



MARSHALL B. C. SCOTT

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RXN : KL4

- Initial look through the reaction
- Kl4
 - $K^0_L + p \rightarrow \pi^+ + \Lambda$
 - π^+ lifetime $\sim 2.6e-8$ s
 - Λ lifetime $\sim 2.6e-10$ s
 - $\rightarrow p + \pi^-$ (63.9%)
 - $\rightarrow n + \pi^0$ (35.8%)
- Concentrating mainly on the charged decay at the moment
- Generated
 - 1 million events for ReactionFilter
 - 250,000 events for monitoring histograms
 - Beam energy range : 0-12 GeV

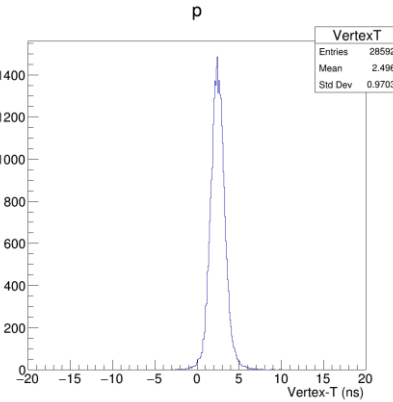
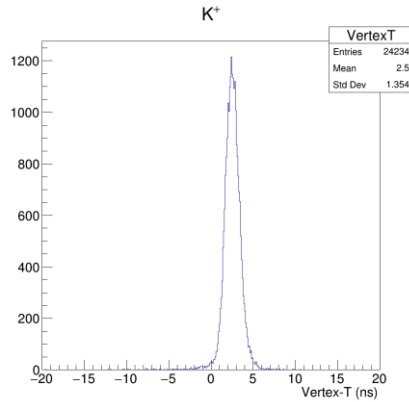
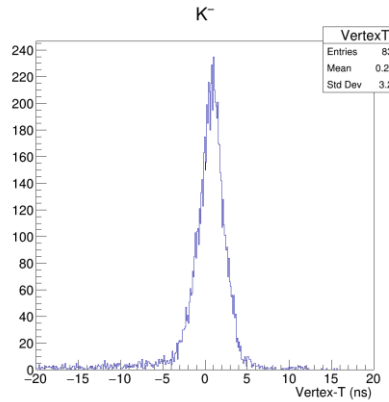


GENERATING STEPS

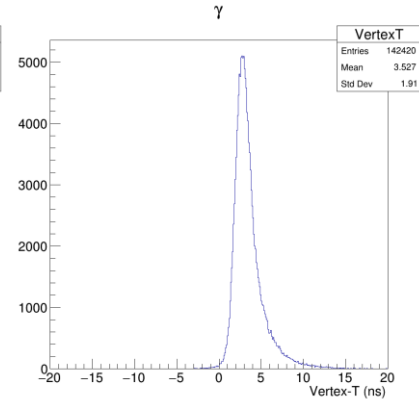
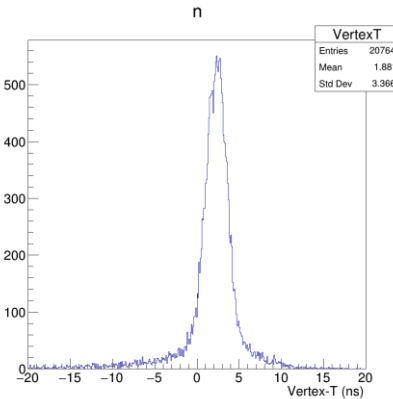
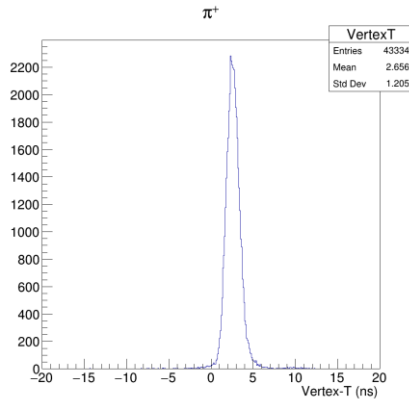
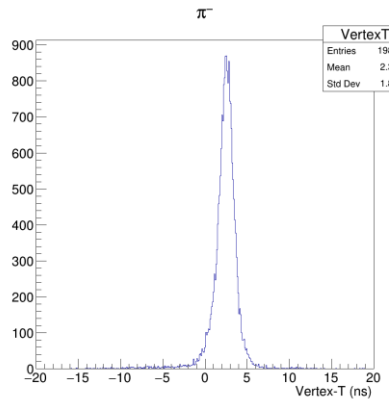
- Generated histograms/root files (Monitoring Histograms, ReactionFilter, fcal_tree)
 - `hd_root --nthreads=8 -PPLUGINS=PEVENTRFBUNCH:USE_TAG=KLong -PVERTEX:USEWEIGHTEDAVERAGE=1 -PPLUGINS=monitoring_hists foo_smeared.hddm`
 - `hd_root --nthreads=8 -PPLUGINS=PEVENTRFBUNCH:USE_TAG=KLong -PVERTEX:USEWEIGHTEDAVERAGE=1 -PPLUGINS=ReactionFilter -PReaction1=10_14__8_18 foo_smeared.hddm`
 - Note the default ReactionFilter only produces the charged decay
 - Added `-PReaction1:Decay=18__7_13` for neutral decay
 - Low statistics : 1 Million events generated -> ~25k charged decay, ~9k neutral decay
 - `hd_root --nthreads=8 -PPLUGINS=PEVENTRFBUNCH:USE_TAG=KLong -PVERTEX:USEWEIGHTEDAVERAGE=1 -PPLUGINS=fcal_tree foo_smeared.hddm`



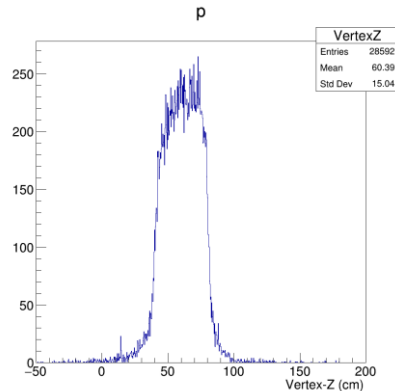
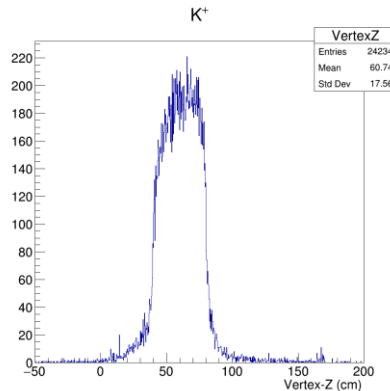
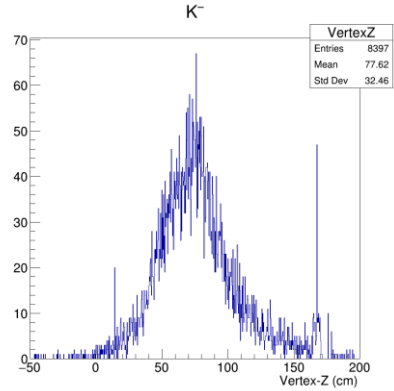
DETECTED KINEMATICS : VERTEX-T



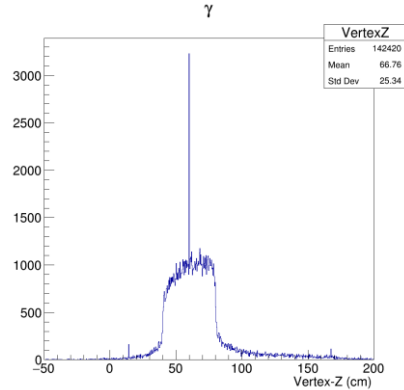
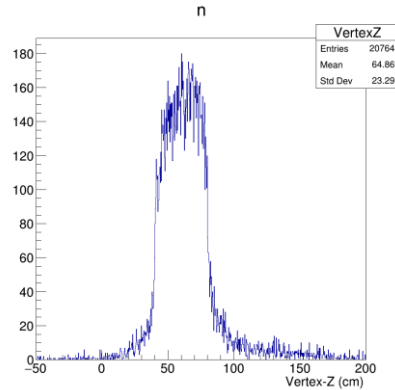
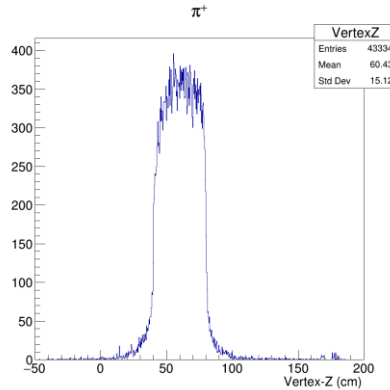
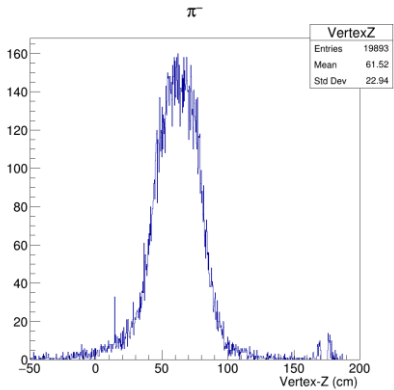
- K^- vertex is much smaller than all other vertexes 0.2 vs 1.8-3.5 ns
- Neutron vertex smaller than others and gamma's is larger



DETECTED KINEMATICS : VERTEX-Z

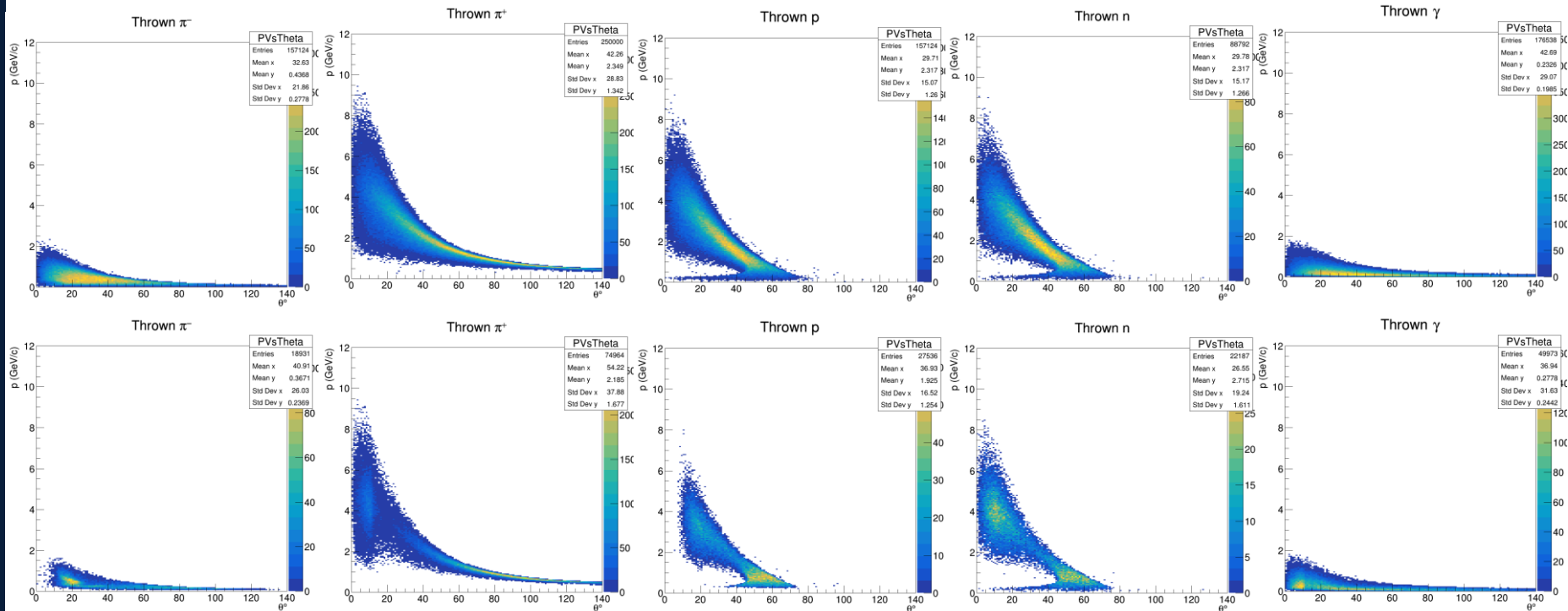


- N and gamma have a Z vertex near the center, 65 cm, while the rest are near 60 cm, save for the K-



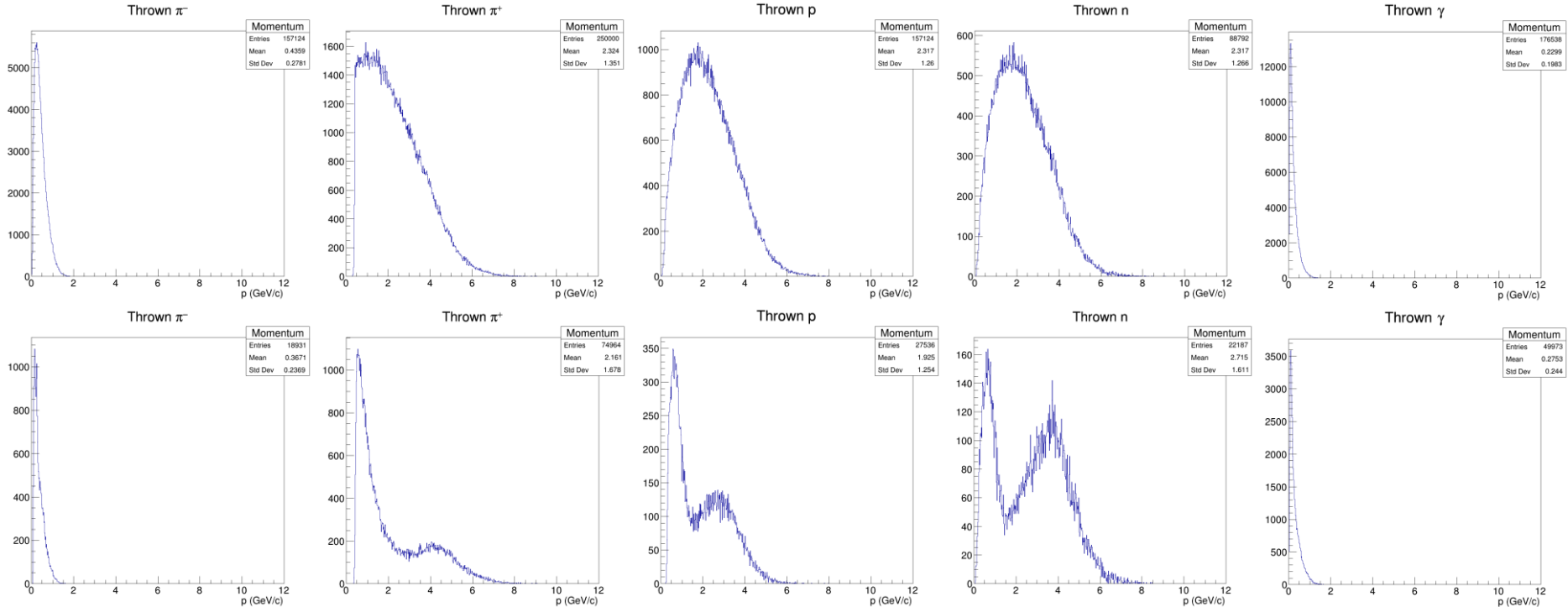
THROWN VS RECONSTRUCTED : MOMENTUM VS. THETA

Thrown (Reconstructed) is on Top (Bottom)

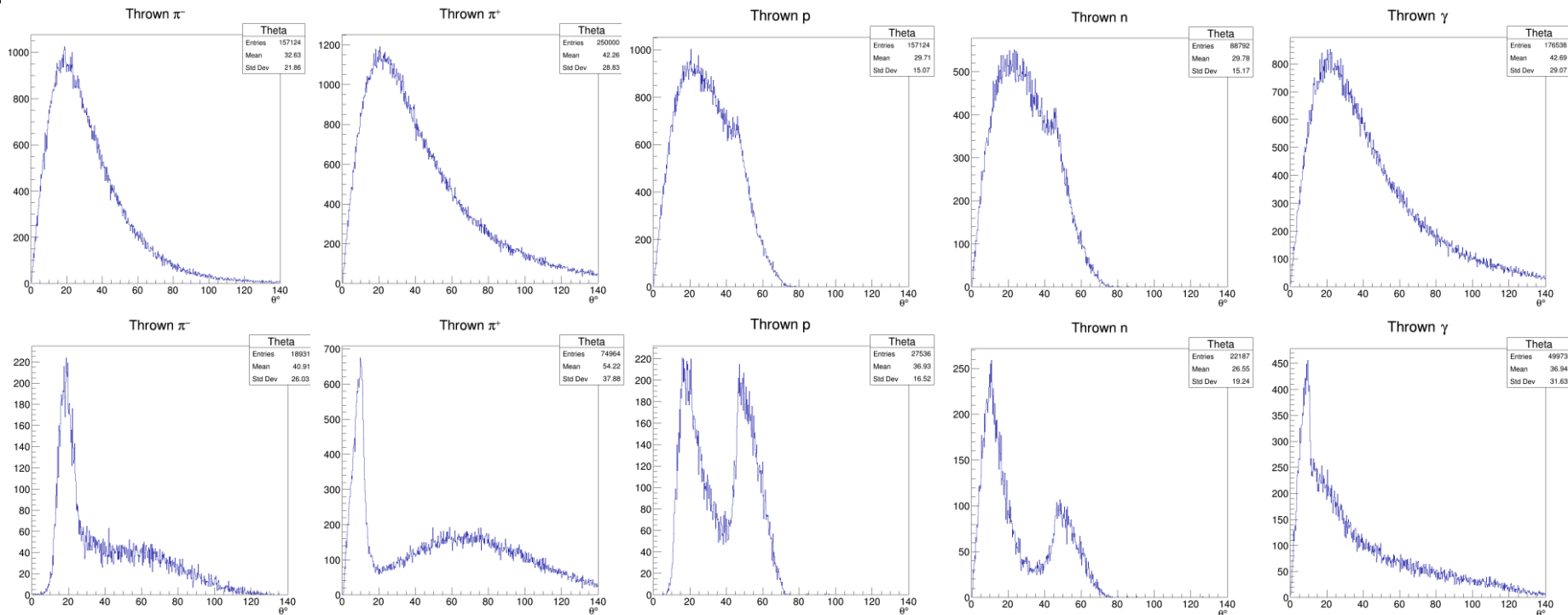


THROWN VS RECONSTRUCTED : MOMENTUM

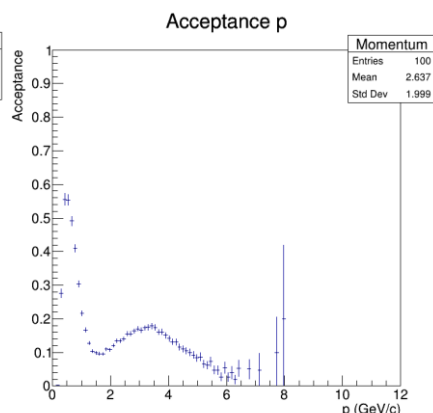
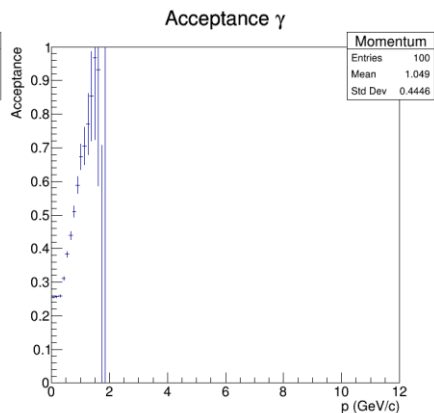
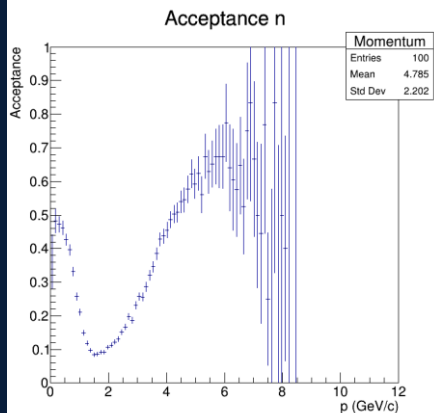
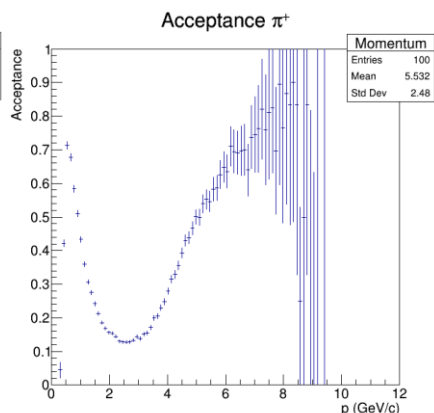
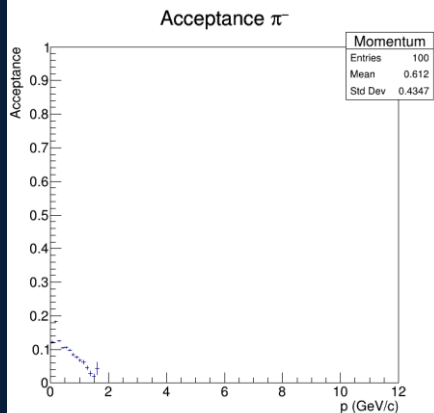
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THROWN VS RECONSTRUCTED : THETA



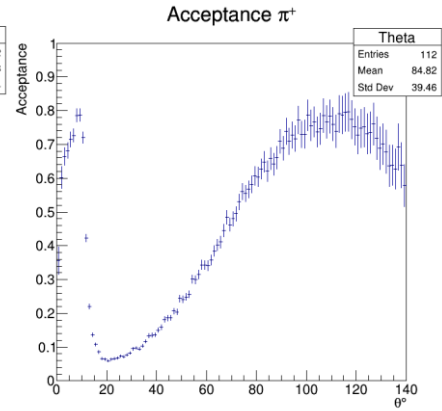
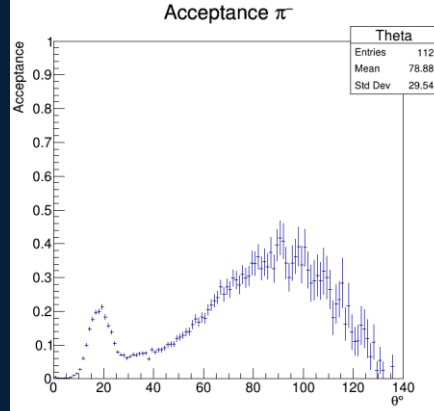
THROWN VS RECONSTRUCTED : ACCEPTANCE (MOMENTUM)



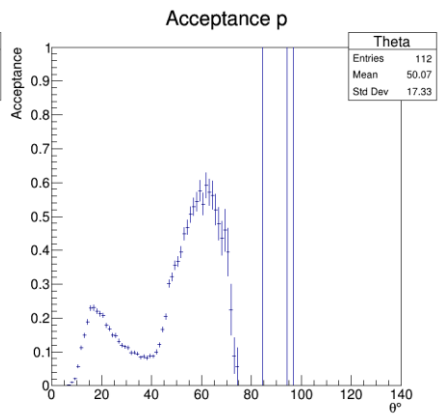
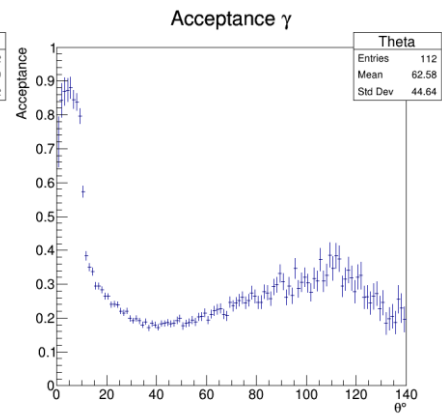
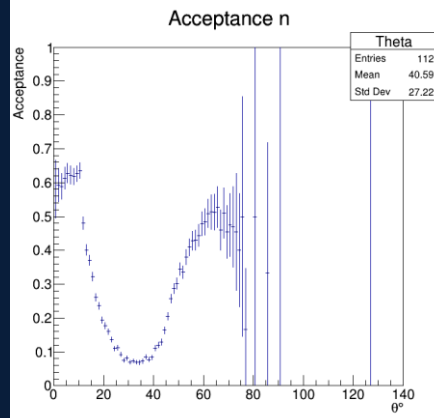
| Particle | Thrown | Reconstructed | Acc |
|----------|--------|---------------|---------|
| π^- | 157154 | 18931 | 0.12046 |
| π^+ | 250000 | 74964 | 0.29986 |
| p | 157154 | 27536 | 0.17522 |
| n | 88792 | 22187 | 0.24988 |
| γ | 176538 | 49973 | 0.28307 |



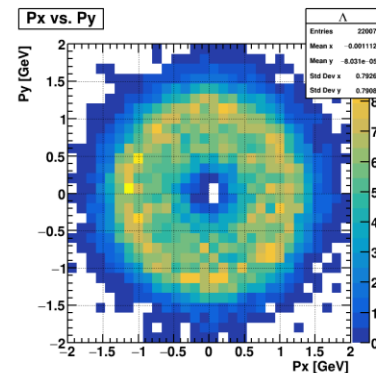
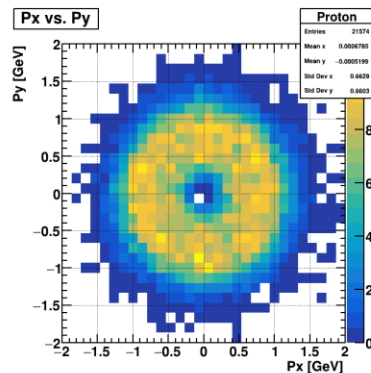
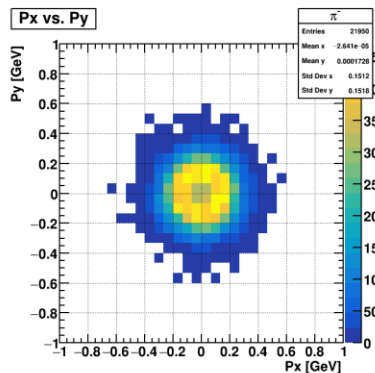
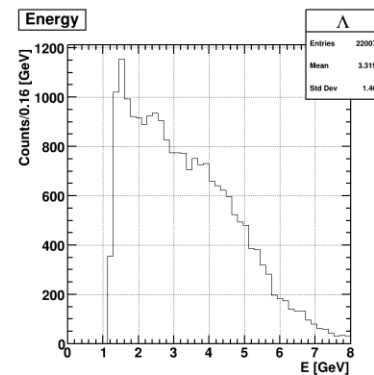
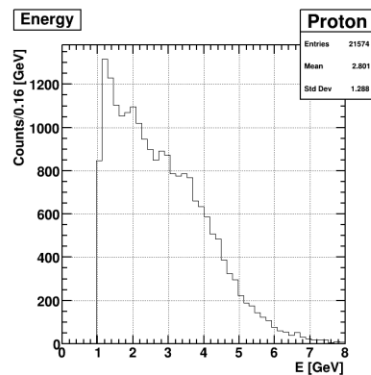
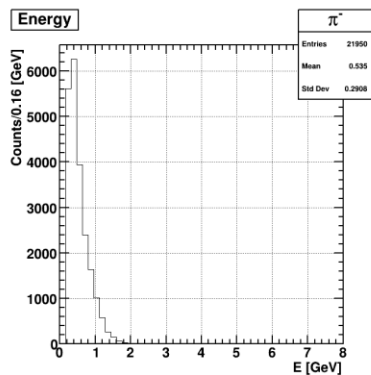
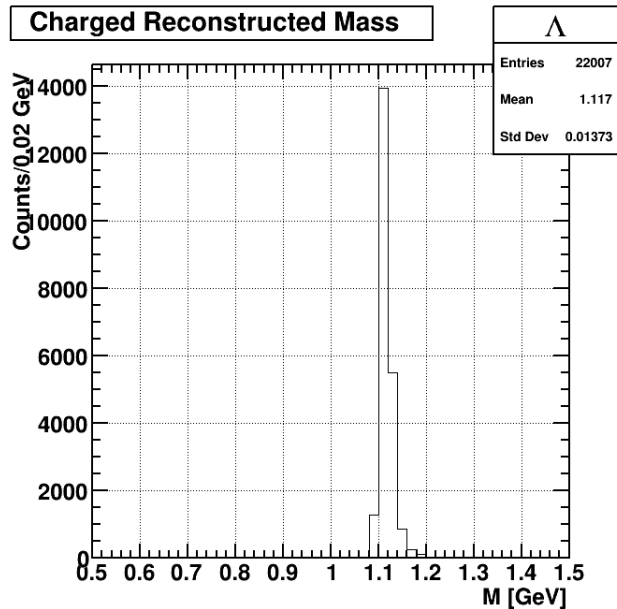
THROWN VS RECONSTRUCTED : ACCEPTANCE (THETA)



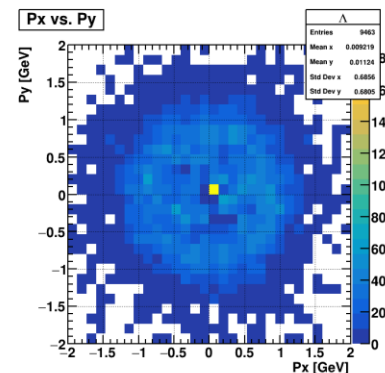
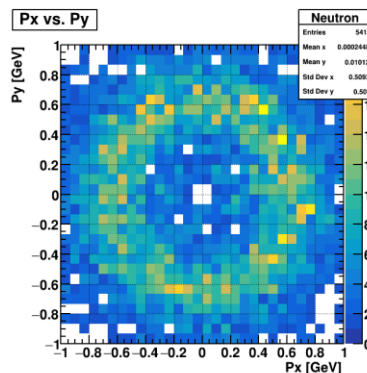
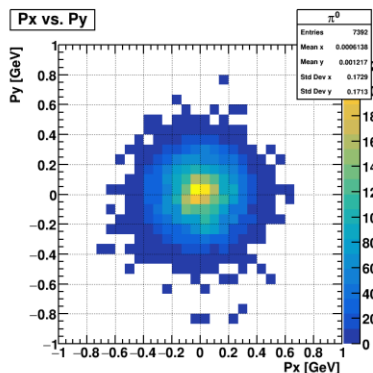
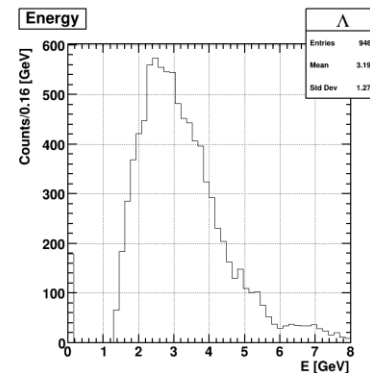
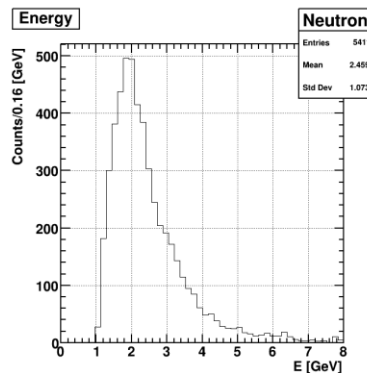
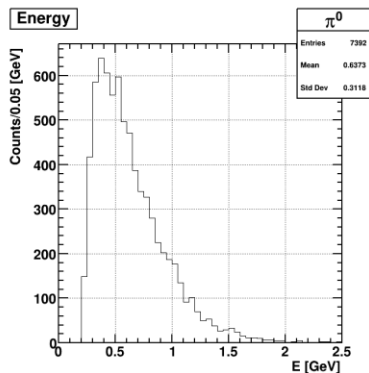
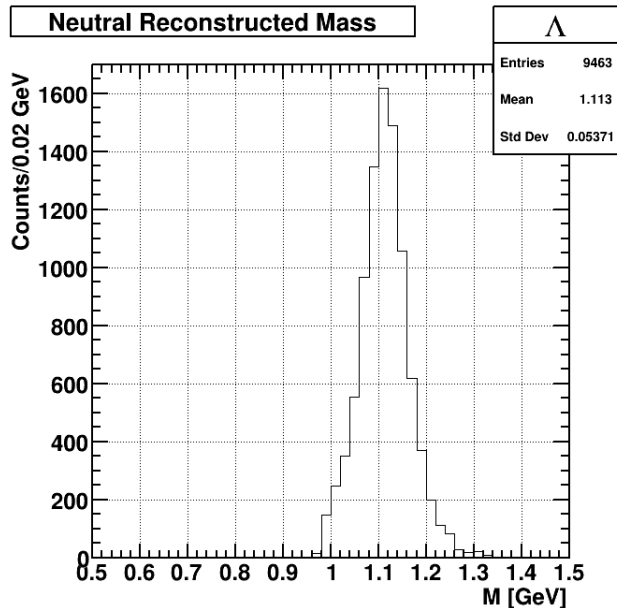
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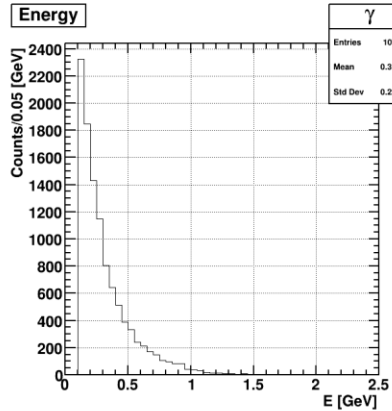
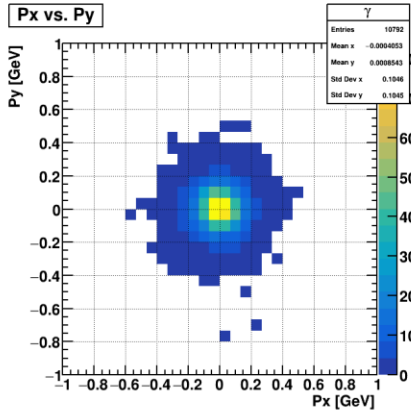
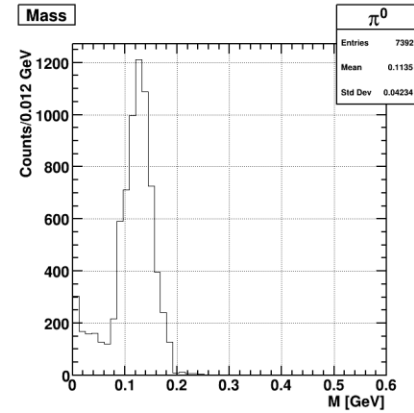
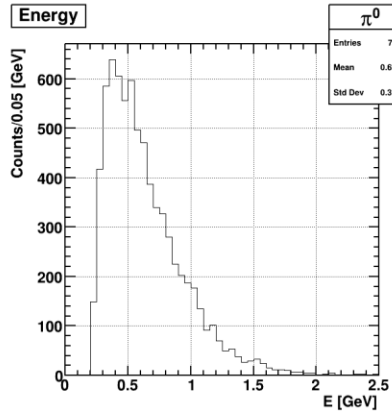
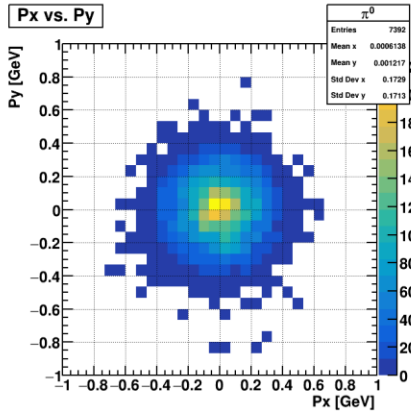
Λ RECONSTRUCTION : CHARGED DECAY



Λ RECONSTRUCTION : NEUTRAL DECAY



π^0 RECONSTRUCTION



ONGOING STUDIES

- Working through the fcal tree
- Rerunning with the recently modified Klong rxnfilter environment

