THE GEORGE WASHINGTON UNIVERSITY
WASHINGTON, DC

$K^0_L + p \rightarrow \pi^+ + \Lambda$

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K LONG FACILITY

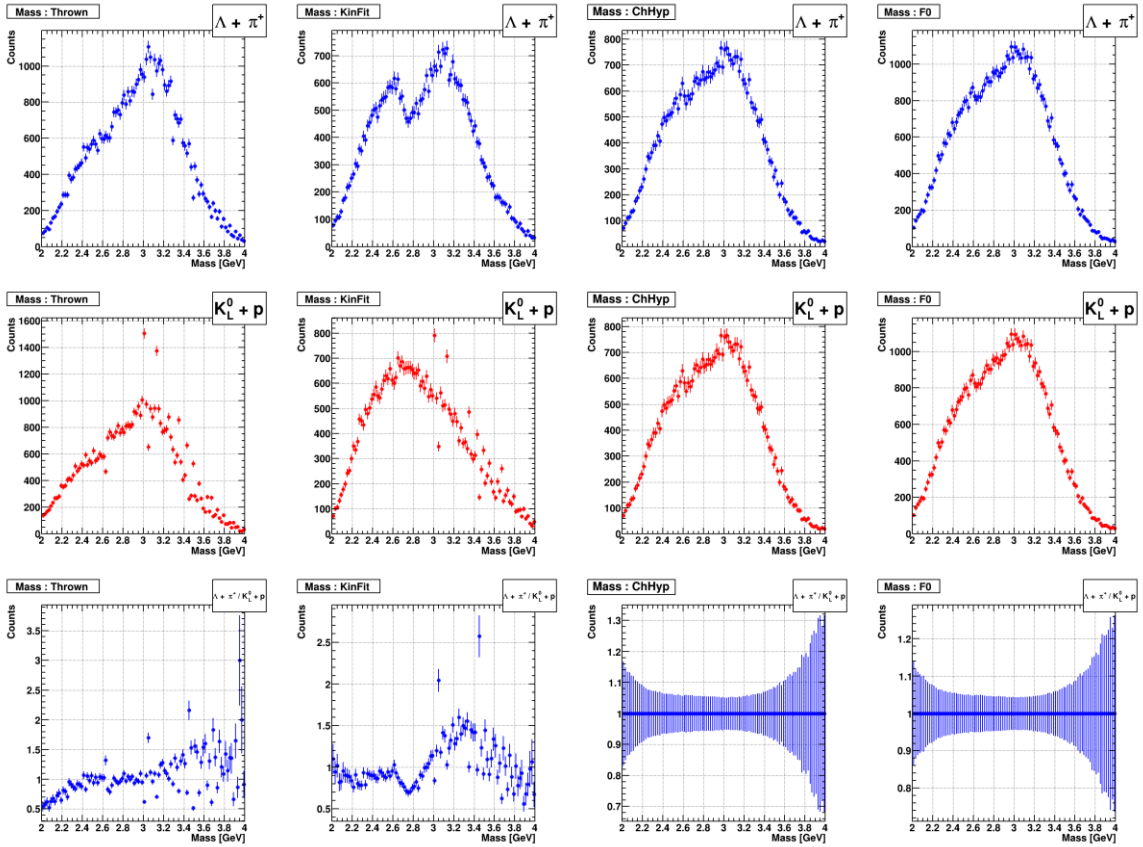
Jefferson Lab

KL4 RXN AND GENERATING STEPS

- Kl4 : $K^0_L + p \rightarrow \pi+ + \Lambda$
  - $\Lambda \rightarrow p + \pi^-$ (63.9%) ; Current priority
  - $\Lambda \rightarrow n + \pi^0$ (35.8%)
- Generated histograms/root files (Monitoring Histograms, ReactionFilter, mcthrown_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
  - hd_root --nthreads=8 -PPLUGINS=PEVENTRFBUNCH:USE_TAG=KLong -PVERTEX:USEWEIGHTEDAVERAGE=1 -PPLUGINS=mcthrown_tree foo_smeared.hddm

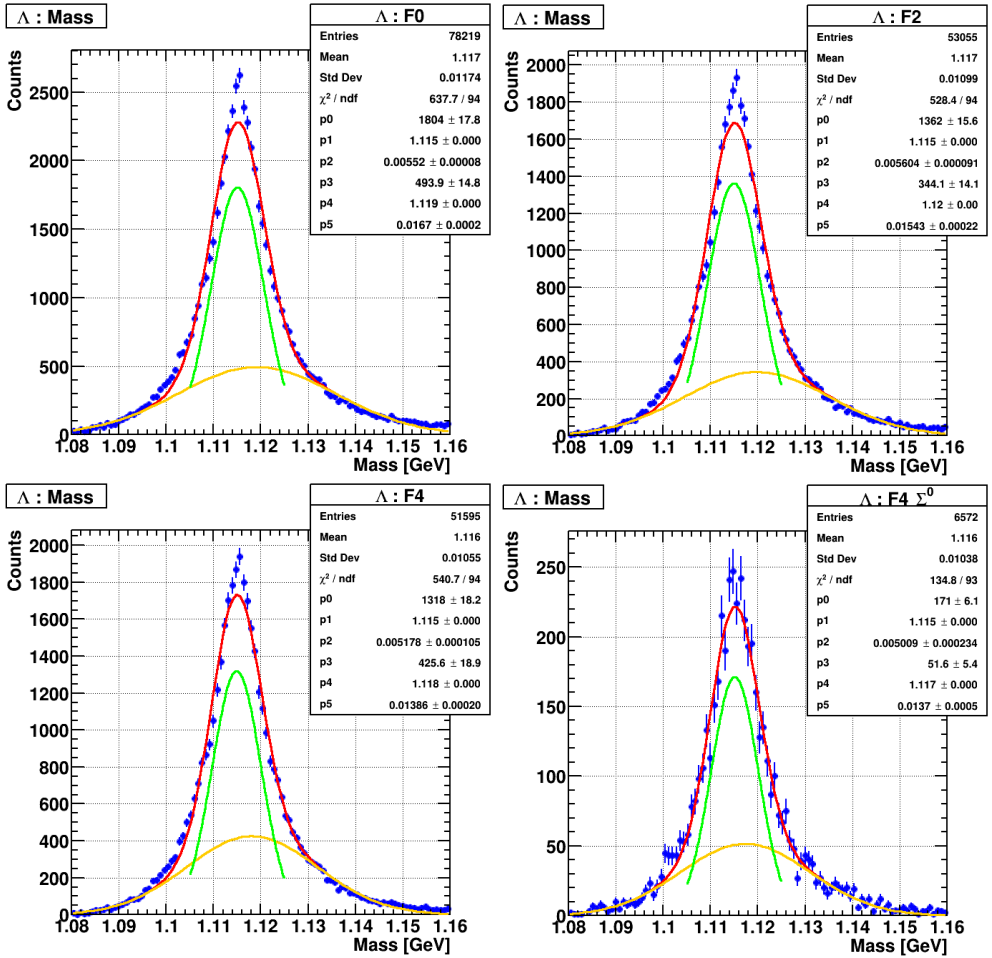
W Comparison

- To the right are plots of the W distributions
  - $w = |K_L^0 + p| = |\Lambda + \pi^+ + X|$
  - Top row : $|\Lambda + \pi^+|$
  - Middle row : $|K_L^0 + p|$
  - Bottom row : top row / bottom row
- Comments
  - Large seemingly random fluctuations in the middle row for first two rows
  - Thrown ~ 1



Invariant Mass

- To the right are the Λ invariant mass plots with a double gaussian fit.
- Plots of the different kinfit parameters are shown
  - F0 : No vertex, no momentum
  - F2 : No momentum
  - F4 : Default, vertexing and momentum
  - F4 Σ^0 : Default, vertexing and momentum. Λ from Σ^0 channel.
- Generally, the more constraints the lower the width for both gaussians.



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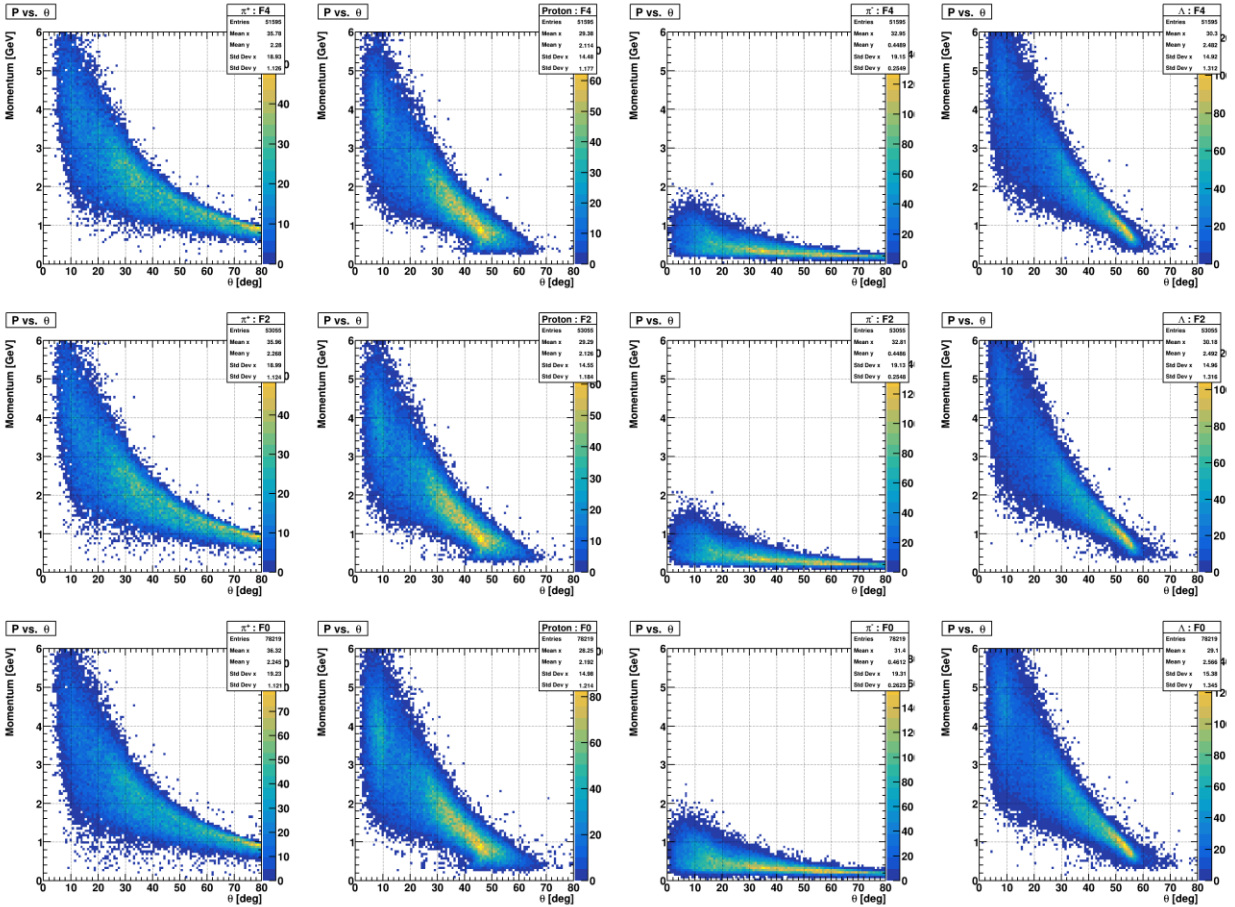
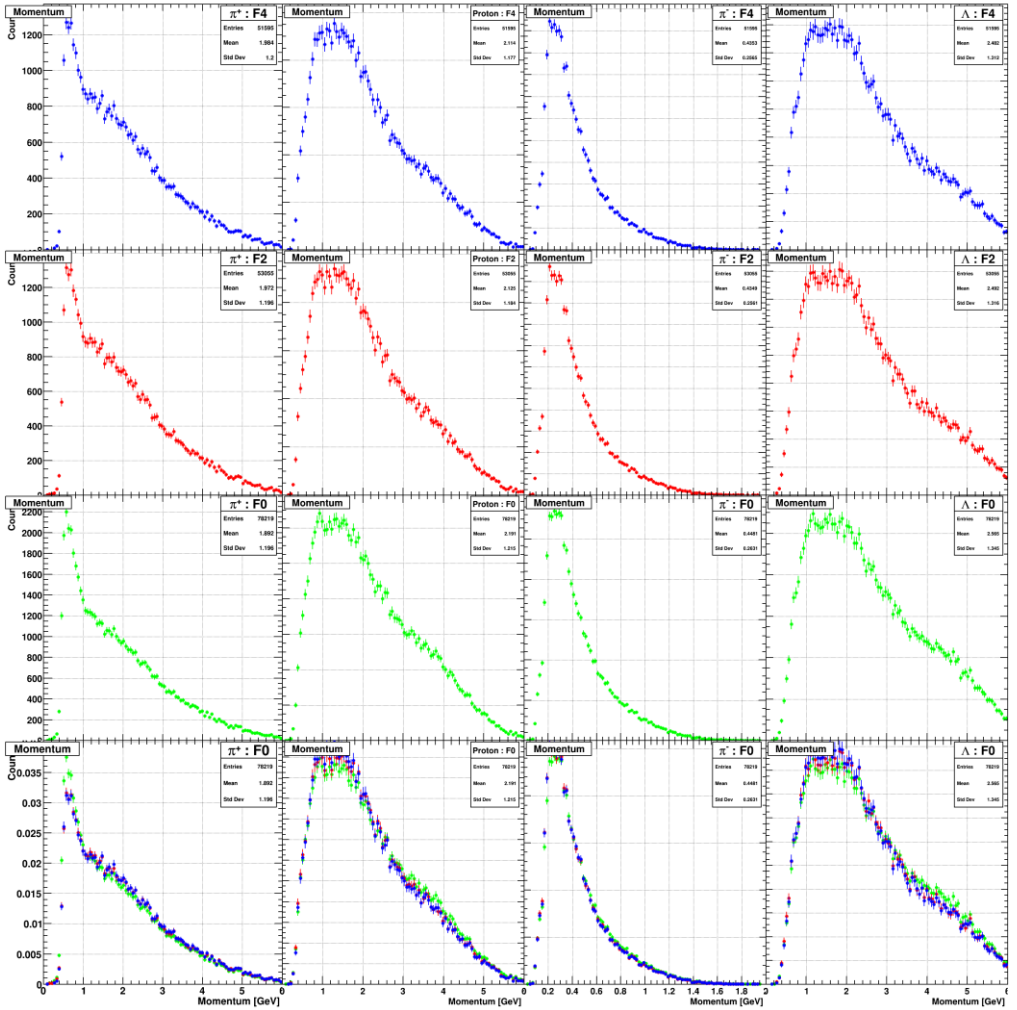
P v. Theta Comparison

- To the right are momentum vs. theta plots for the decay particles.
- Top row : F4 (P & V)
- Middle row : F2 (V)
- Bottom row : F0 (No P & no V)



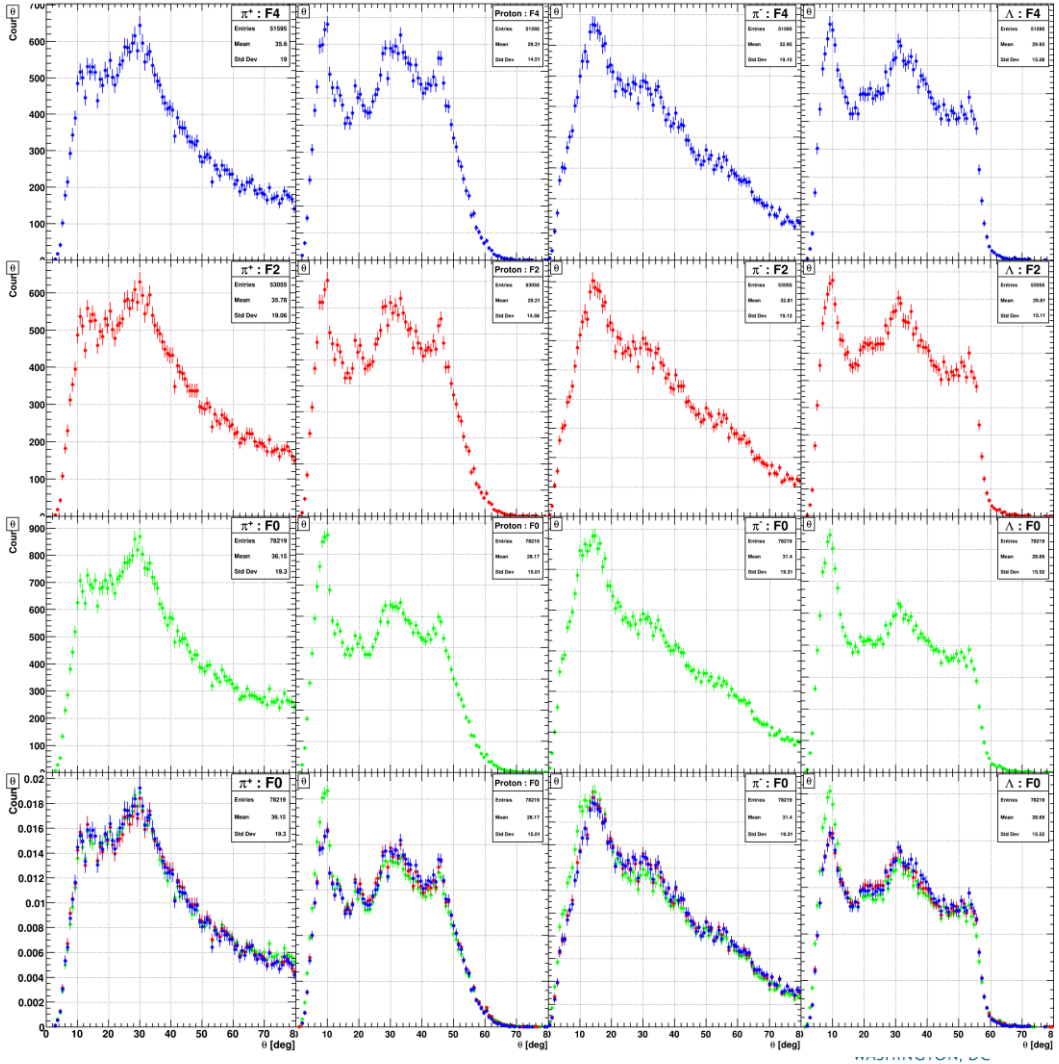
Momentum Comparison

- To the right are momentum plots for the decay particles.
  - Row 1 : F4 (P & V)
  - Row 2 : F2 (V)
  - Row 3 : F0 (No P & no V)
  - Row 4 : All plots are normalized and drawn
- As constraints are relaxed
  - π^+ mean momentum decreases slightly
  - Λ and proton mean momenta increase slightly



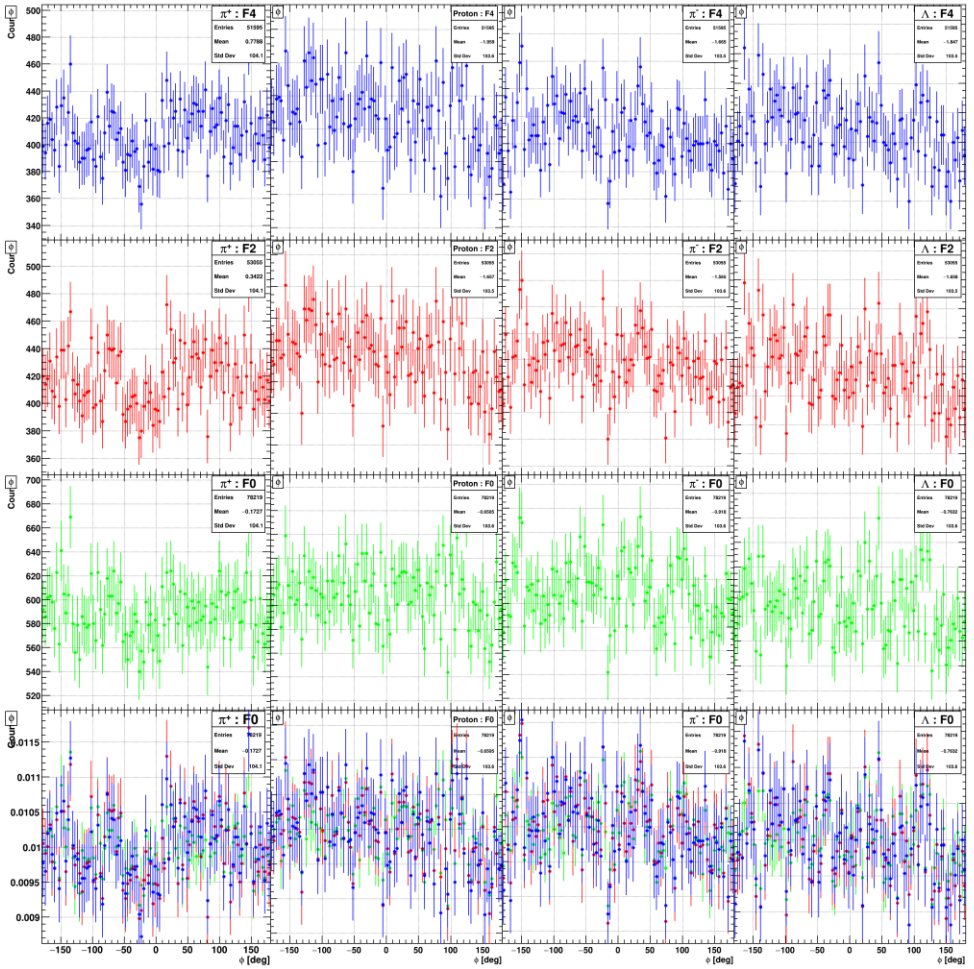
Theta Comparison

- To the right are theta plots for the decay particles.
  - Row 1 : F4 (P & V)
  - Row 2 : F2 (V)
  - Row 3 : F0 (No P & no V)
  - Row 4 : All plots are normalized and drawn
- As constraints are relaxed
  - π^+ mean theta increases slightly
  - Λ, π^-, and proton mean theta decreases slightly



PHI COMPARISON

- To the right are phi plots for the decay particles.
  - Row 1 : F4 (P & V)
  - Row 2 : F2 (V)
  - Row 3 : F0 (No P & no V)
  - Row 4 : All plots are normalized and drawn
- As constraints are relaxed
  - π^+ mean phi decreases slightly
  - Λ, π^-, and proton mean phi increases slightly



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Back up slides

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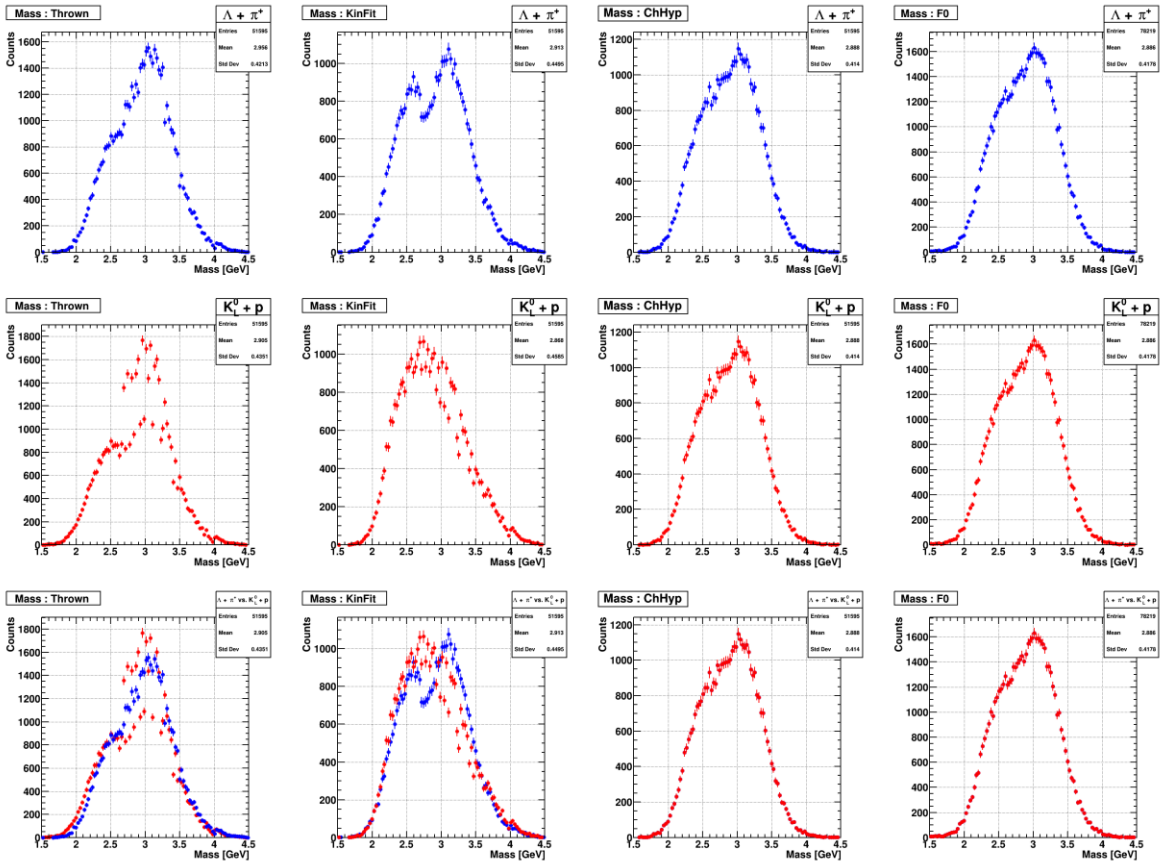

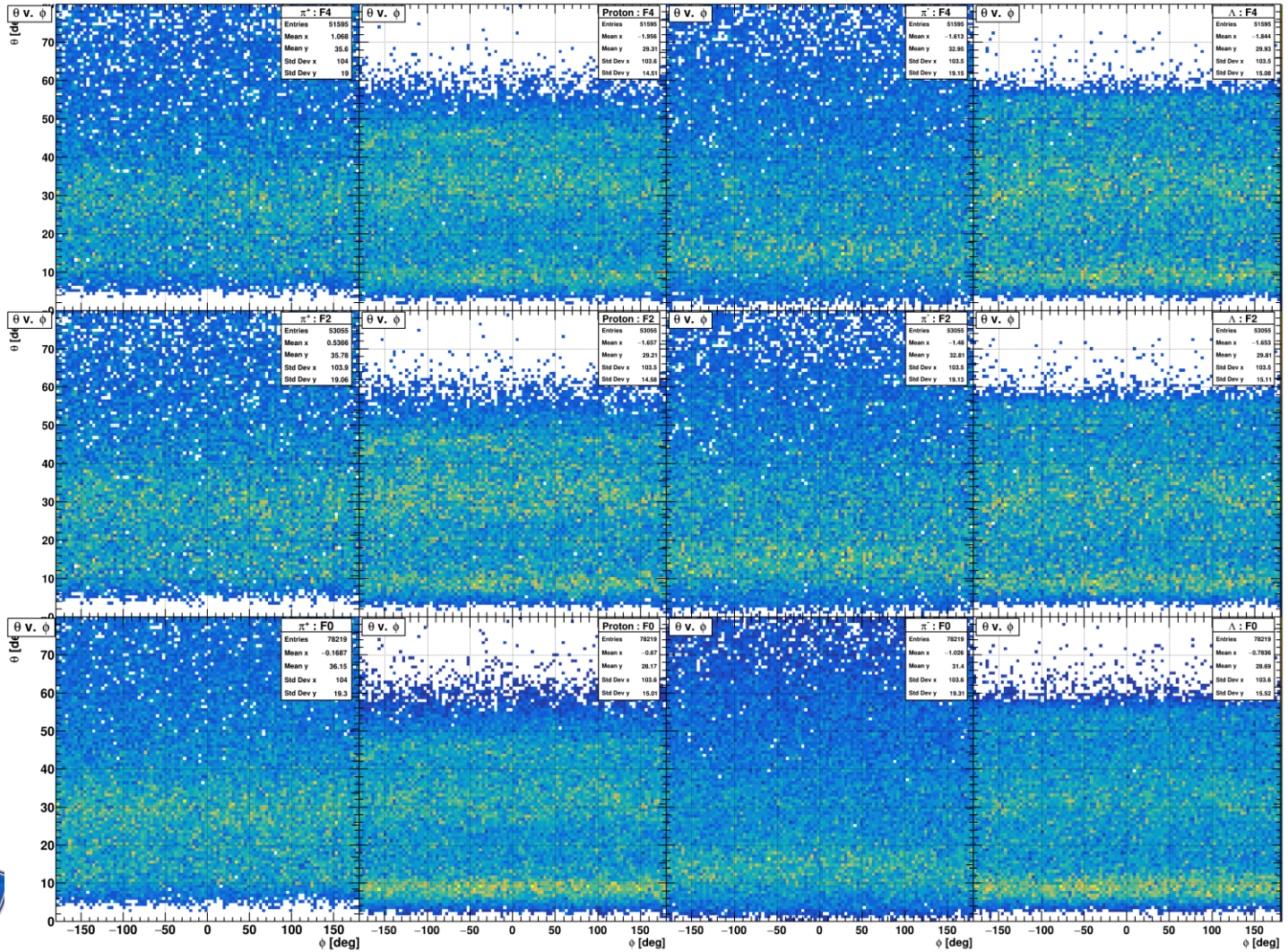

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