

18/04/2024

1

Updated analysis framework for e^+ . Spallation + triangulation work

This week work

2

- ❖ Start work on spallation neutrons for background
- ❖ Try to merge noise and signal together into one data stream (1 day)
- ❖ Implement removal of e⁺ in analysis framework plots for e⁺

e^+ etruth in analysis framework

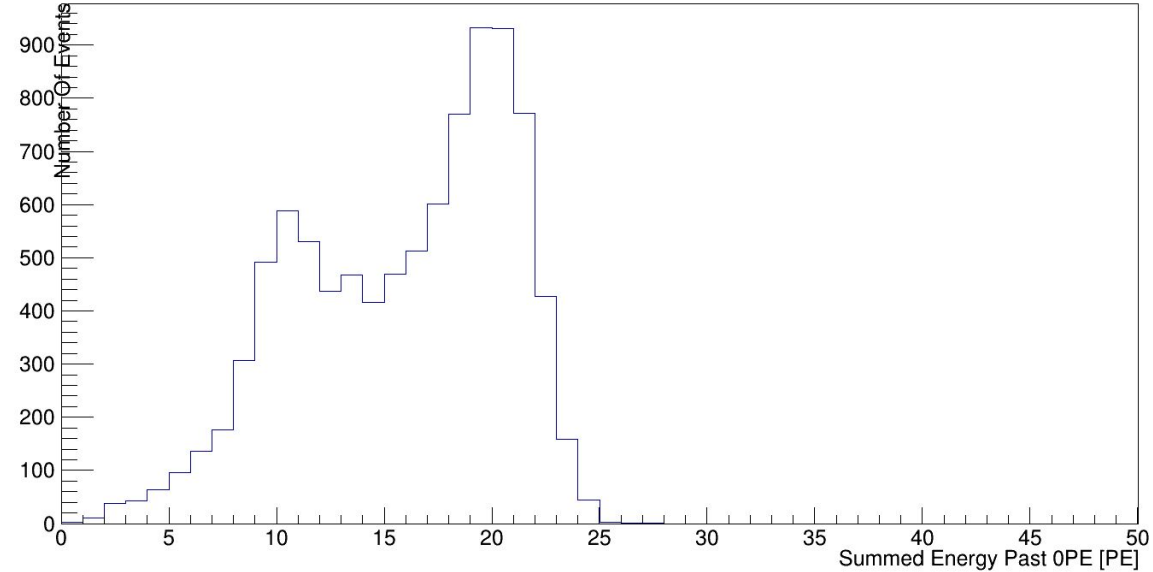
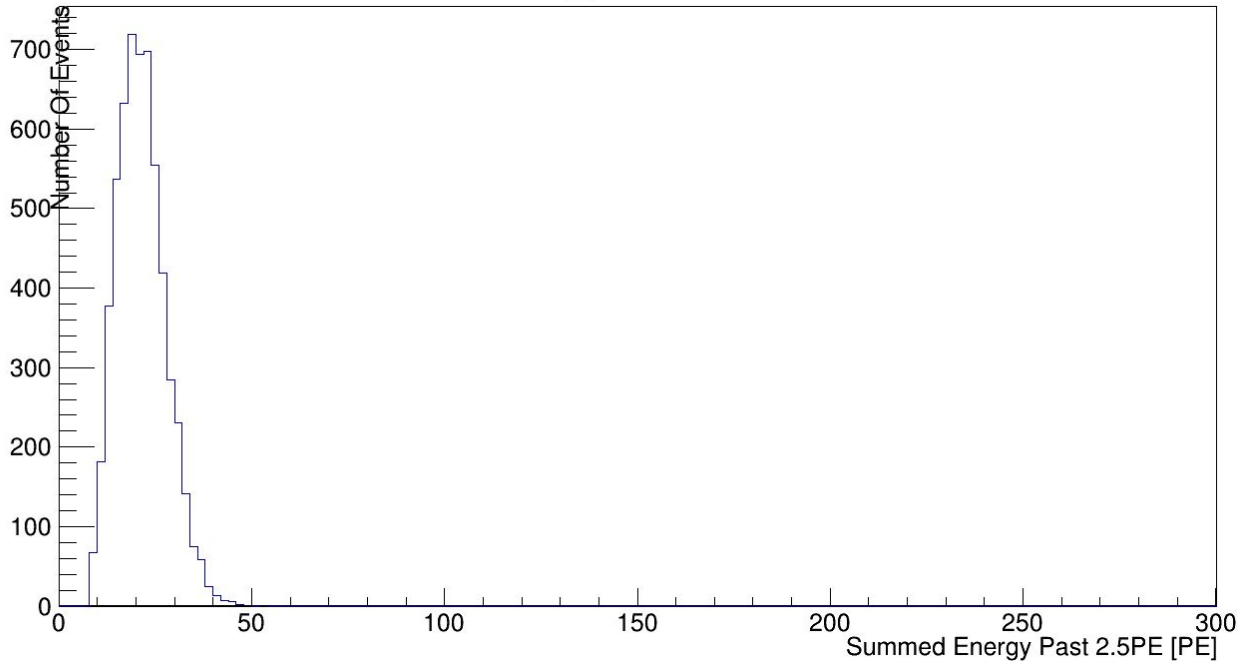
3

Implement removal of etruth in analysis framework plots for e^+

- ❖ Did this by removing the known positron kinetic energy from the summed energy
- ❖ Tried to circumvent by completely ignoring all deposits with a PDGID of 2212 (positrons)
 - Ended up removing multiple child tracks information as well
 - Just removing the etruth is sufficient for now

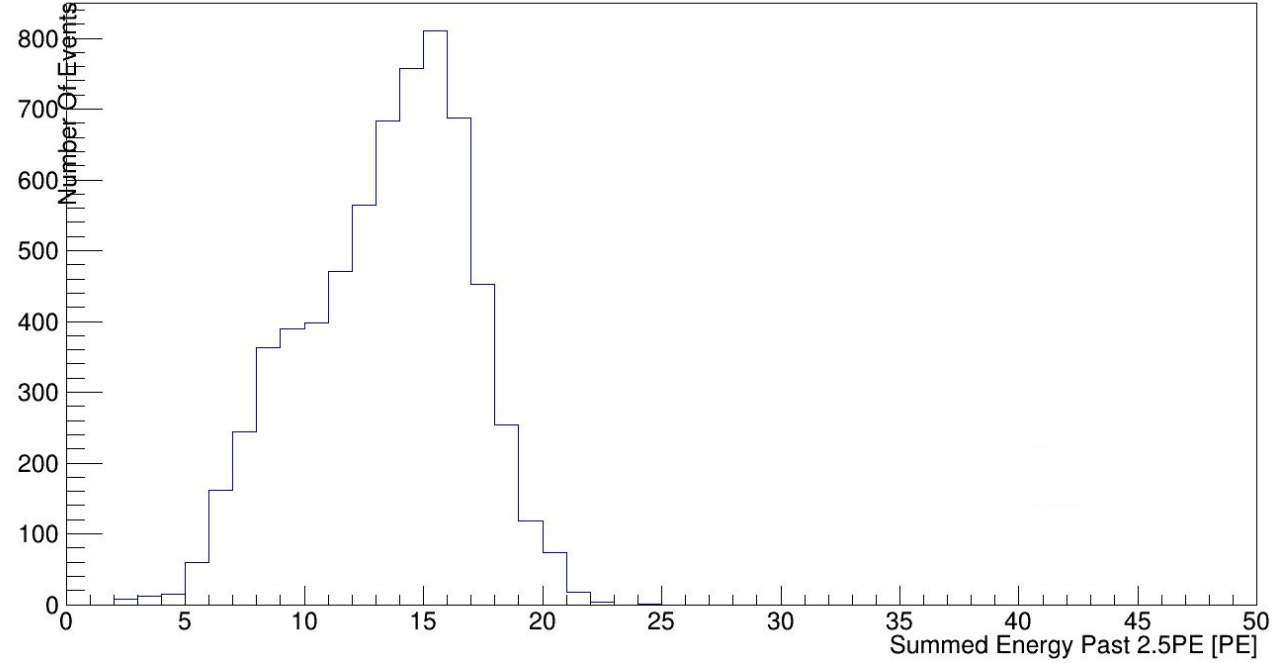
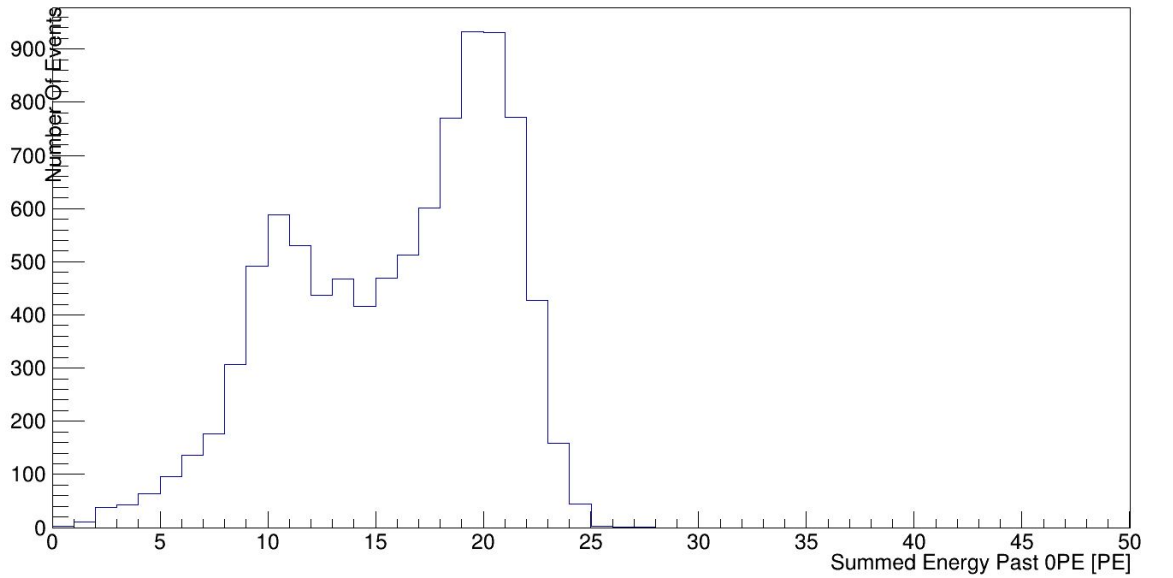
Analysis framework positron energy plots fix

summedEnergyPastThreshold1



- ❖ As mentioned last week
 - Positron scatter energy also being show in eDep.
 - Not in line with sim as e^+ deposits should not be seen
 - Happening ince g4 v11 upgrade
 - Updated analysis framework to remove etruth drum Sum eDep
 - Fixed plot with no cuts and no filters
 - Left before removing etruth, right after removing etruth

Analysis framework positron energy plots fix



- ❖ Re-added cuts and filters
 - Only consider individual hits > 2.5 PE per event
 - Only consider minimum > 1.5 PE
 - Left without cuts, right with cuts and trigger threshold

Cosmics & spallation

- ❖ Started looking at geant4 Sim
 - Should spallation be coming from cosmic muons
 - Or something else
- ❖ Started looking at how cosmics interact in detector
 - Cosmic tracks work fine. How can i start putting this into my master file
- ❖ Part of code called cosmic neutrons
 - Big ambiguous - any idea what it means
 - Assuming it is neutrons generated by cosmics, but are their own event in the sim right now
 - This part of the code needs updating to generate the same angles as CRY , like that used for cosmic muons
 - Started work on this already

Triangulation

Detector Triangulation:

- ❖ Problem: Can we determine the size, position, and location of an unknown source using only the daily flux rate?
 - Solution: Utilize the anti-neutrino generator code to simulate daily expected neutrino flux rates for varying source sizes, activities, and locations.
 - Create a lookup table based on these simulations. (Currently being done)
 - With an unknown source, use detectors positioned around the potential source to estimate its size, activity, and location.

- ❖ Problem: Can we predict if a given source is the only one at its location based on daily neutrino flux?
 - Based off chat with Robert that is atleast other neutrino sources
 - Underground plume
 - In talk with robert to get some flow rates and previous know activity of these sources

Questions?

