G13 Update

CLAS collaboration meeting

Newport News VA

June 12

2009

Danny Martinez

IDAHO STATE UNIVERSITY

G13

The experiment ran between October 2006 and June 2007
Liquid Deuterium target

- g13a: Circularly polarized photons
- Ee = 2.0 GeV & 84% polarization
- Ee = 2.6 GeV & 78% polarization
- Trigger = 2 sectors, up to 10 kHz
- 2×10^{10} triggers

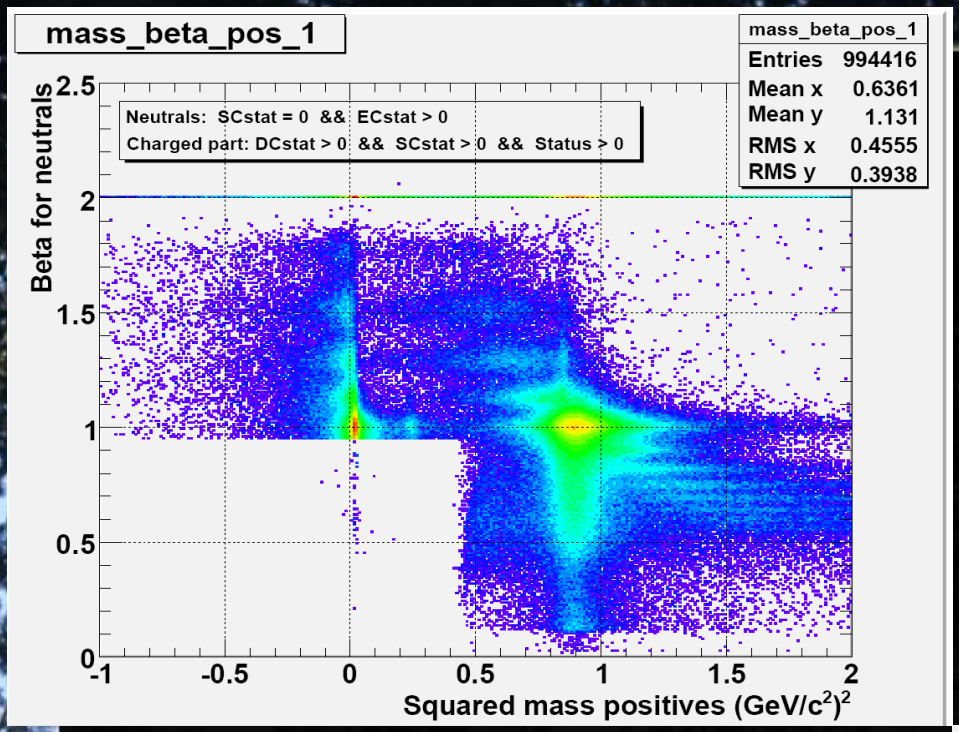
- g13b: Linearly polarized photons
- Ee = 3.3 – 5.2 GeV
- Eγ = 1.1 – 2.3 GeV
- Polarization 70% - 90%
- Trigger = 1 sector, 7 – 8 kHz
- 3×10^{10} triggers

CURRENT STATUS

- g13a is being cooked for pass1
- g13b pass1 finished in early May
  - Future presentations with preliminary results
- Normalization runs exist, but gflux has not been created
- No trip files for g13a-b
- A problem with neutral particles was corrected when ~2/3 of g13b data were already cooked

THE PROBLEM

- Events where the first track was neutral were thrown away by a small routine
- N-tuples did not have the problem, only BOS

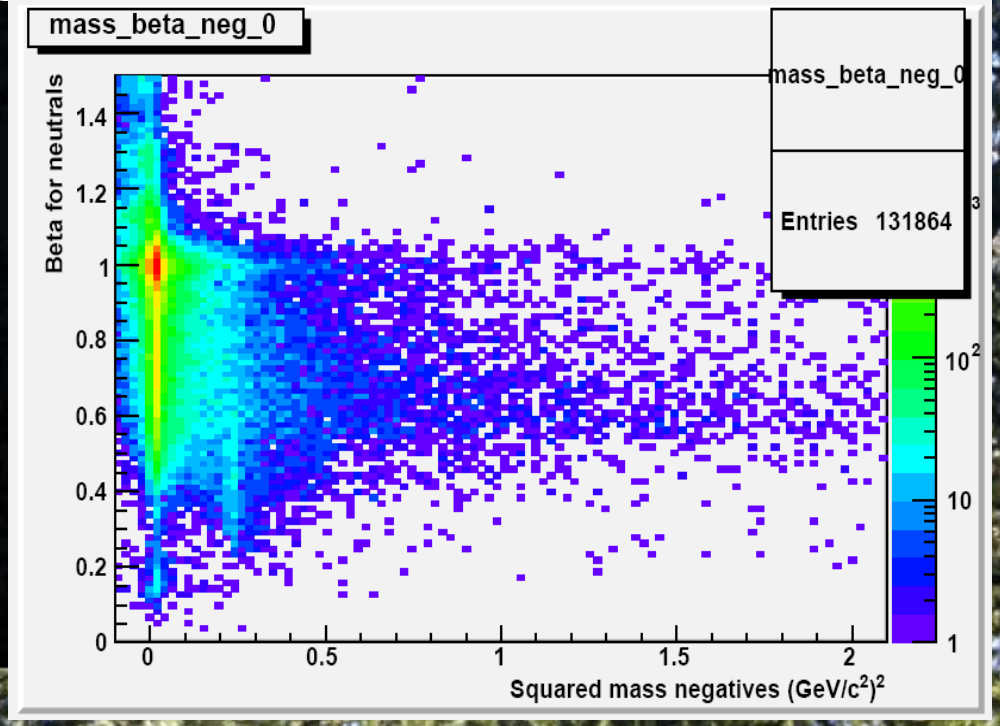


← 1+, 1-, 1neut.

No neutrals with beta <1

nor positives with mass < Proton mass

ECstat>0 , q=0 →



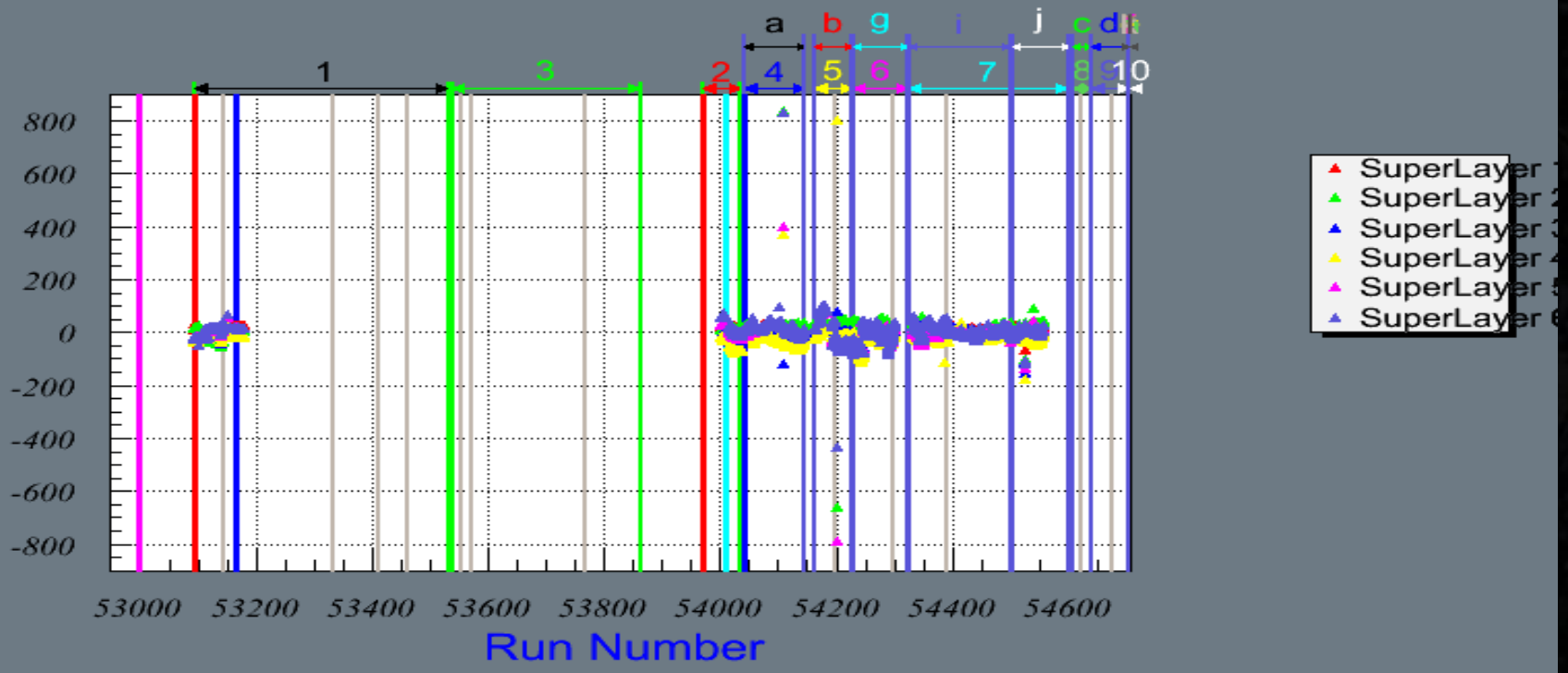
CALIBRATION

- Tagger - Russell Johnstone -
- DC - Edwin Munevar -
- ST - Daria Sokhan -
- TOF - Neil Hassall -
- EC - Paul Matione -
- LAC - Danny Martinez -
- PHOTON BEAM POLARIZATION – Charles Taylor -

DC CALIBRATION

- Achieved DC resolution:
  - Protons : below 100 Microns
  - Pions : below 300 Microns

DC residuals, 1G-fit



Golden Runs

53333 54392
53410 54821
53460 54968
53554
53570
53768
53144
54043
54197
54620
54675
55019
54297

Beam Energy, Pass

1) 53095 - 53532 1.987, 3
2) 53970 - 54035 1.996, 3
3) 53538 - 53862 2.649, 4
4) 54042 - 54145 3.302, 4
5) 54163 - 54229 3.914, 4
6) 54229 - 54325 4.748, 5
7) 54325 - 54600 5.057, 5
8) 54607 - 54640 4.192, 5
9) 54641 - 54705 4.475, 5
10) 54707 - 55204 5.157, 5

Coh Edge, Beam Energy

a) 54042 - 54145 1.3, 3.302
b) 54163 - 54228 1.3, 3.914
c) 54607 - 54640 1.3, 4.192
d) 54641 - 54705 1.5, 4.475
e) 55011 - 55082 1.5, 4.065
f) 55126 - 55140 1.5, 4.065
g) 54229 - 54323 1.7, 4.748
h) 55087 - 55125 1.7, 4.065
i) 54325 - 54500 1.9, 5.057
j) 54503 - 54600 2.1, 5.057
k) 54707 - 54770 2.1, 5.157
l) 54784 - 55001 2.3, 5.157

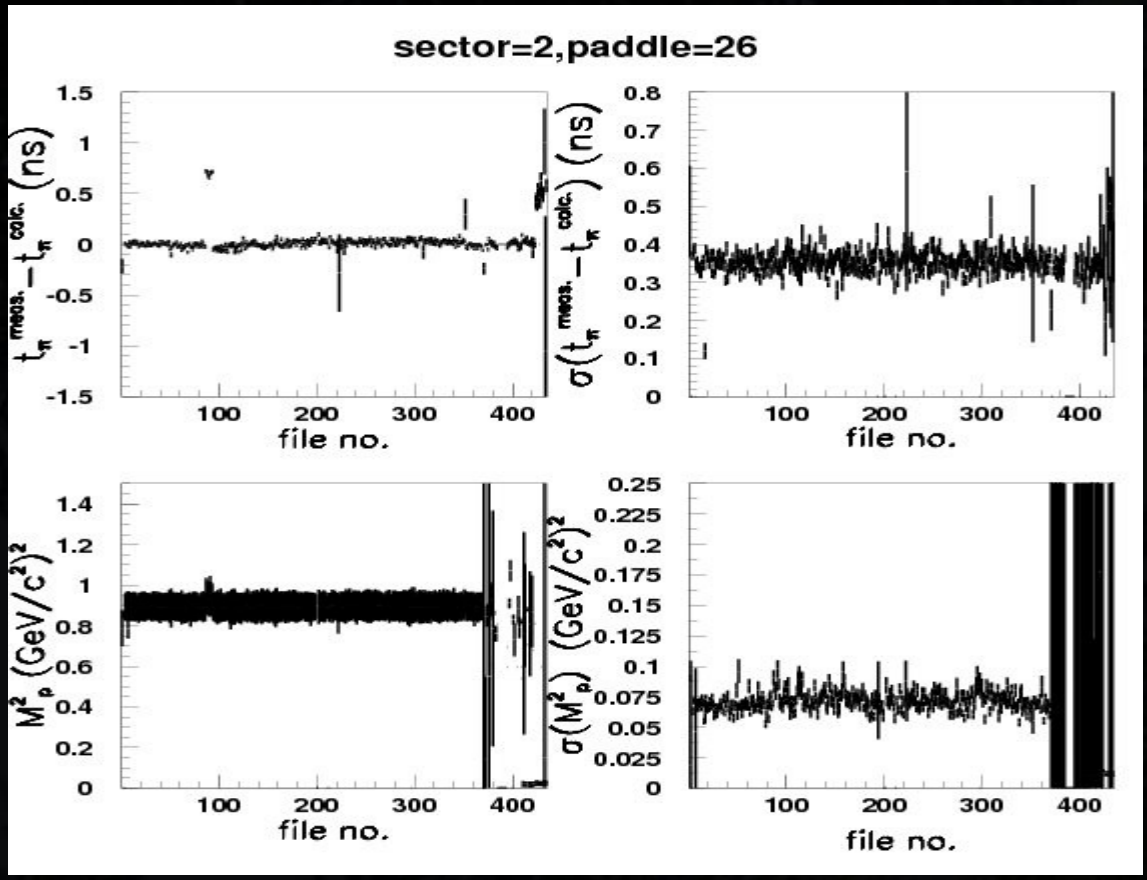
Notable Events

53095 LH_2 in
53165 LD_2 in
53970 LH_2 in
54042 LD_2 in
55147 LH_2 in
53000 Circular Pol
54010 Linear Pol

TOF CALIBRATION

- TOF is being monitored in detail in order to know which runs need an improvement
- Time of flight is using g11 timewalks

TOF CALIBRATION

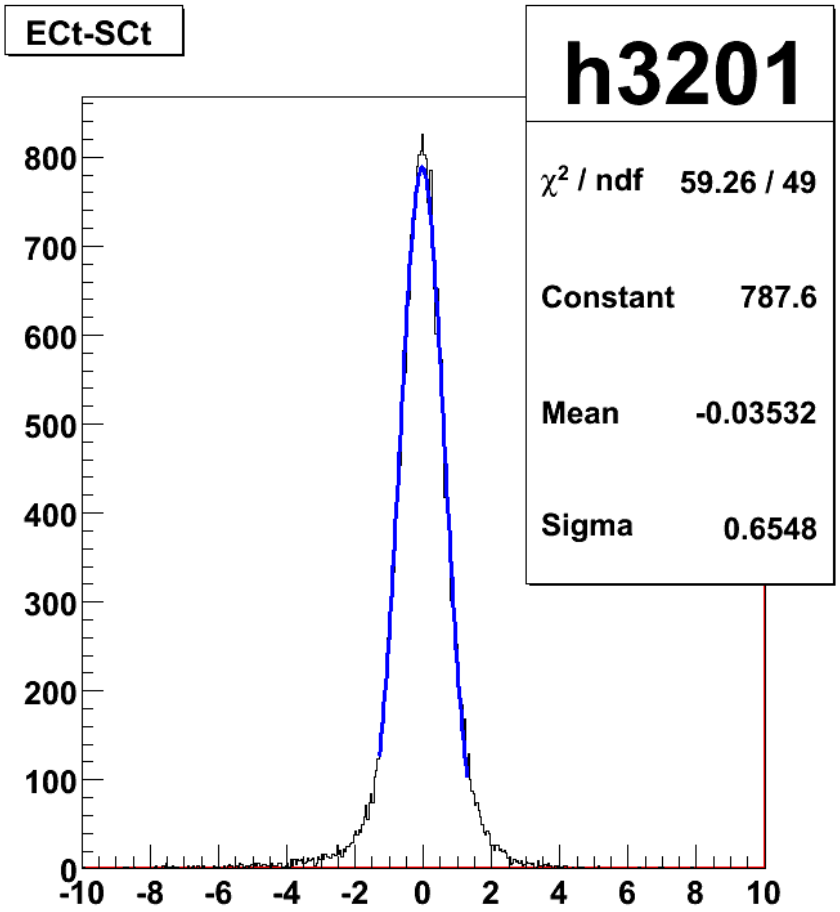


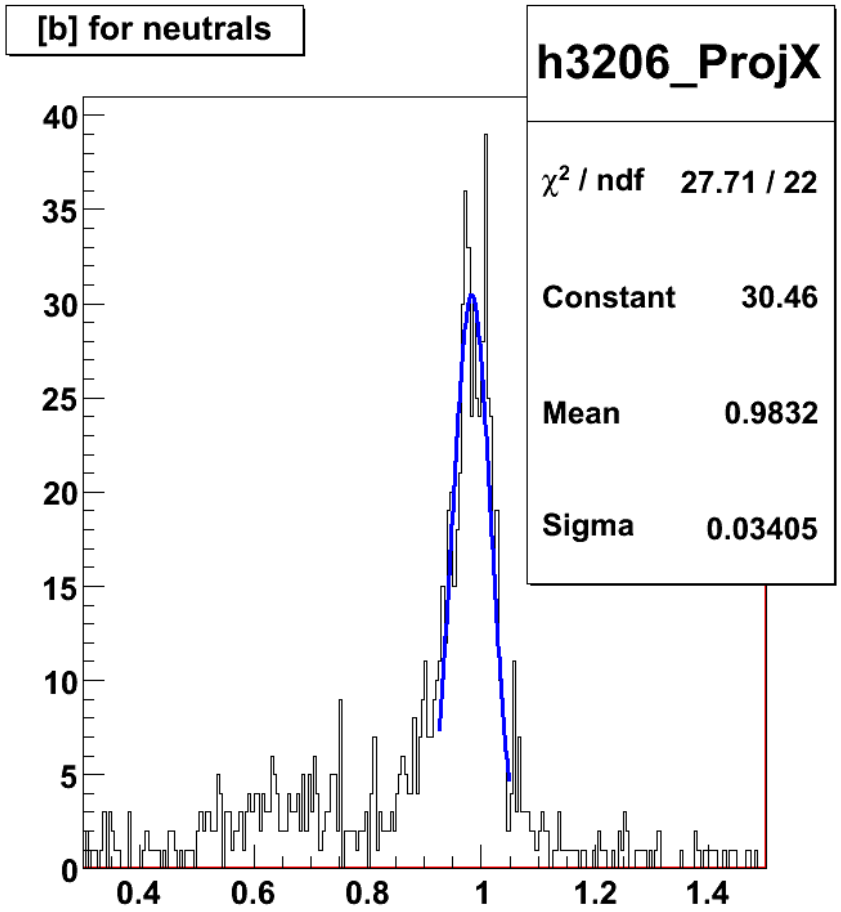
Sample from g13b

EC CALIBRATION

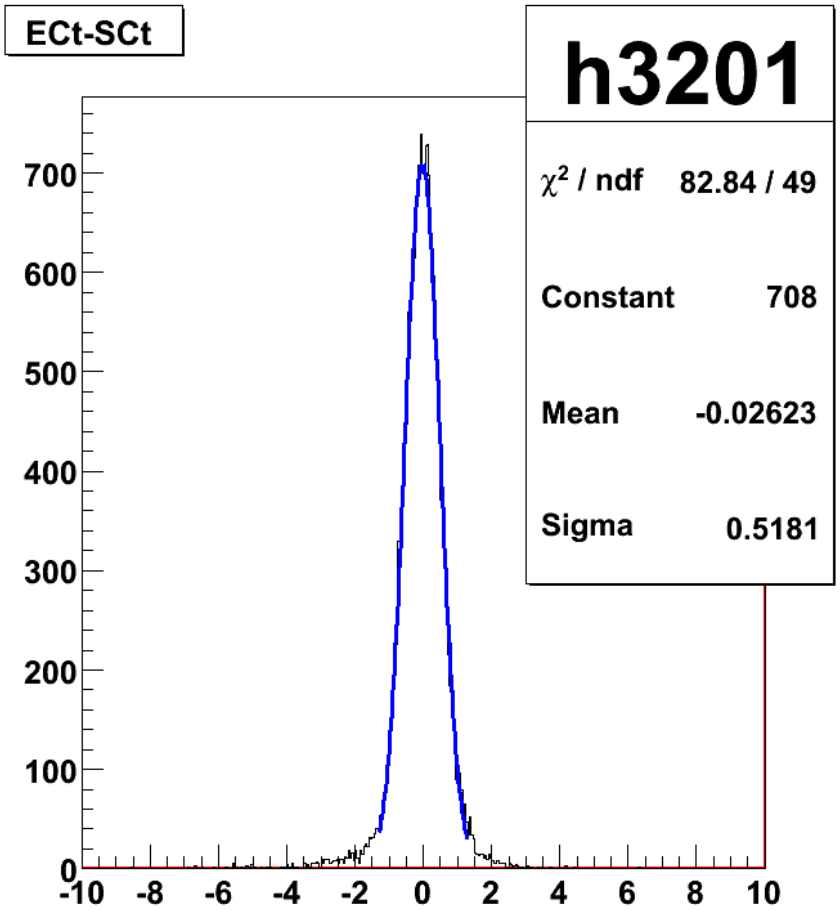
- A change to the code -packages/utilities/sc_calib/tdc_calib- was implemented in the fitting procedure for photon runs which resulted in an improvement of timing resolution by ~18%

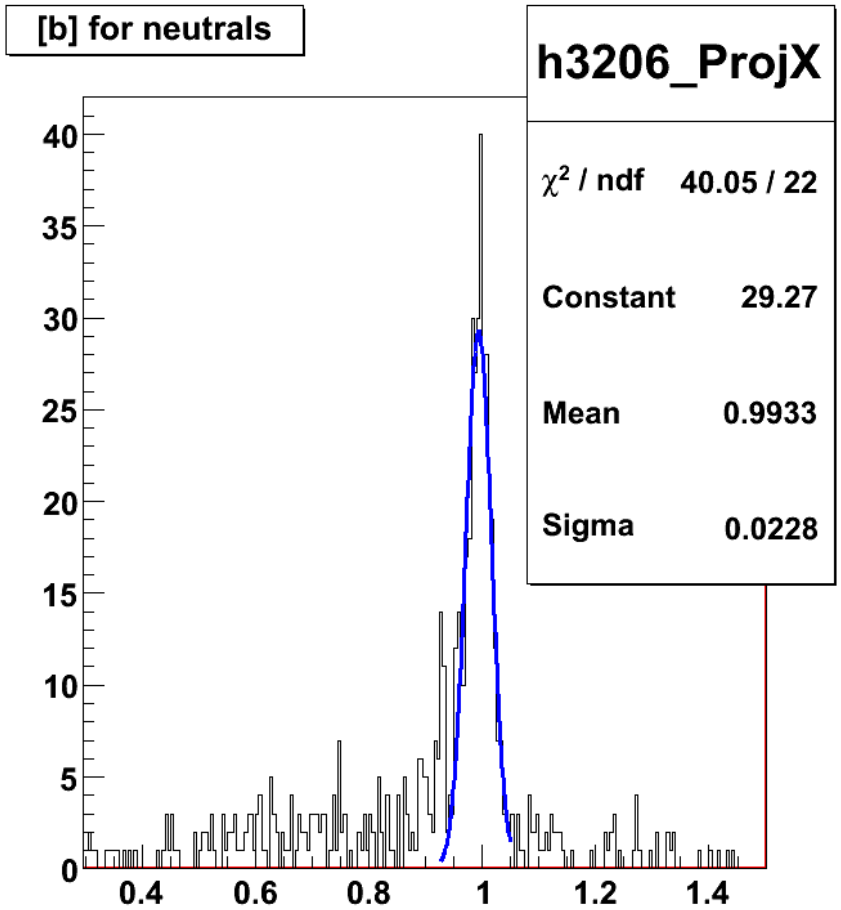
EC CALIBRATION





EC CALIBRATION





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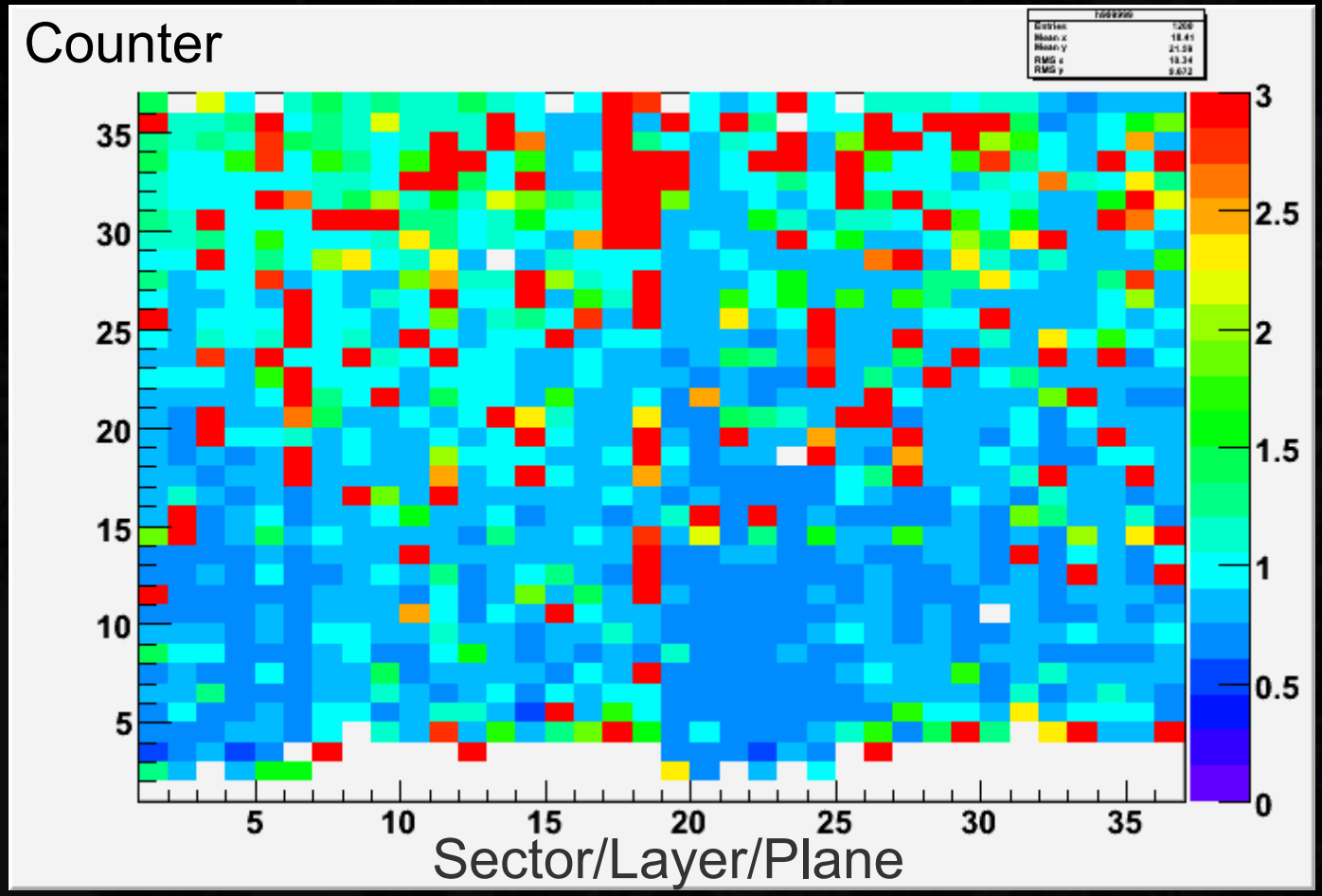

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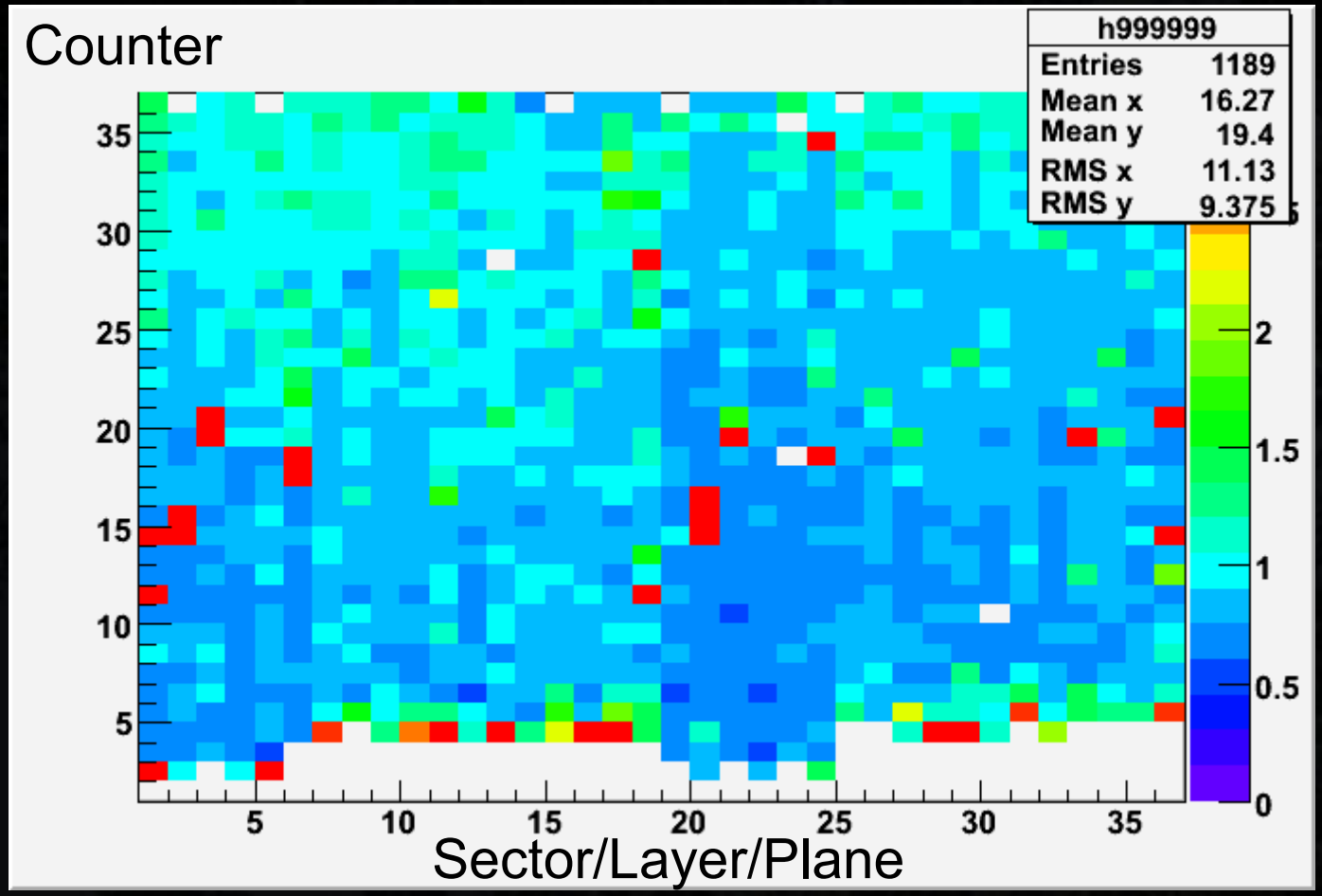
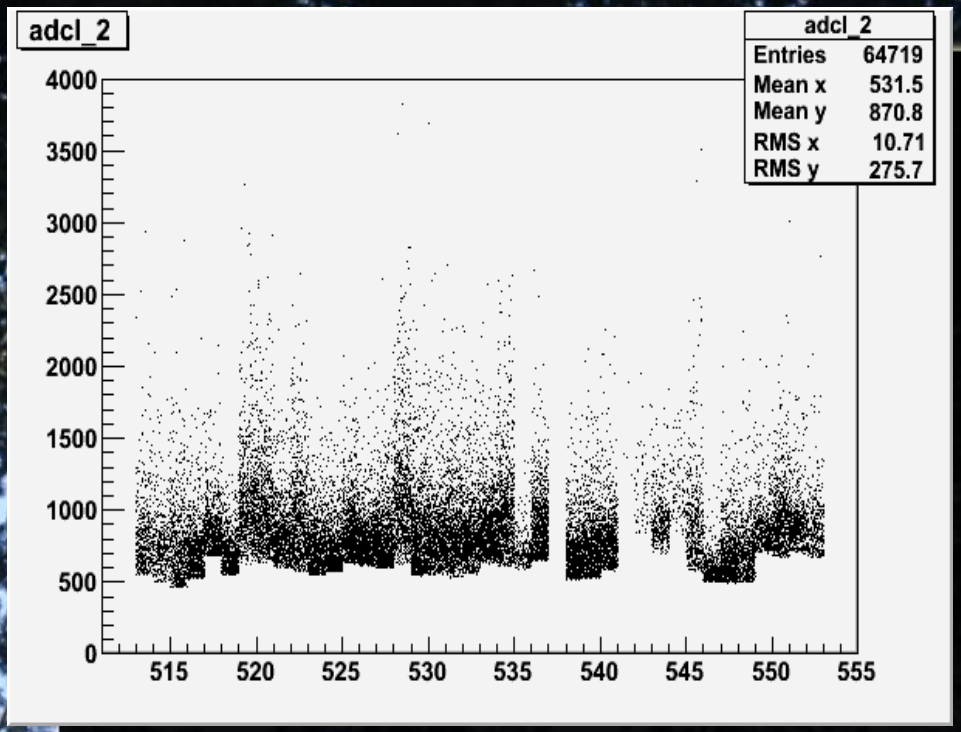


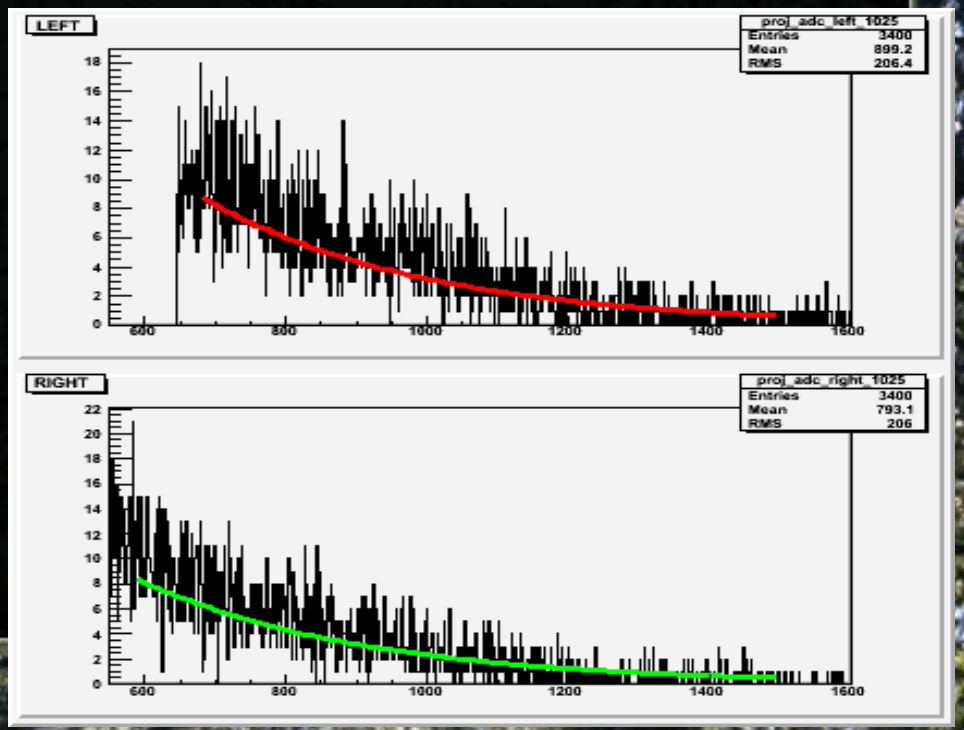
LAC CALIBRATION

- In progress



← ADC values for all stacks, layers and sectors

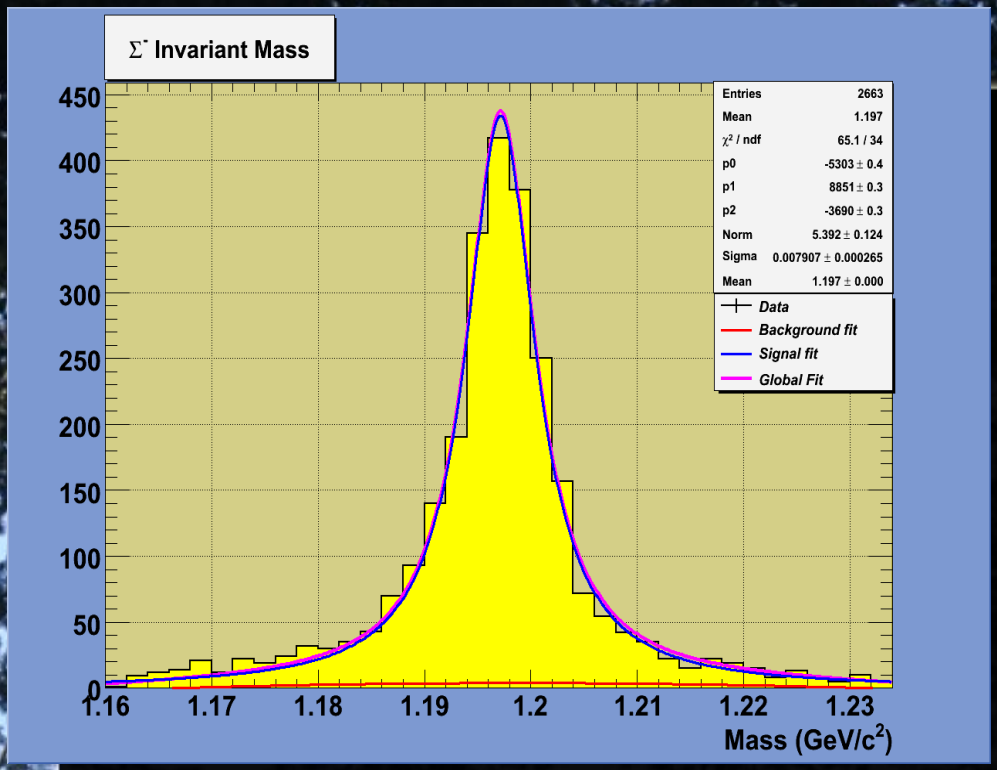
Projection in y axis and fitting →



$\gamma + n(p) \rightarrow K^+\Sigma^-(p)$

Edwin Munevar -GWU-

- 1+, 1-, 1neut
- Momentum for n recalculated according to Σ^- decay vertex
- $K^+\pi^-$ n assumed with no PID information
- Reaction identification
  - Σ^- Invariant mass
  - P spectator mass calculated by missing mass
  - Quasi-free calculated state by missing momentum



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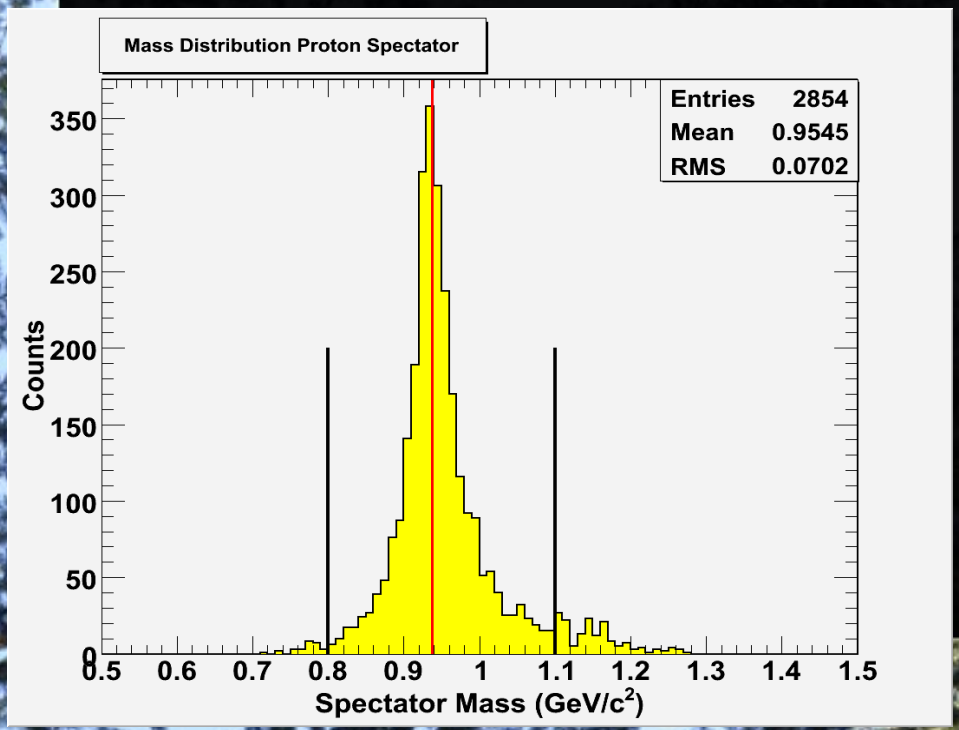
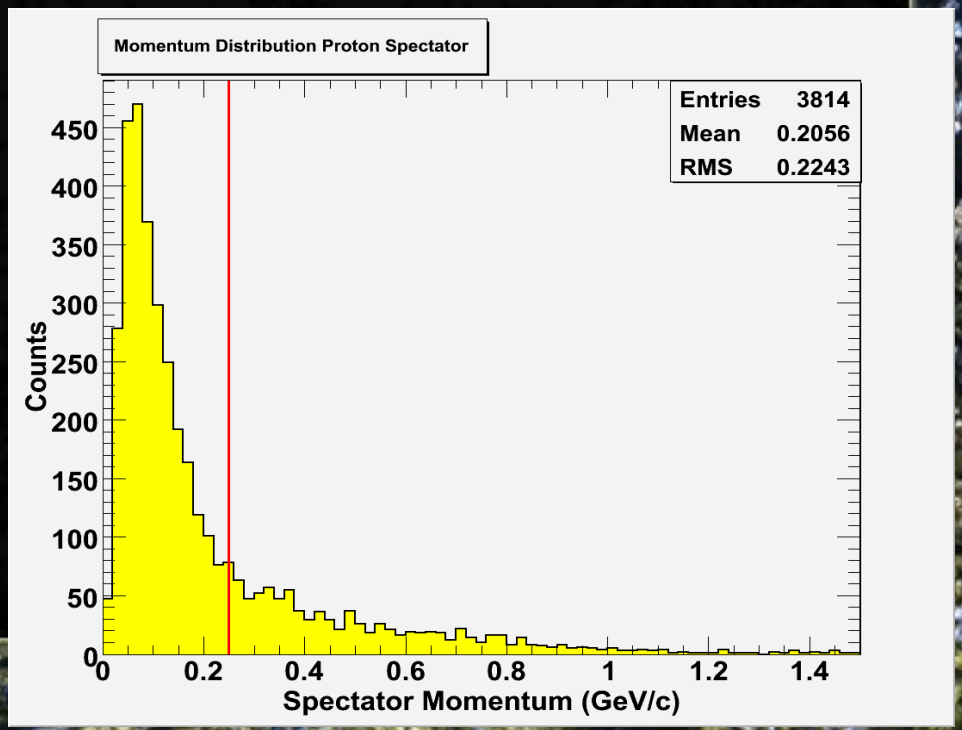


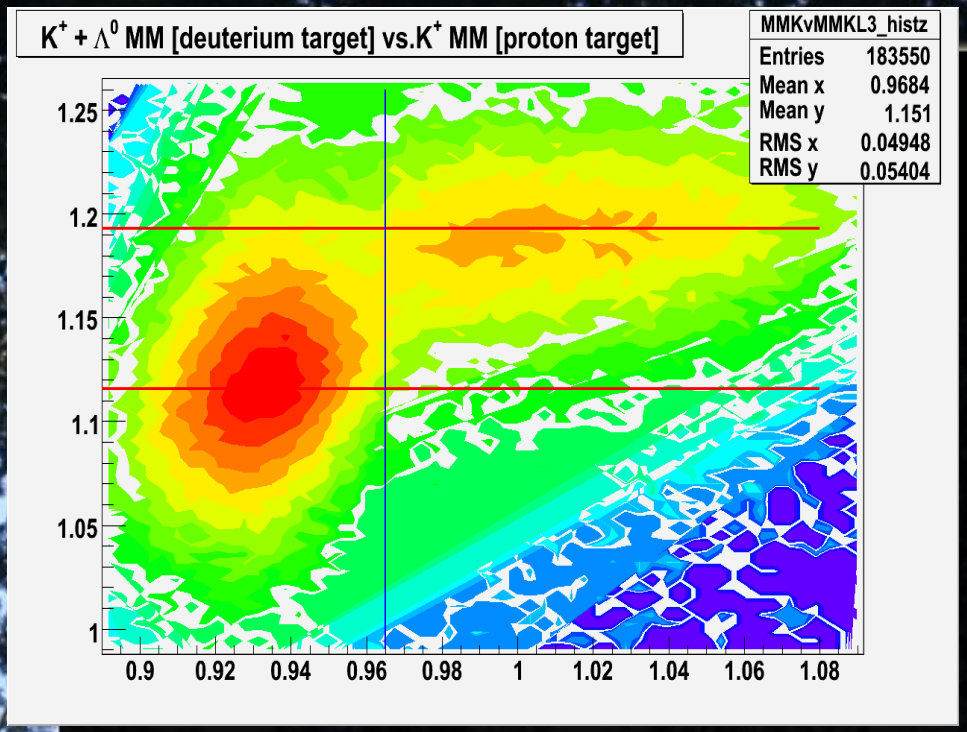


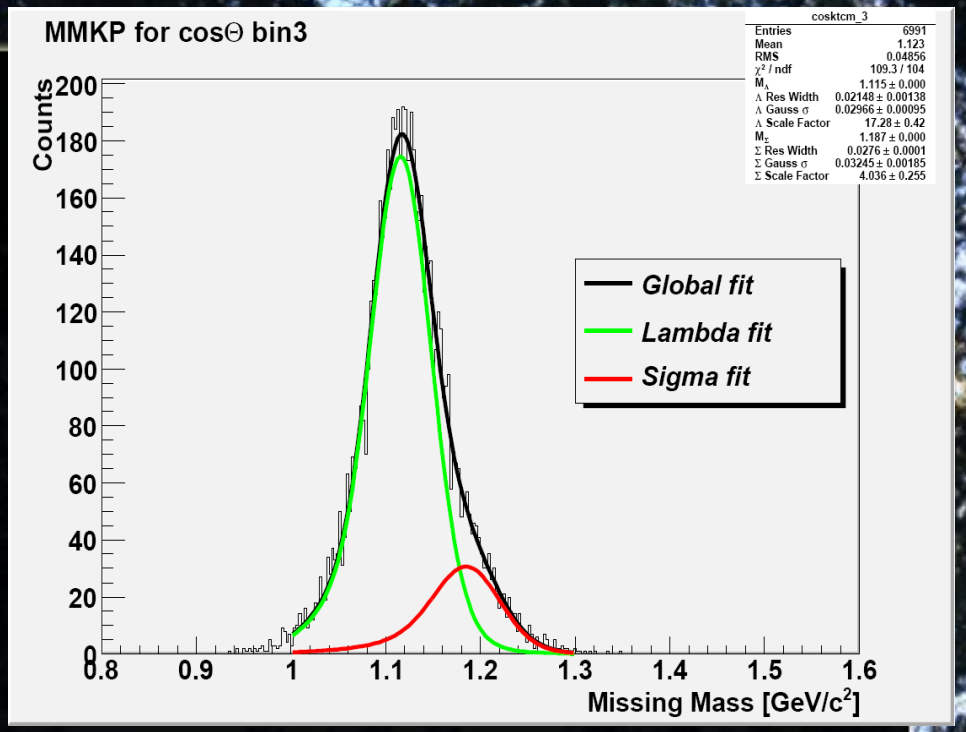
$K^+\Lambda(n)$; $K^+\Sigma^0(n)$

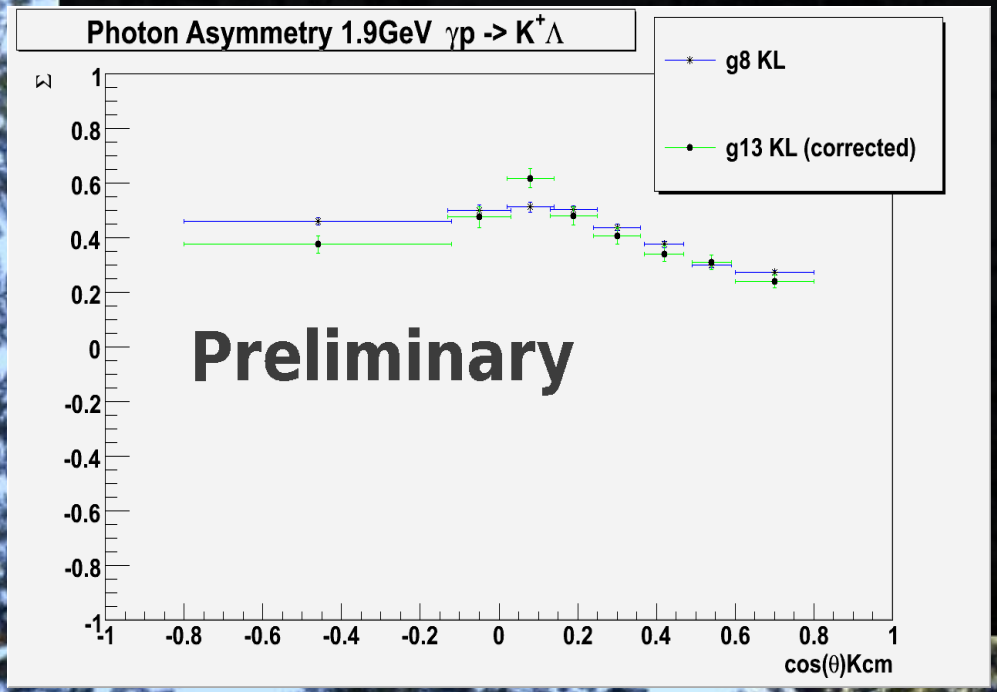
Russell Johnstone (Glasgow)

- Aplication of standard cuts for particle identification
- Hyperons reconstructed by missing mass
  - There is overlapping due to Fermi momentum
  - Sigma asymmetry values will give considerable contamination to lambda asymmetry
  - Asymmetry values for each hyperon over 8 angular bins in cos (θ)

-> Comparison with g8b data - Craig Paterson -







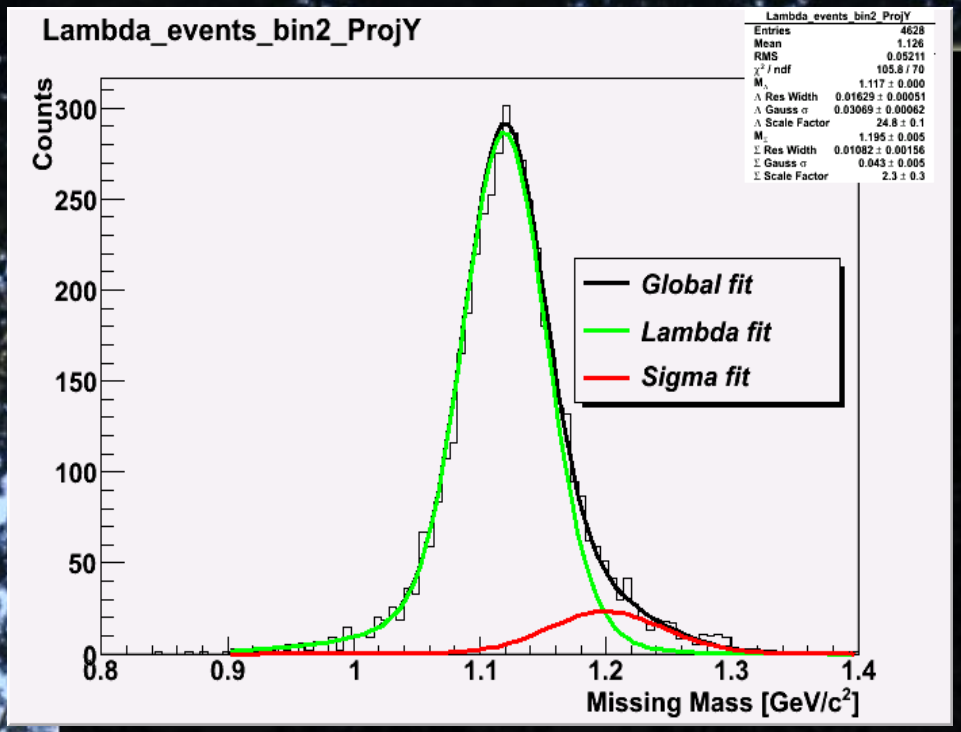
K⁺Λ(n); K⁺Σ⁰(n)

Russell Johnstone (Glasgow)

$K^0\Lambda(p)$; $K^0\Sigma^0(p)$

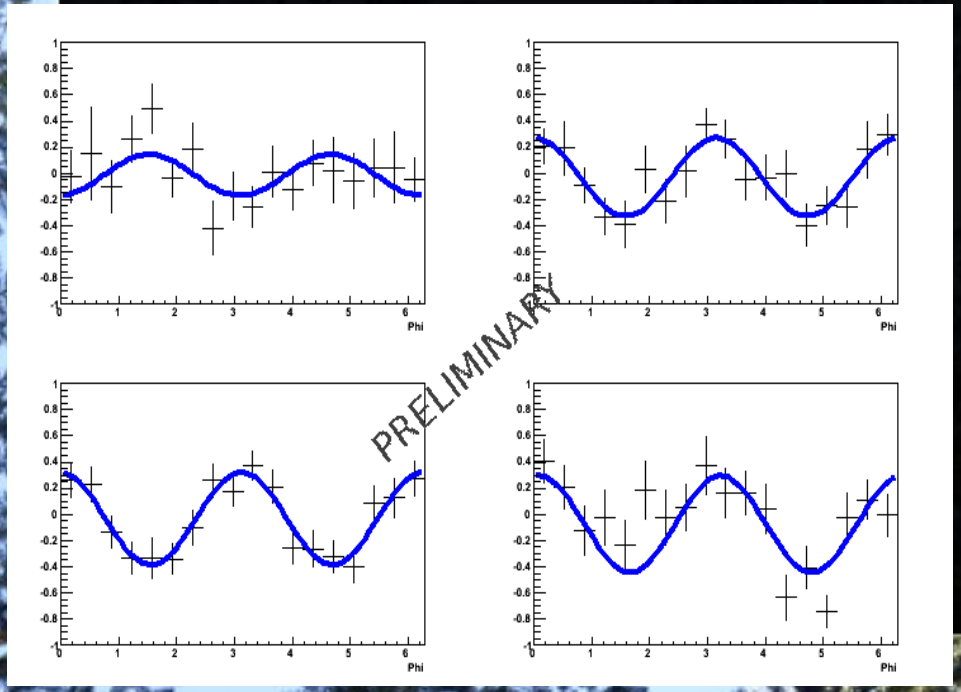
Neil Hassall (Glasgow)

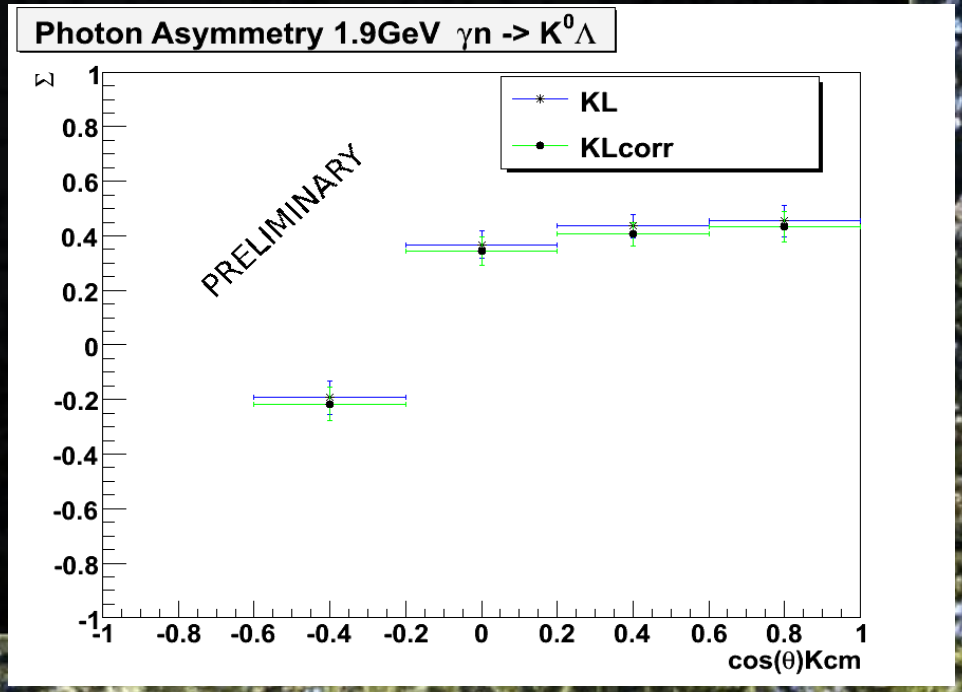
- Estimate how much sigma contamination is under lambda particle - first graph - (black fit is a Voight function; is the sum of lambda fit and sigma fit)
- Photon asymmetry for the 1.9 GeV peak setting - second graph – (4 angular bins & 1 200 MeV energy bin)
- Asymmetry as a function of cos (θ) – third graph -
- Estimation of systematic uncertainties ongoing



$K^0\Lambda(p)$, $K^0\Sigma^0(p)$

Neil Hassall (Glasgow)





PHD PROJECT STATUS

$\pi^- p(p)$: Daria Sokhan (Edinburgh)

- completed -

$K^+\Lambda(n)$; $K^+\Sigma^0(n)$ Russell Johnstone (Glasgow)

- almost completed -

$K^0\Lambda(p)$; $K^0\Sigma^0(p)$ Neil Hassall (Glasgow)

- in progress -

$K^+\Sigma^-(p)$: Edwin Munevar (GWU)

- in progress -

$K^{0*}\Lambda(p)$; $K^+\Sigma^{*-}(p)$ Paul Mattione (RICE)

- in progress -

$p\omega(n)$: Danny Martinez (ISU)

- starting -

Charles Taylor (ISU)

- to be determined -

THANKS

- NSF
- JLAB
- CUA
- GLASGOW
- GWU
- EDINBURGH
- USC
- ISU
- RICE

AND TO YOU ALL !!!