



THE UNIVERSITY OF  
CHICAGO

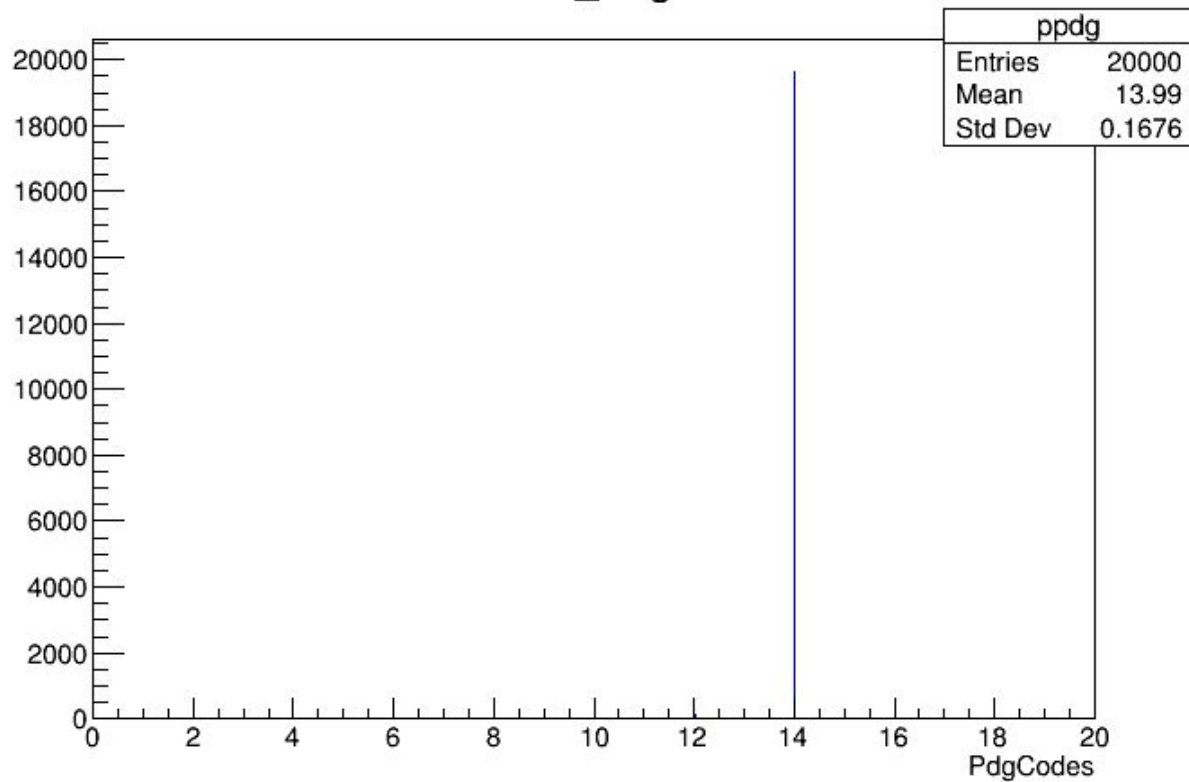
# Delta Rays and Muon Source Identification (SBND)

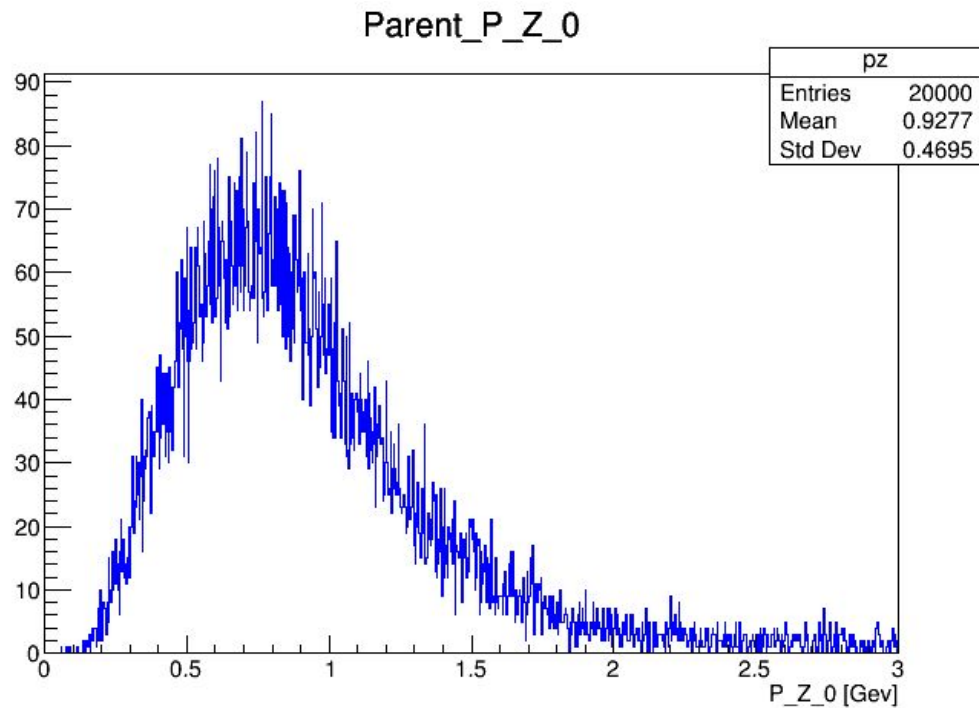
Dawit Belayneh

# Source Neutrinos

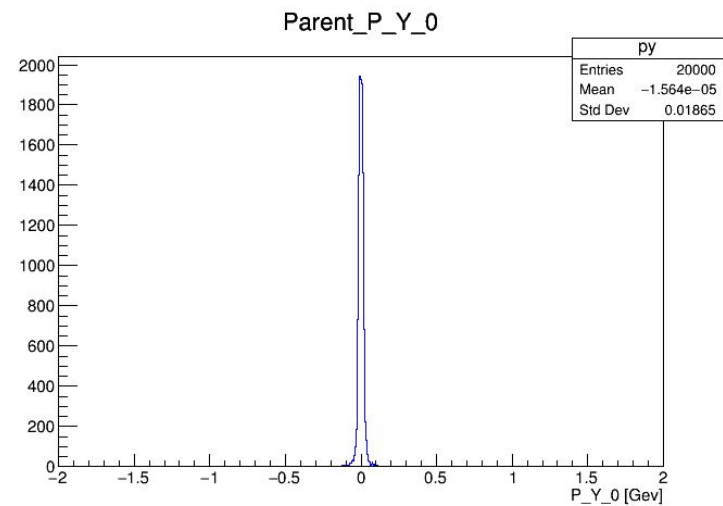
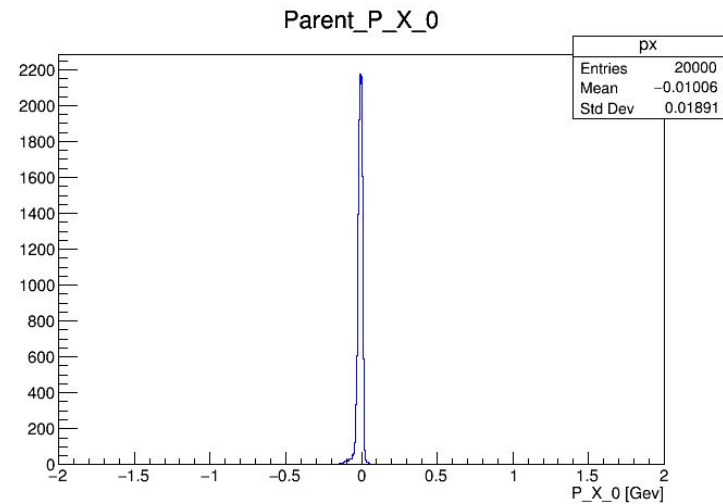
Parent\_PdgIDs

- 14 - Muon Neutrinos
- 12 - Electron Neutrinos

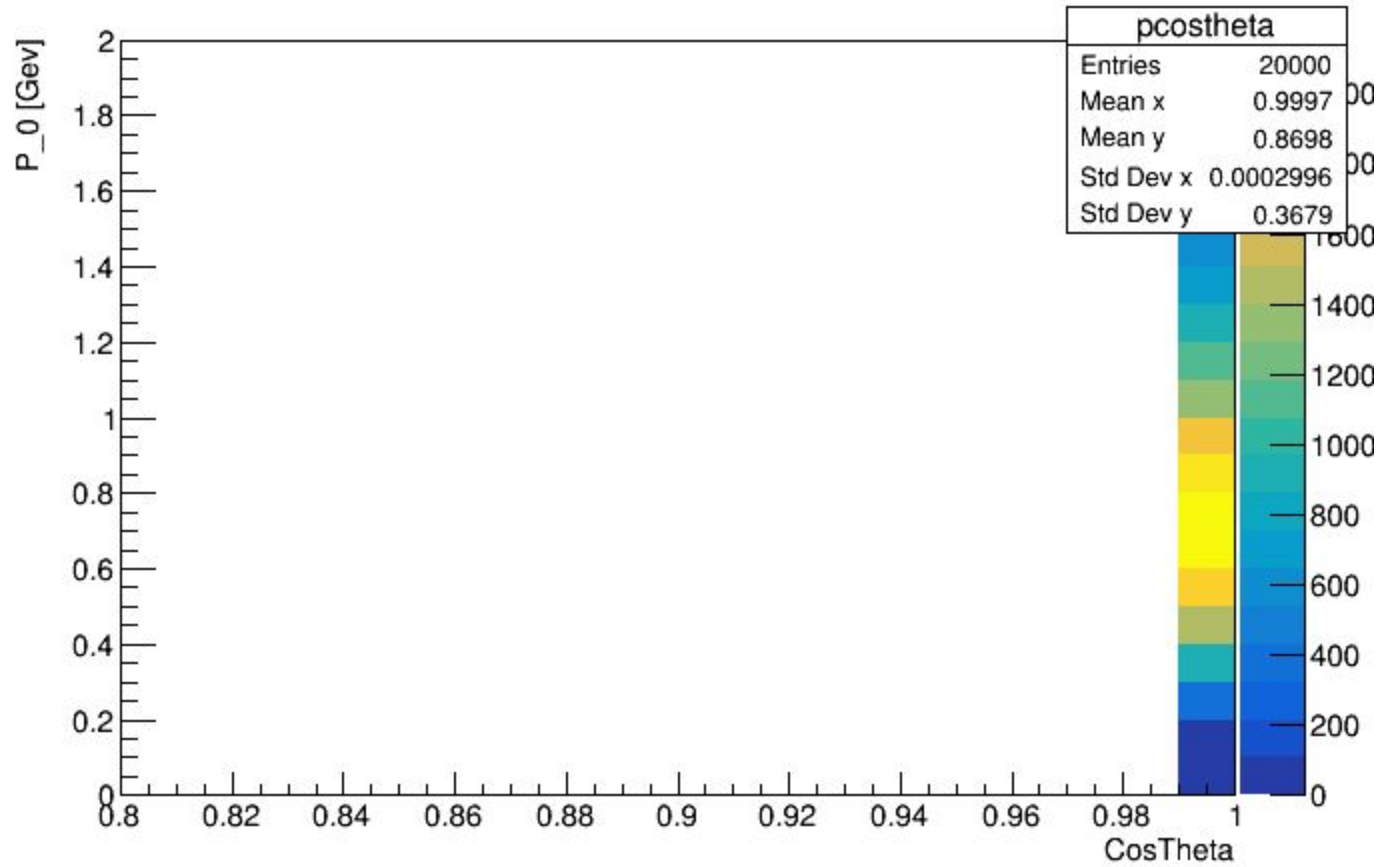




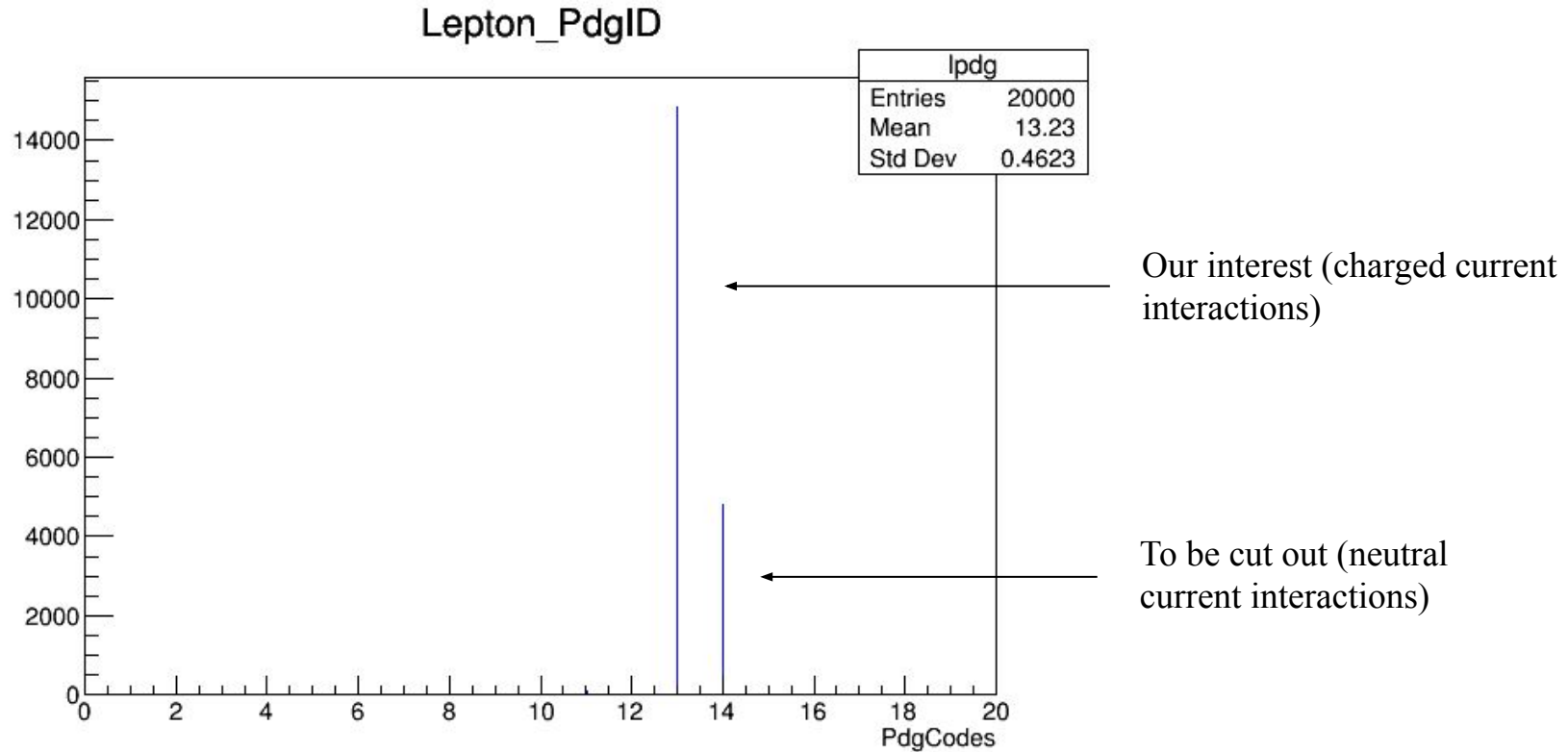
Almost all momentum is in + z direction; tightly focused neutrinos

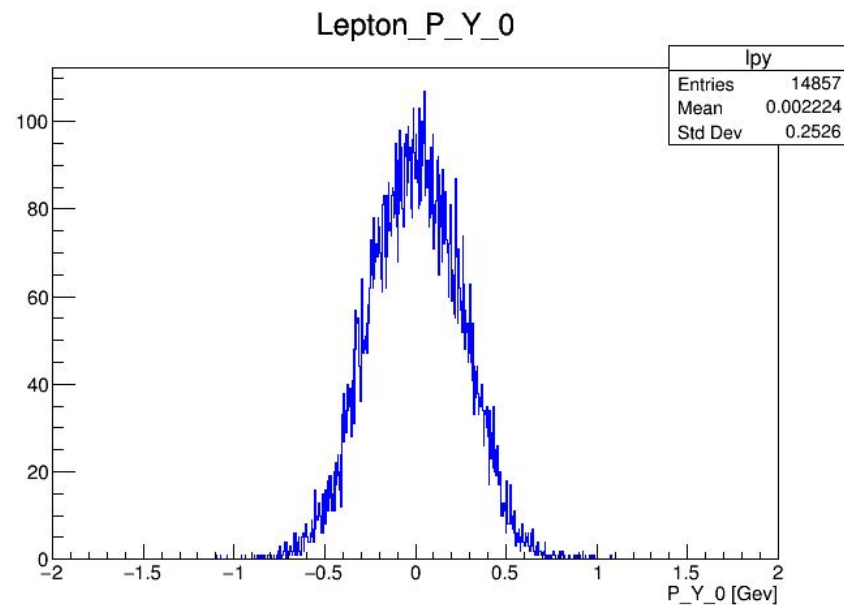
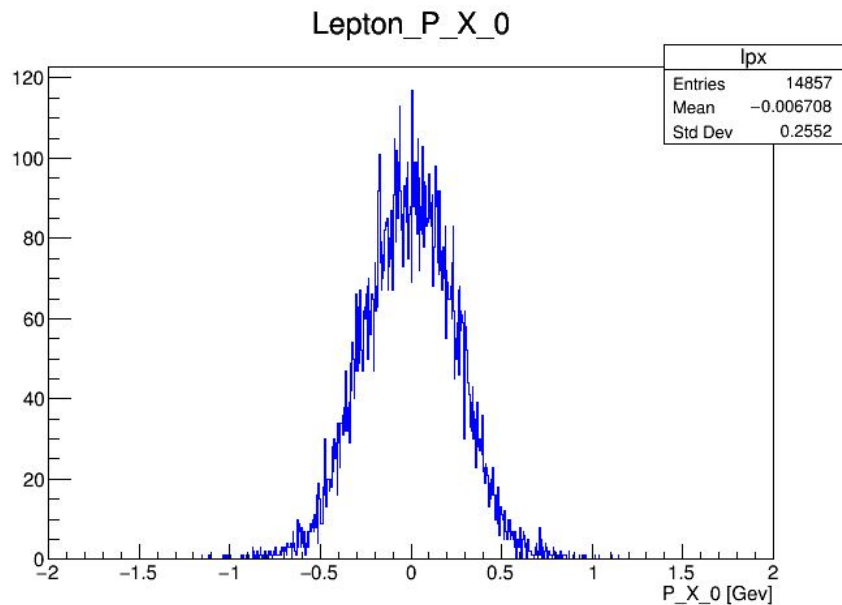


P vs CosTheta



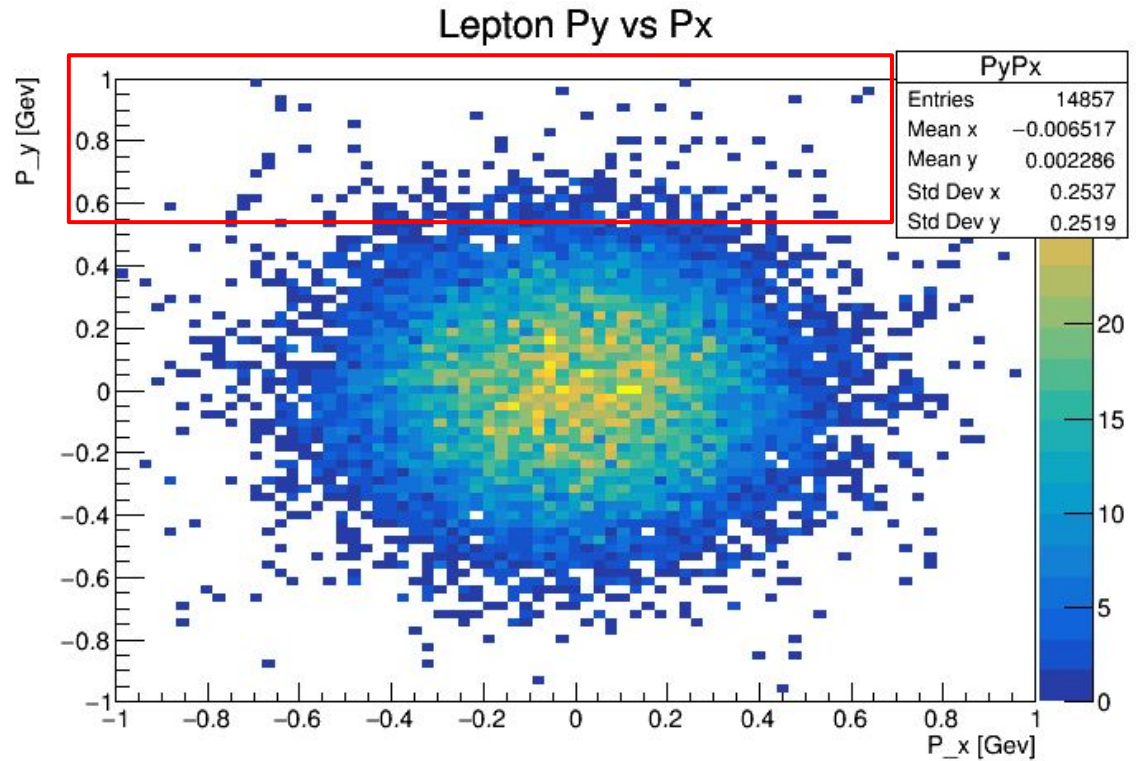
# Leptons Produced





- After NC interaction cut
- Significantly less focused muons compared to source neutrinos

- Expected these to have a more linear correlation because source neutrinos have similar  $P_x$  and  $P_y$
- Expect most cosmic muons in red region?



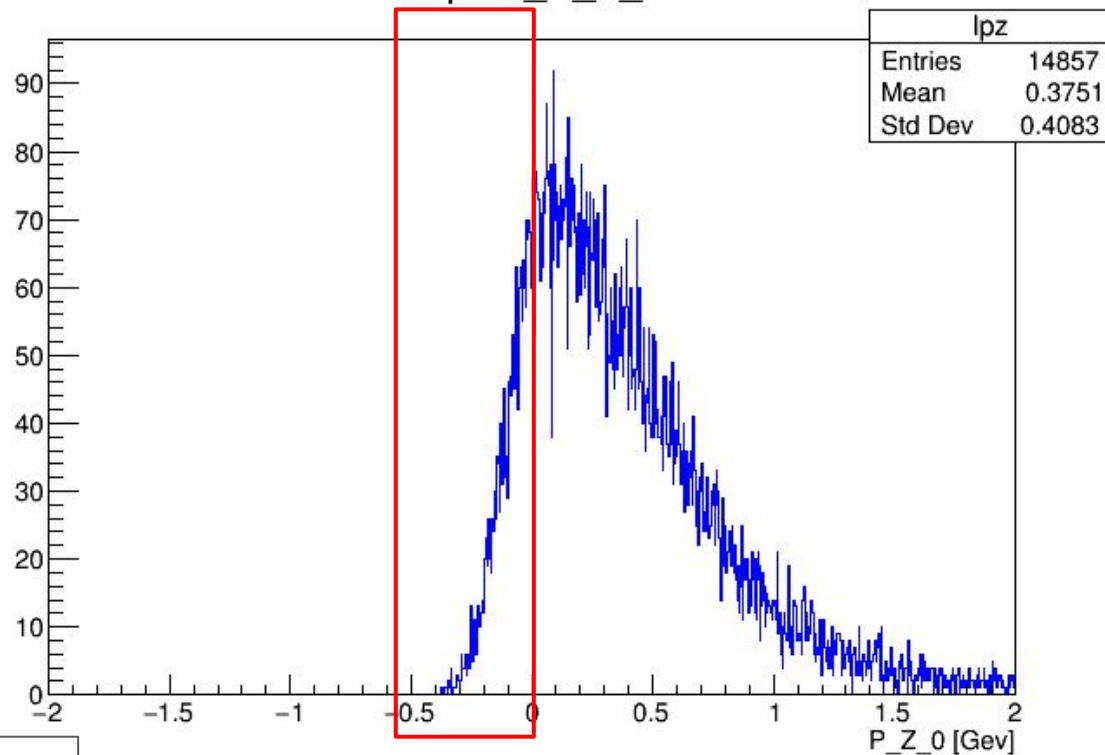
- - z momentum muons produced
- Cuts from future delta ray direction analysis might be insensitive to these events
- Cuts from # of delta rays per muon track should be unaffected

Cosmic

signal

+Z →

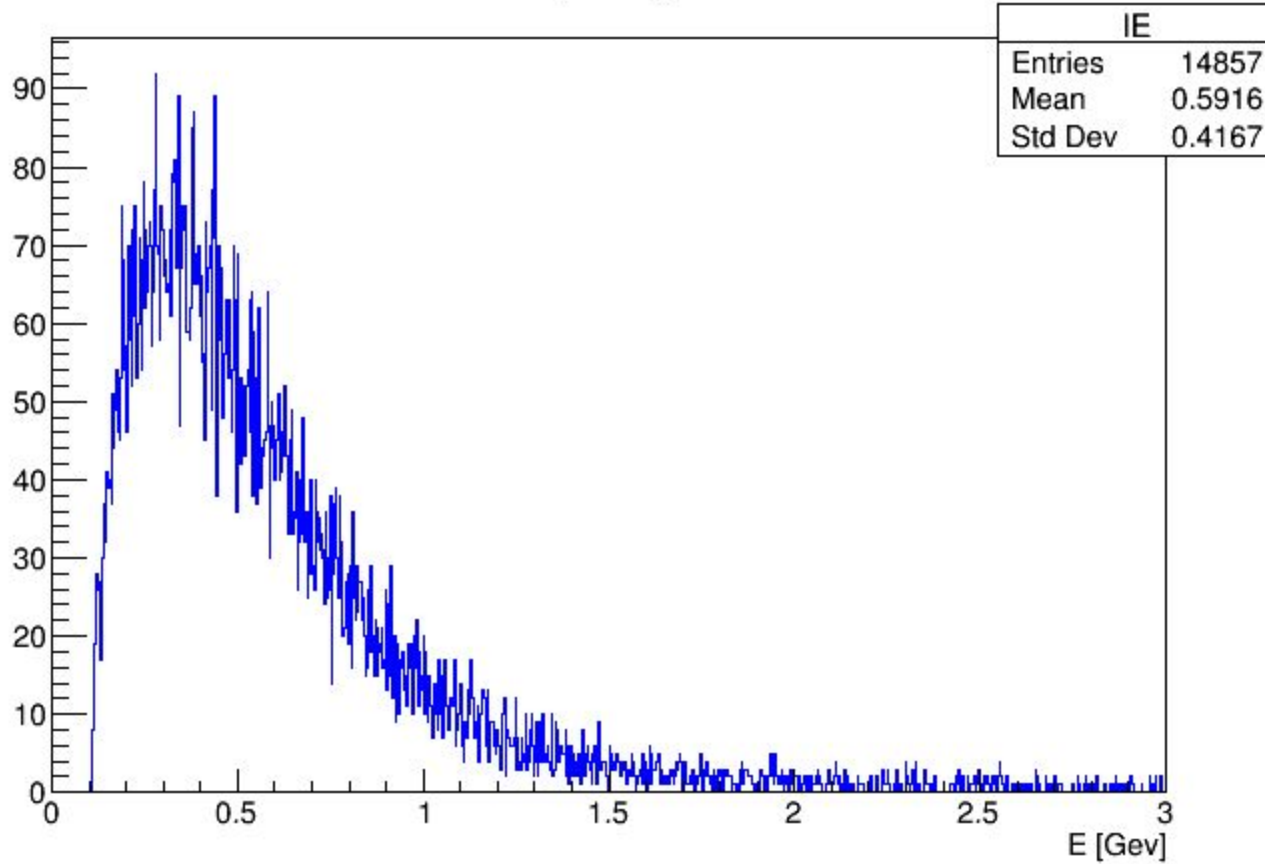
Lepton\_P\_Z\_0



These would have similar delta ray direction?



## Lepton\_E



- Muons depositing  $\sim 2\text{Mev/cm}$
- 1 Gev muon might travel  $\sim 5\text{ m}$
- So muon decays inside the detector possible

# Lepton P vs CosTheta

