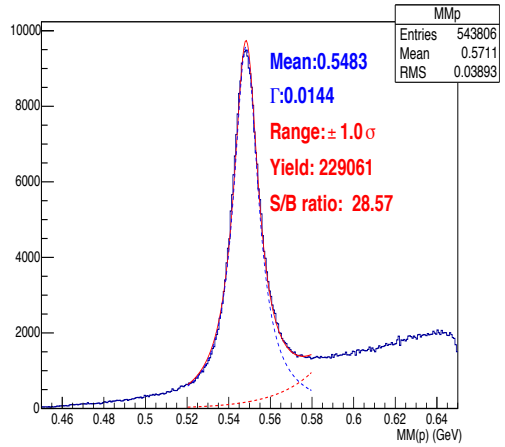
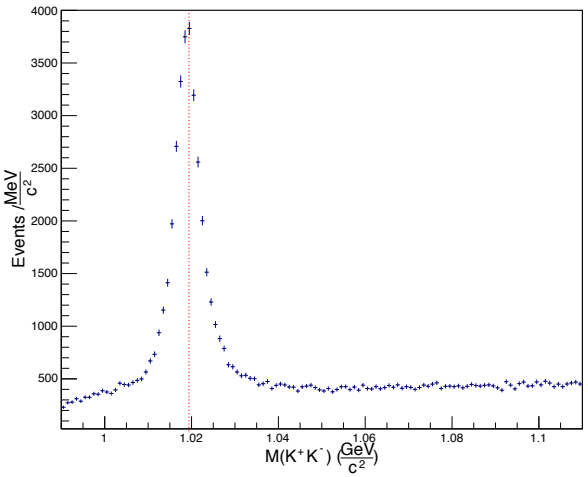
g12 status

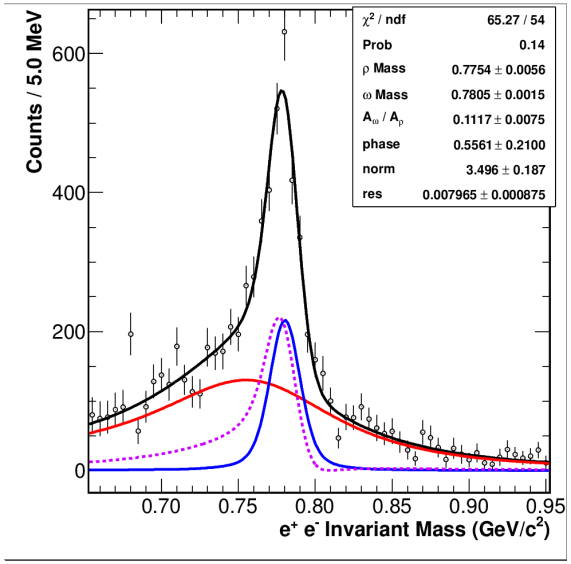
- g12 group review ongoing (second round)
- Key issues:
  - MC/Data Comparison
  - Normalization
- Key results
- Road forward

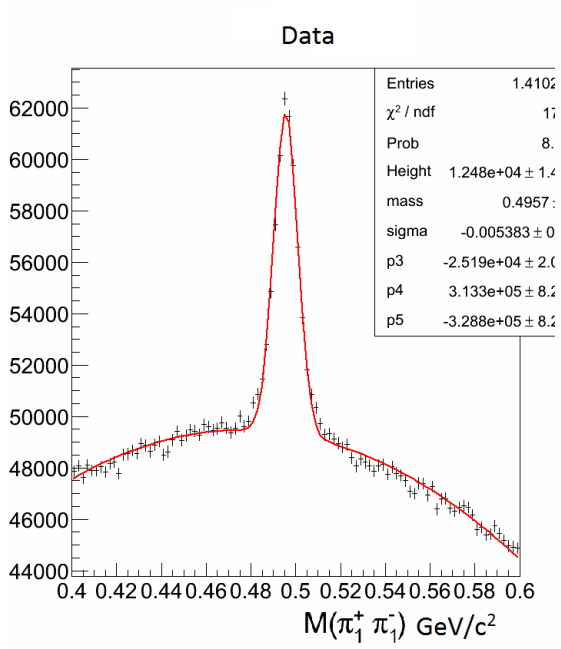
Lei Guo, Florida International University, g12 group

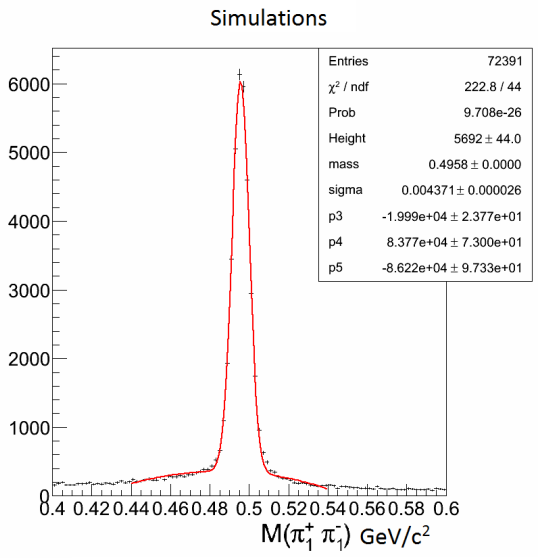
Data quality: Mass positions







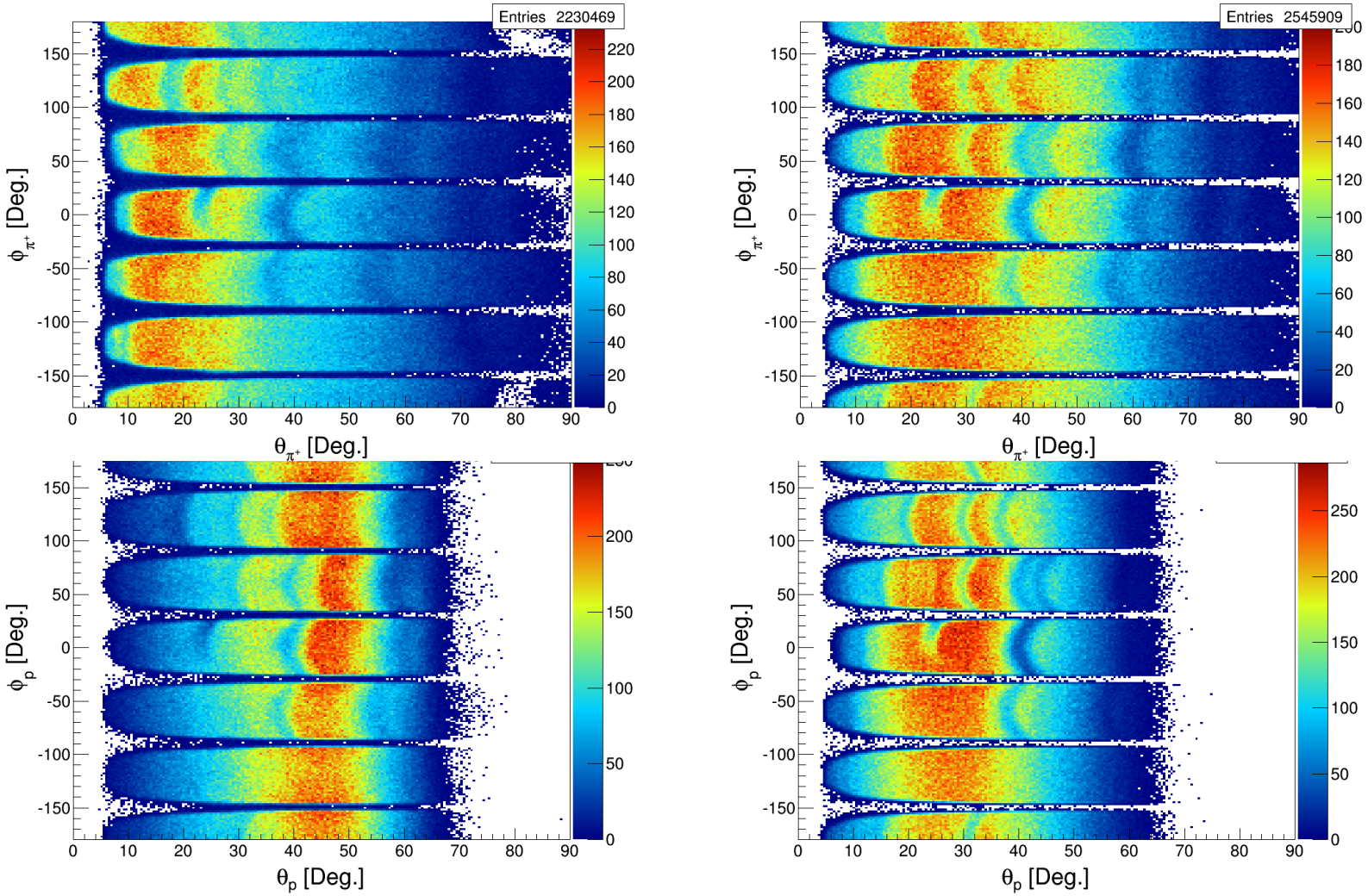




- All known narrow states are within ~1MeV of the PDG value (using missing mass, invariant mass; strange states or non strange states; hadron/lepton decays)
- Mass resolution (K_s) from MC reproduces data (within 1MeV)

MC/Data comparison

$$\gamma p \rightarrow p\pi^{+}\pi^{-}$$



Included: TOF knockout (Dead/Bad paddles); Wire efficiency map (gpp)

Good agreement between data/simulation (Dead/inefficient areas correctly simulated)

Simulation: phase space

TOF knockout

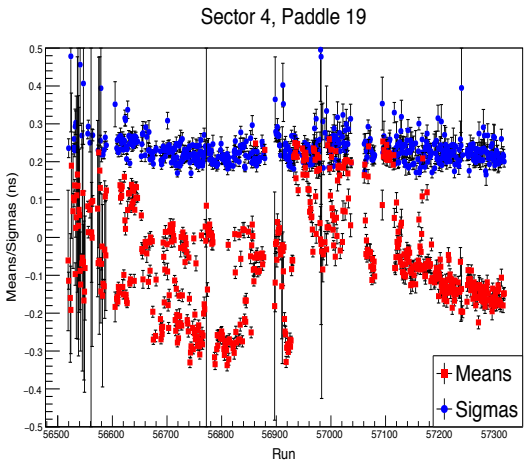
- Dead paddles (occupancy)

Sector 1:	6, 35, 40, 41, 50, 56
Sector 2:	2, 8, 34, 35, 41, 44, 50, 54, 56
Sector 3:	11, 35, 40, 41, 56
Sector 4:	41, 48
Sector 5:	48
Sector 6:	1, 5, 33, 56

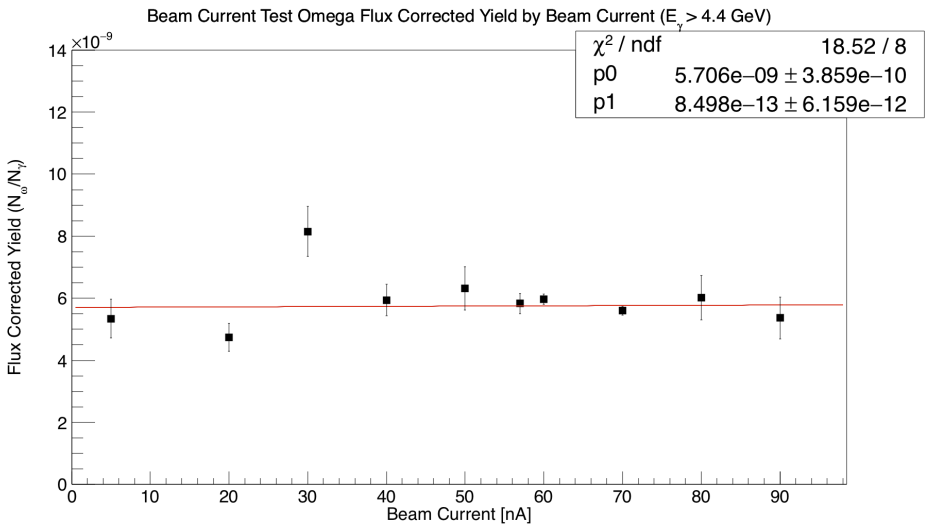
- Unstable (resolution/shifting)

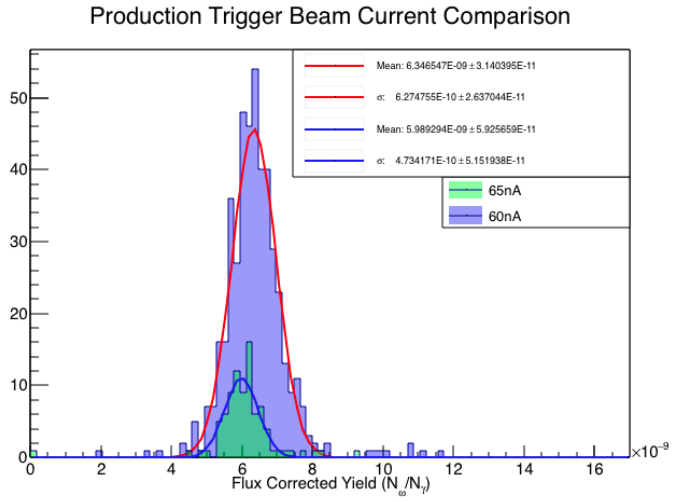
Sector 1:	25, 26
Sector 2:	18, 25, 27
Sector 3:	1, 18, 32
Sector 4:	8, 19
Sector 6:	24

- The combined list has small statistical impact
- Most are in the backward region



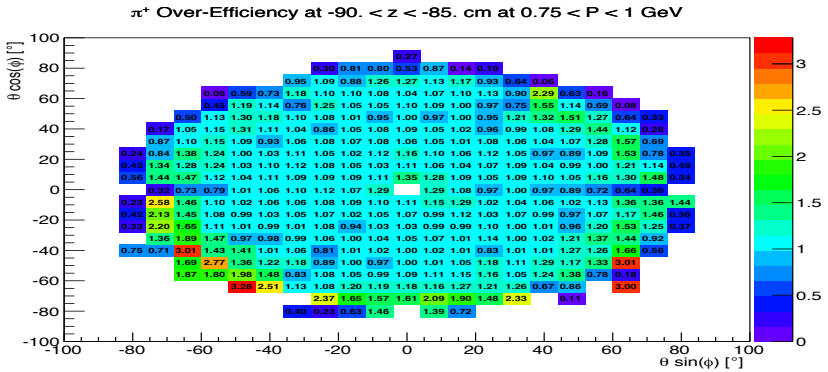
Normalization

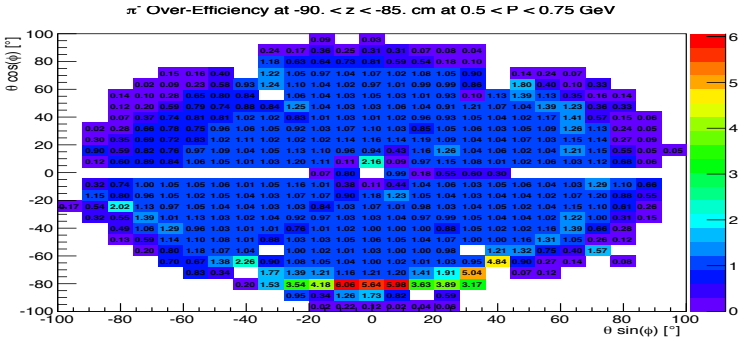


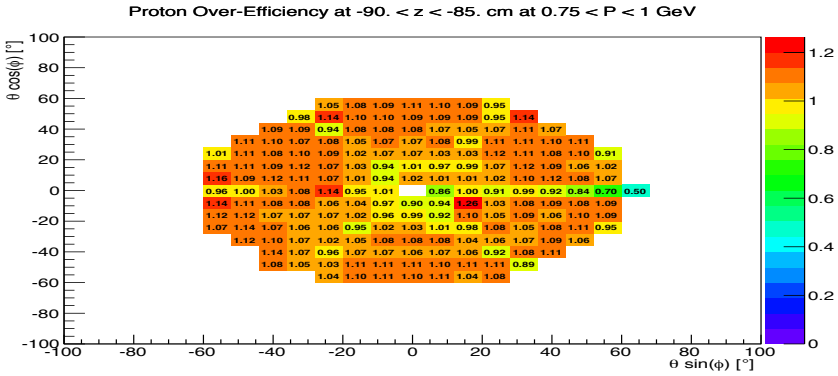


Flux normalized yields (ω) do not show inefficiency at high currents (60nA)
Overall uncertainty in normalization (from 60nA/65nA comparison) ~6%

Dynamic Track-dependent Efficiency Map (MK)



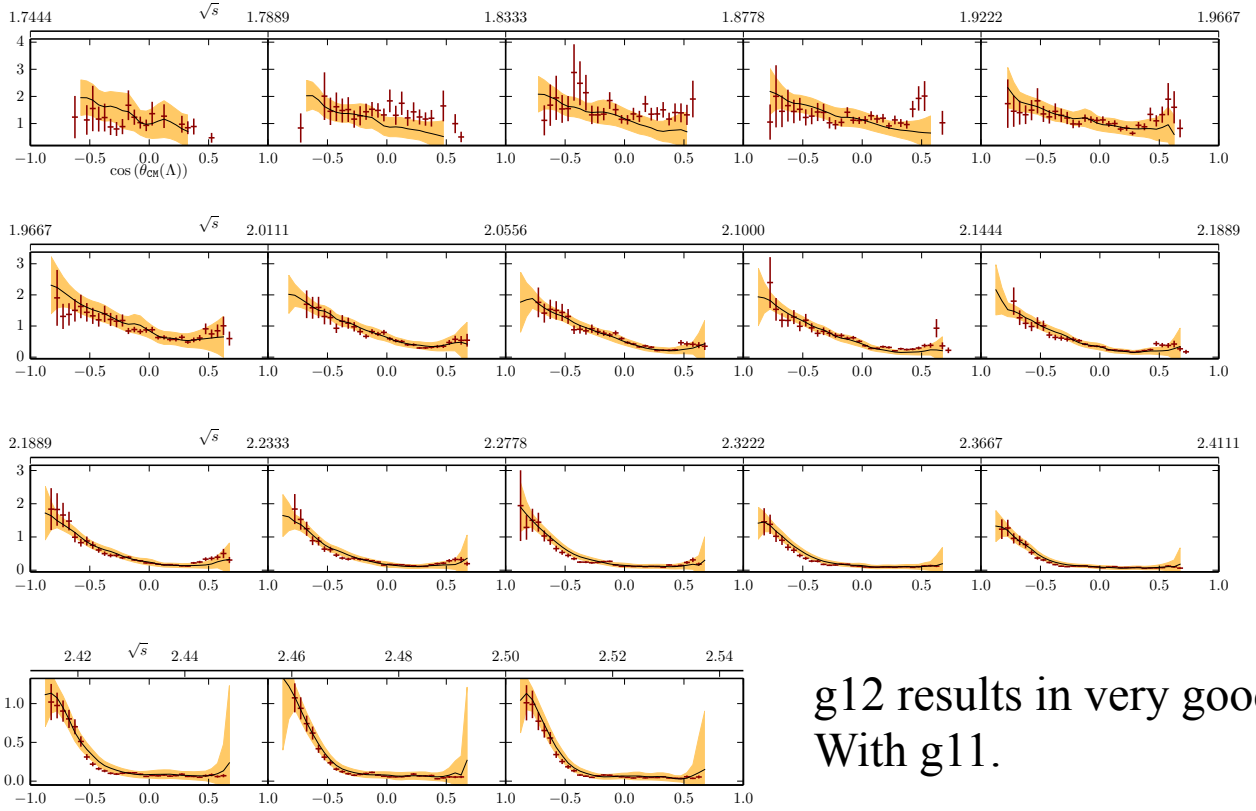




- Methology:
  Use $\gamma p \rightarrow p\pi^+\pi^-$ and compare MC/Data Reconstruction efficiency compared
- MC found to have over-efficiency;
- Correction derived for p, π^+, π^-
- Functions of z, momentum, angles
- Derived with and without multiple photon

Cross section results (Johann):

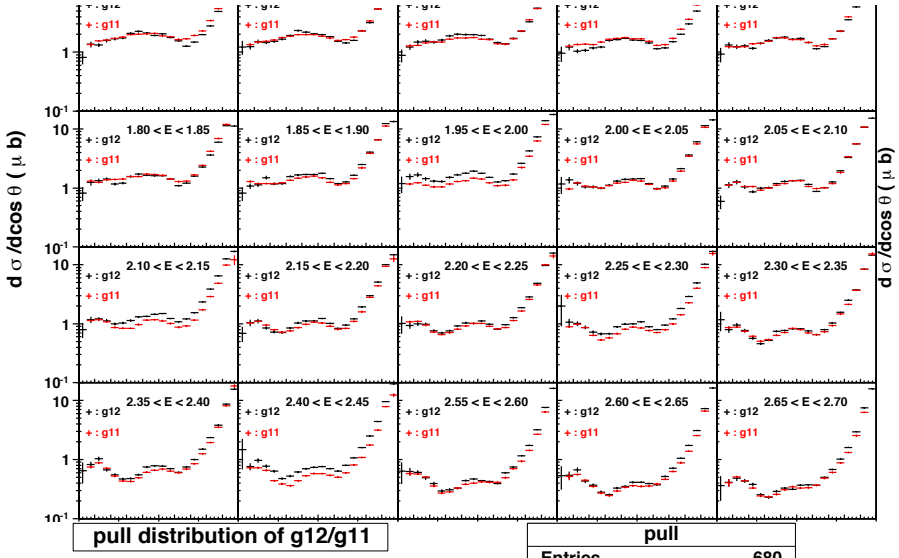
$$\gamma p \rightarrow K^+\Lambda \rightarrow K^+ p\pi^-$$

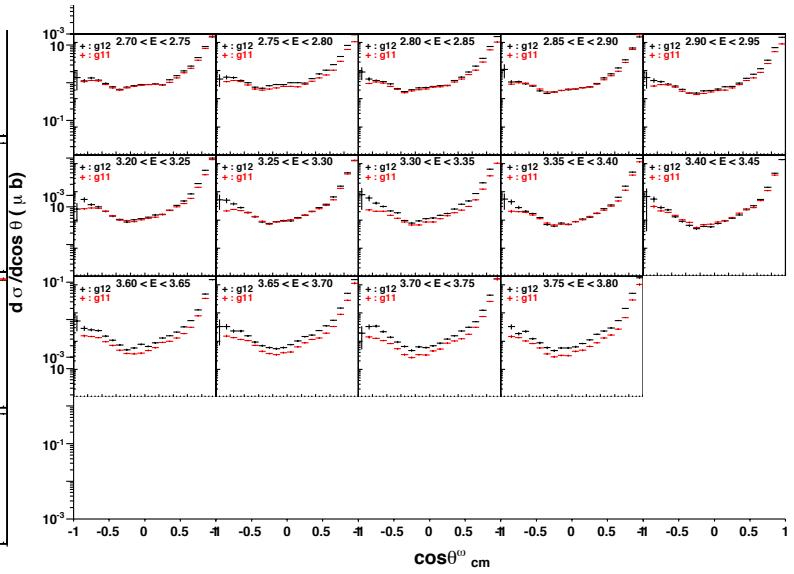


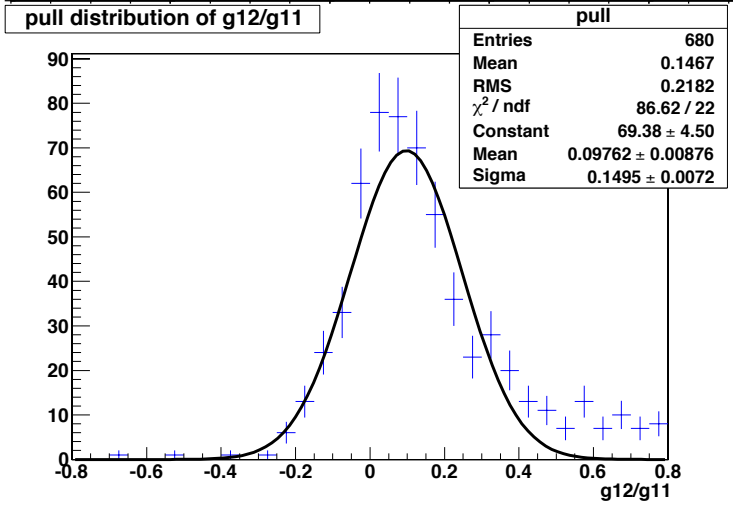
g12 results in very good agreement With g11.

Cross section results (Zulkaida):

$$\gamma p \rightarrow p\omega \rightarrow p\pi^{+}\pi^{-}(\pi^{0})$$



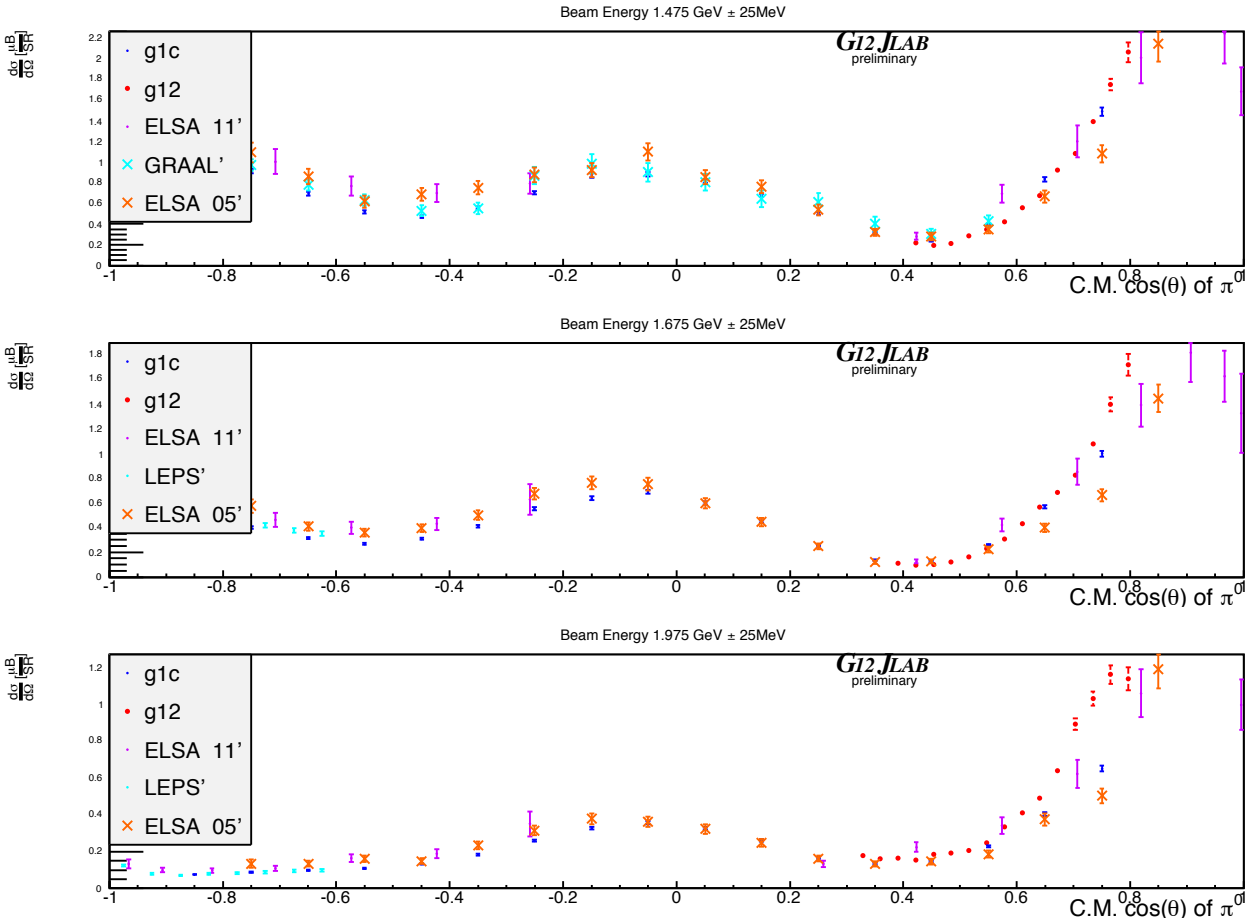




- Included: All corrections;
- Efficiency map: applied
- Not yet implemented: TOF knockout
- g11/g12 agrees well. Except at high energies
- g12 efficiency map is a dynamic, track-dependent correction!

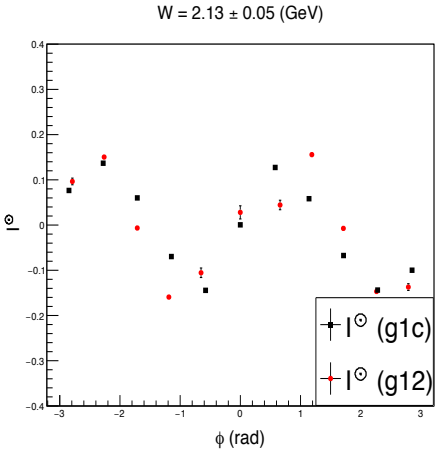
Cross section results (MK):

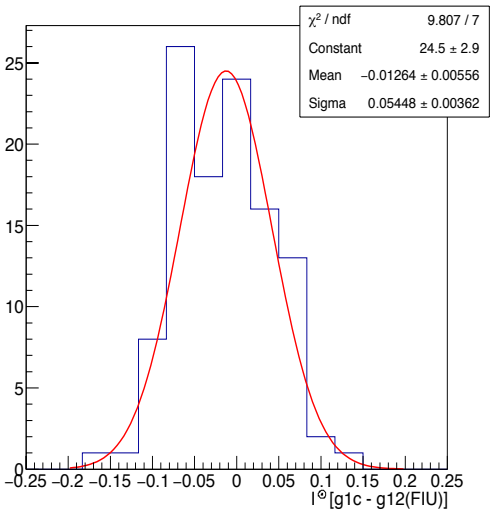
$$\gamma p \rightarrow p\pi^0 \rightarrow pe^+e^-(\gamma)$$

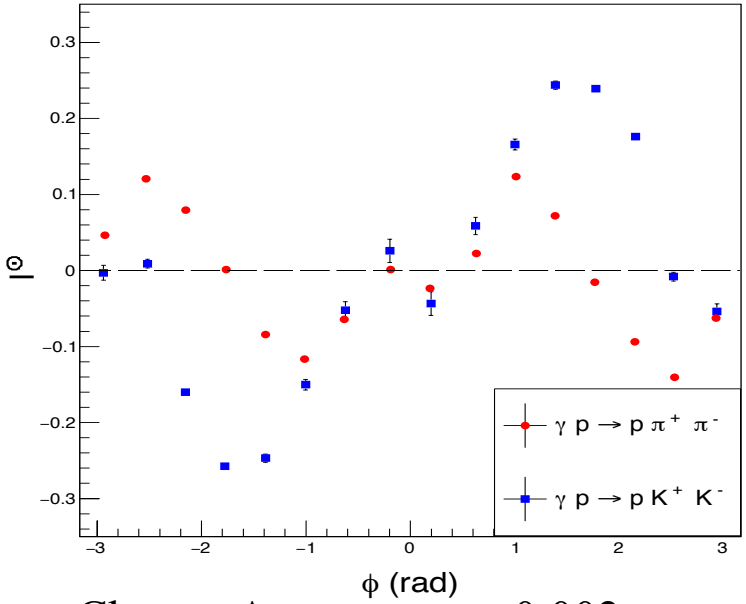


- Cross section results fed back to simulation(PLUTO)
- All photons analyzed, no multiple photon correction
- g12 results consistent with g1c (backwards)
- At forward angles, g12 has the highest statistics
- Across the whole range, g12 agrees with world data

Polarization measurements/uncertainty: beam helicity asymmetries







- Charge Asymmetry: ~0.002 (derived from single pion channels)
- Beam polarization uncertainty: ~5%
- g1c/g12 comparison: pulls~0.01 (Not exactly a fair comparison since the mean values off ϕ are not the same)
- g12 is self consistent as well (FIU/FSU)

Summary

- We would like to thank the review committee
- All corrections (standard/g12 specific) performed and systematics checked
- g12 cross sections (strange/lepton/hadron) all in good agreement with prior results
- Polarization measurements also consistent with existing results
- Multiple results ready for review (Thesis/Analysis/Paper draft written)
  - π^0 cross section (MK)
  - Meson->$K_s K_s$ (Schloka/Ken)
  - Ξ^- polarization (Jason)
  - Ξ^- cross section and Ξ^{-*} upper limit (Johann)
  - ρ/ω interference (MP)
  - Many other analysis are in mature stage (PWAs, Asymmetries, ….)