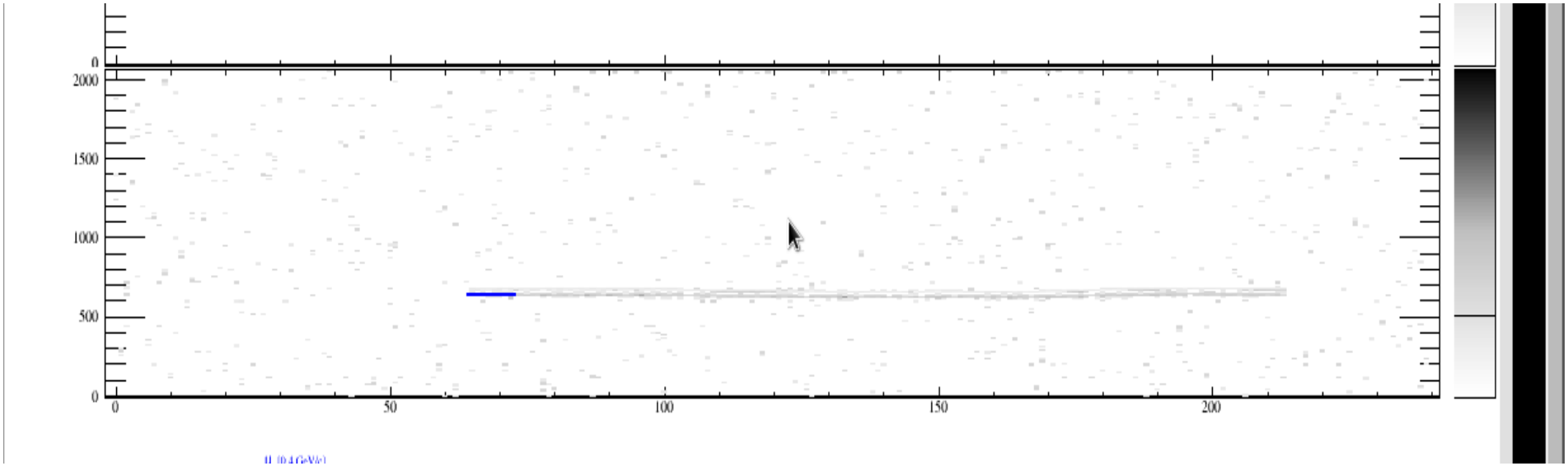
Study of Noisy Hits from Reconstruction



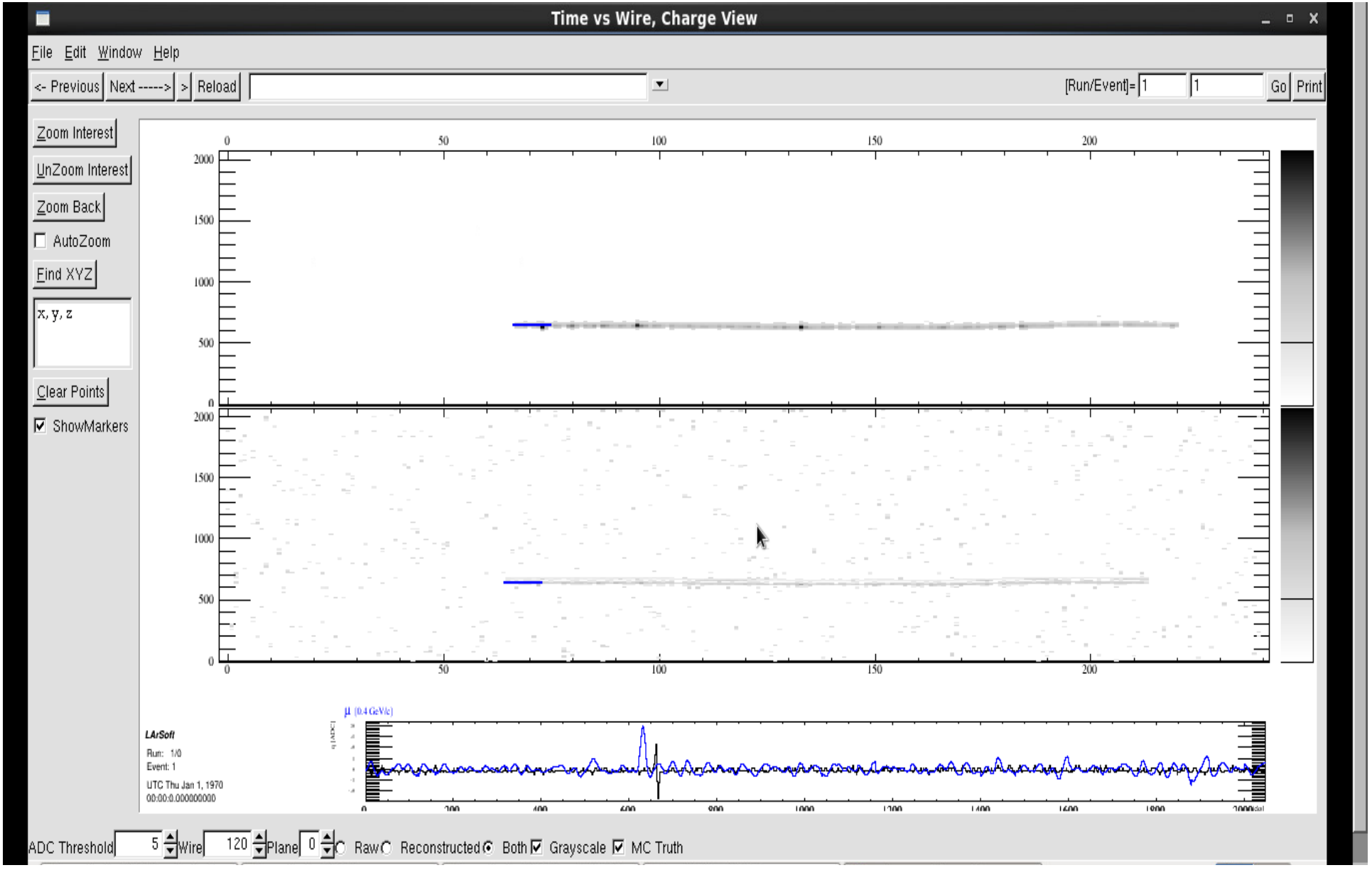
By: Andrew Olivier

Presented at the LArIAT weekly meeting on 4-28-15

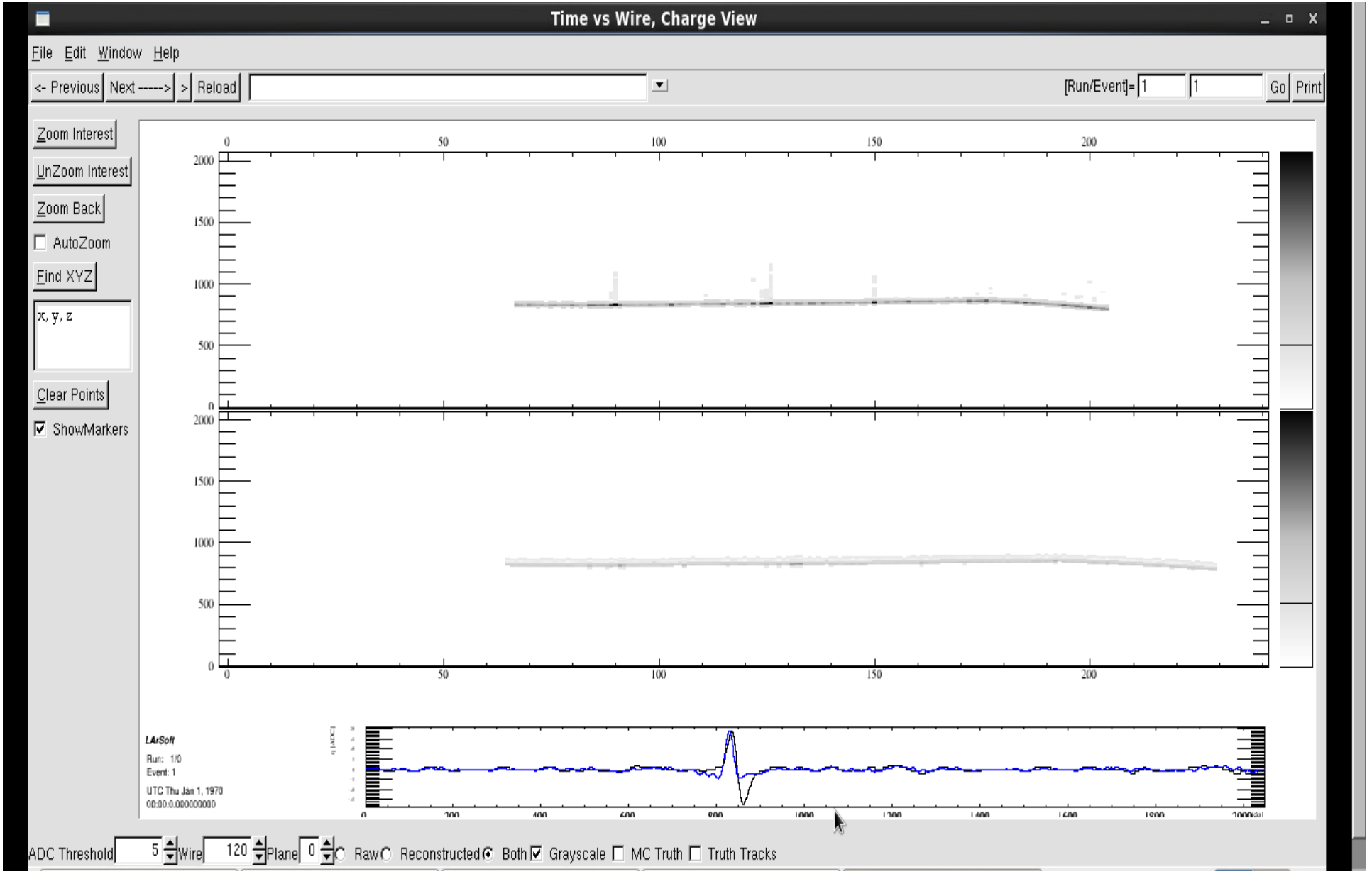
Large Number of Reconstructed Tracks

- Study of through going muons in LArIAT and ArgoNeut
- Generated 1000 muons with 400 MeV energy
- Reconstruction returns at most 2 tracks for ArgoNeut
- However, it reconstructs ~10 tracks for LArIAT
- Suspected noise and/or threshold settings
- We observed large number of noise hits in the induction plane for LArIAT (see next slide)

Noise Hits in the LArIAT Event Display



ArgoNeut Does Not Have Noise as of v03_04_06



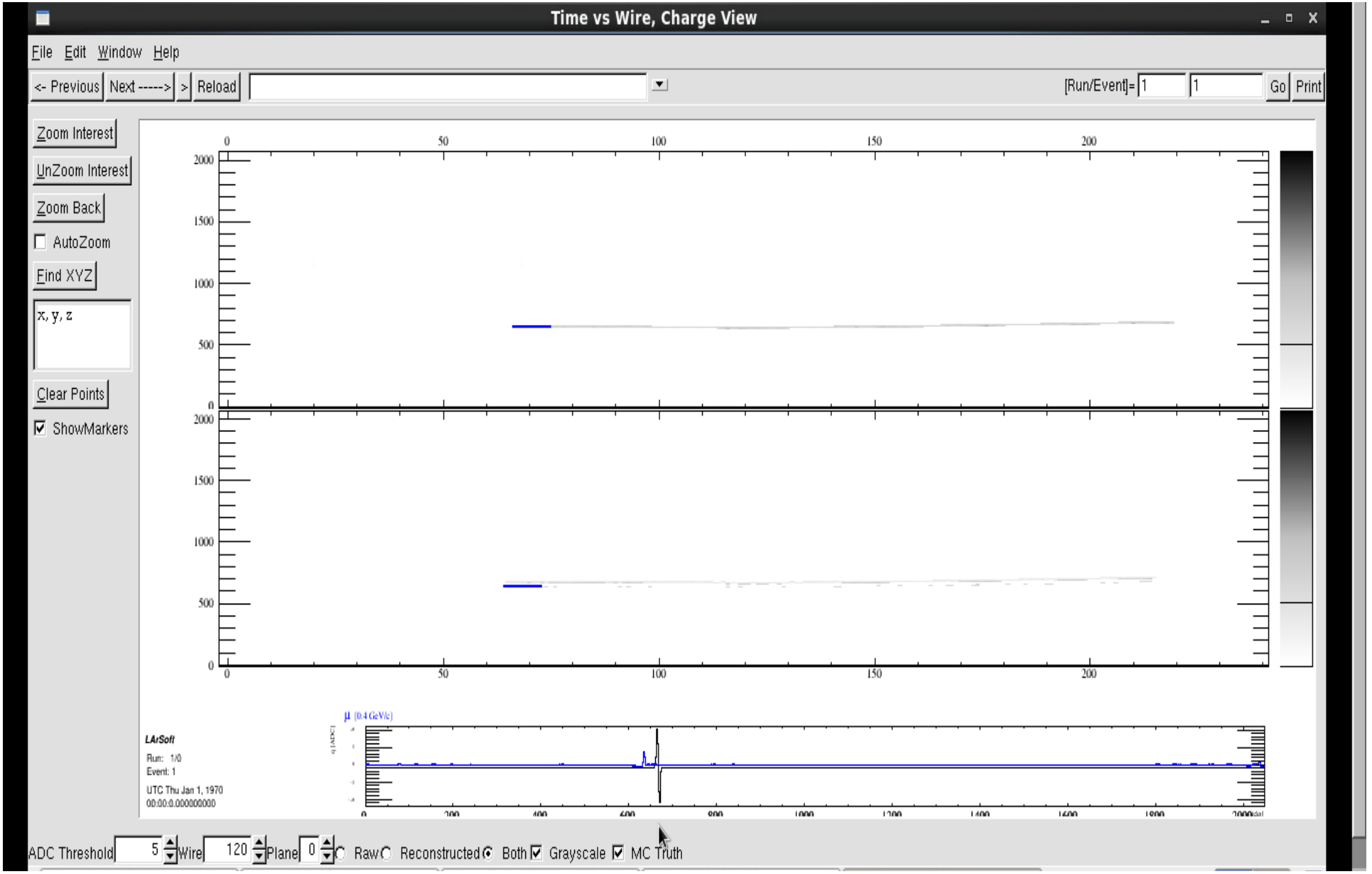
What is the Source?

- Performed a study to identify the cause of the noisy hits
- Studied several samples with/without noise simulation which were reconstructed with/without noise filter (suggested by Andrzej)

Study 1

- Muons with 400MeV with vertex inside the TPC
- No noise simulation
- Noise filter set to 1 for reconstruction
  - Perhaps not a good choice (might have wrong normalization)

No Noise Simulation And Filter=1

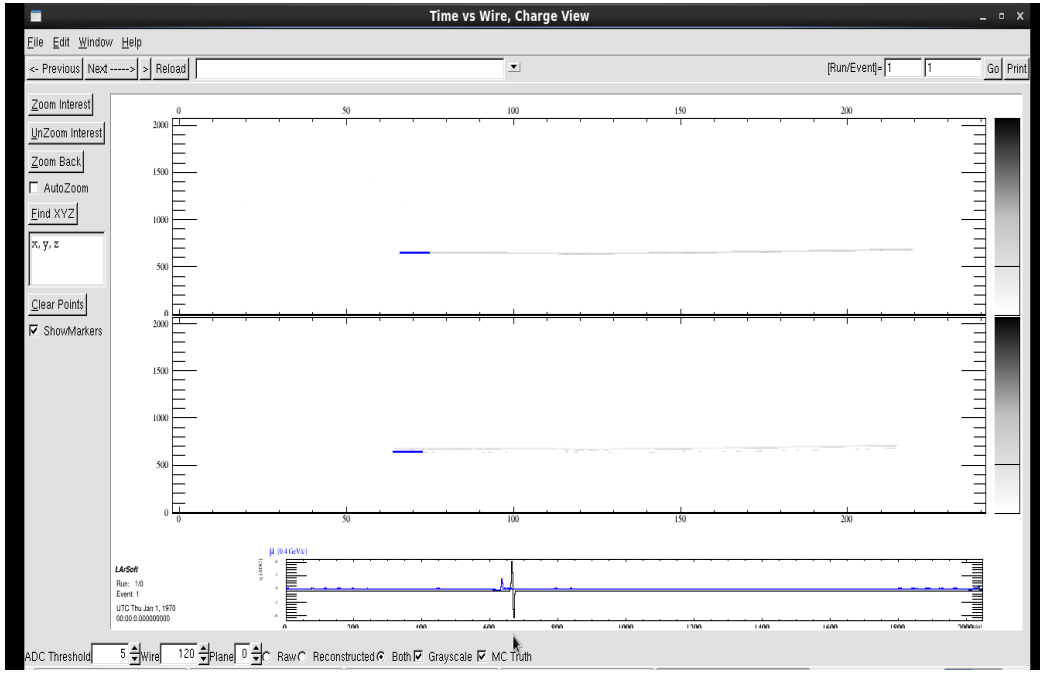


Study 2

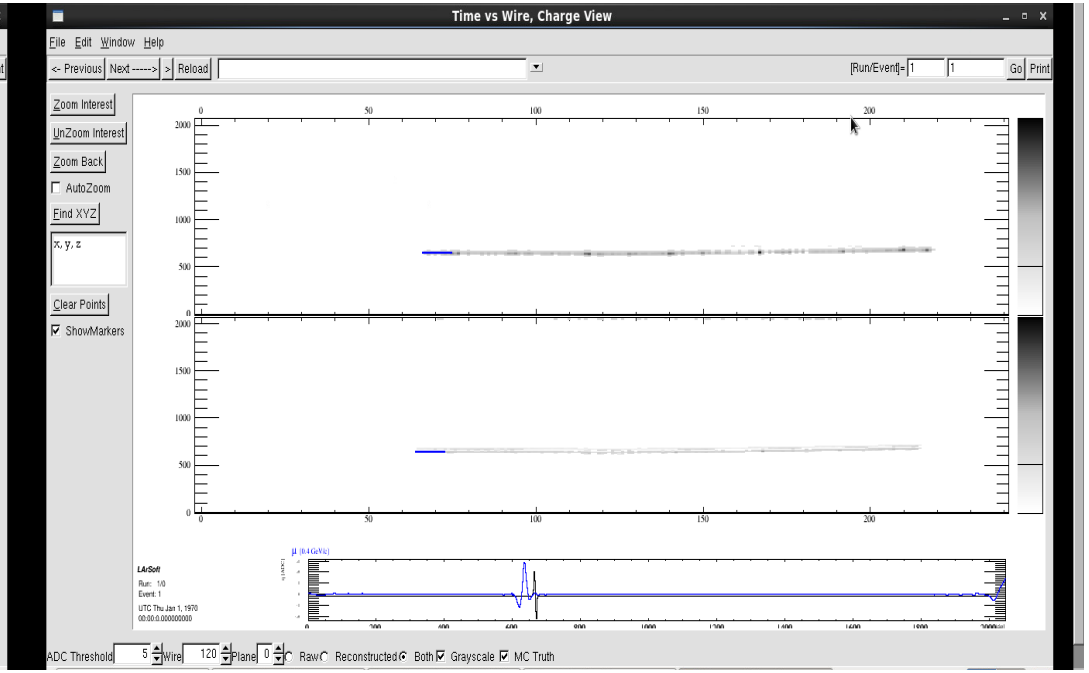
- Muons with 400MeV with vertex inside the TPC
- No noise simulation
- Usual noise filter (from histogram)

Filter Does Not Introduce Noise

LArIAT with No Filter

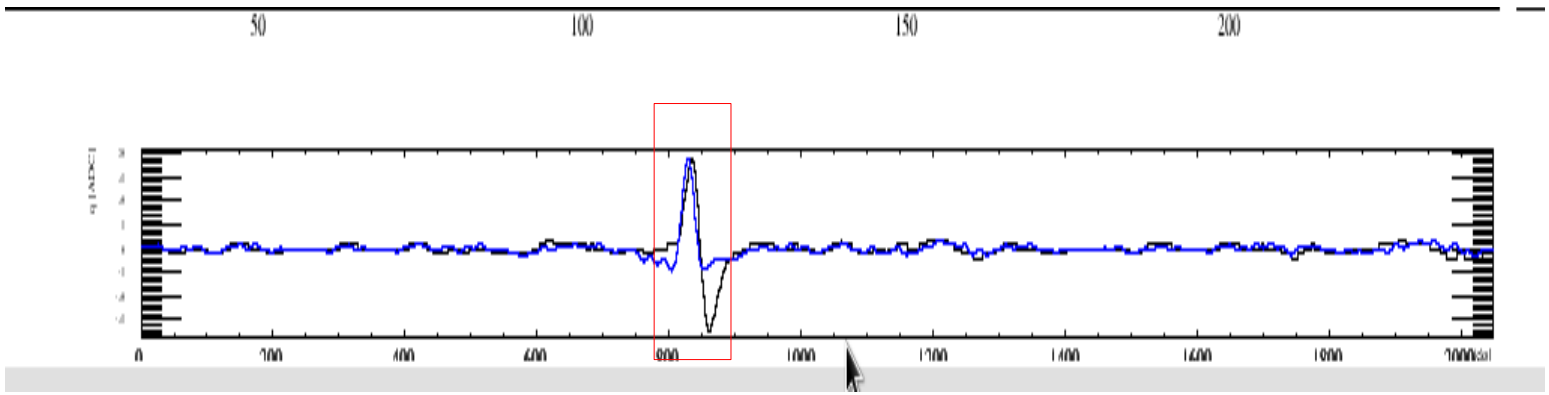


LArIAT with Filter

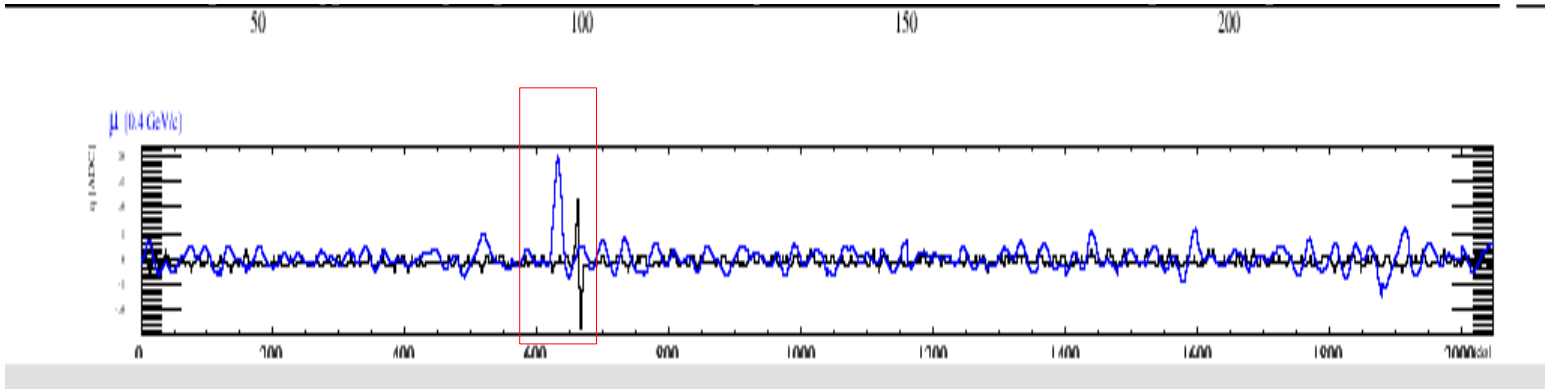


Time Offset in Wave Forms: LArIAT vs. ArgoNeut

ArgoNeut Wave Form with No Time Offset

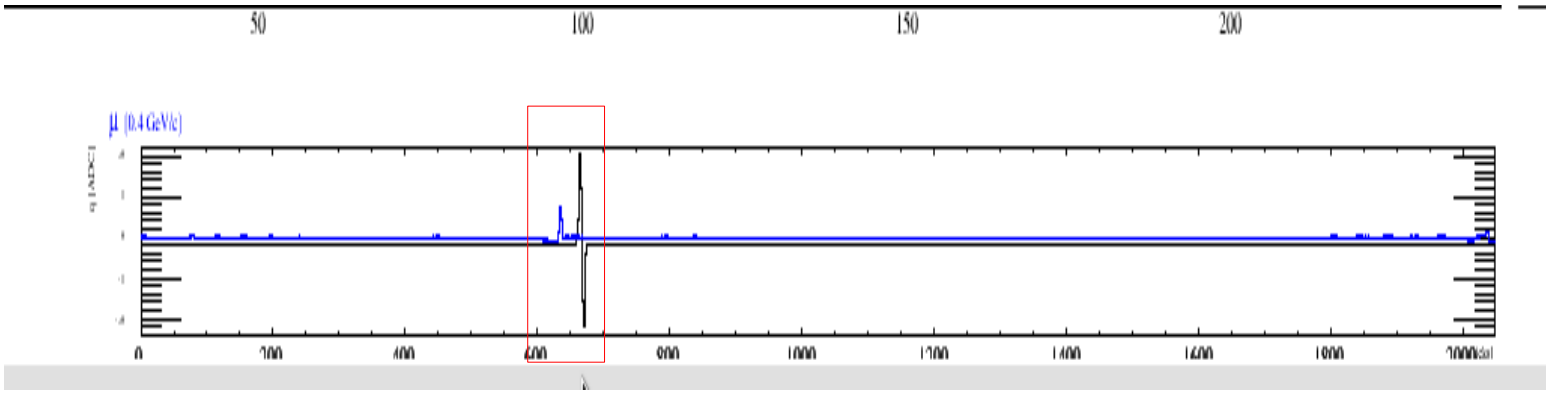


LArIAT Noisy Wave Form with Time Offset

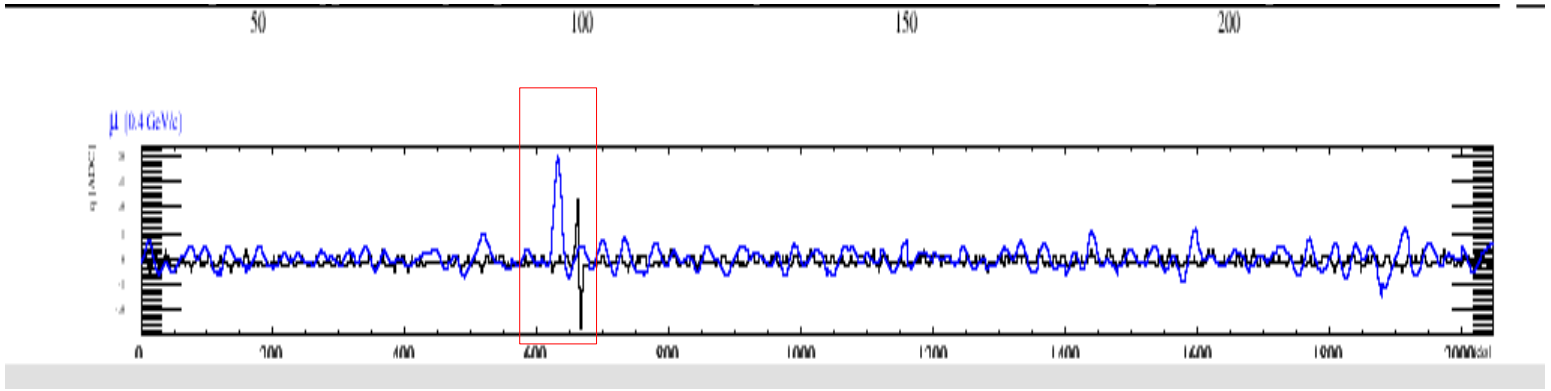


Time Offset in LArIAT: LArIAT with Noise Versus LArIAT without Noise

LArIAT Wave Form Without Noise Generation or Filter



LArIAT Noisy Wave Form



Open Questions

- Is the filter histogram appropriate for LArIAT electronics?
- Why is a time offset introduced in LArIAT reconstruction?
- Adjusting the ADC threshold helps remove noise hits in the induction plane.