

# Track Timing in 2019 Data

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# Track Time

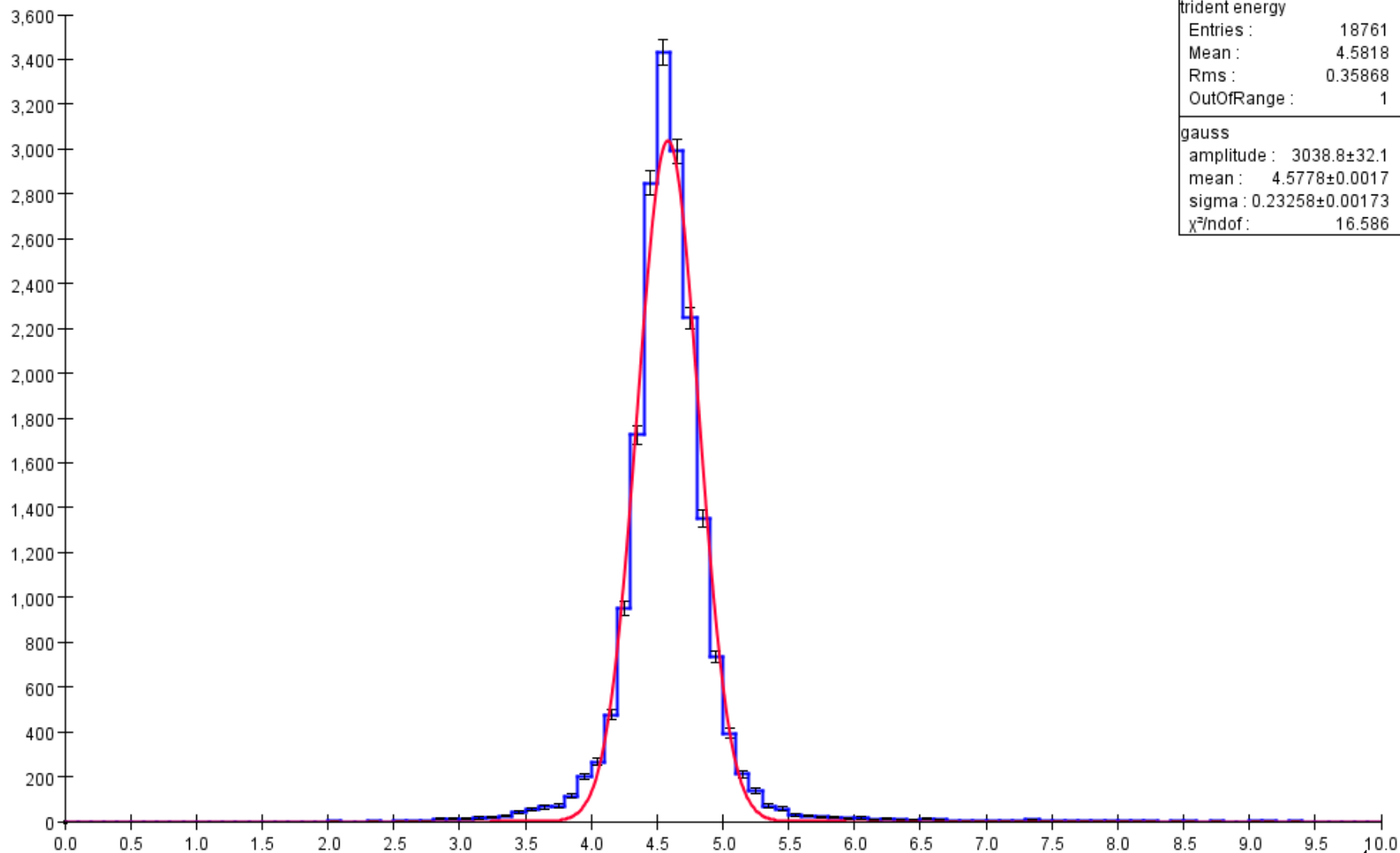
- Because of the two-cluster trigger in 2016 the V0 analyses all required that electrons have an Ecal cluster associated with the track. Requiring the two clusters to be in-time was a powerful cut to reduce backgrounds.
- In 2019 we use the positron trigger, allowing track-only electrons to be used in the analysis. Can we reduce backgrounds by requiring the track time on clusterless electrons to agree with the positron cluster time?

# Data Sample

- To study this, we need a clean sample of data with little to no background.
- I have previously developed analysis techniques to select tridents ( $e^+e^-e^-$ ).
- Run that analysis on latest reconstruction using hps-java 5.0, which has the fix to the trigger phase synch.

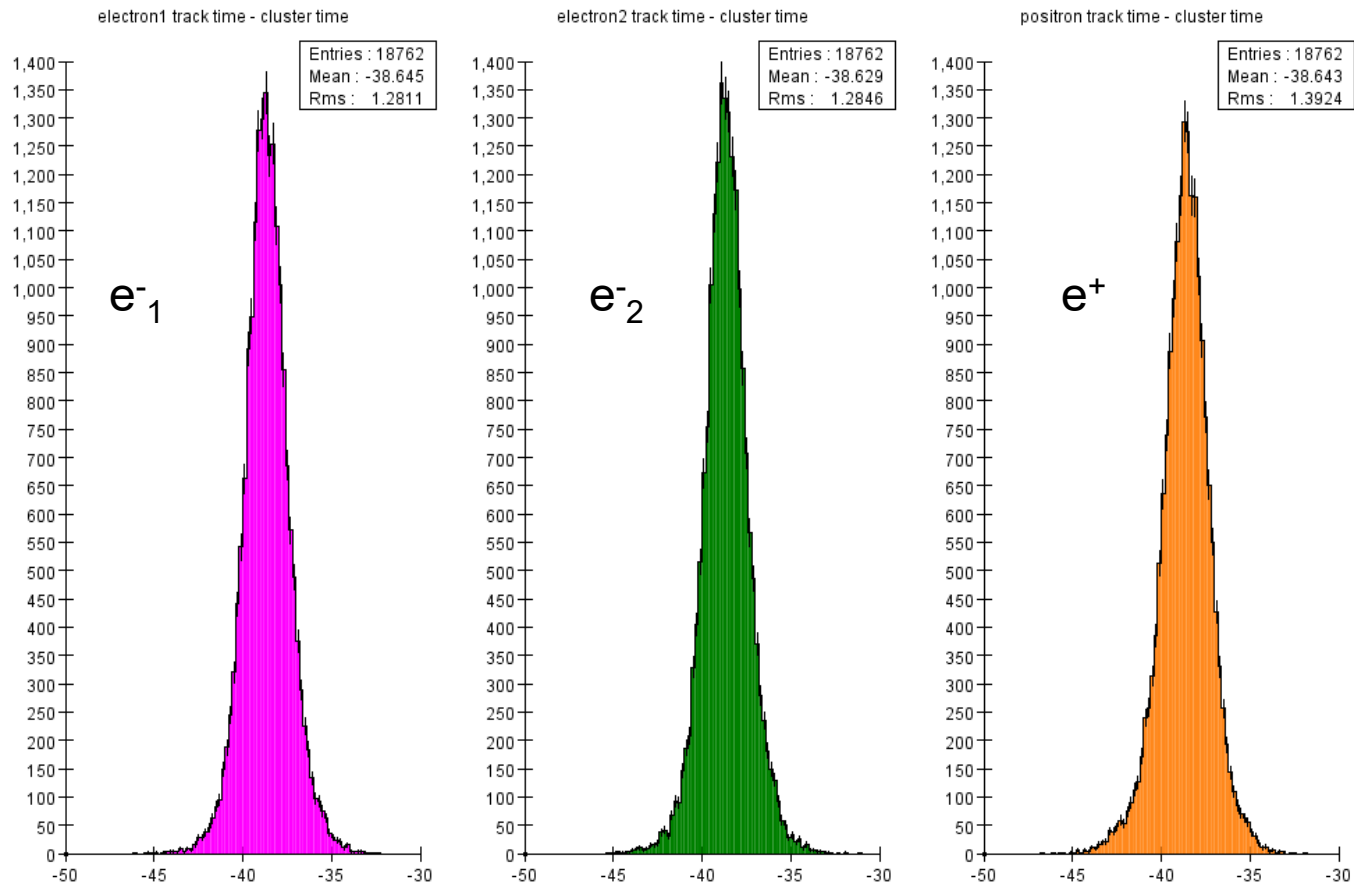
# 2019 Trident Sample

Trident Cluster Energy Sum



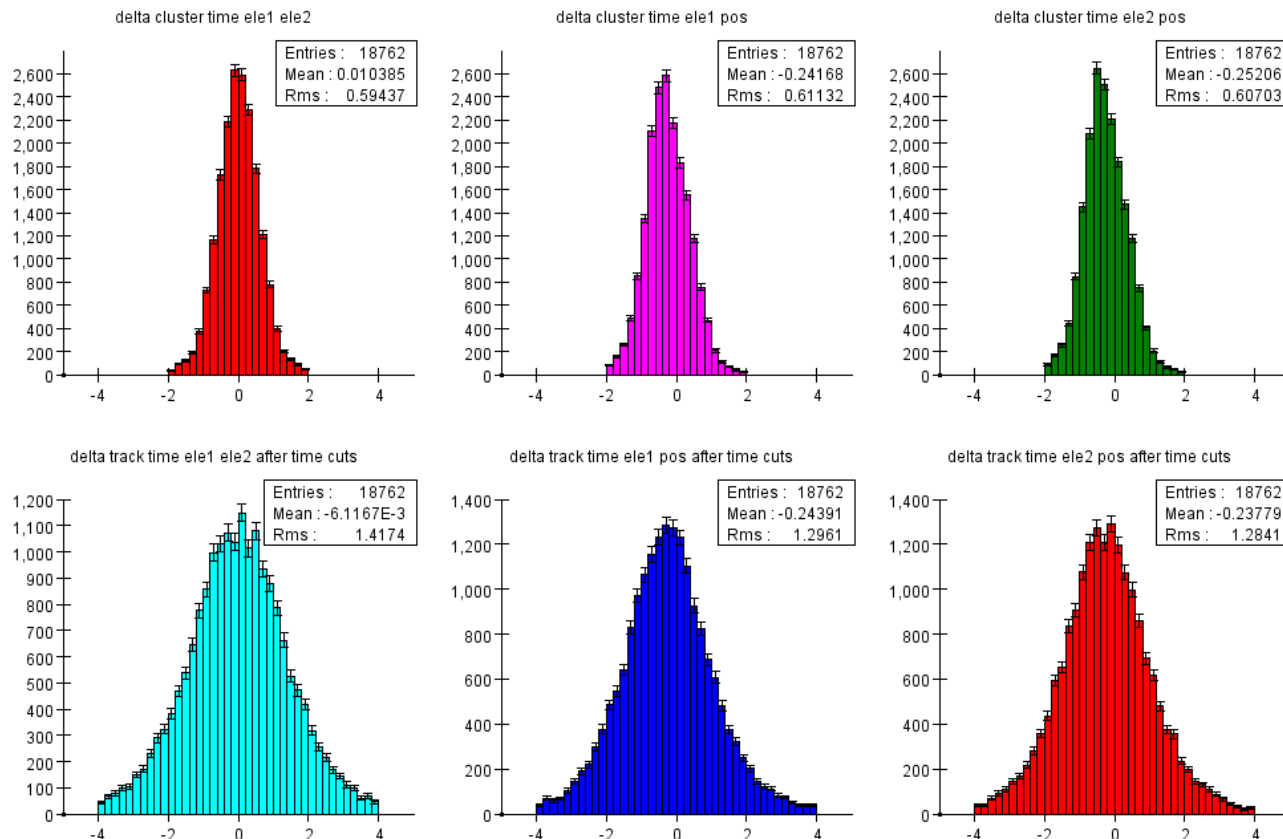
# Track Time - Cluster Time

- Track time – cluster time for clean trident constituent tracks shows an rms of  $\sim 1.3$  ns.
  - Note trigger offset of  $\sim 38$  ns



# Particle Pair $\Delta T$

- Create time difference between all pairs of tracks in the trident sample,  $e^-_1 e^-_2$ ,  $e^+ e^-_1$ ,  $e^+ e^-_2$
- Compare cluster  $\Delta T$  with track  $\Delta T$



# Track Time as Selection Criterion

- Track times, although a factor of  $\sim 2$  worse in resolution compared to cluster times, appear to be a useful metric to reduce backgrounds.
  - Can be included in track-cluster matching when creating ReconstructedParticles.
  - Can be used to reduce backgrounds in V0 analyses.