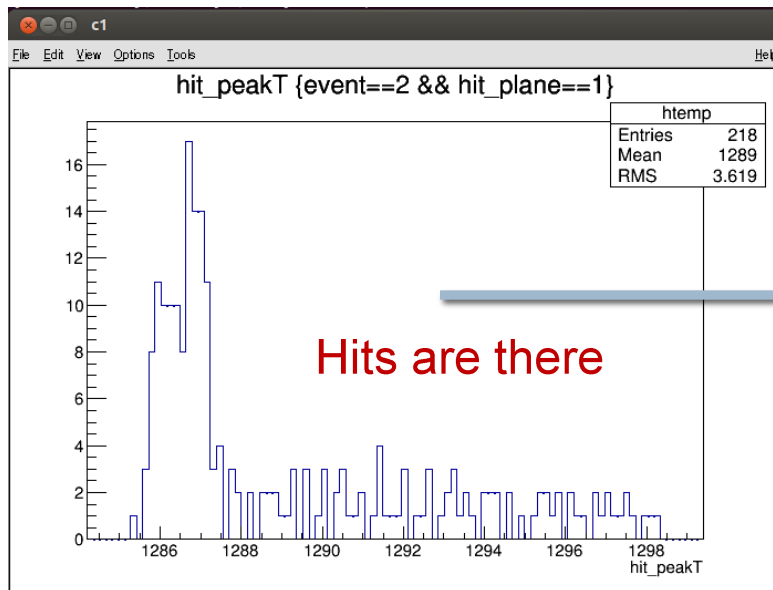
CosmicTracker crosscheck

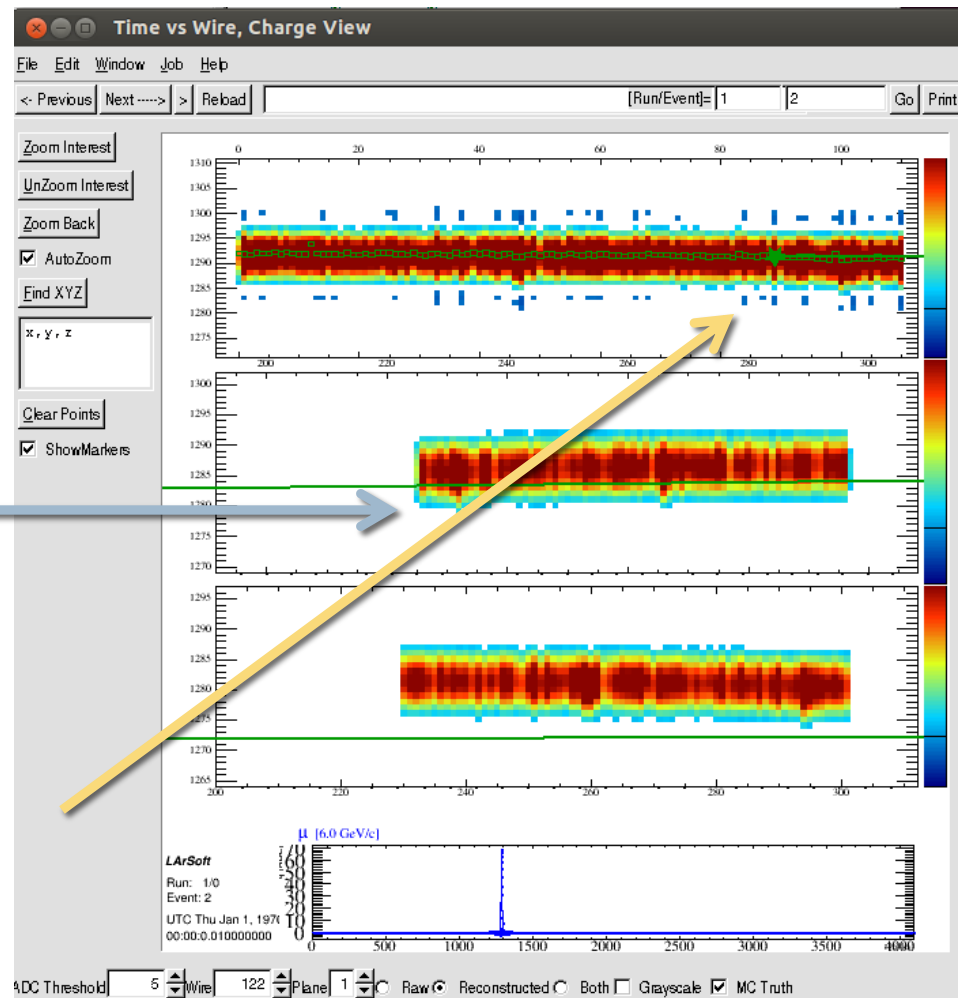- Cross check: Straight line tracks would have the same direction for the first and last spacepoint
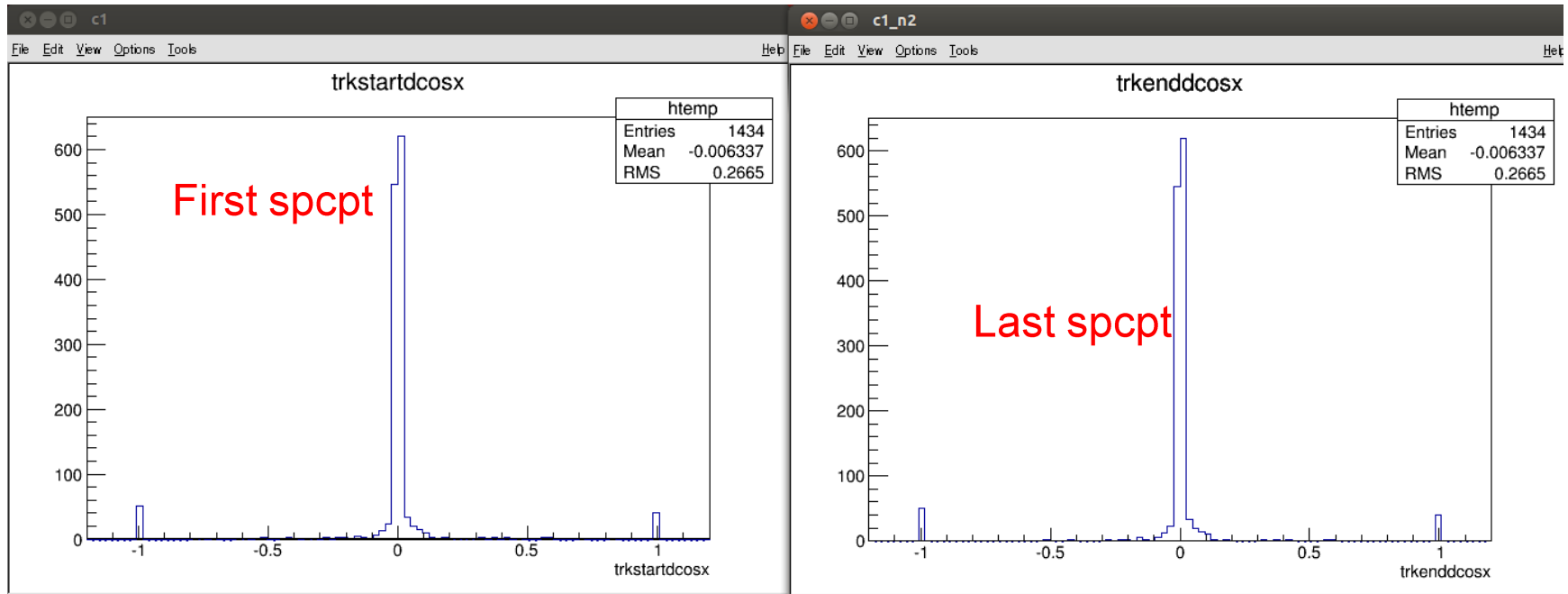
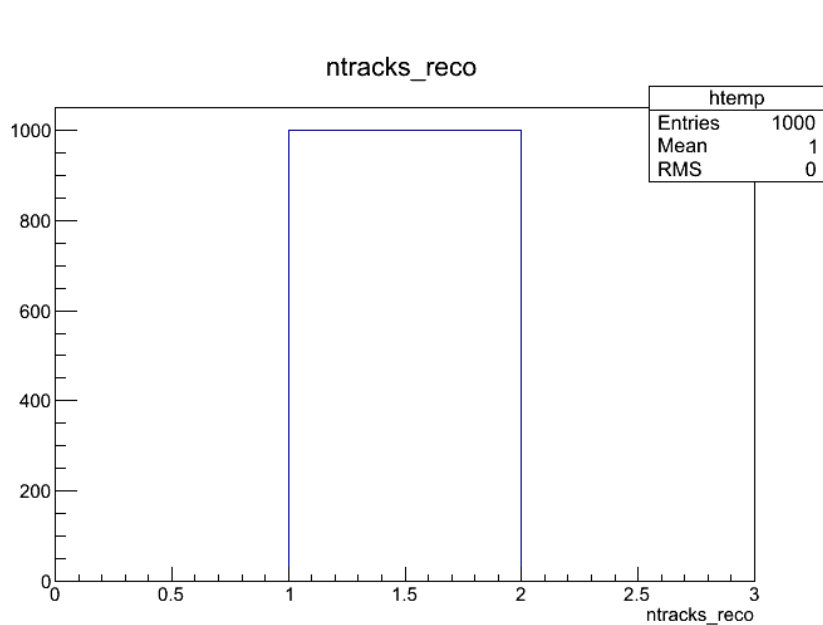Distributions are the same

Issues with the EVD

- Time offset between planes (shifted in time ticks)
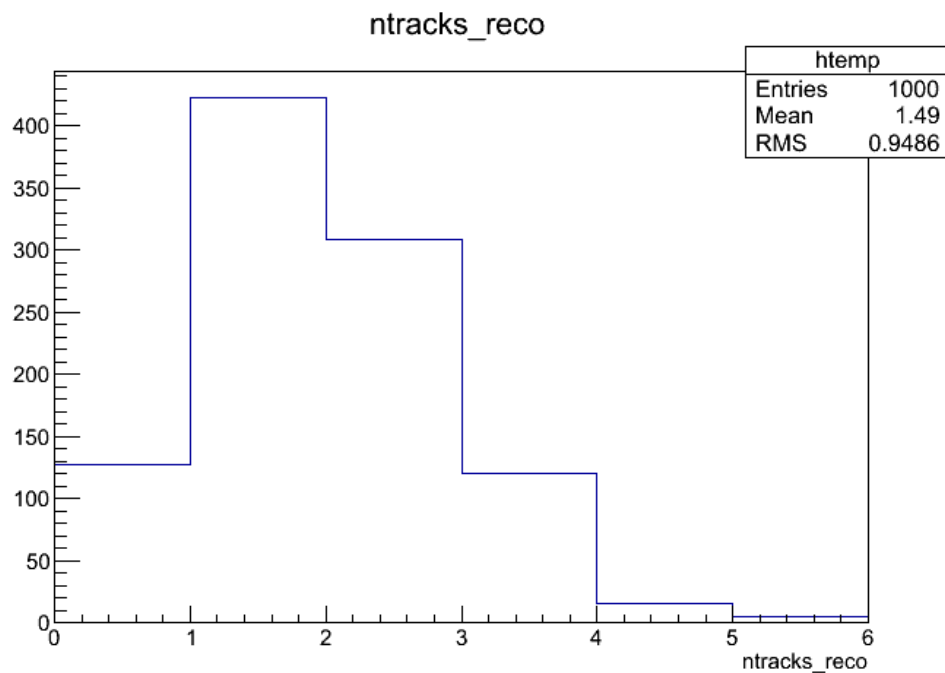- No hits on the U,V planes

Hits are there

Tracks not found at the right position

No. of tracks (*Reco vs. Cheater*)

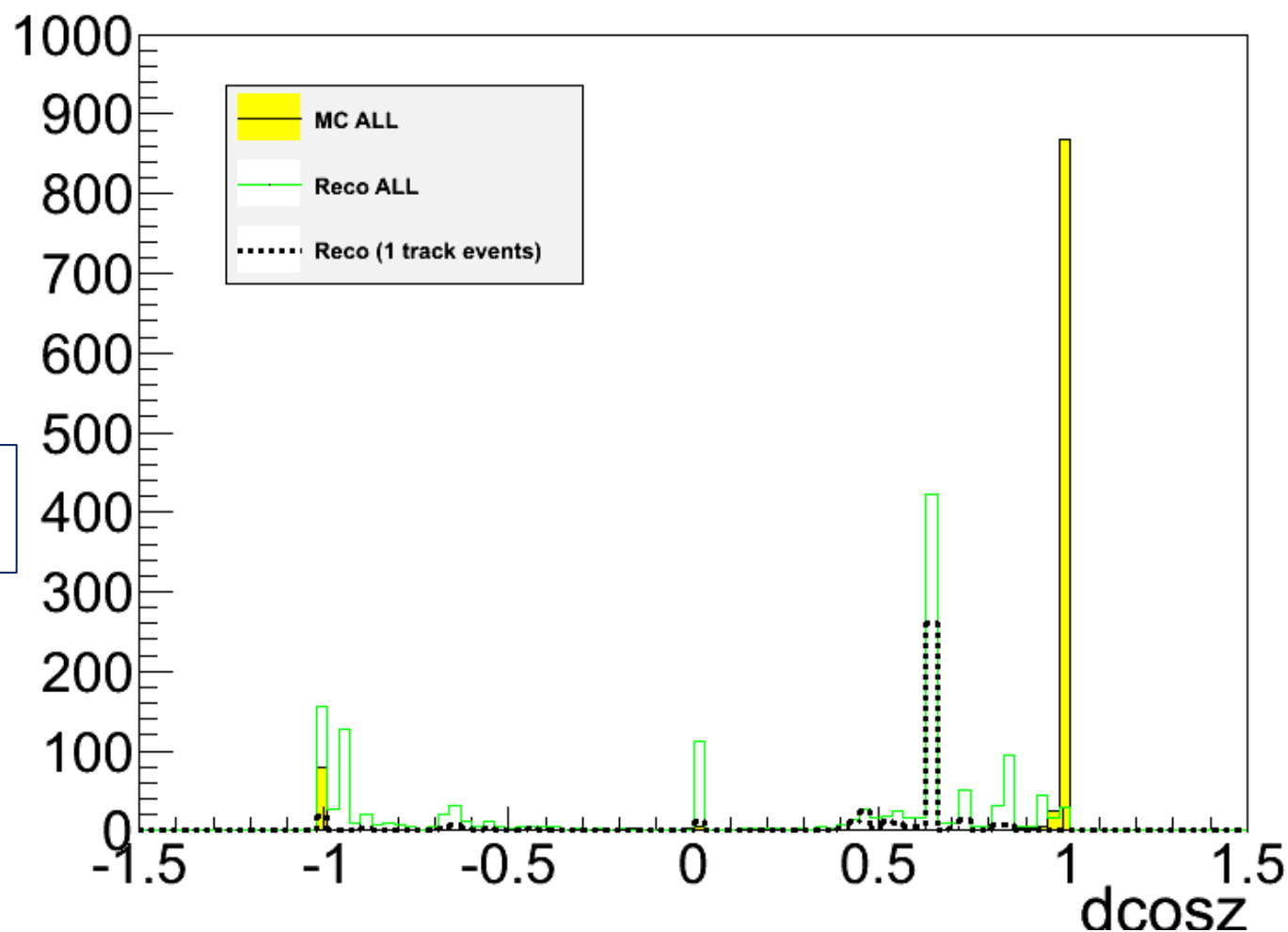**Cheater**   **Reco**

Dir. Cosine distributions (*Reco vs. Cheater*)
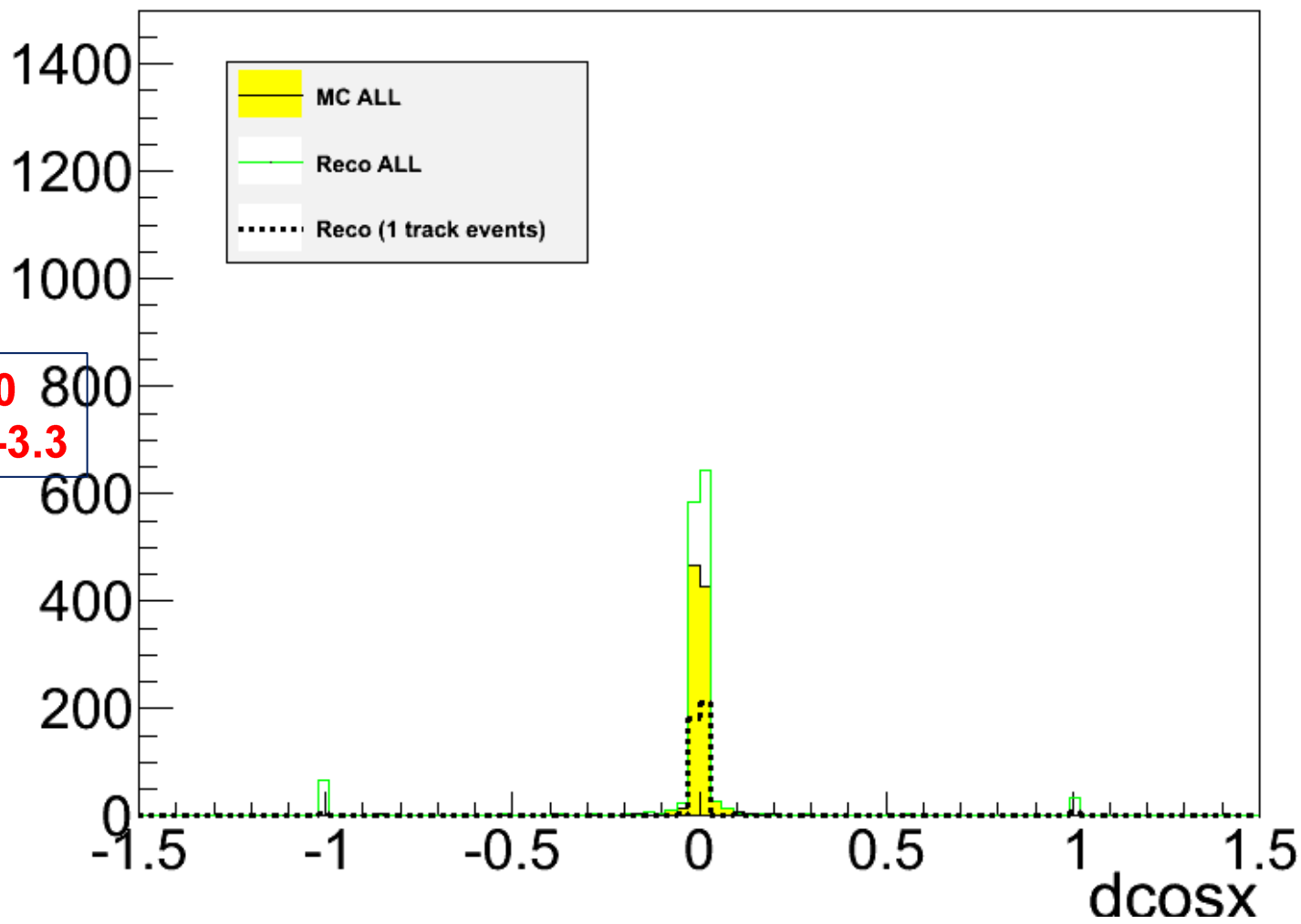
X0=25
Y0=0
Z0=20

Theta0XZ=0
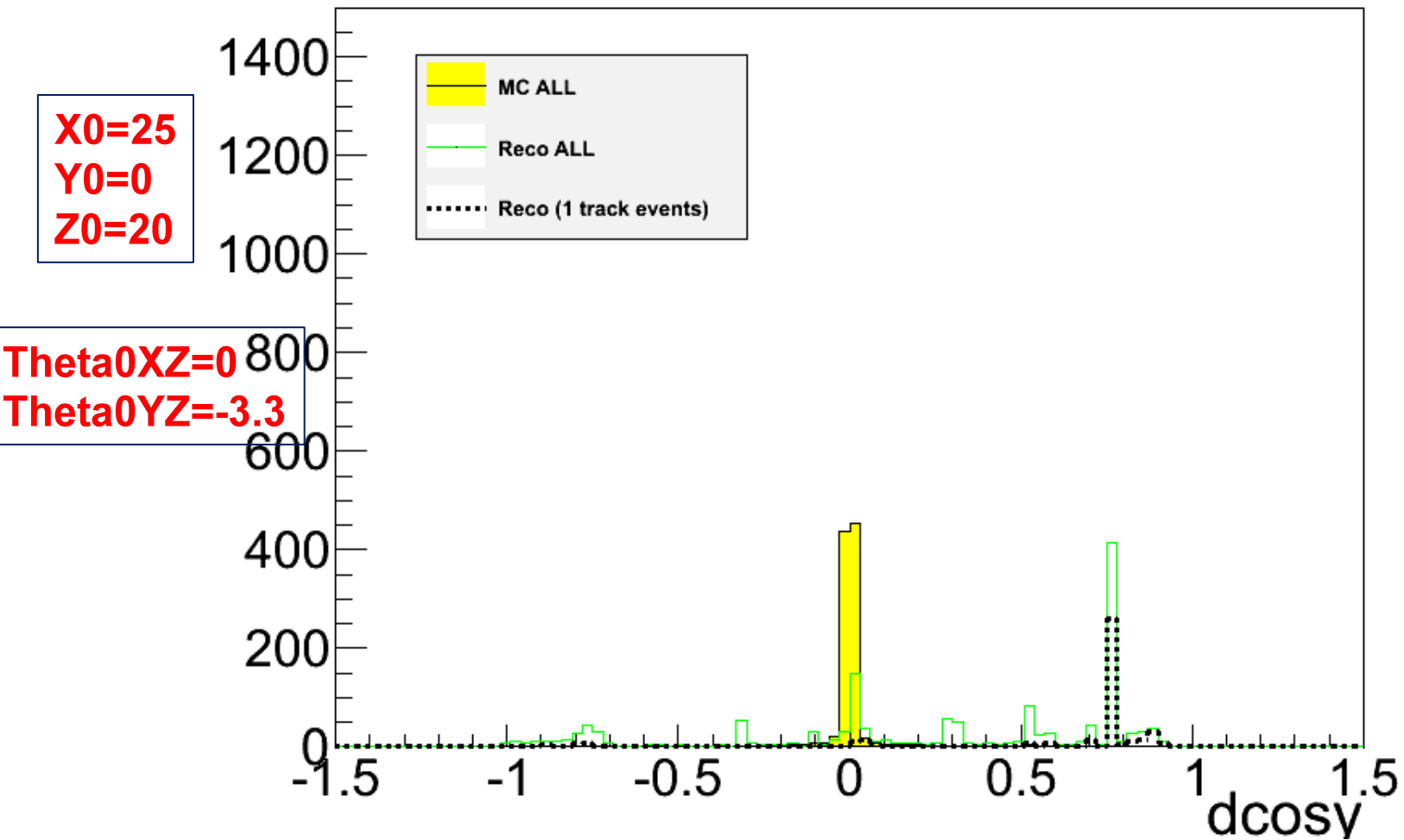**Theta0YZ=-3.3**

Dir. Cosine distributions (*Reco vs. Cheater*)

X0=25
Y0=0
Z0=20

Theta0XZ=0
Theta0YZ=-3.3

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X0=25
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Theta0XZ=0
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Issues

- Common gotchas:
  - Fhicl modules have to been given consistently the same name all the time
    - Example: if you run a reconstruction job then they have to be the same names as the ones used for generation
      - fuzzy: @local::lbne35t_fuzzycluster

  - Also, the errors given by ART don't mention the file/line number that generated the error; so you have to comb through all the fhicl files to find where such a module is declared/defined

Summary

- Progress on the 35t prototype tracking reconstruction
  - Able to run the CT on 35t produced MC muon files
  - Able to use the lbne35t_evd on the reconstructed tracks (with some issues)
  - Able to run the Track cheater as well
    - Compare between cheater vs. reco

- Next:
  - Cosmics
    - Already generated samples (CRY)
  - Track metrics:
    - Completeness
    - purity
    - Track length (Truth vs. Reco)
  - Explore fcl parameters (No. of hits, spacepoints, KSCut)
  - Try different tracking algorithms (PANDORA…etc)

Thanks