Update for Displaced Photon Analysis

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1. Displaced Photon Trigger

- DisplacedPhoton65_CaloIdVL_IsoL_PFMET25

- Selections :

→ Cut on trigger filter object to decouple the effect on the target object.

→ hltPFMET25 is fired for Photon Pt scan.

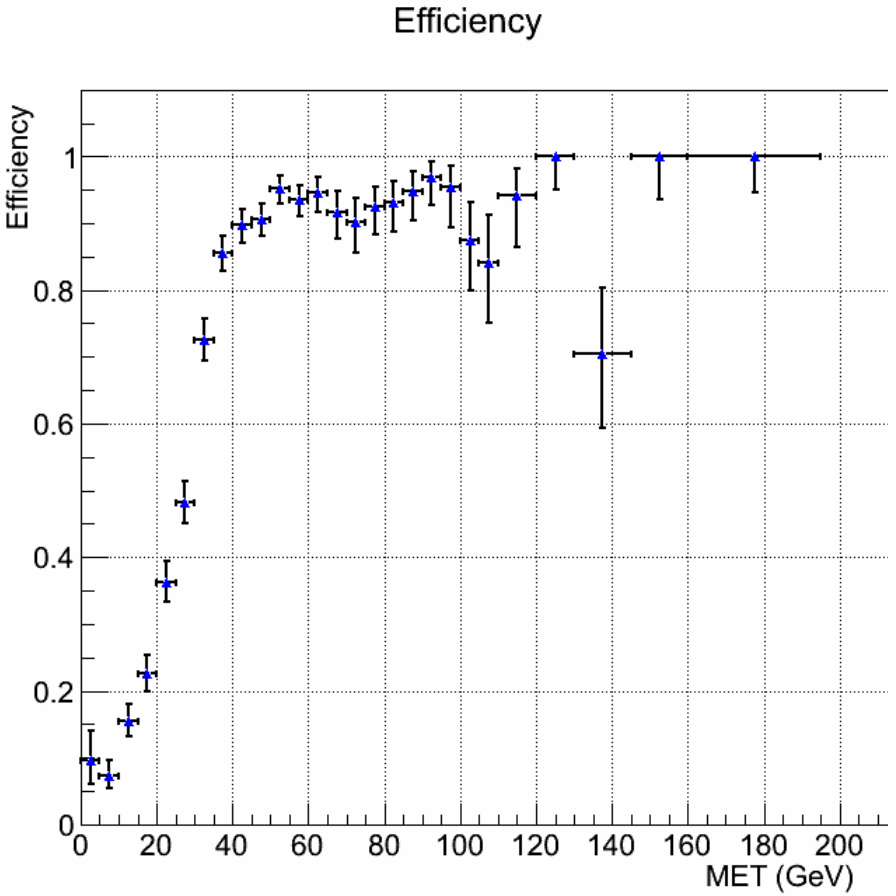
→ hltPhoton65 is fired for PFMET scan

→ Use SingleMuon dataset (HLT_IsoMu24)

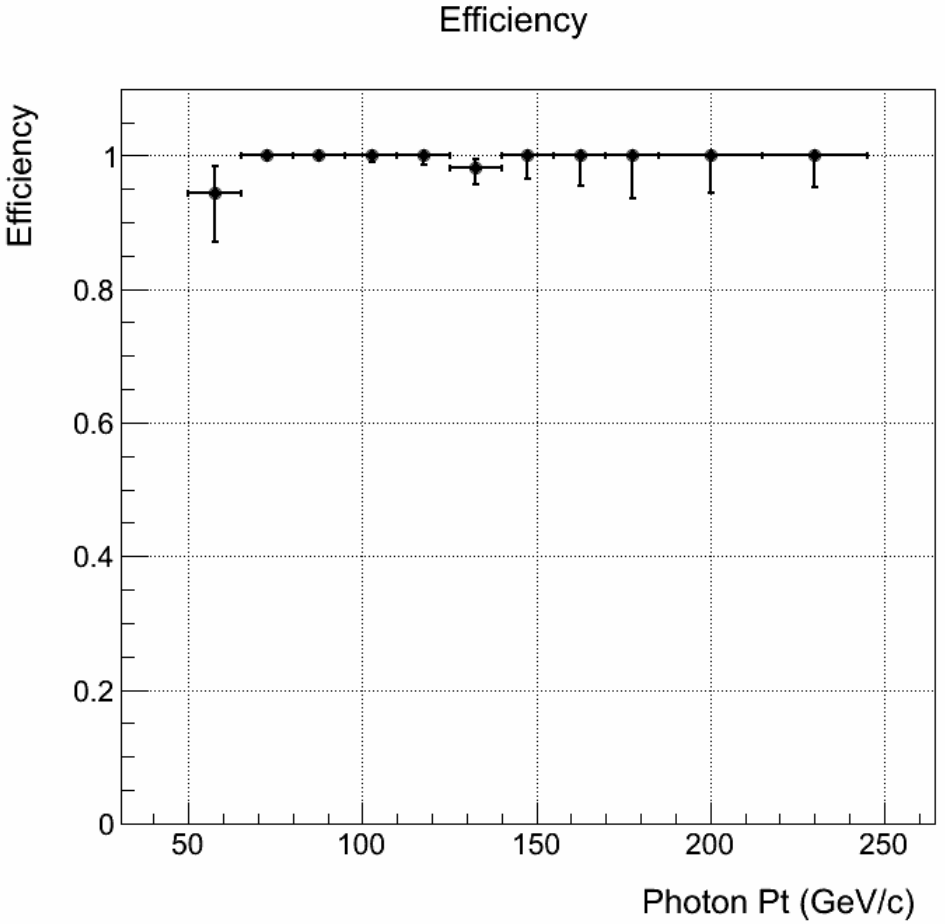
→ Baseline selection : Photon Pt > 50 GeV/c , |eta| < 2.4 , 0.15 < sMinor < 0.35 , dR(track , photon) > 0.6

→ Isolation : TrackIso(0.2) , EcalIso(0.1) , HcalIso(0.1)

- Cuts for off-line selection
  → Photon Pt : 75 GeV , MET : 60 GeV



PFMET



IsoPhoton

2. Photon Time Studies

- Use “uncleaned” photon :

  → Topological/spike cleaning is applied but recovered “out-of-time” and “poor-calibrated” photons.

  → Need to understand the sideband/tail of ECAL timing spectrum.

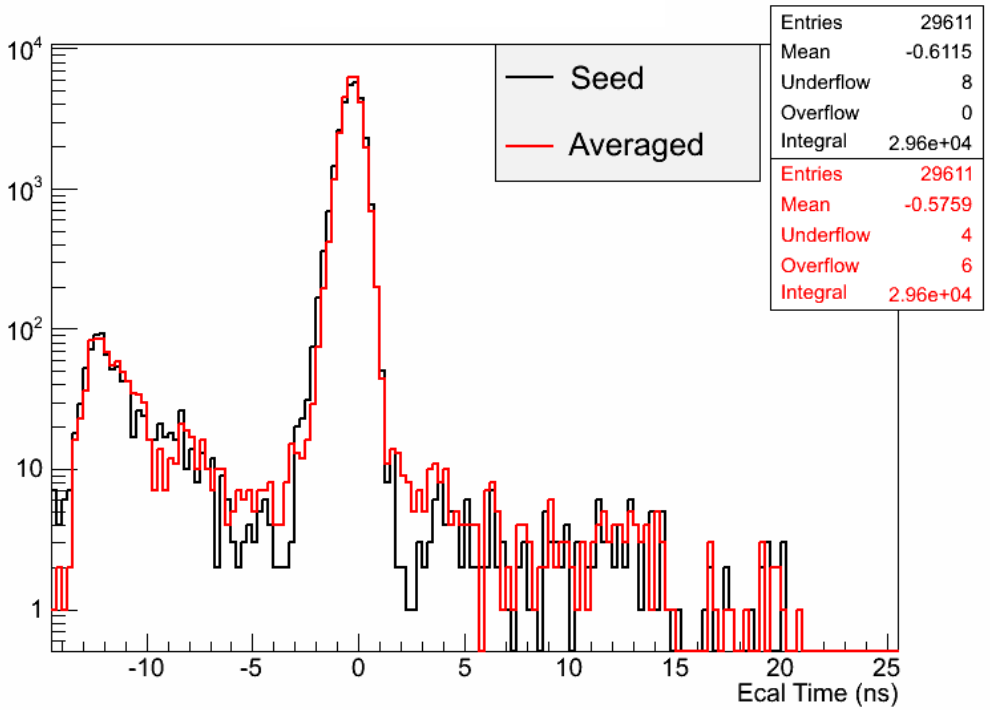
- ECAL timing for signal and background :

  → Signal region is ≥ 3 jet and MET > 60 GeV.

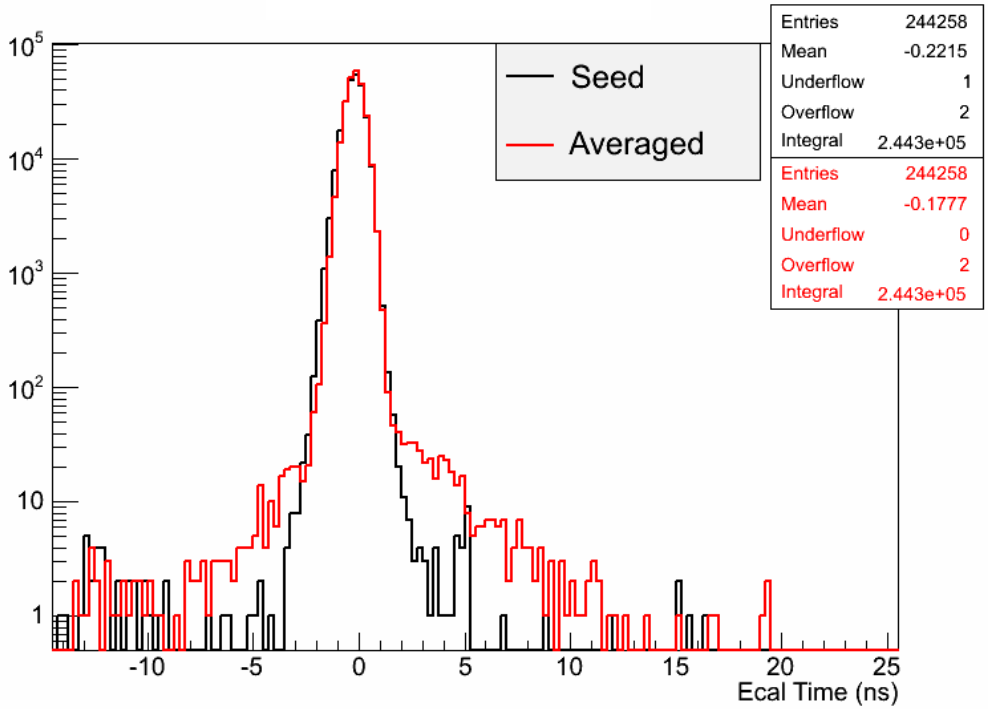
  → ECAL timing for backgrounds should be the same regardless jet multiplicity and MET.

- Most negative time photons are from 0-jet events.
- Anomalous spikes were considered to be responsible for the | photon time | > 3 ns

  → Timing from Seed crystal and weighted averaged timing of the basic cluster are similar.



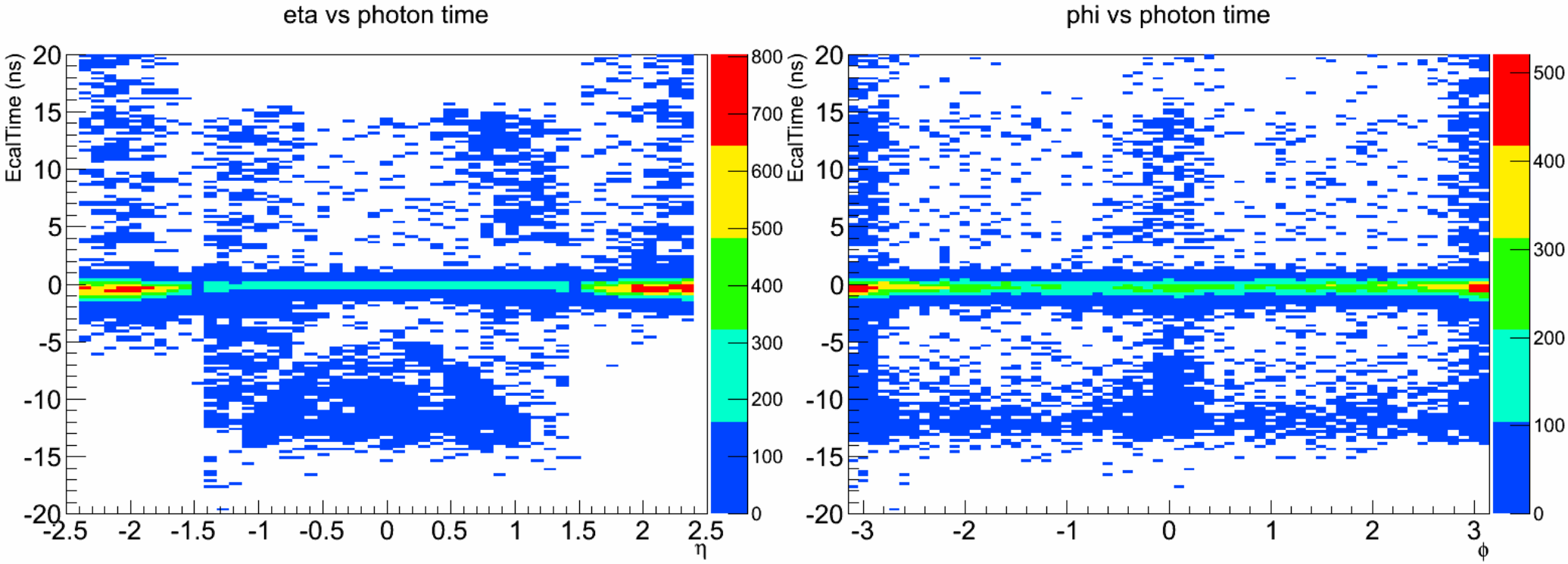
0 Jet Events



≥ 1 Jet Events

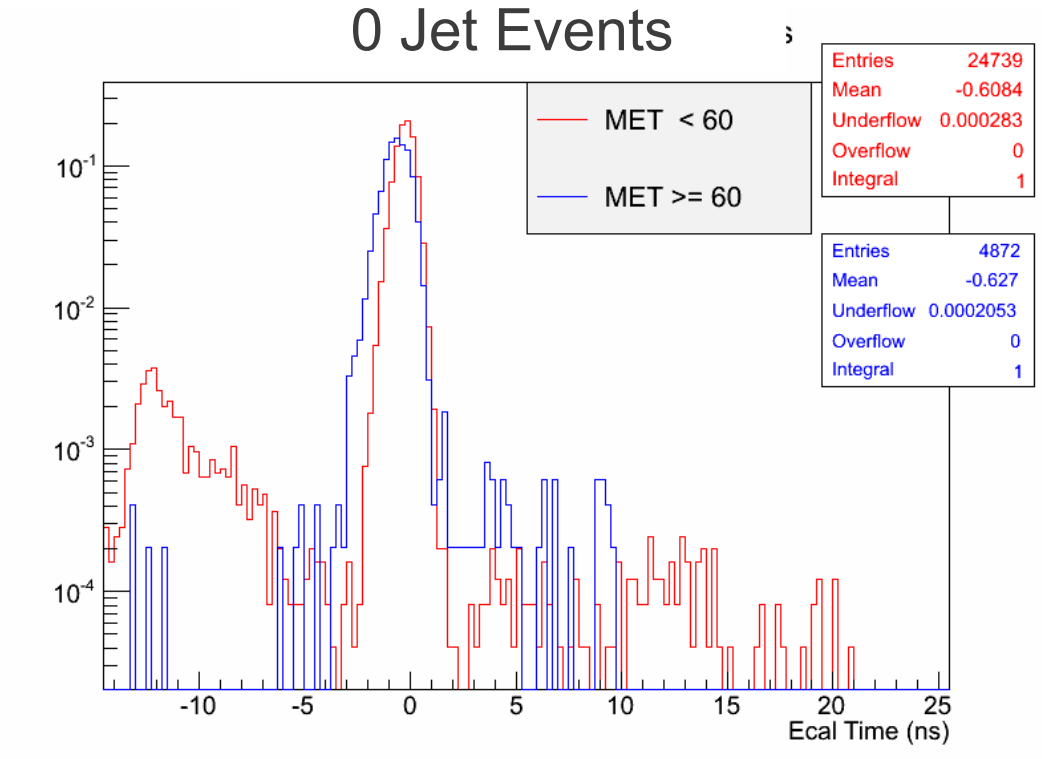
- Unknown eta and phi structures indicates that photon with negative/large timing are not from spikes
- Possible guess for photons with negative time are from beam-halo.

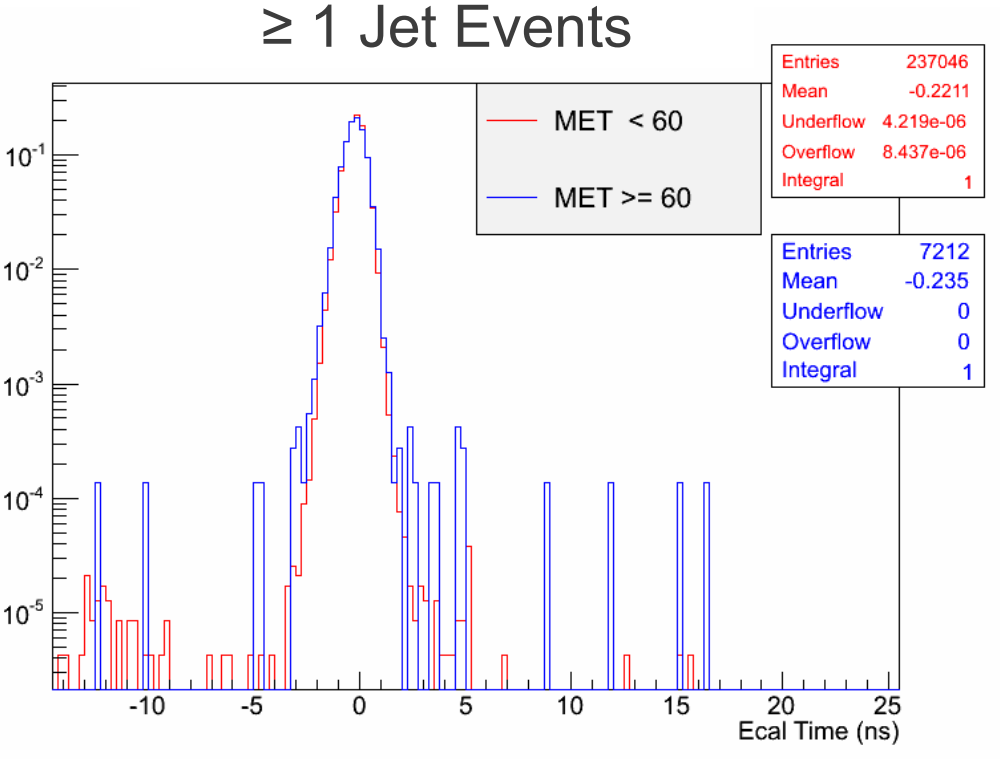
  → Current event selection applied “CSCTight” BeamHalo Identification.



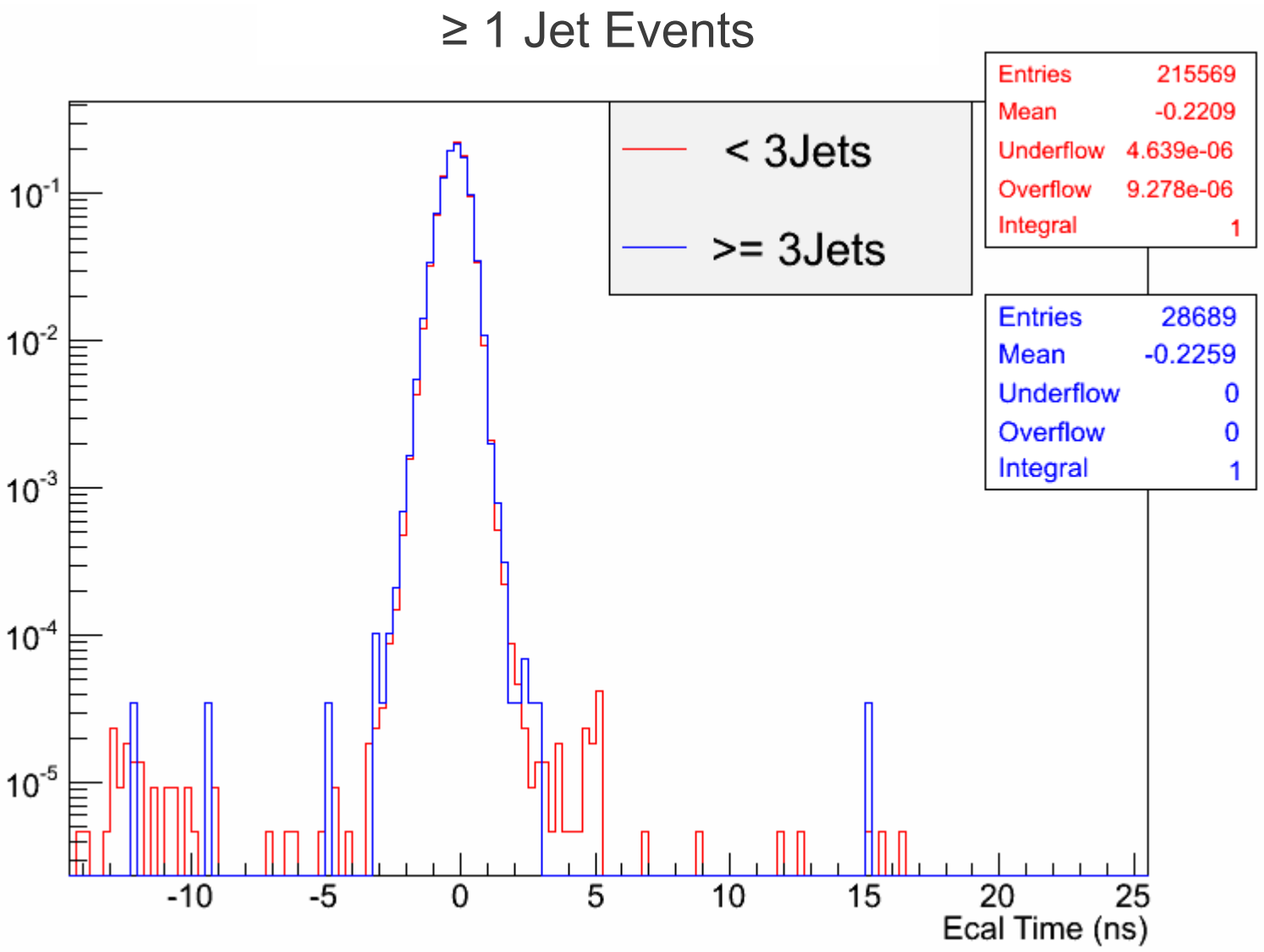
0 Jet Events

ECAL Time in MET





ECAL Time in Jet Multiplicity



To-do

- For ≥ 1-jet events, ECAL timing distribution is the same in different jet multiplicity and MET range.

  → Define 1 or 2-jet events are background control sample.

- Use 0-jet events to study the sideband of the timing spectrum.

  → Check the effect if applying more beam halo identifications.

- Monitor the trigger performance.