# ν_e CCQE/CC1π^+ Selection Studies

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ν_e CCQE/CC1π^+ Meeting
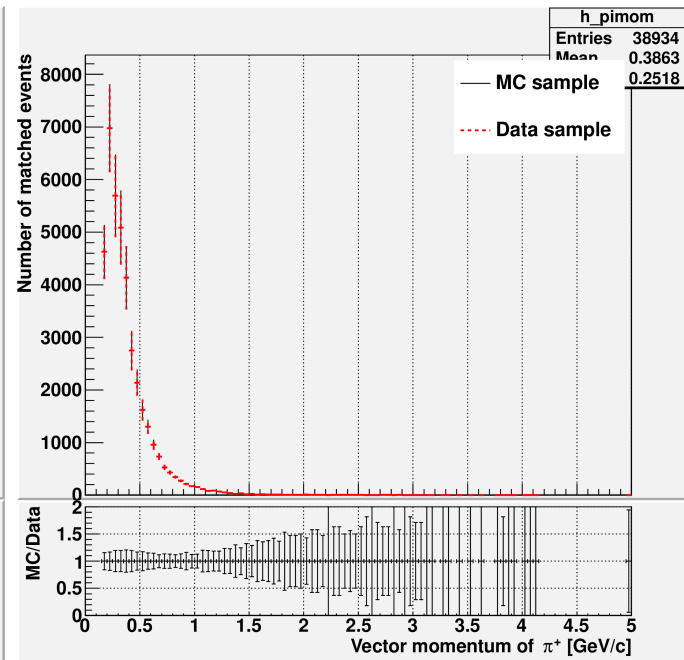May 24, 2019

Hybrid Sample

- Step 1 (atm ν e-like extraction): – DONE
  - Generate list of 1-ring e-like events from atm data and from MC
  - Equalize MC to data
  - Extract e-like events from zbs files (data and MC)
- Step 2 (T2K eπ_+ extraction): – DONE
  - Extract all eπ_+ events from T2K MC and save kinematics to text file
- Step 3 (matching e's): – DONE
  - Match e from T2K MC eπ_+ events with single ring e-like events from atm data/MC
    - Rotates T2K MC eπ_+ events to line up the e with the e-like atm events
- Step 4 (merge e and π_+): – DONE
  - Generate MC π_+ ring with same kinematics as π_+ from matched T2K events
  - Merge atm e (data/MC) with MC π_+ to create hybrid events
- Step 5 (apfit, fiTQun):
  - Run apfit on hybrid .zbs files and run fillnt to get .hbk/.root files – DONE
  - Run fiTQun on hybrid .apfit.zbs files and run fillnt to get .hbk/.root files – IN PROGRESS
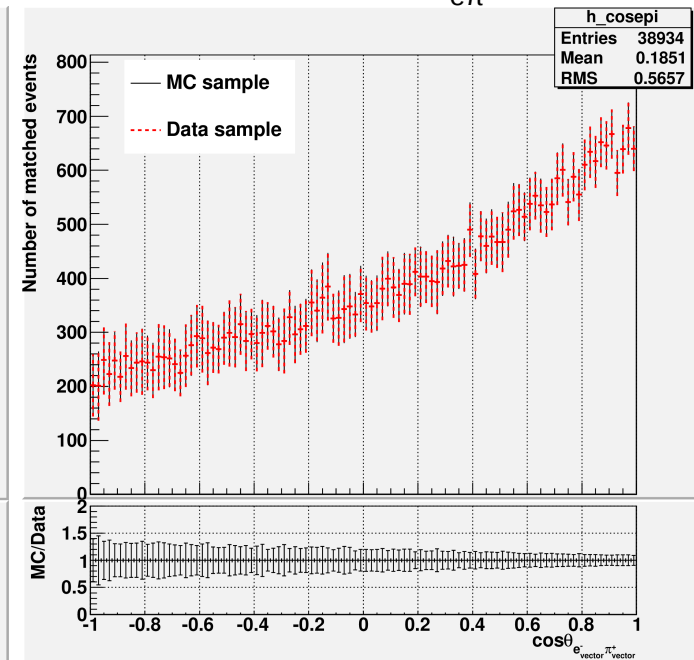
Kinematics of matched events
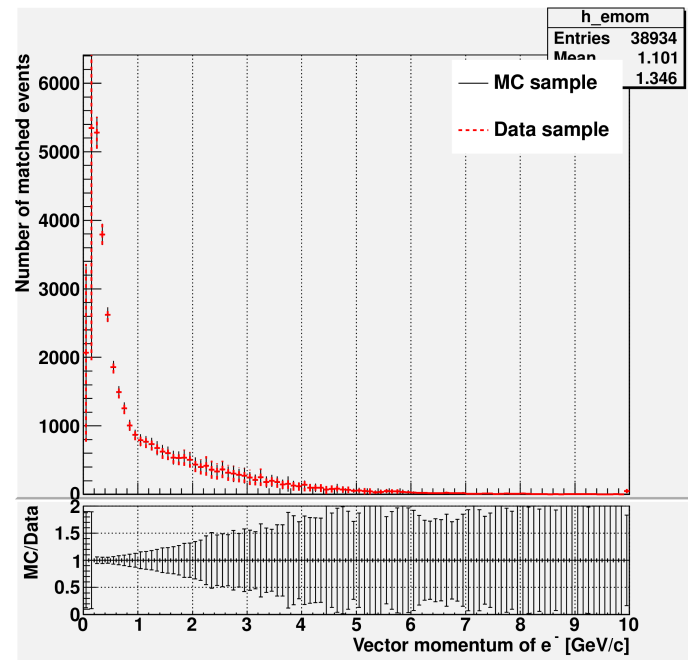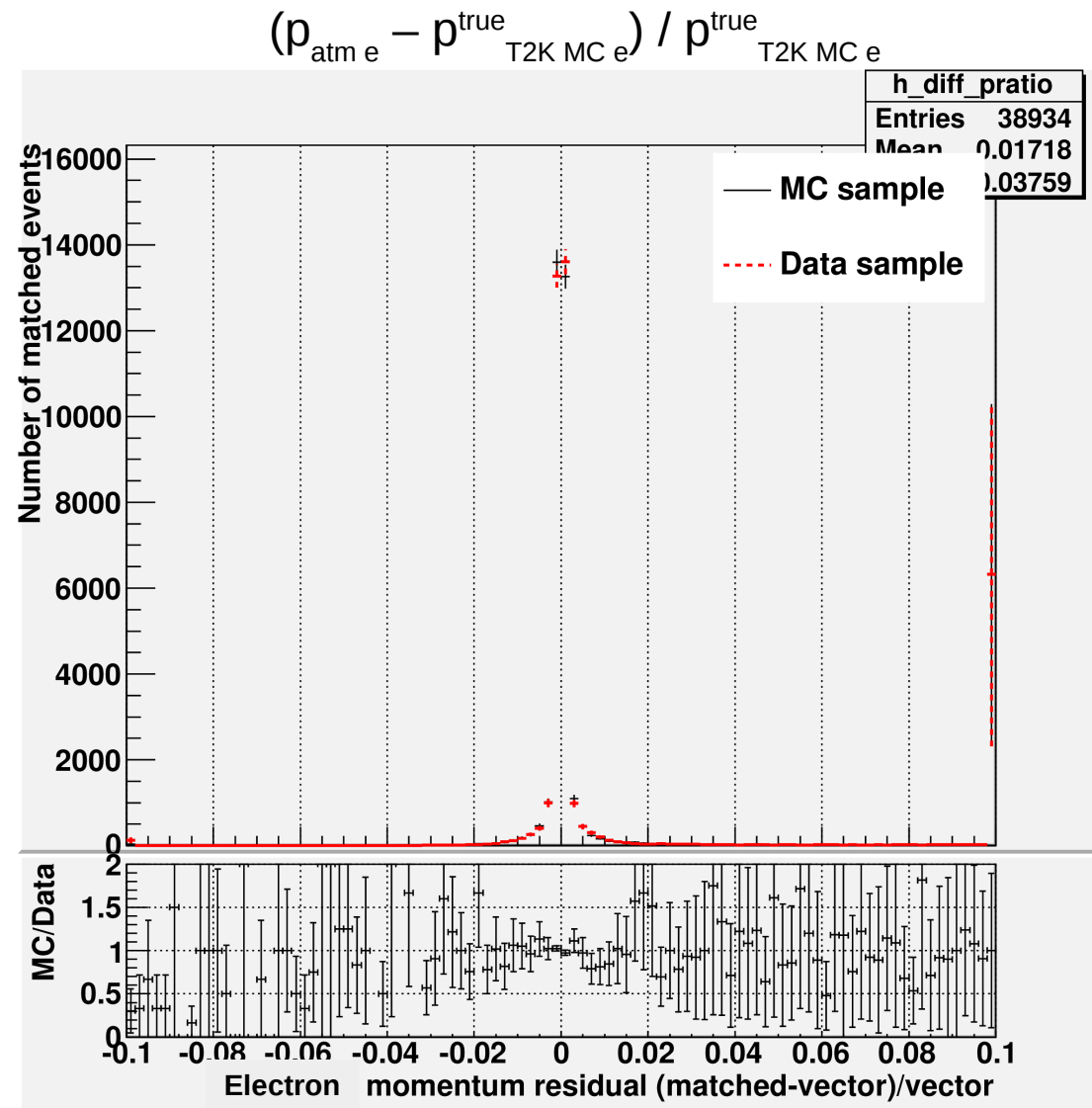
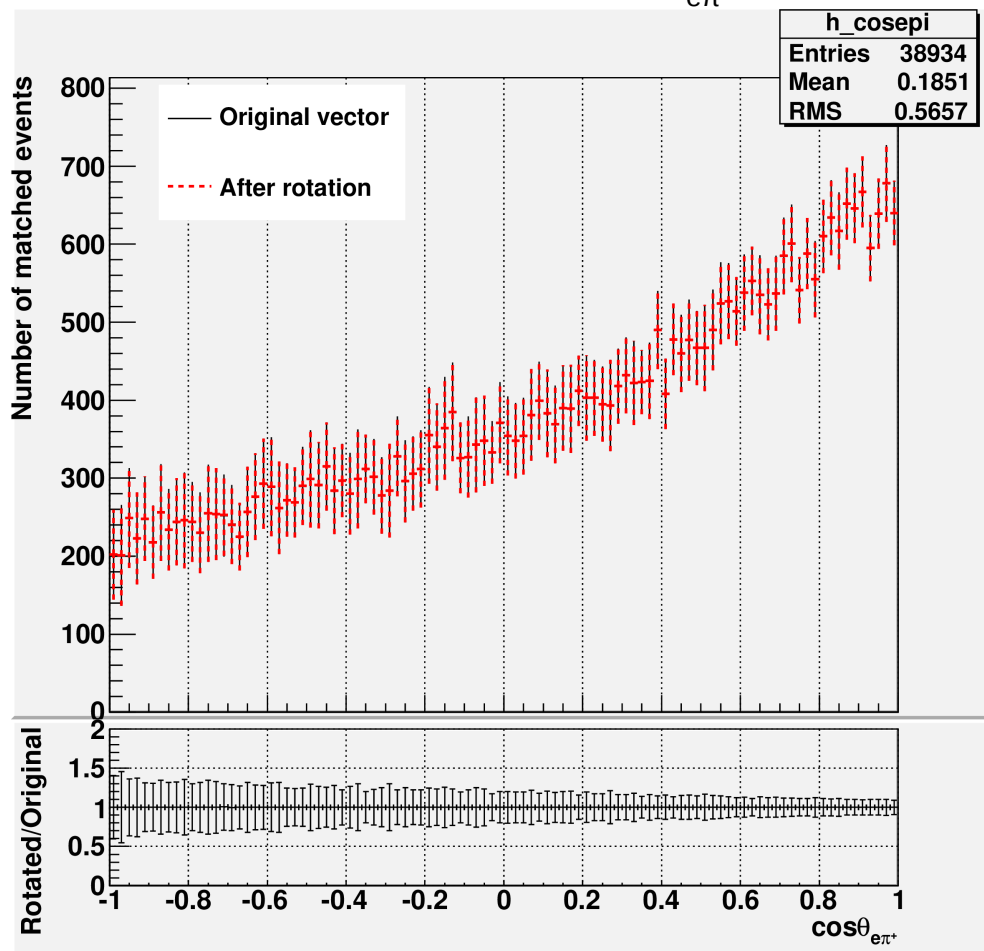True e⁻ momentum   True π⁺ momentum   True cos(θ$_{e\pi}$)

MC/data should be perfectly matched (by construction)

Matched e Momentum Difference

$$(p_{atm\ e} - p^{true}_{T2K\ MC\ e}) / p^{true}_{T2K\ MC\ e}$$

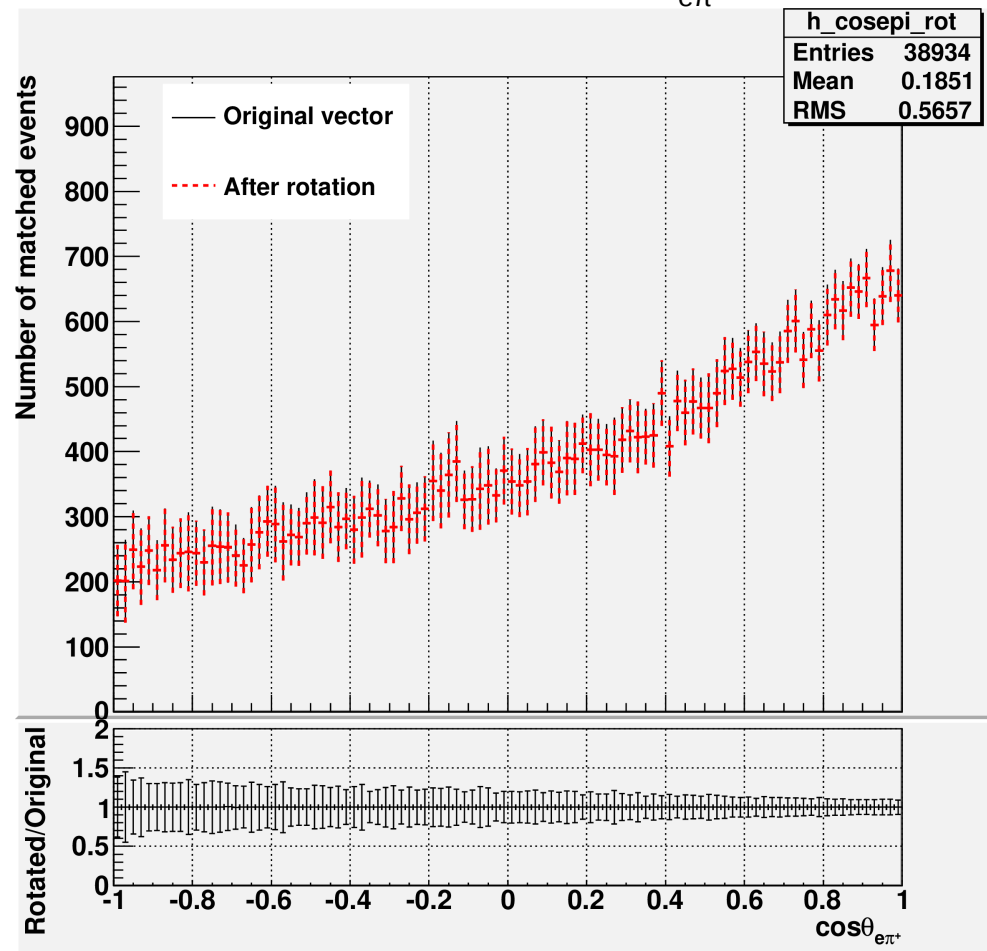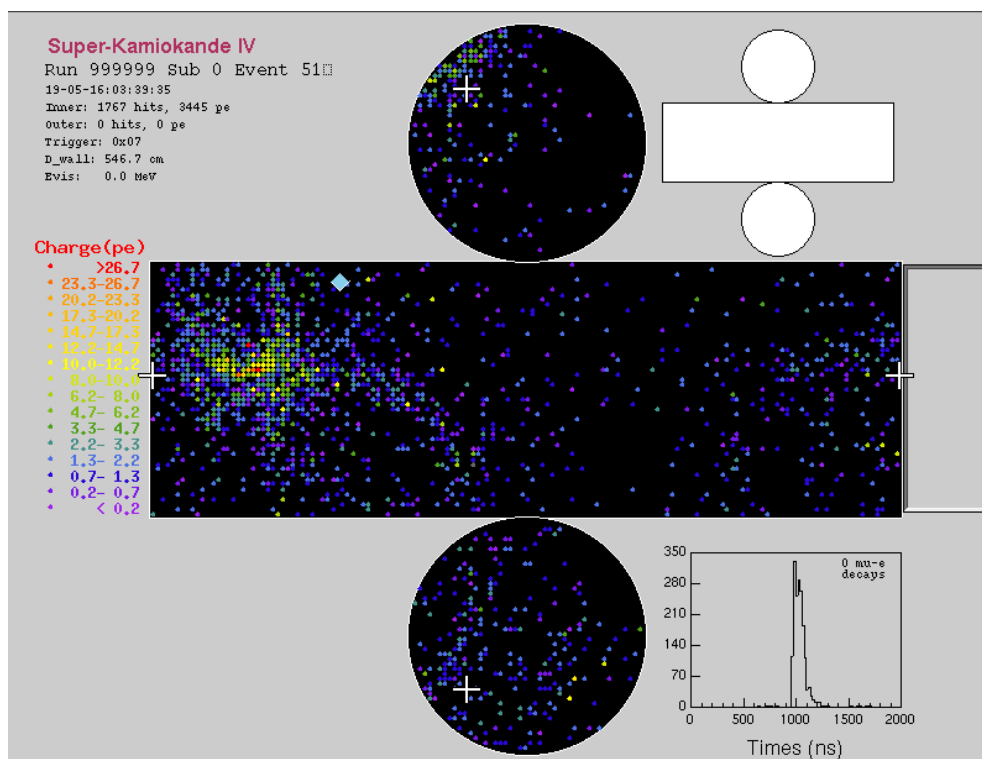# Rotation

Data Sample: $\cos(\theta_{e\pi})$

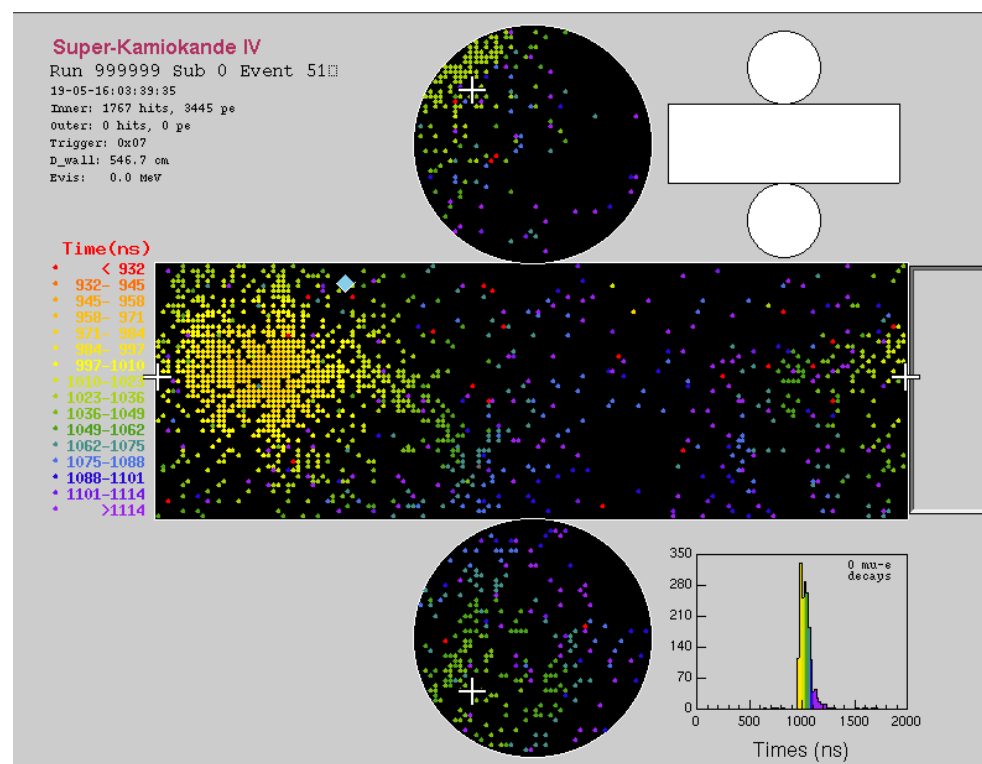MC Sample: $\cos(\theta_{e\pi})$

Rotated/original should be perfectly matched (by construction)
Data sample and MC sample should have same distribution (by construction)
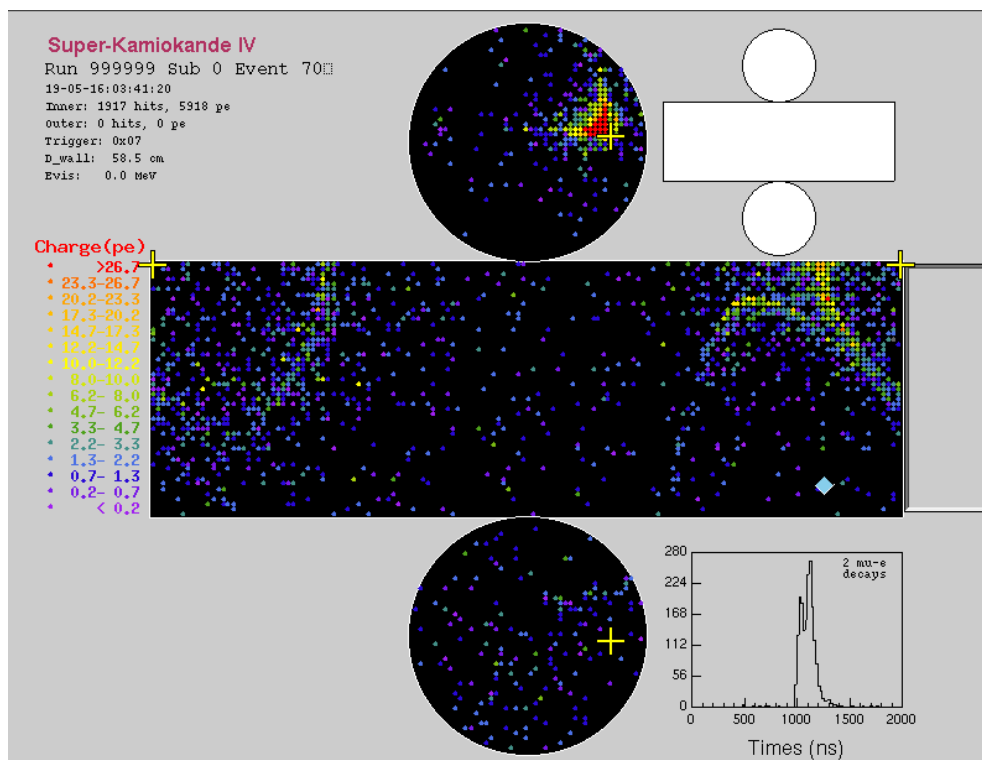
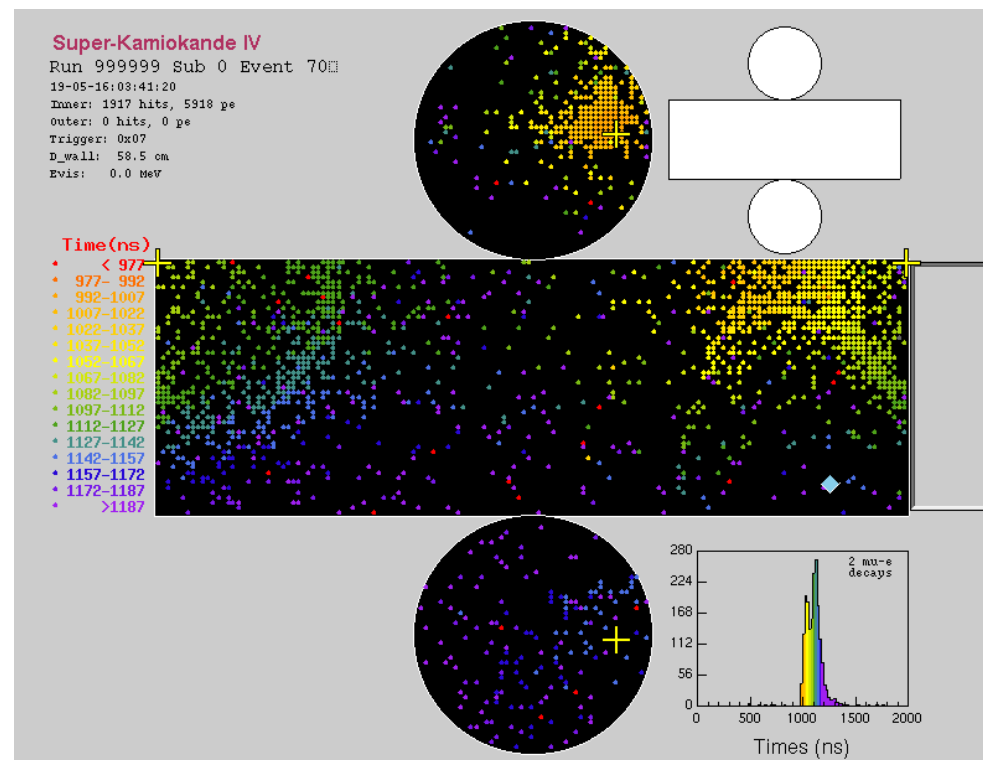# Event Display – Data Sample

Charge

Time

Event Display – MC Sample

Charge

Time

Future Work

- Will hopefully have fiTQun run on the hybrid samples by next week

- Will need to validate the samples
  - I will look at Yoshida-san's slides/code to figure out how best to do this