

Implementing separated reconstruction → checking performance

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Get hands dirty I phase

- Develop and implement 3D reconstruction
 - 😊 Separate planes into different groups
 - ☀️ Check that reconstruction works in single groups

How to check that reco works in separated groups?
Compare reconstruction of small number of events from main-branch with reconstruction of separated groups
Check distributions output at end of reconstruction

- Combine/match reconstruction of groups
- Check that 3D reconstruction works



Get hands dirty I phase

- Develop and implement 3D reconstruction

😊 Separate planes into different groups

☀️ Check that reconstruction works in single groups

- Hough Transform only

- For 100 spills from `pnfs/dune/persistent/users/kleykamp/nd_production_output/2022-12-15_simple_spill/edep/FHC/00m/00/neutrino.0...`
- 35 with reconstruction
- Both single groups perform pretty similar, one has higher tendency to find tracks and finds tracks earlier on
→ 'seeding' difference?

Two bugs currently

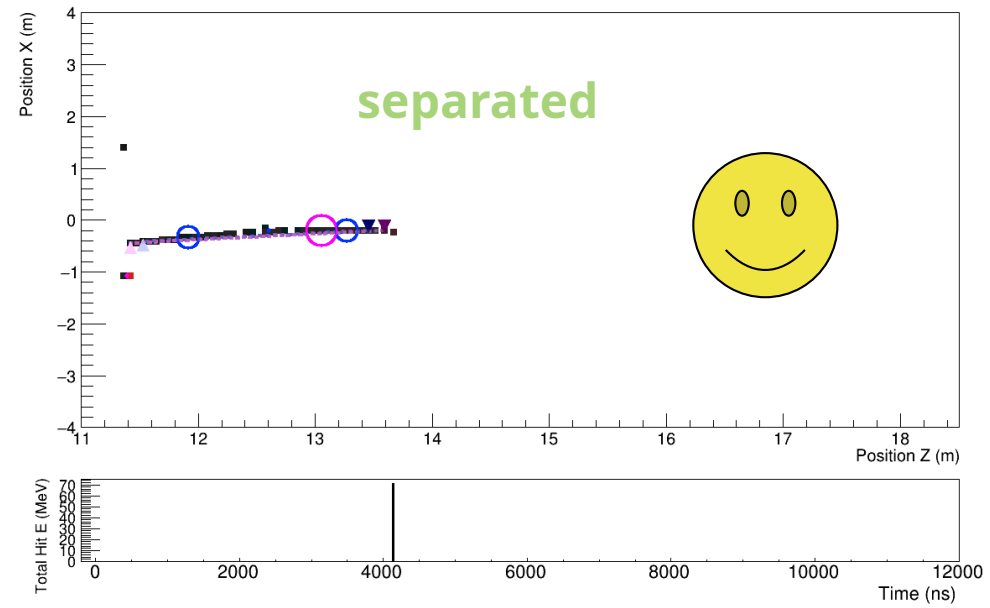
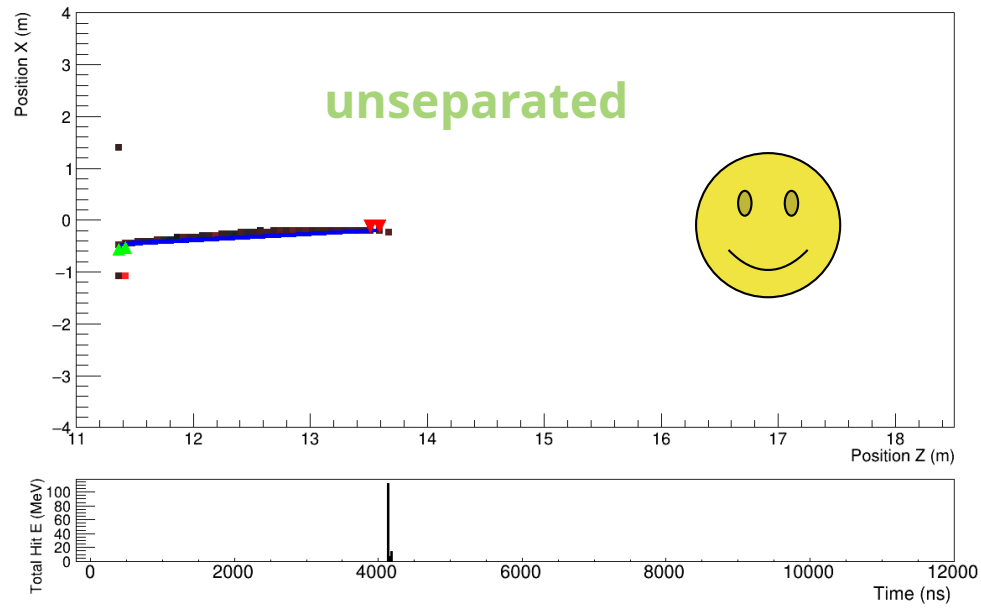
A* runs into seg fault even on main branch

Unseparated and separated reconstructions don't get the same hits

| | badly/wrong | okay-ish | good |
|------------------|-------------|-----------|------------|
| Unseparated reco | 2 (5.7%) | 5 (14.3%) | 28 (80%) |
| Separated reco | 6 (17.1%) | 3 (8.6%) | 26 (74.3%) |

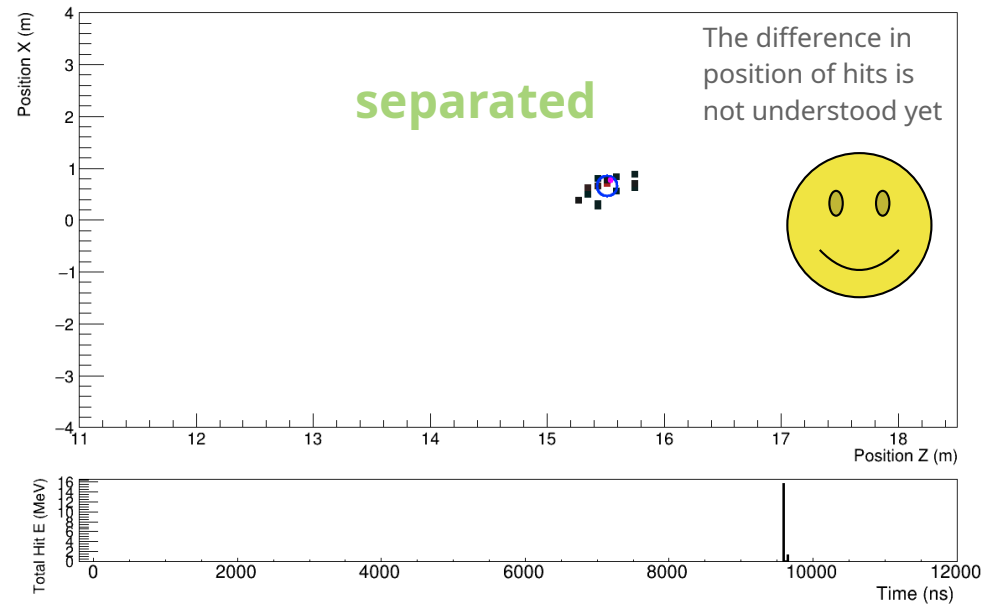
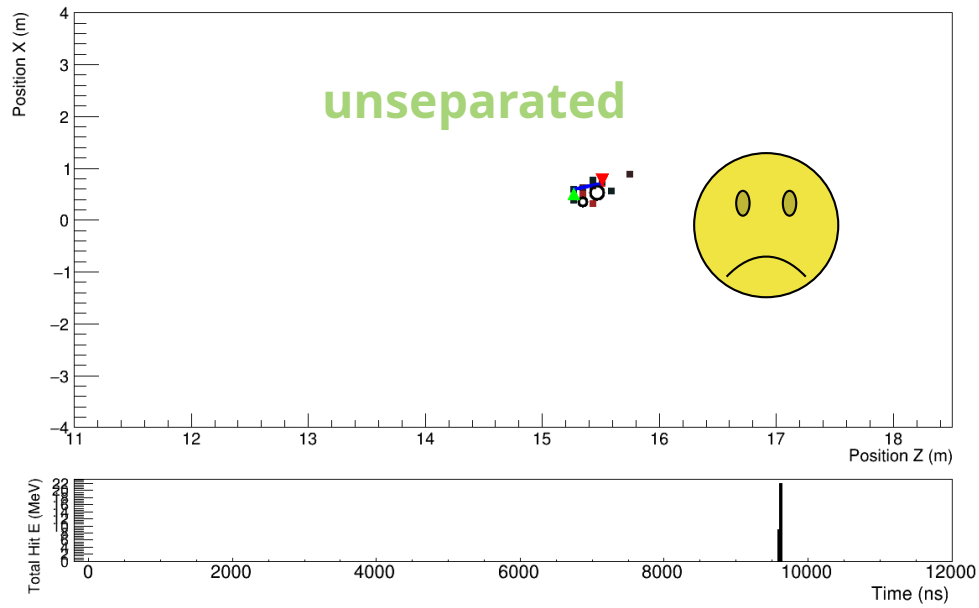


Examples of reconstruction



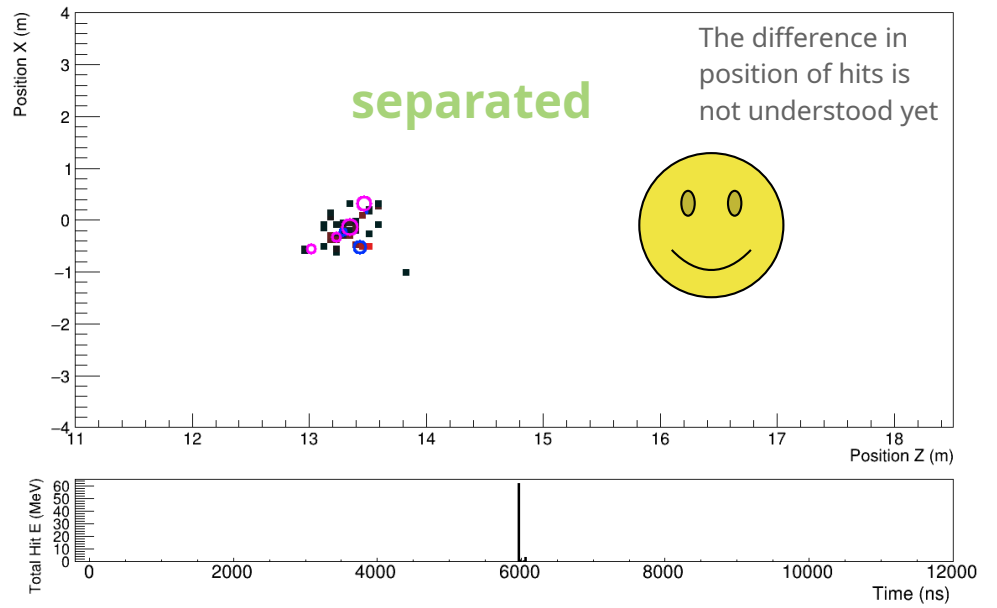
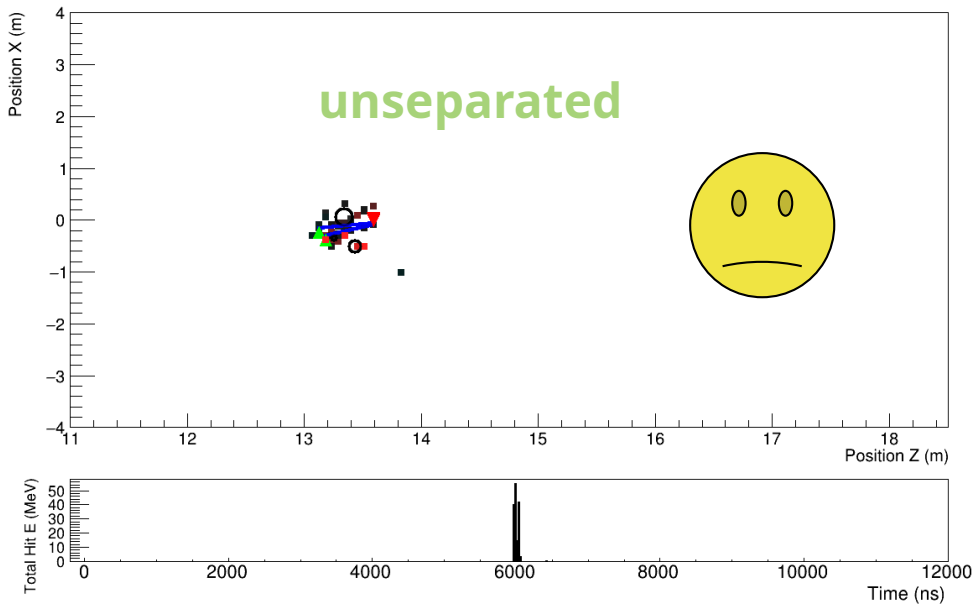


Examples of reconstruction



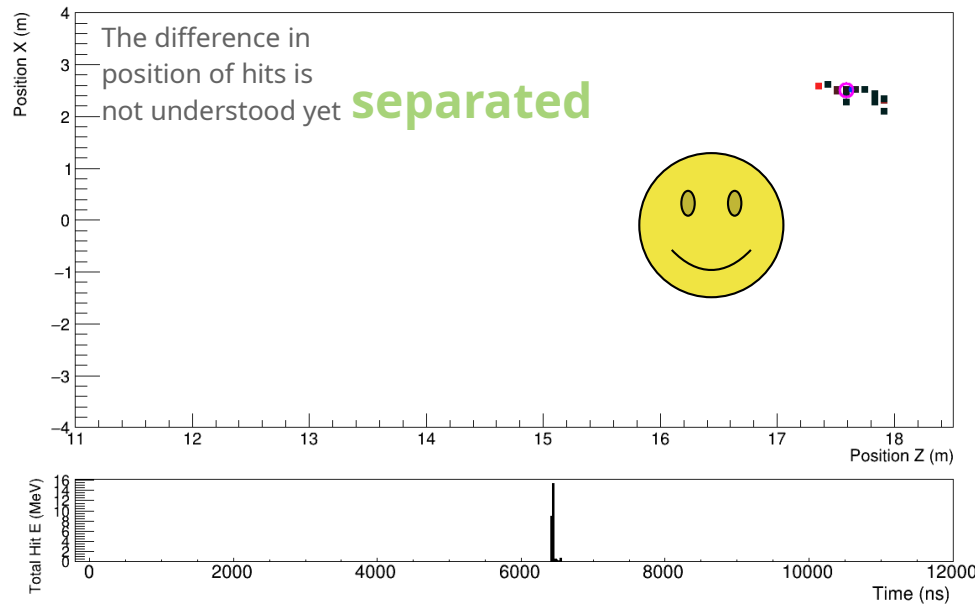
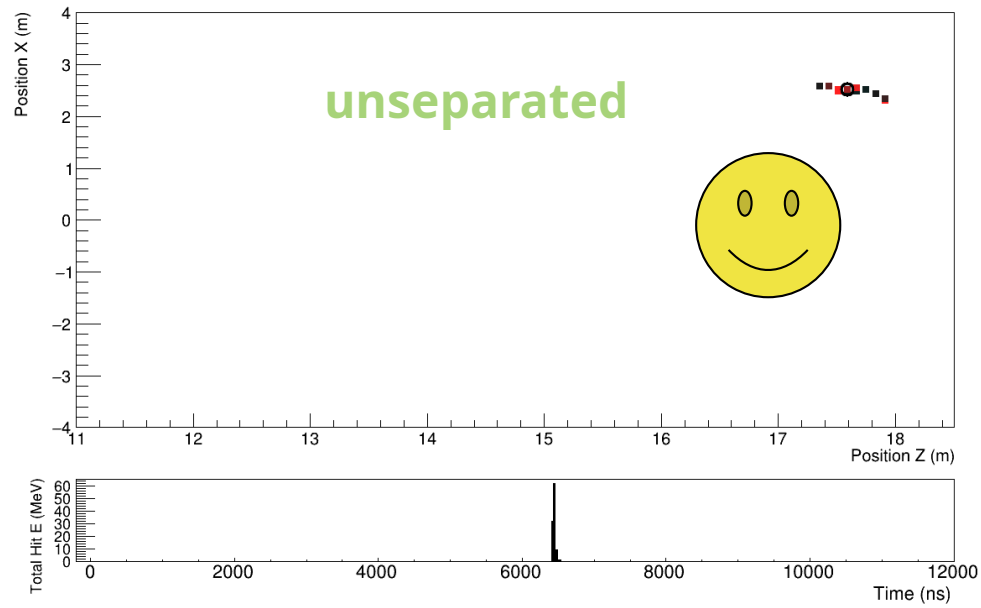


Examples of reconstruction



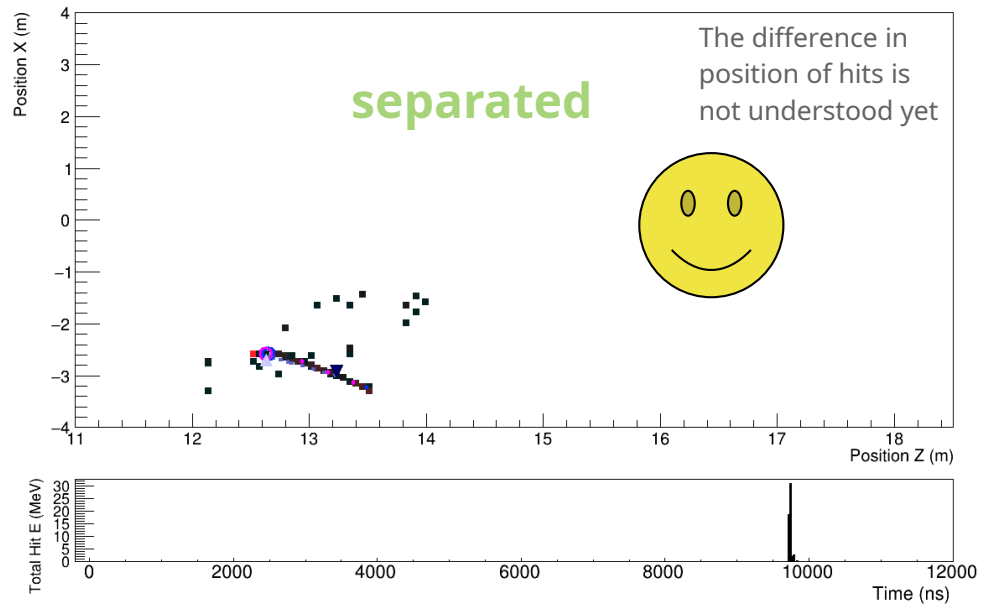
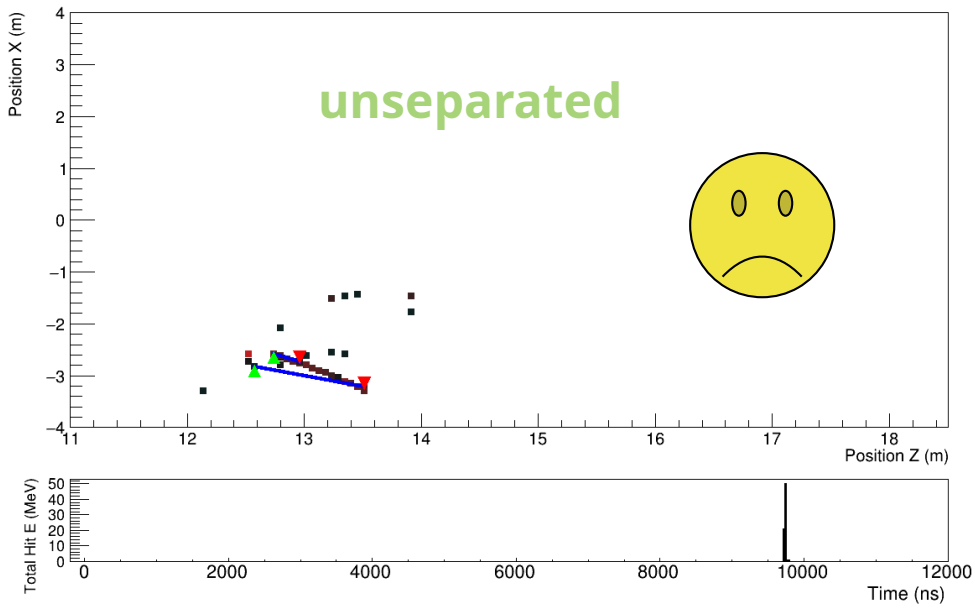


Examples of reconstruction



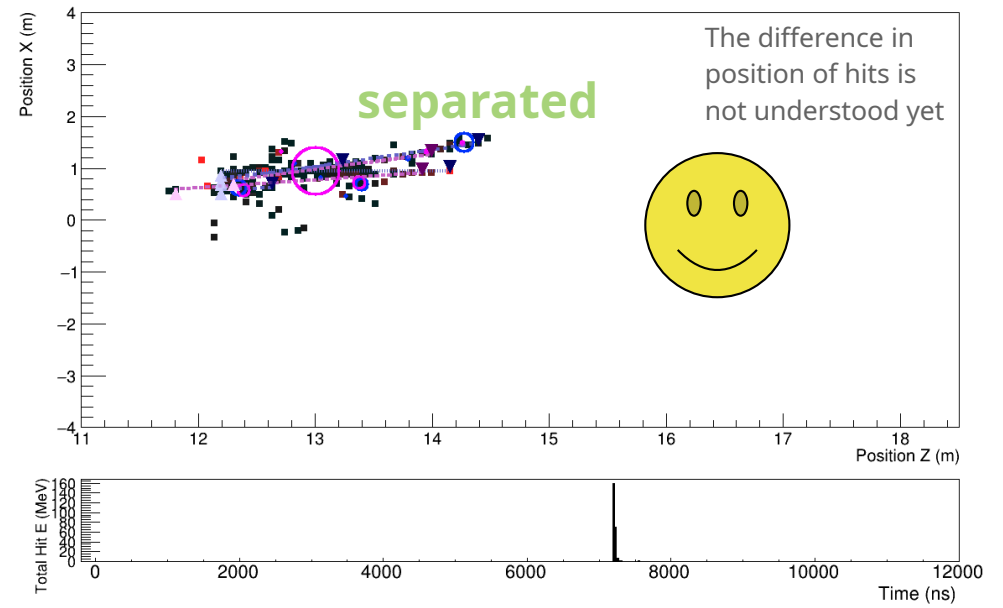
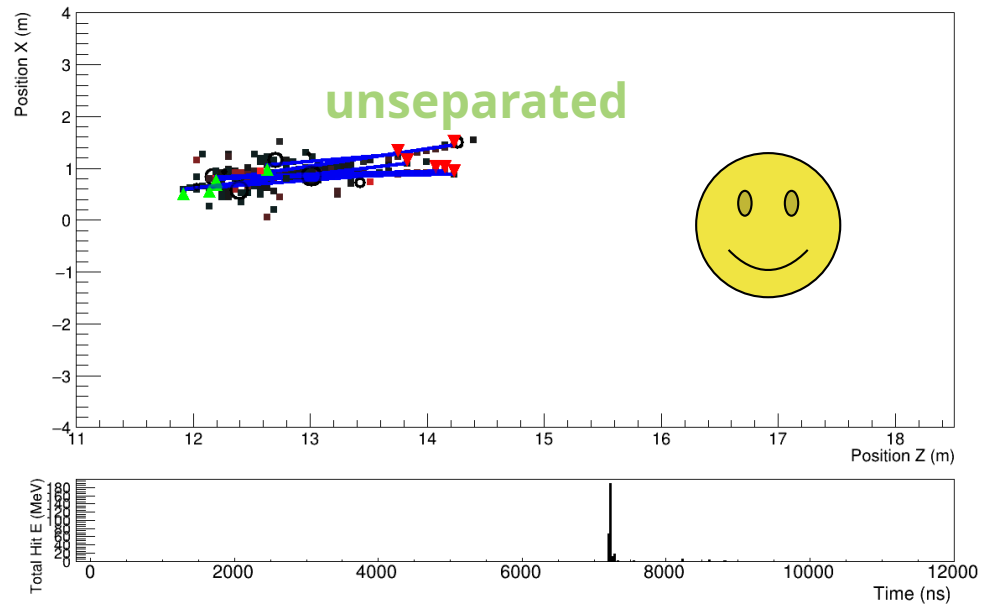


Examples of reconstruction



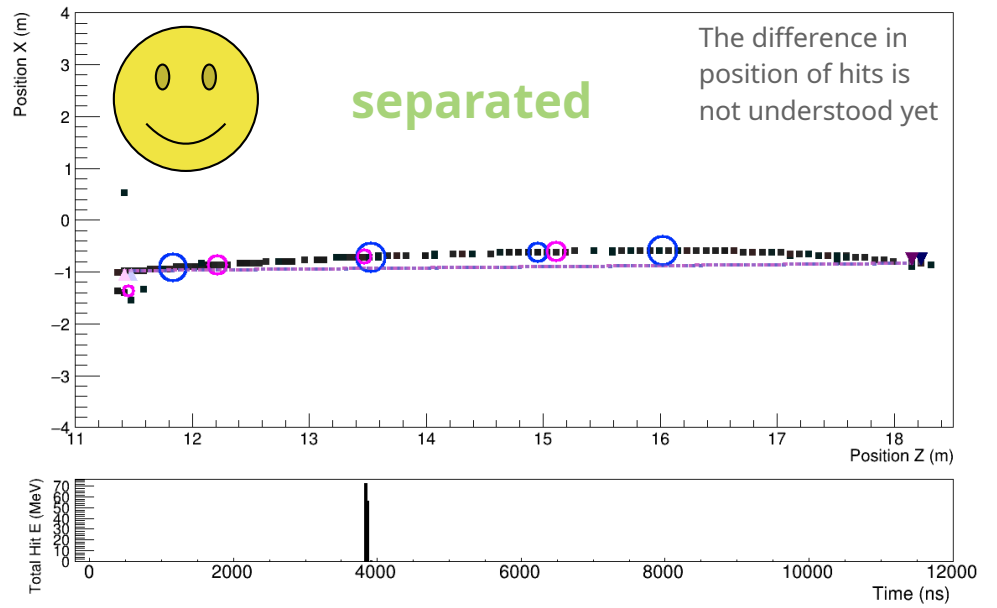
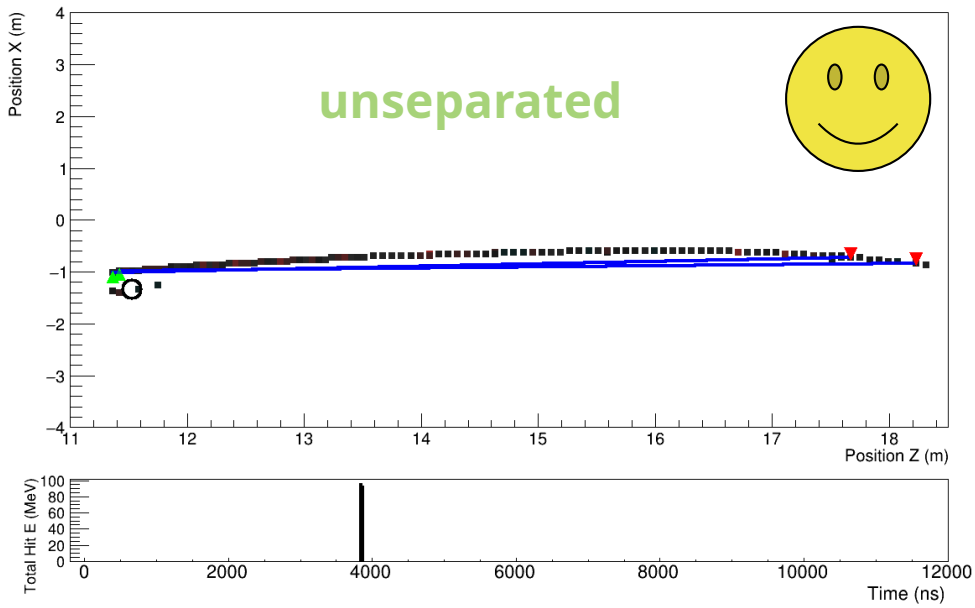


Examples of reconstruction





Examples of reconstruction





Comparing muon kinetic energy

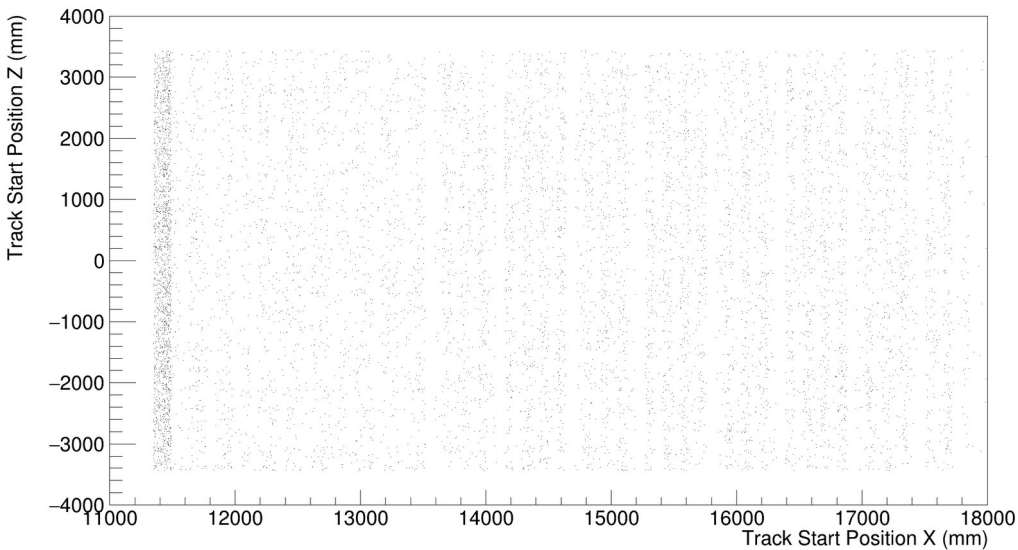
- Adapted script meant for analysing the kinetic energy of reconstructed muons
 - Output for both separated reconstructions and fixing some issues as pointed out in comment on pull request for make_hists.py
 - Finding simulation files with muons... (took way longer than it should/expected)
- Ran script on `pnfs/dune/persistent/users/kleykamp/nd_production_output/2022-12-15_simple_spill/edep/FHC/00m/00/neutrino.14...`
- Result
 - Both separated reconstructions work very similar
 - Both are pretty similar to the unseparated reconstruction
 - If you want to have a look at all plots or specific other plots → I'll send them to you

| | True muons | *Start in TMS | *End in TMS | *Start&End in TMS |
|-------------|--------------|---------------|-------------|-------------------|
| unseparated | 28966 /39612 | 1120 | 3913 | 646 |
| separated | 13725 /39612 | 1120 | 3911 | 646 |

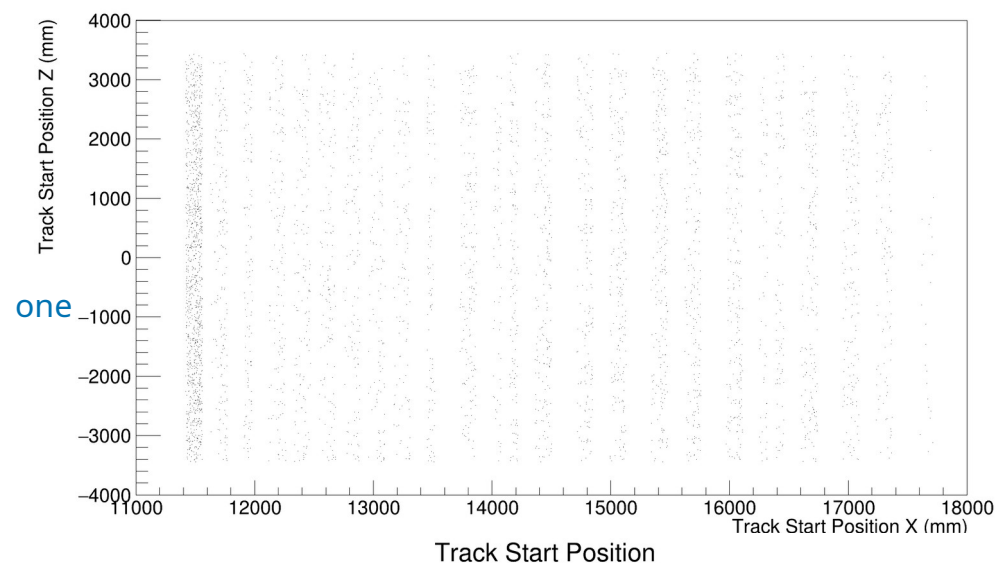


Example outputs

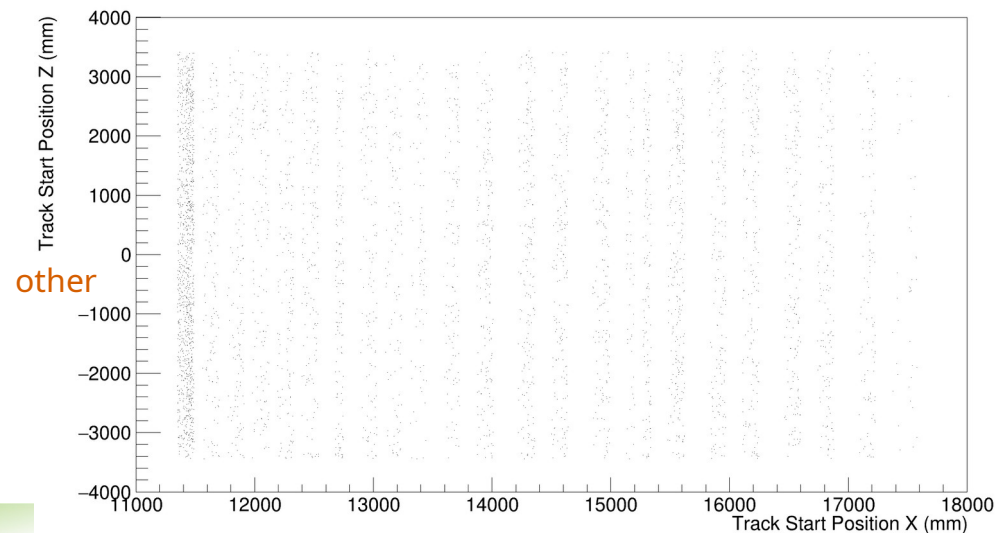
unseparated
Track Start Position



one



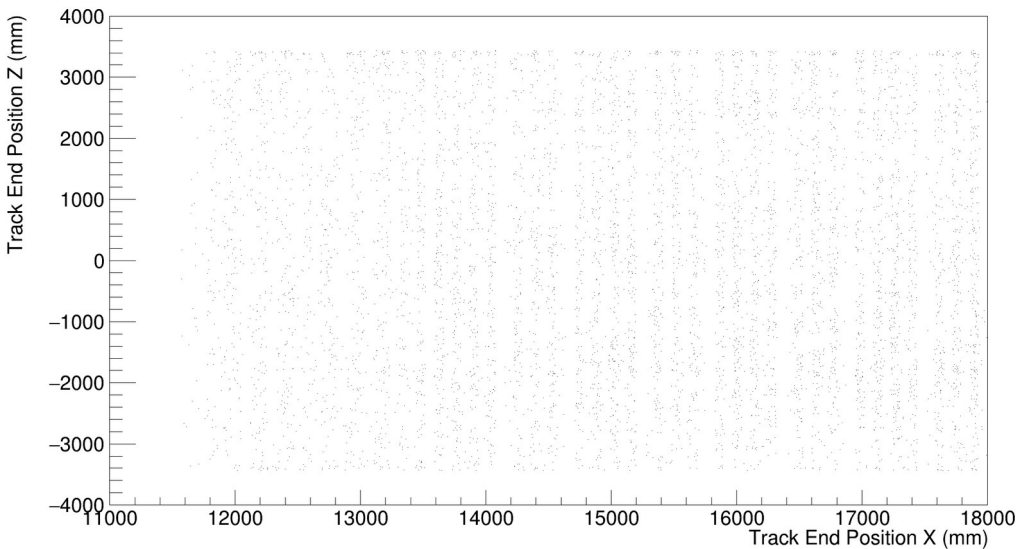
other



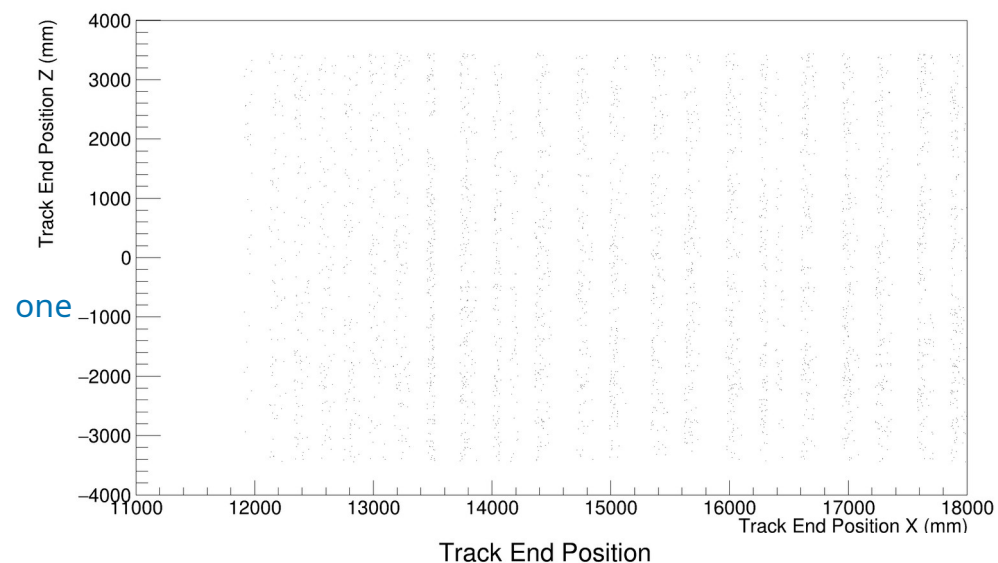


Example outputs

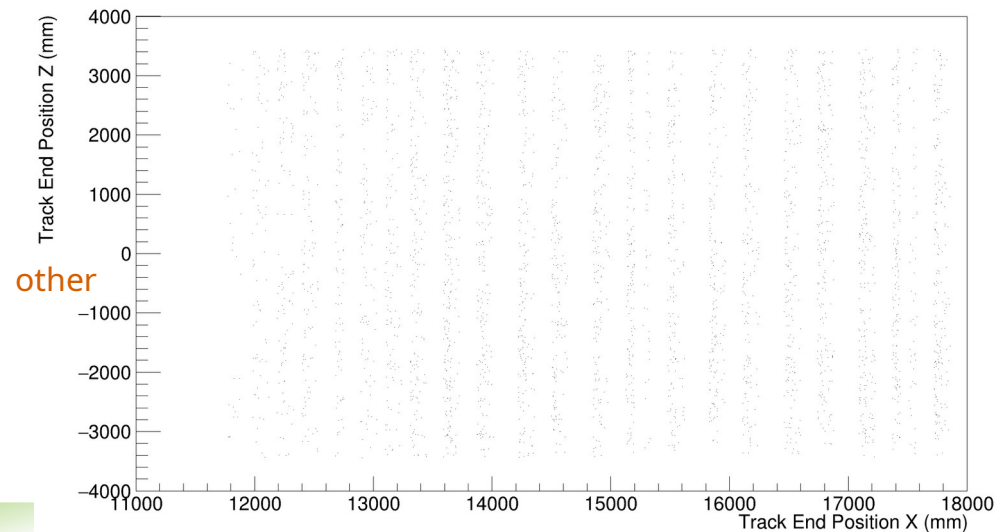
unseparated
Track End Position



one



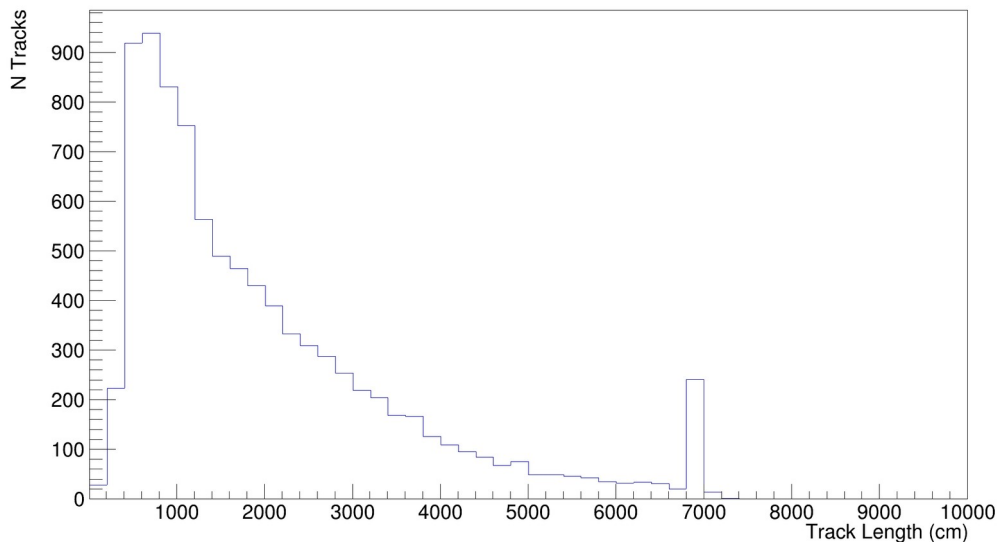
other



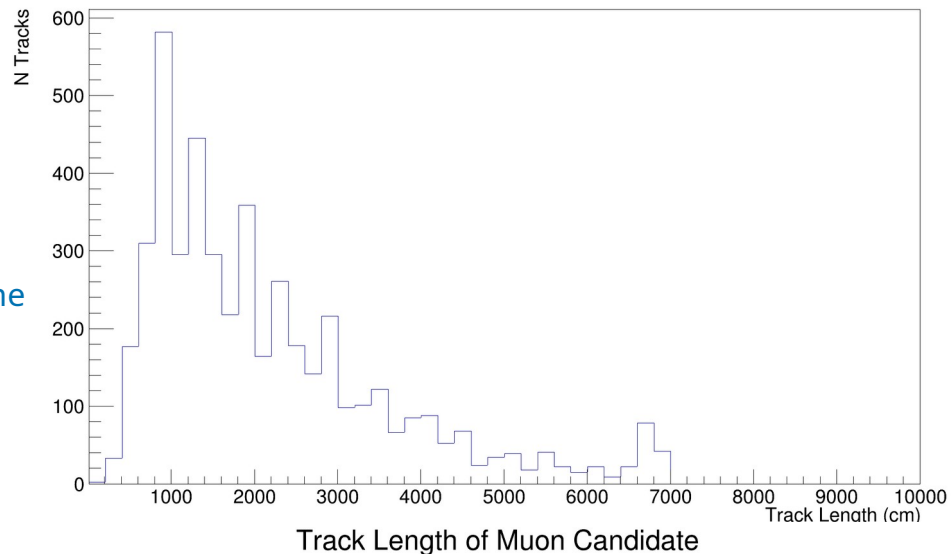


Example outputs

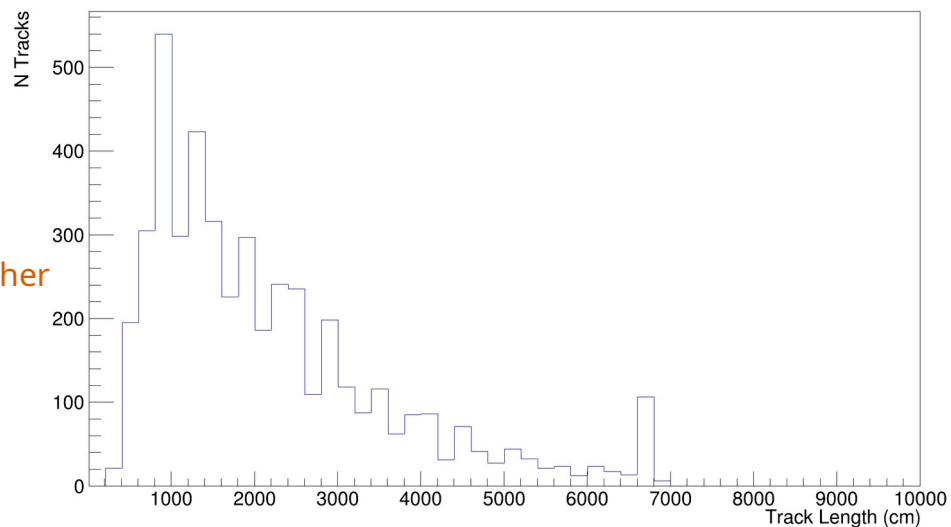
unseparated
Track Length of Muon Candidate



one



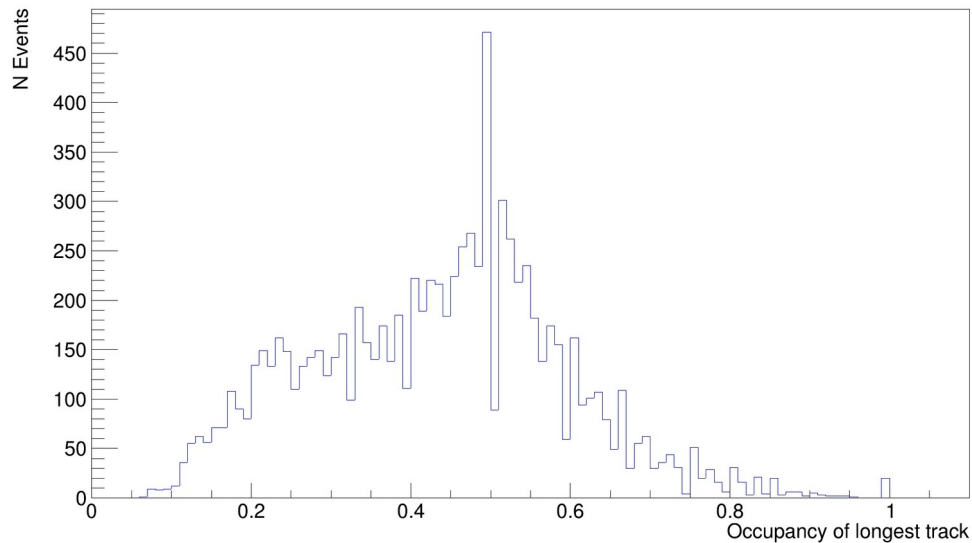
other



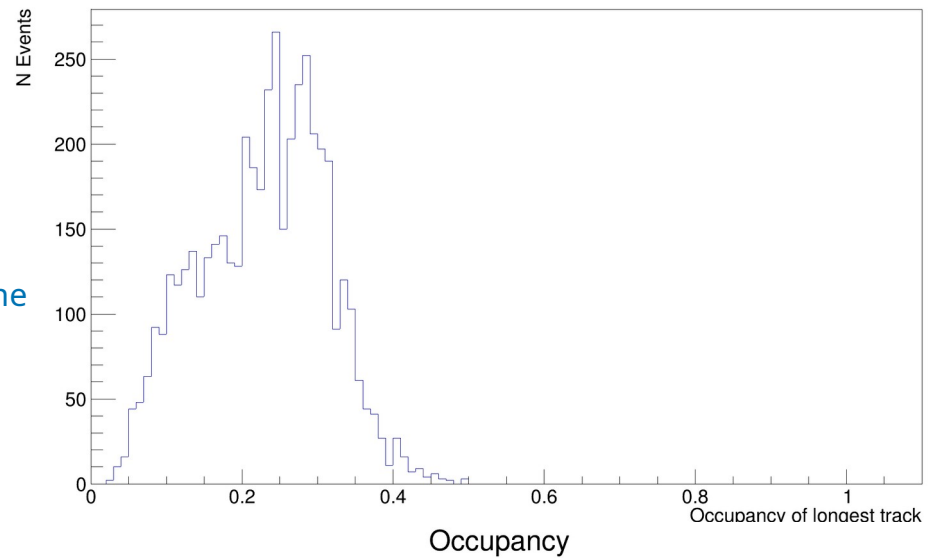


Example outputs

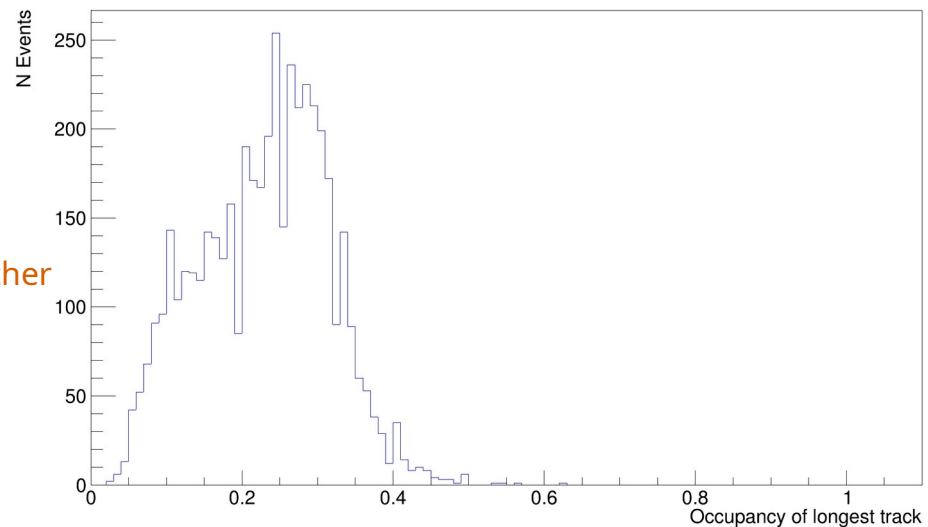
unseparated
Occupancy



one



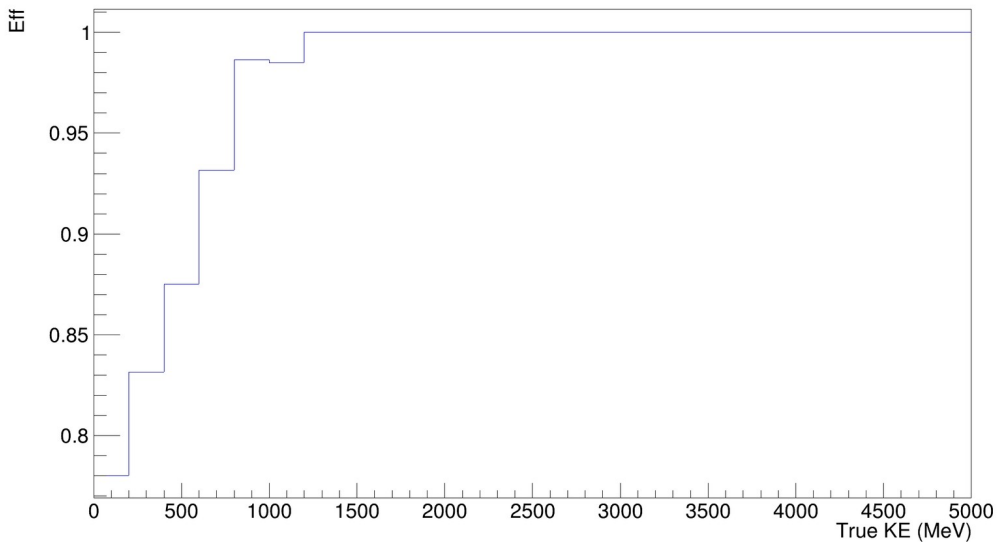
other



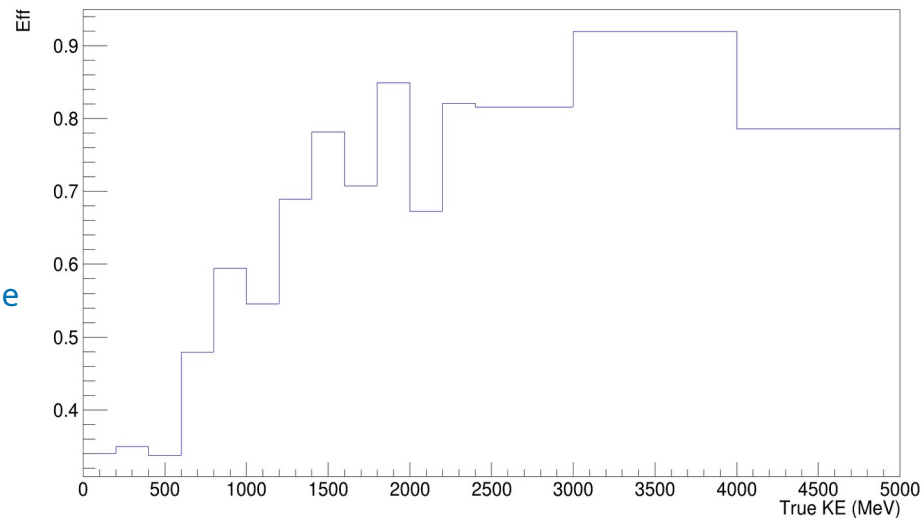


Example outputs

unseparated
Eff. of Reco'ing TMS-Starting Muons



one



Eff. of Reco'ing TMS-Starting Muons

other

