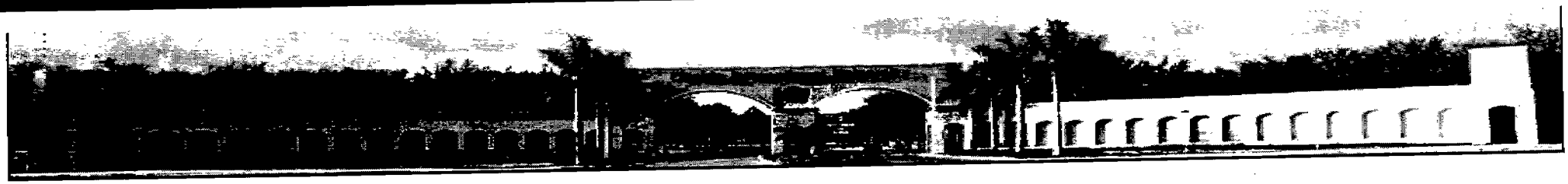
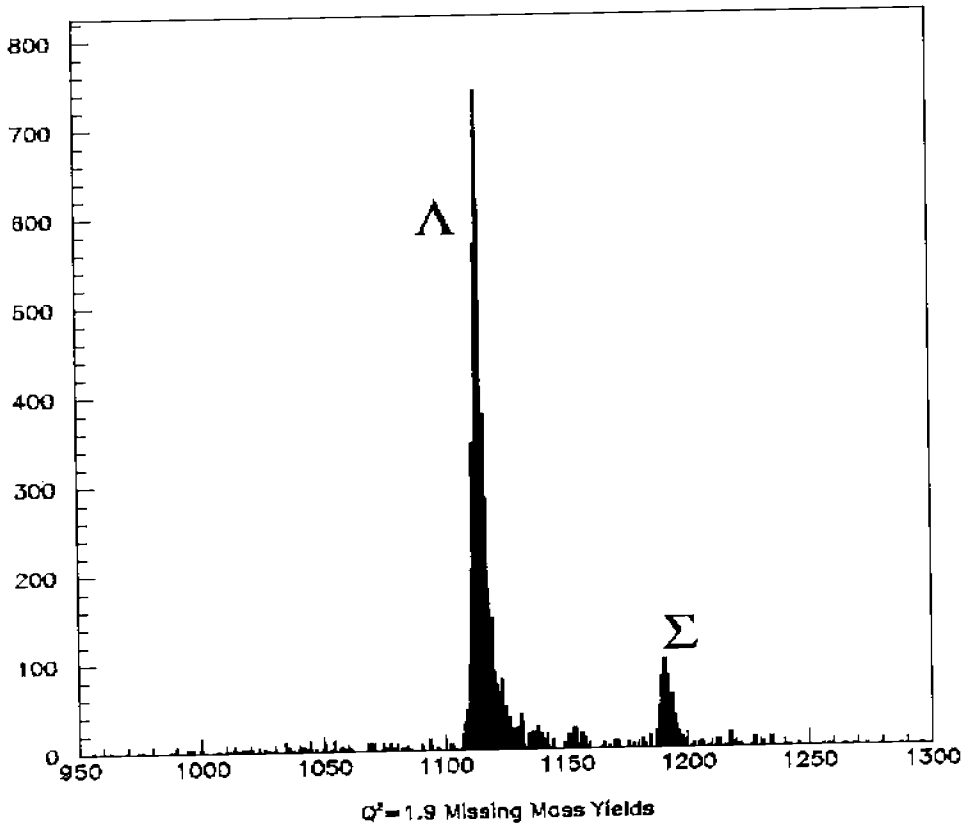


Kaon Electroproduction at Jlab in Halls A and C

Pete Markowitz

Florida International University



- Hall C
- Physics results
- Hall A
- Current Analysis
- Future Work

Hall C

E93-018

Longitudinal/Transverse Cross Section Separation in p(e,e'K$^+$)Λ,(Σ^0)

O.K. Baker

Results

- Rosenbluth separation of σ_L, σ_T
- $0.5 \leq Q^2 \leq 2.0$ $(GeV/c)^2$, W~1.84 GeV
- H target, Λ,Σfinal states

E91-016

Electroproduction of Kaons and Light Hypernuclei

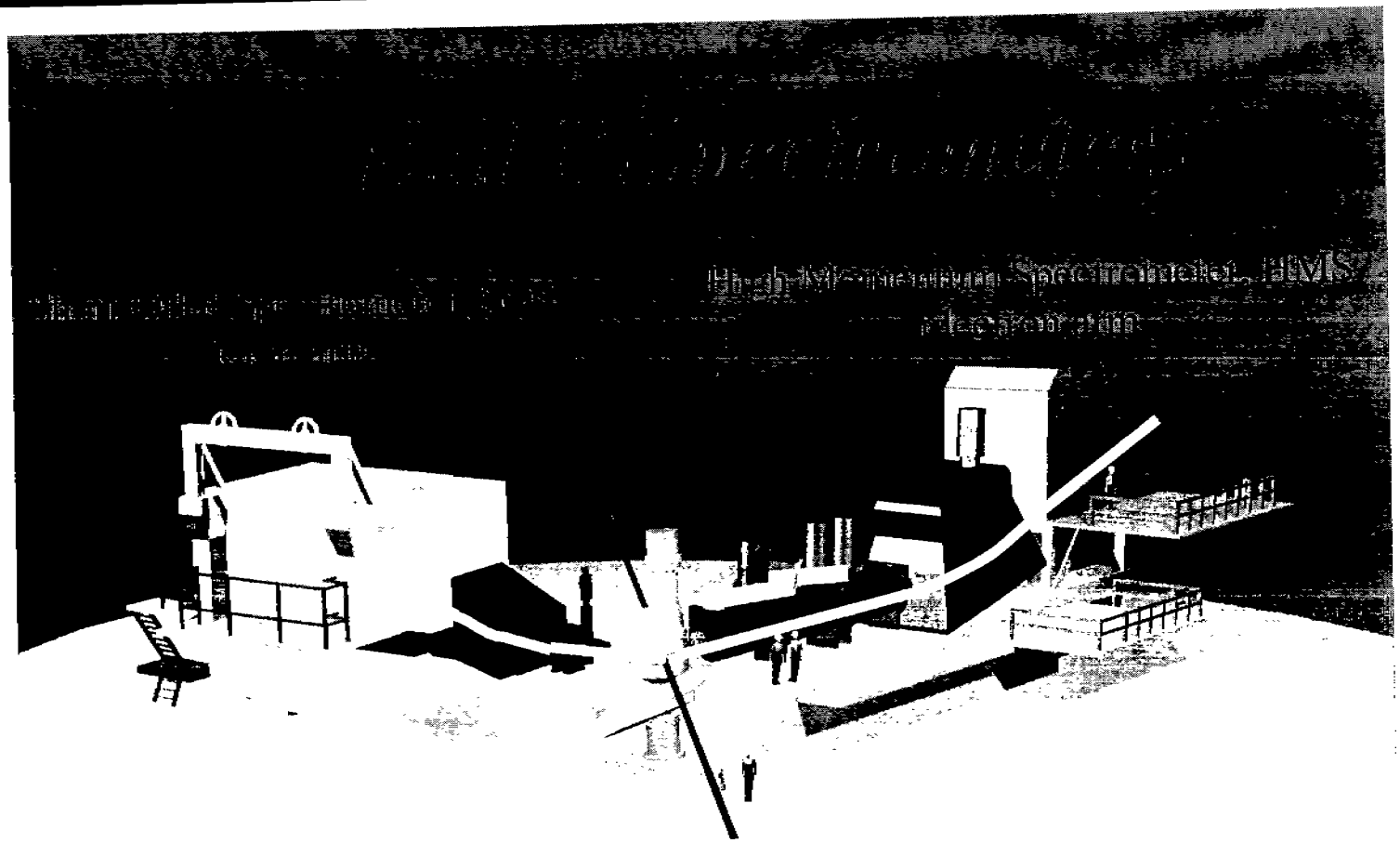
B. Zeidman

J. Reinhold

Results

Angular distributions gave:

- H gave σ parameterization
- D gave n(e,e'K$^+$)Σ^-
- R(d/p) and R(d/p)
- Unresolved $\Sigma^{0/-}$ final states
- Q^2=0.38 $(GeV/c)^2$, W~1.9 GeV



Electron beam

- SOS built to detect rapidly decaying particles
- HMS allows working at high electron energy

Hall C Particle Identification

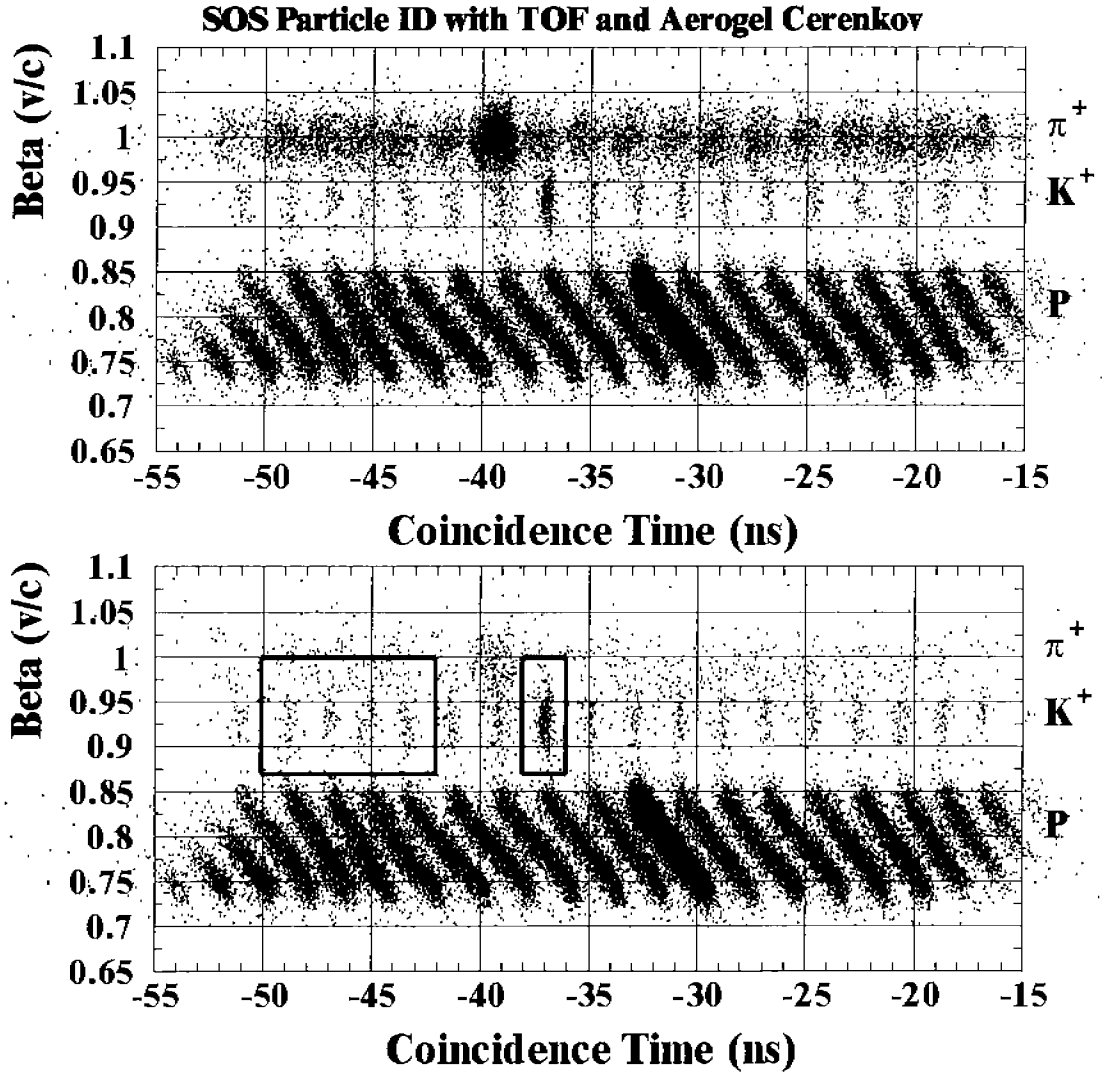
K^+ PID:

Coincidence time cuts separate 99.9 % reak K^+, π^+,p

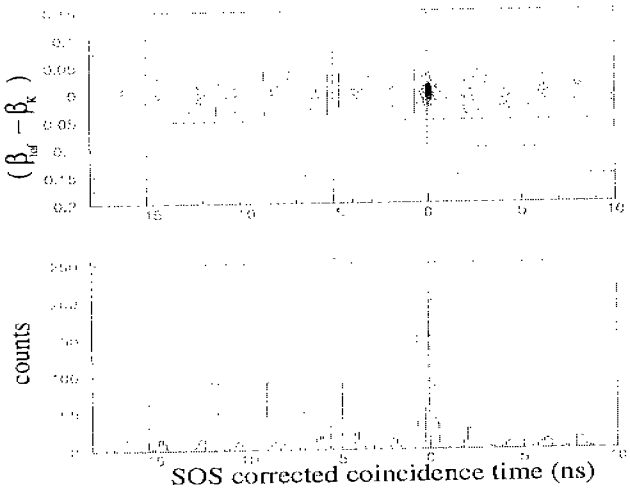
Aerogel cuts reject 98 % π^+
b cuts reject 99 % p

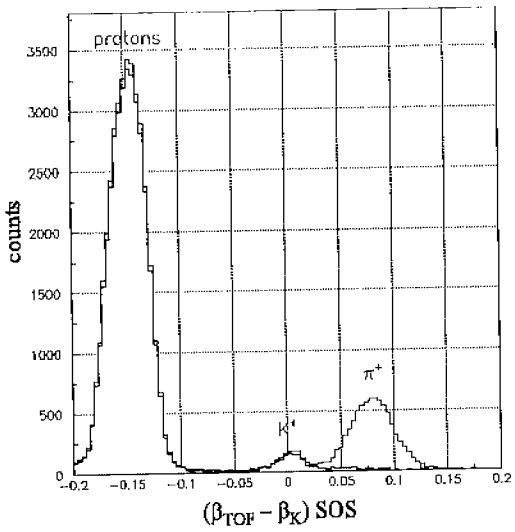
e' PID

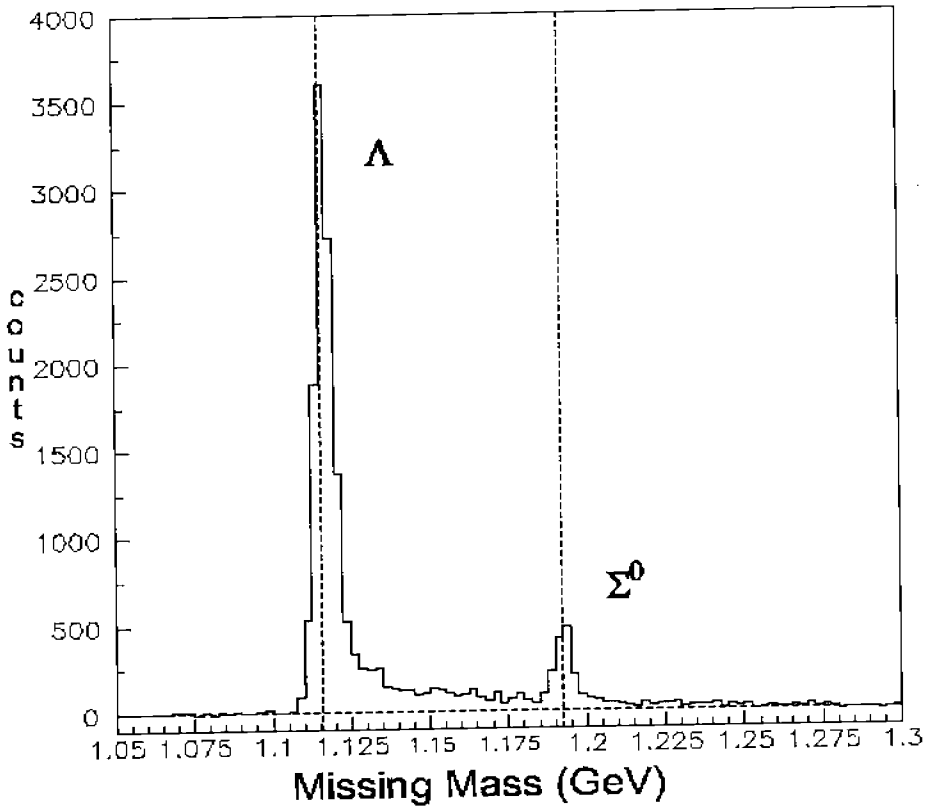
Cerenkov and calorimeter have ~ 99.8 % efficiency for electron PID



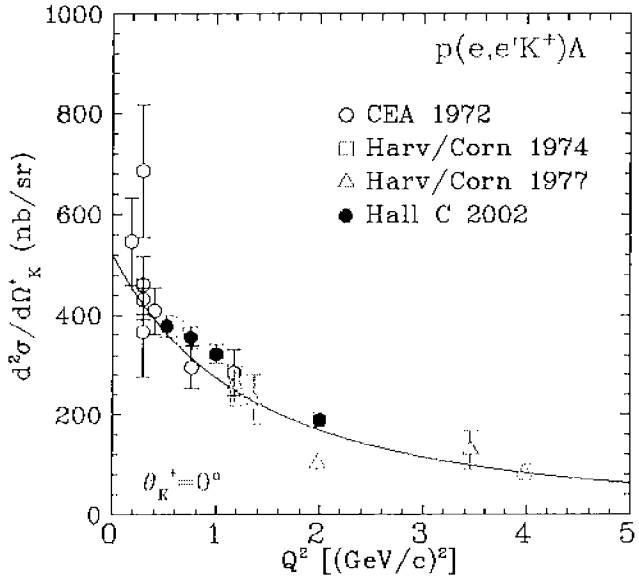
H(e,e'K)Y Missing Mass

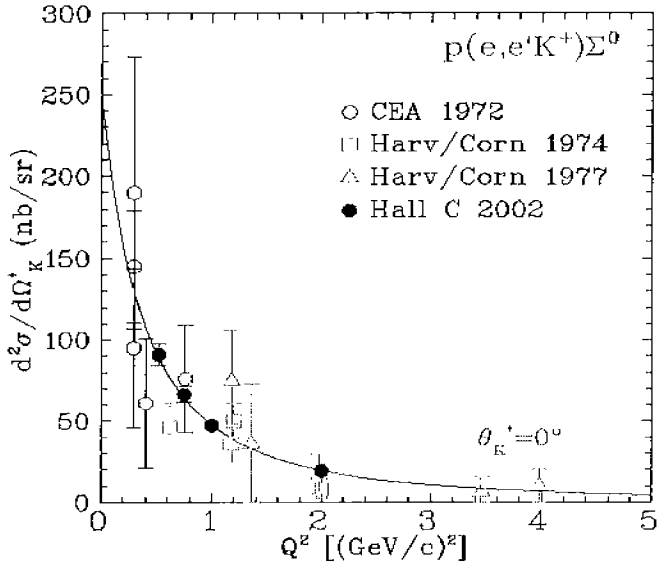






Results from E93-018 on H(e,e'K)Y
Unseparated cross sections



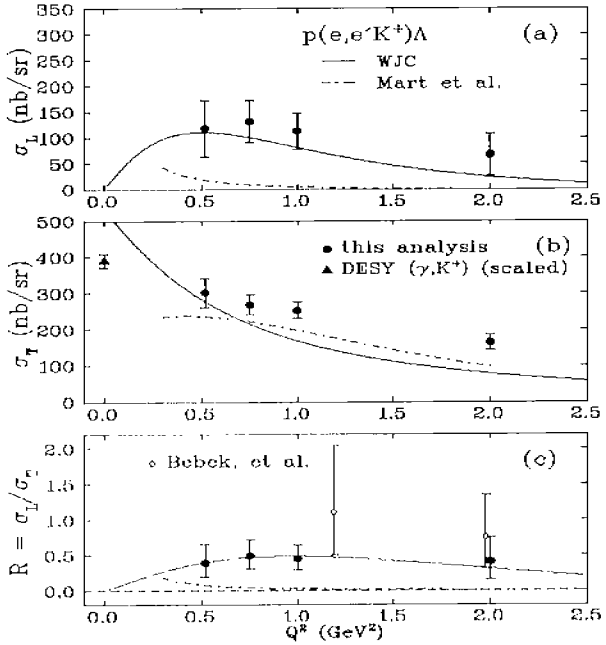


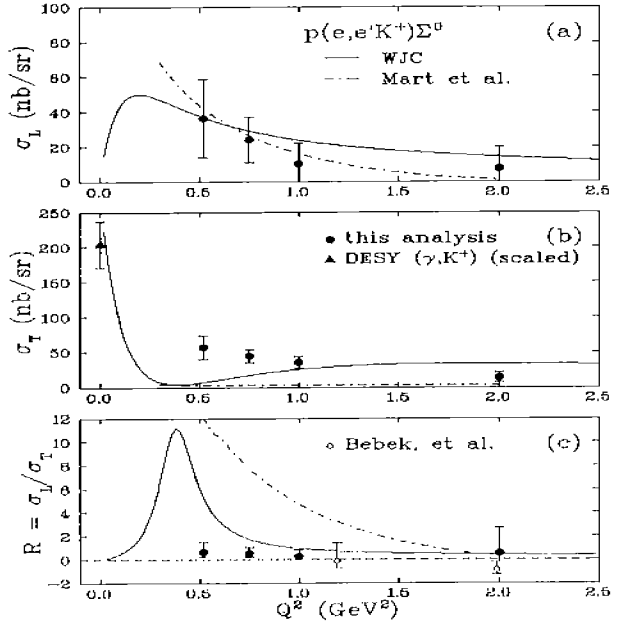
Λ cross section drops as $(Q2 + 2.67)^{-1}$

Σ cross section drops as $(Q2 + 0.79)^{-1}$

Both consistent with previous analyses

Results from E93-018 on H(e,e'K)Y
Separated responses





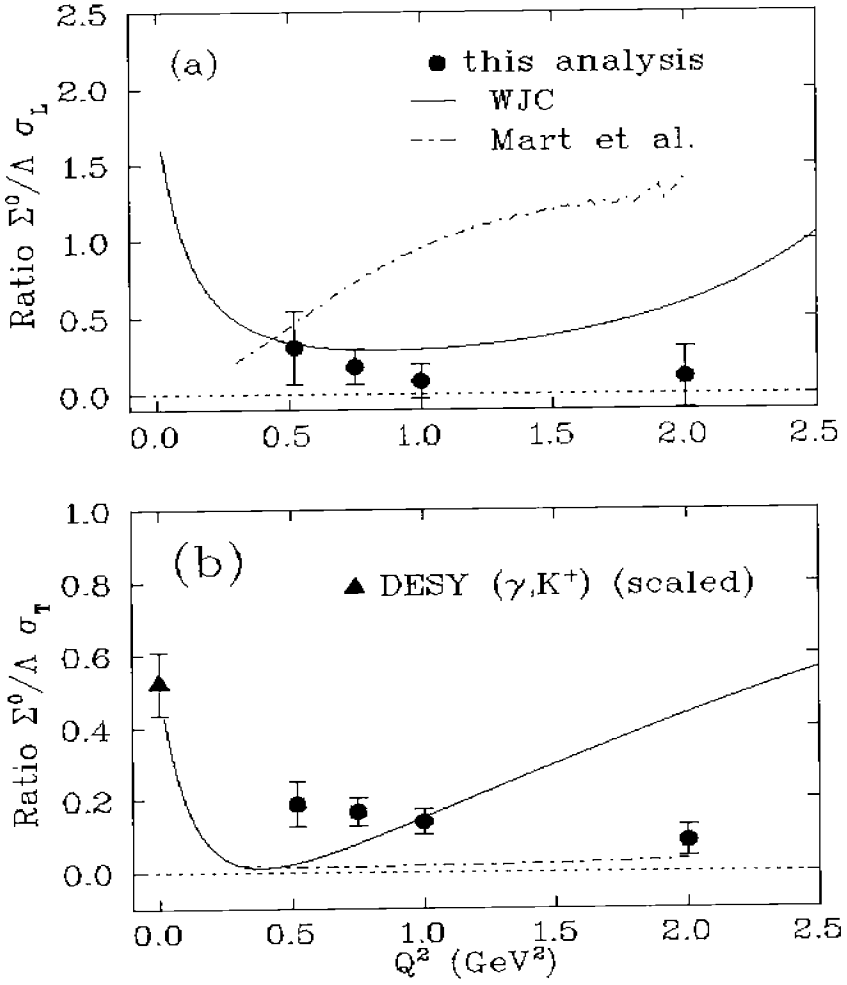
Λ L/T $\Rightarrow$ 0.5

Σ L/T $\Rightarrow$ 0

Both consistent with previous analyses

Results from E93-018 on H(e,e'K)Y
Ratio of Λ to Σ response functions

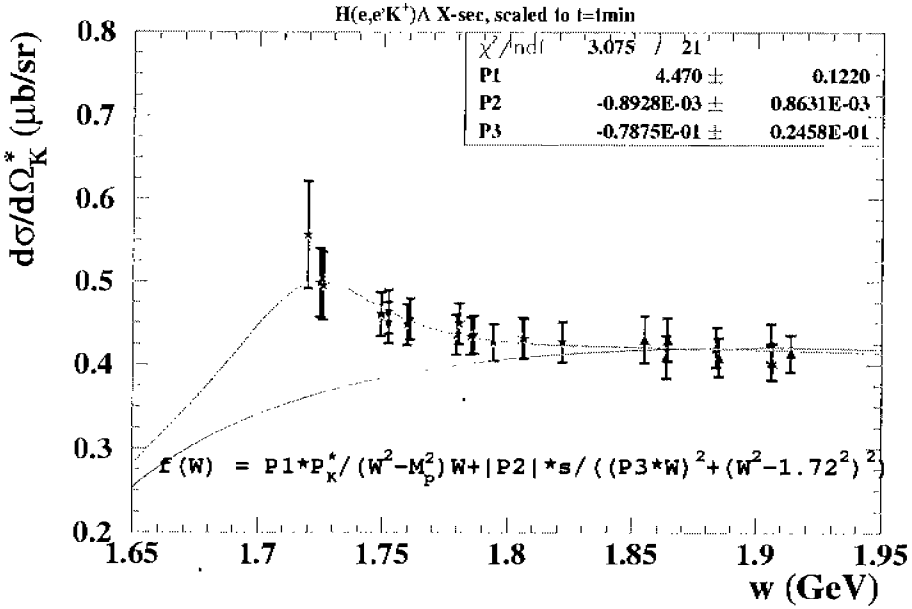
- Longitudinal $\Lambda/\Sigma \Rightarrow 0$
- Transverse $\Lambda/\Sigma \Rightarrow 0.1$



Results from E91-016 on H(e,e'K)Y

Simple Model for Hydrogen Data

$$\partial\sigma/\partial\Omega \;\prod\; f(Q^2)\; g(W)\; h(t)\; i(\varphi)$$

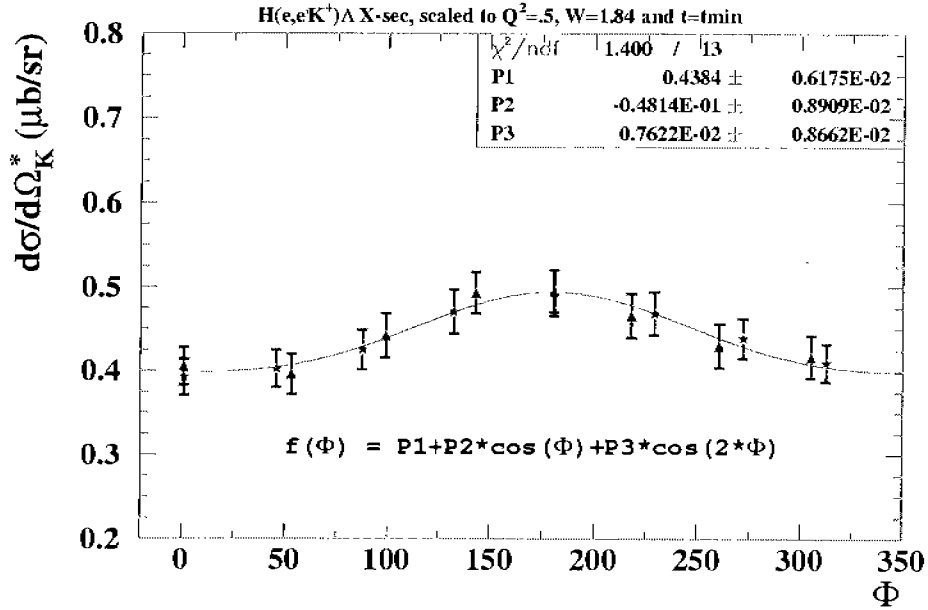


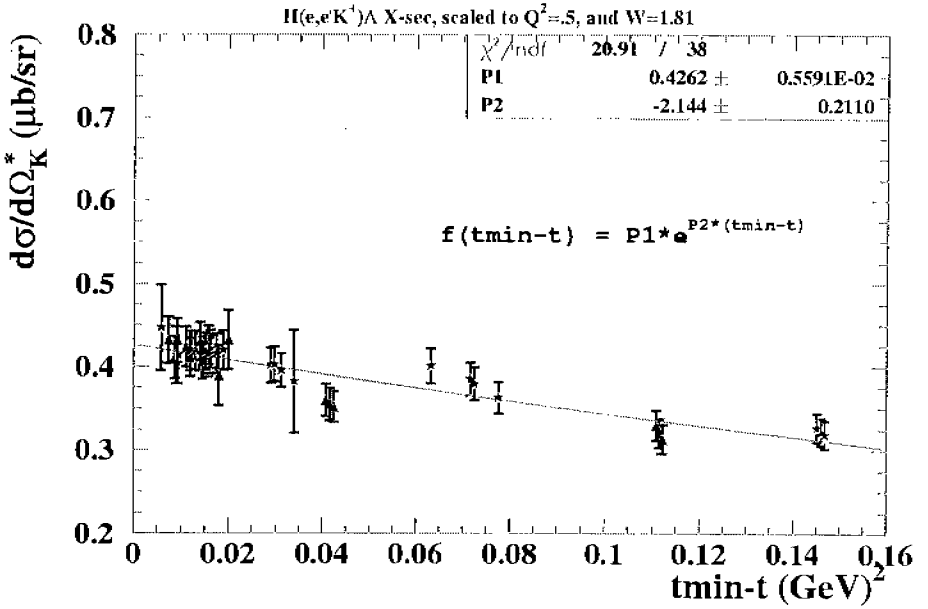
$$f(Q^2) \;=\; Constant$$

$$g(W) \;=\; \frac{P_1 P_k^{CM}}{(W^2 - M_p^2)W} + \frac{P_2 W^2}{(P_3 W)^2 + (W^2 - P_4^2)^2}$$

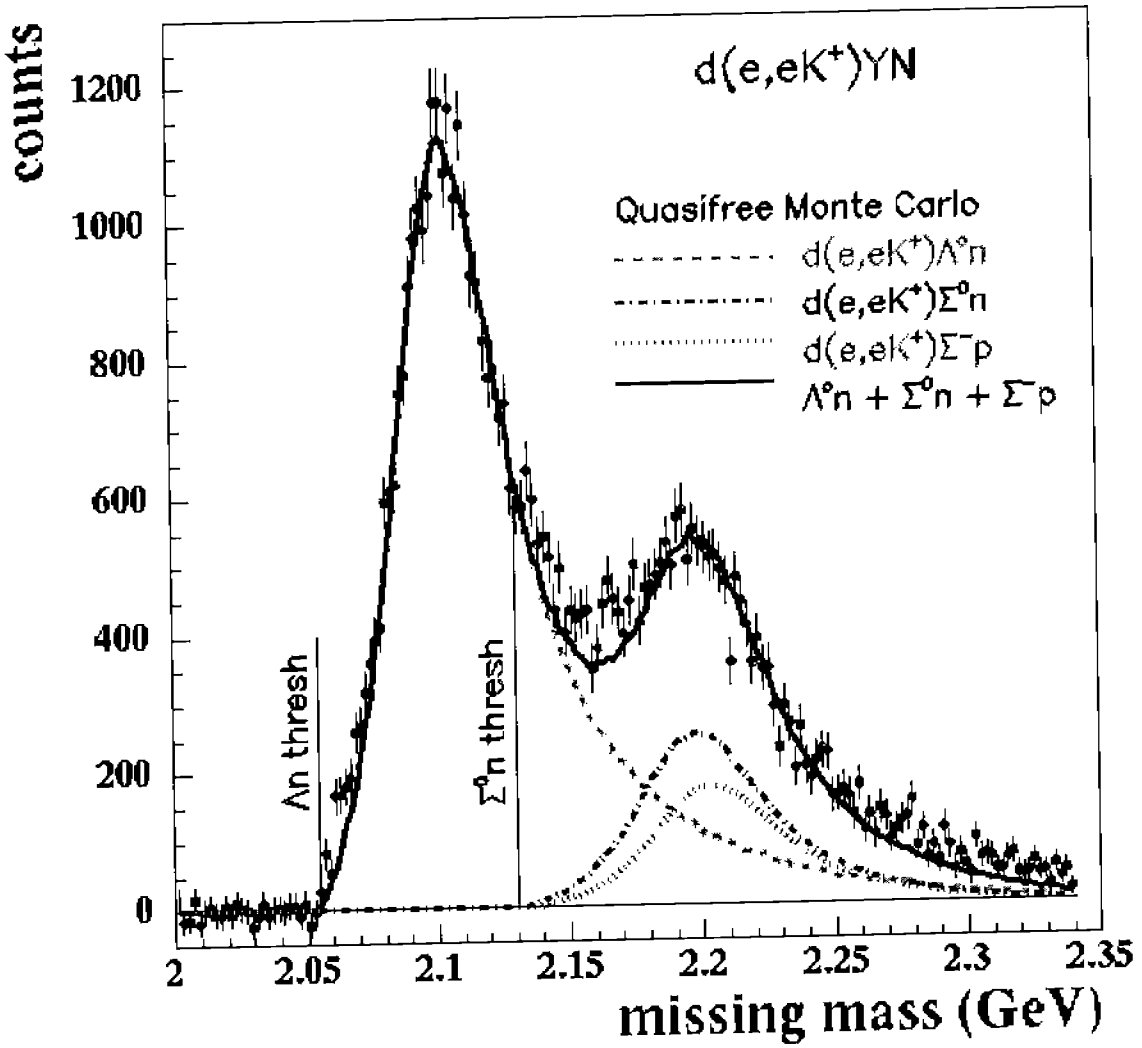
$$h(t_{min} - t) \;=\; P_1 e^{P_2(t_{min} - t)}$$

$$i(\phi) \;=\; P_1 + P_2\cos(\phi) + P_3\cos(2\phi)$$





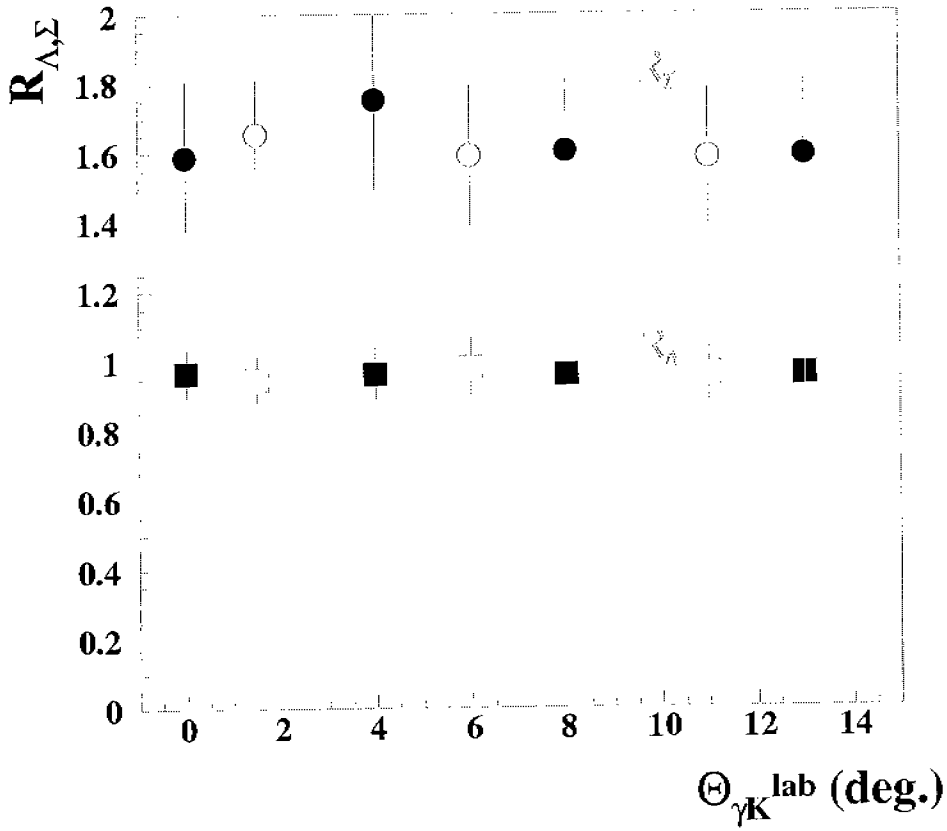
Results from E91-016 on D(e,e'K)Y



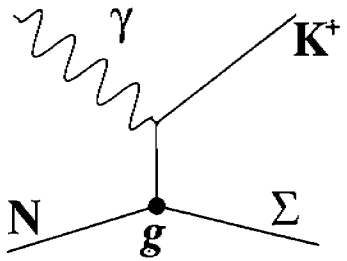
Results from E91-016 on D(e,e'K)Y

$$R_\Lambda = \frac{\frac{d\sigma}{d\Omega}(\gamma d \to K^+\Lambda)}{\frac{d\sigma}{d\Omega}(\gamma p \to K^+\Lambda)}$$

$$R_\Sigma = \frac{\frac{d\sigma}{d\Omega}(\gamma d \to K^+\Sigma)}{\frac{d\sigma}{d\Omega}(\gamma p \to K^+\Sigma^0)}$$

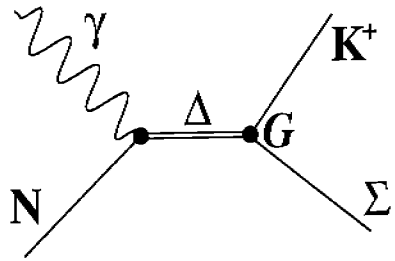


t-channel:



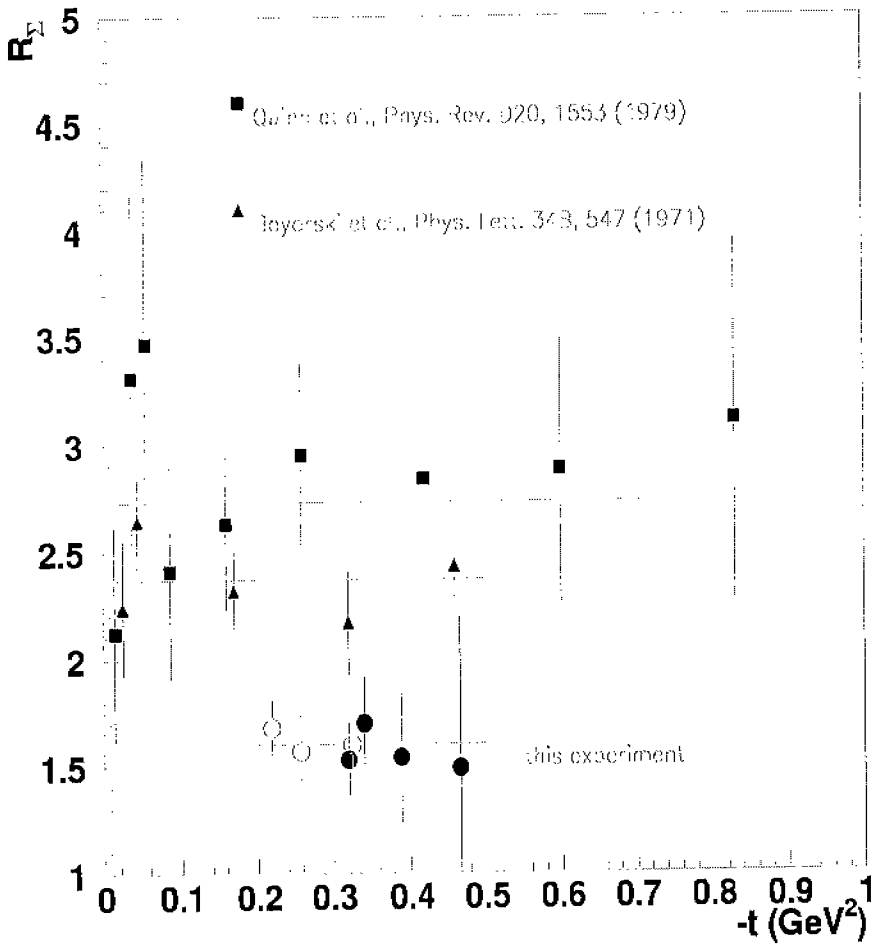
$$g_{K^+\Sigma^- n} = \sqrt{2} g_{K^+\Sigma^0 p} \qquad R_\Sigma = 3$$

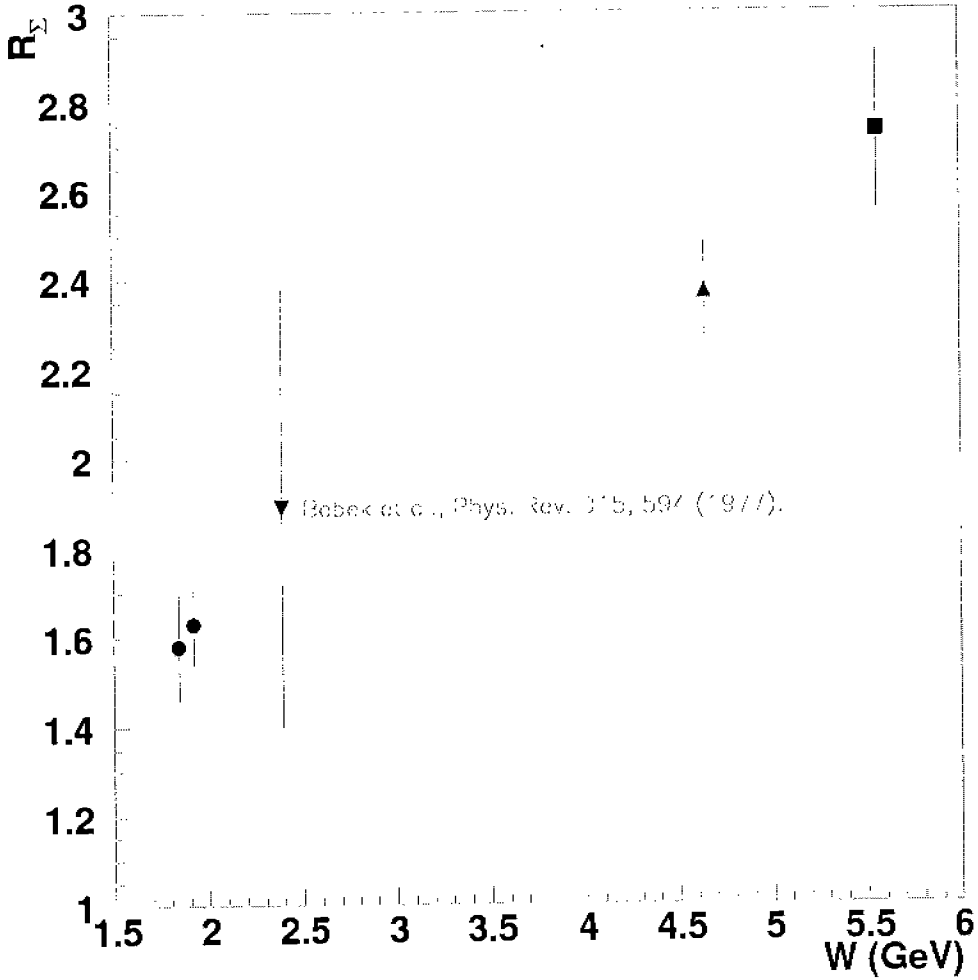
s-channel:



$$G_{K^+\Sigma^- \Delta^0} = G_{K^+\Sigma^0 \Delta^+}/\sqrt{2} \qquad R_\Sigma = 1.5$$

Results from E91-016 on D(e,e'K)Y





FLORIDA INTERNATIONAL UNIVERSITY

INFN Istituto Nazionale di Fisica Nucleare

Hall A

E98-108

Electroproduction of Kaons up to $Q^2=3\ (GeV/c)^2$

O.K. Baker, C.C. Chang, S. Frullani, M. Iodice, P. Markowitz

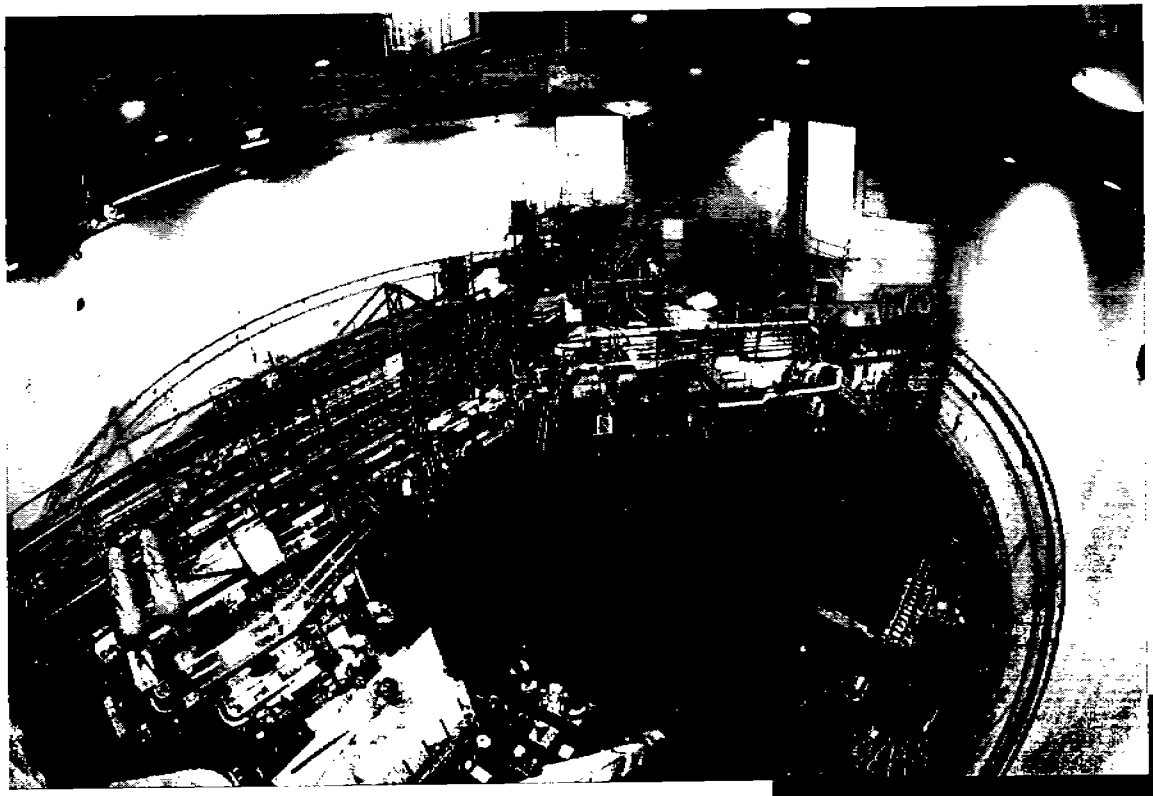
- Separate σ_L, σ_T, σ_{LT}

  allows extrapolation of $\sigma_L(t)$ to kaon pole

  σ_T data overlaps resonance region, extends into DIS

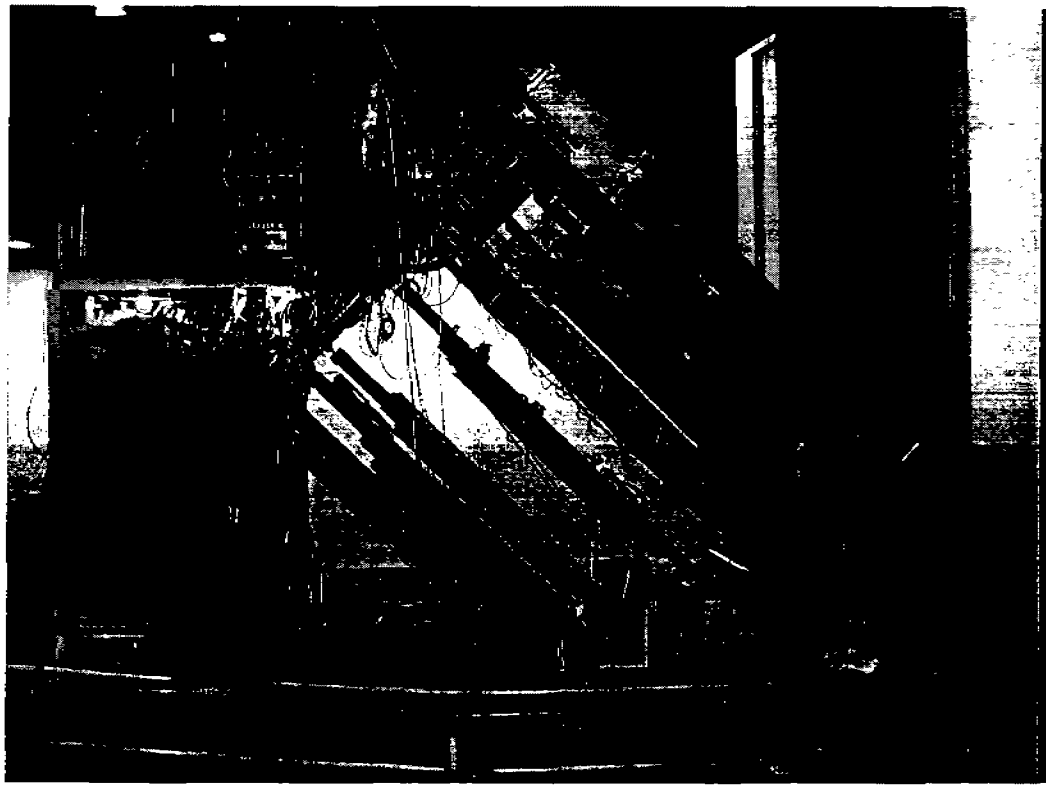
  $1.8<W<2.4,\quad Q^2=2,2.5,\quad .4<|t|<3$

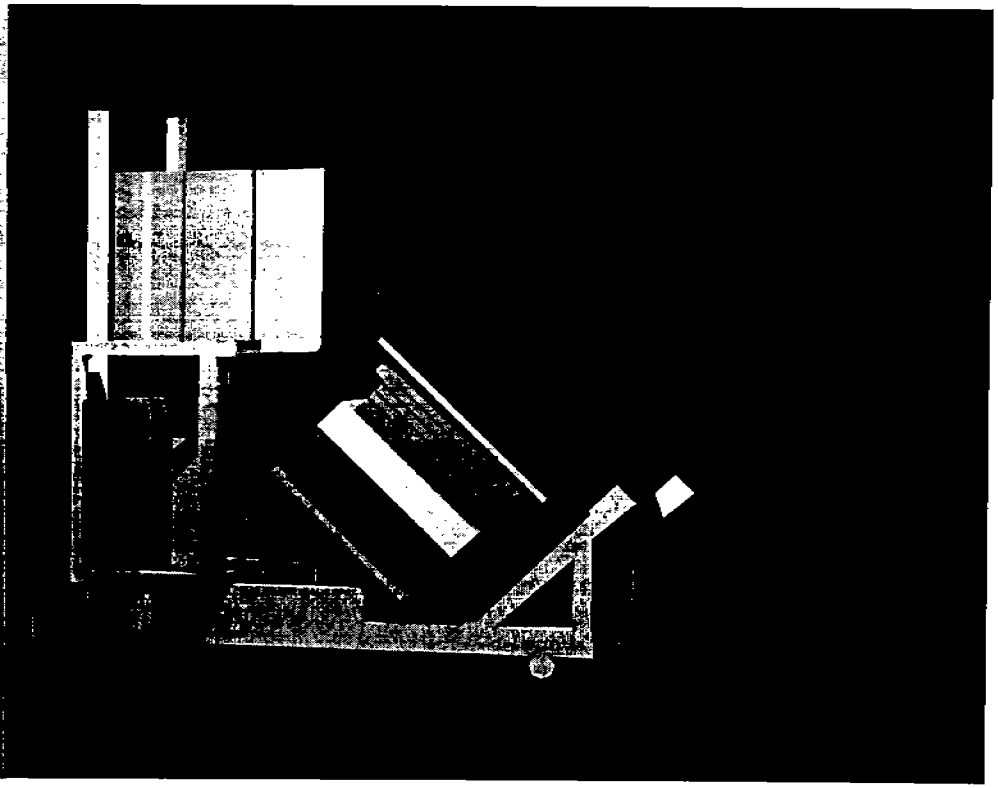
  σ_{LT} very model sensitive
- Understand electroproduction mechanisms
- Eventually (when mechanisms under control) $\rightarrow$ $F_K(Q^2)$



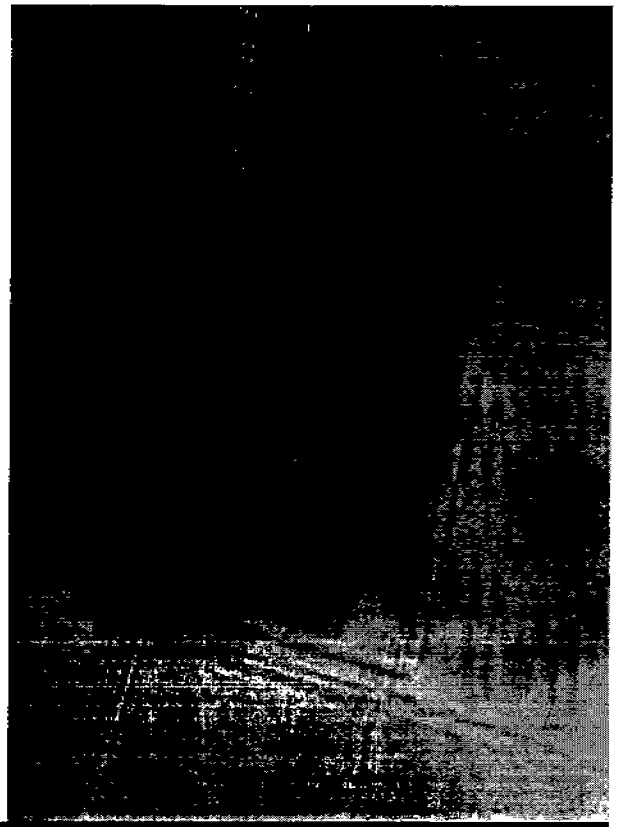
Hall A HRS Spectrometers

Hall A Hadron Detectors



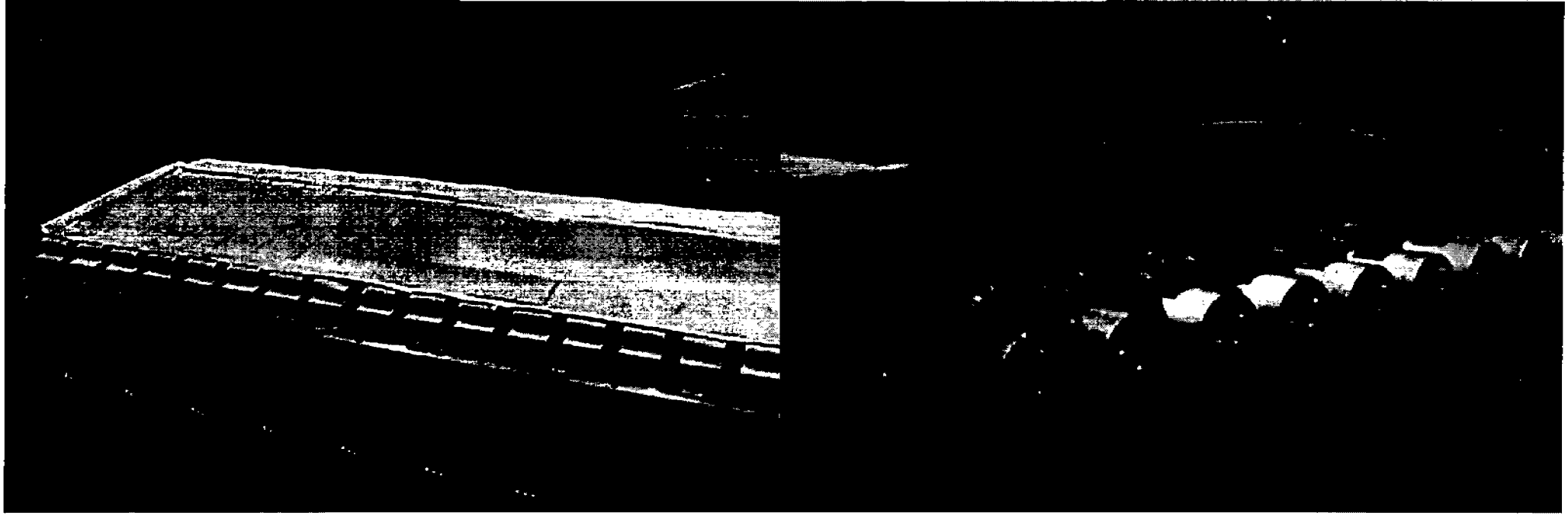


2 new aerogel Čerenkov counters

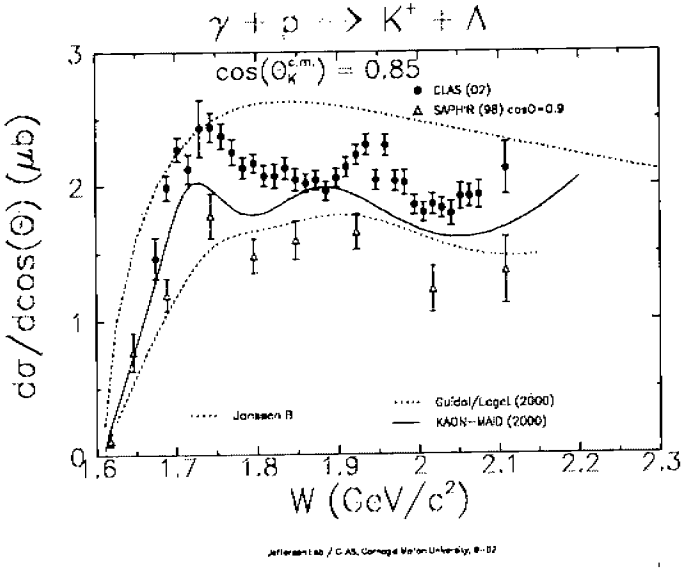


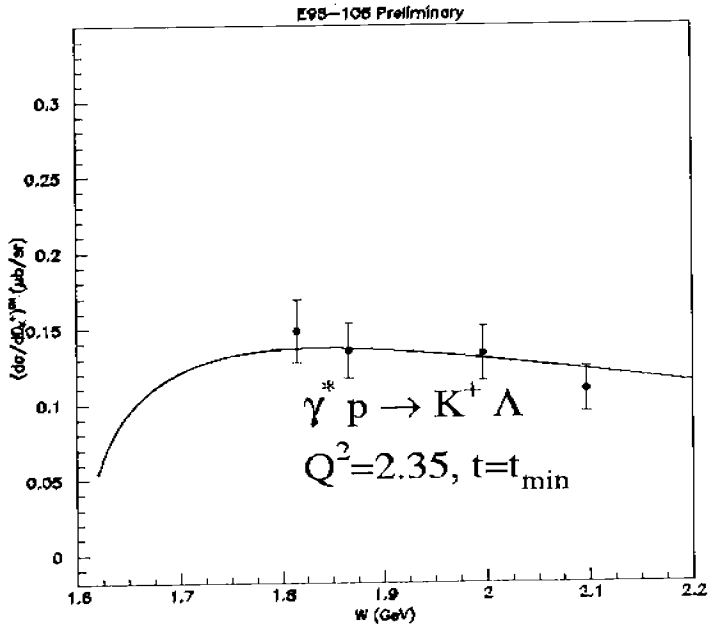
A1 has n_1=1.015, sees e^+, π^+

A2 has n_1=1.015, sees e^+, π^+,K^+



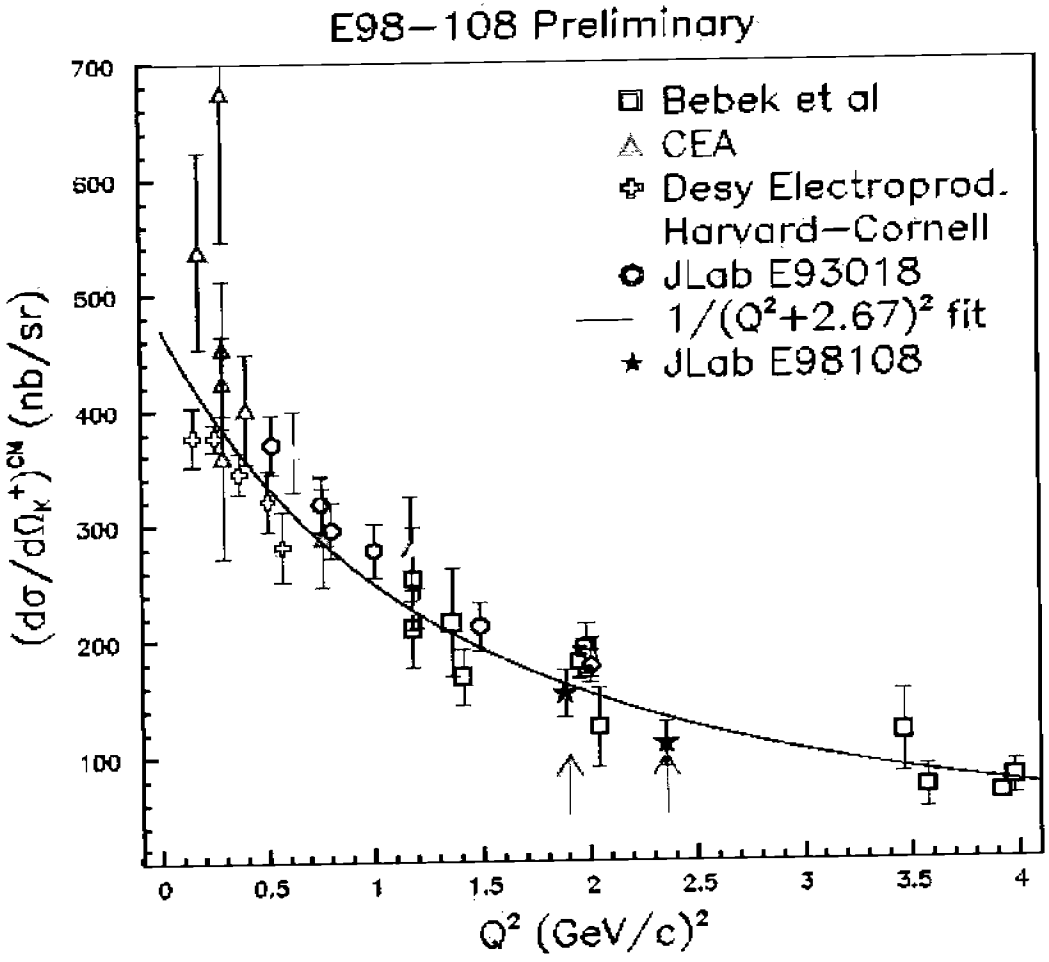
Invariant Mass Dependence





- Left plots shows real photon data from Bonn, CLAS
- Right plot shows high-ϵ points (curve scaled in Q^2)

Q^2 Dependence

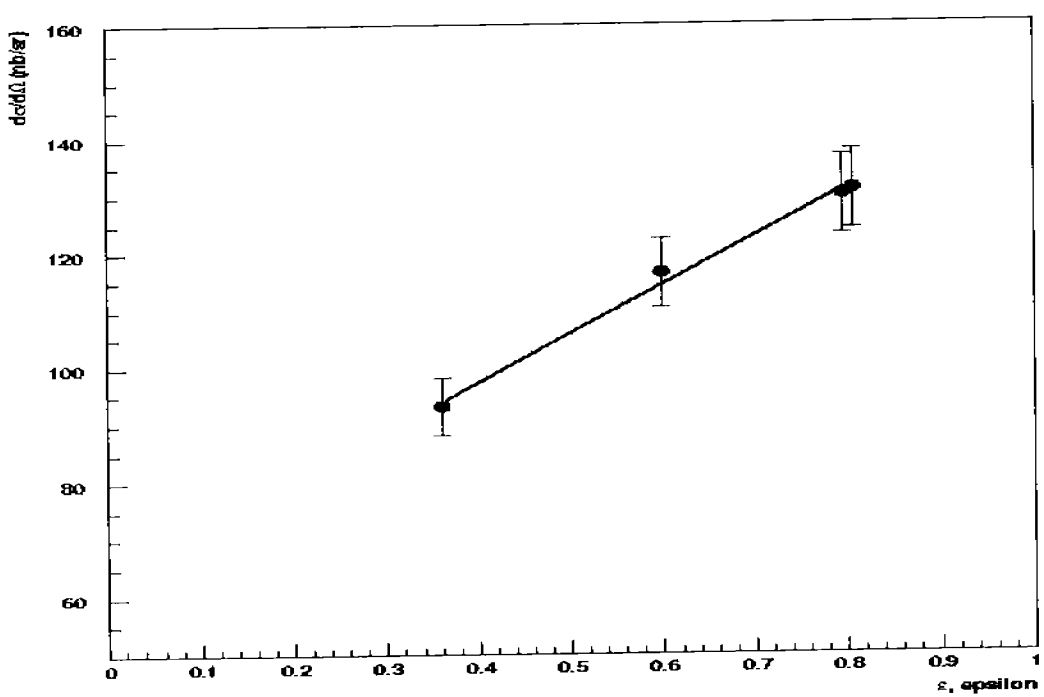


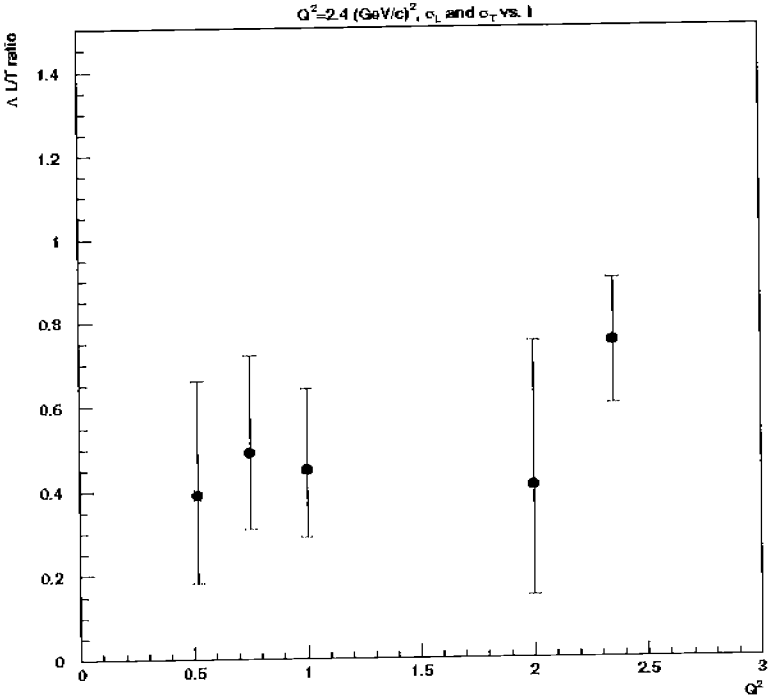
Agreement to empirical fit reasonable

Data taken at varying ε

Scaled to *W=2.15 GeV*

Q^2 Dependence





"Typical" experiment data; "cautious" error bars

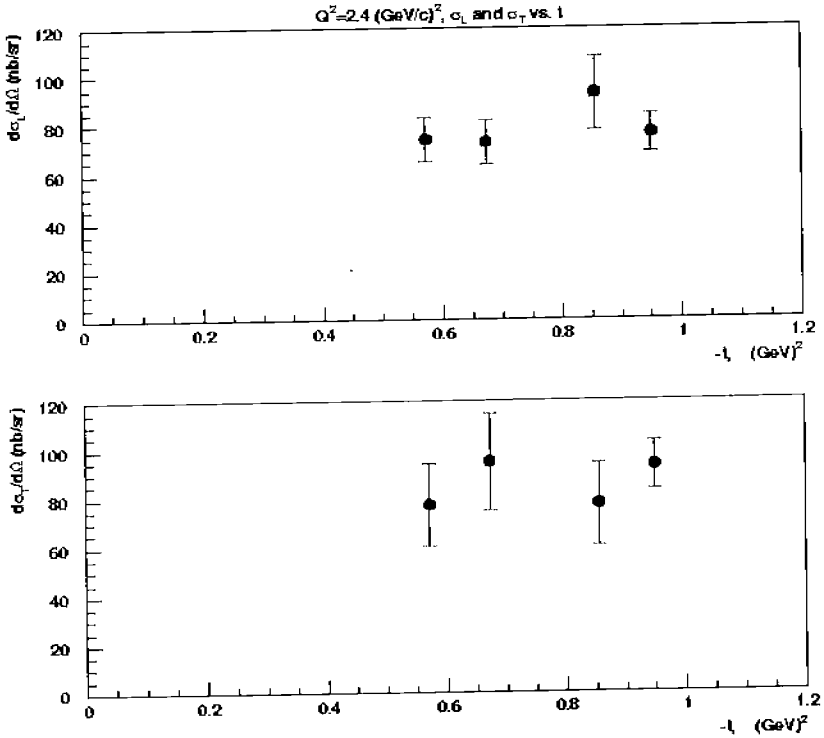
L/T ratio seems to be climbing with Q^2

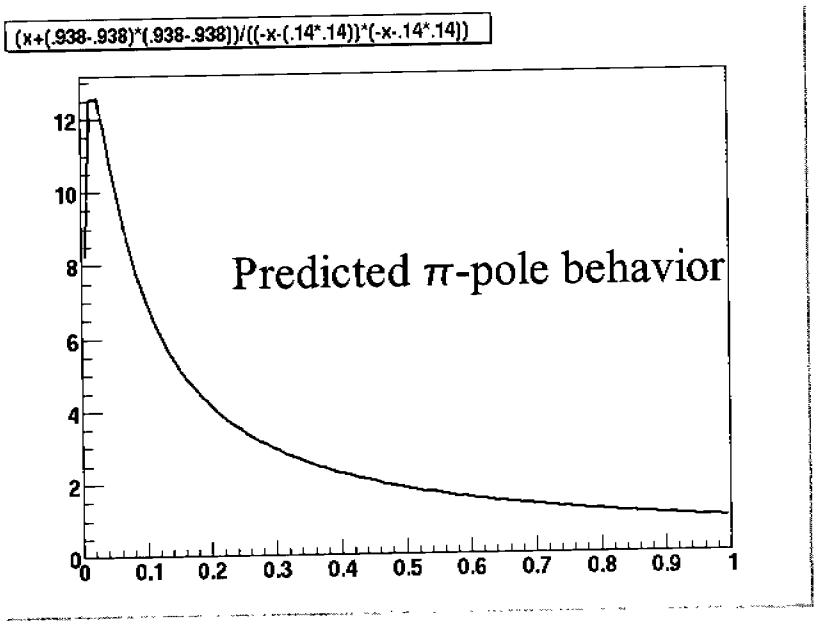
Old data at *W=1.83*, new data at *W=1.80 GeV*

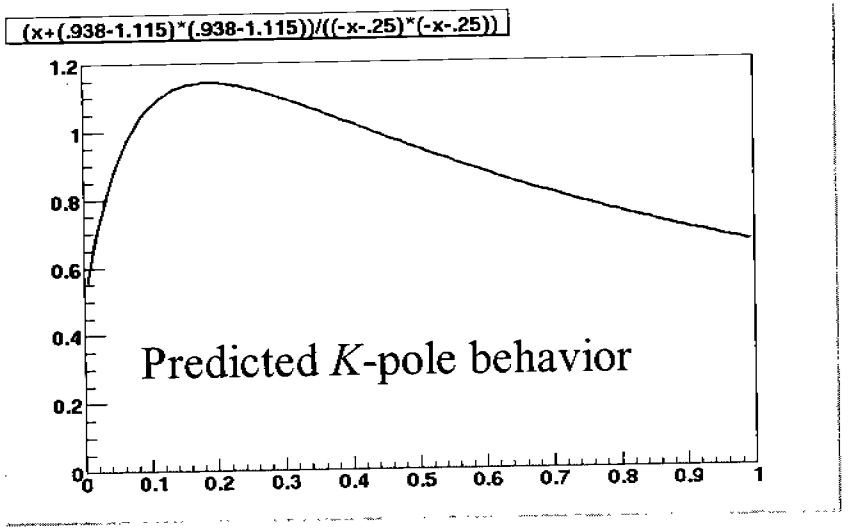
⇒ New data closer to pole

Presently looking at *W*-dependence of ratio

t Dependence



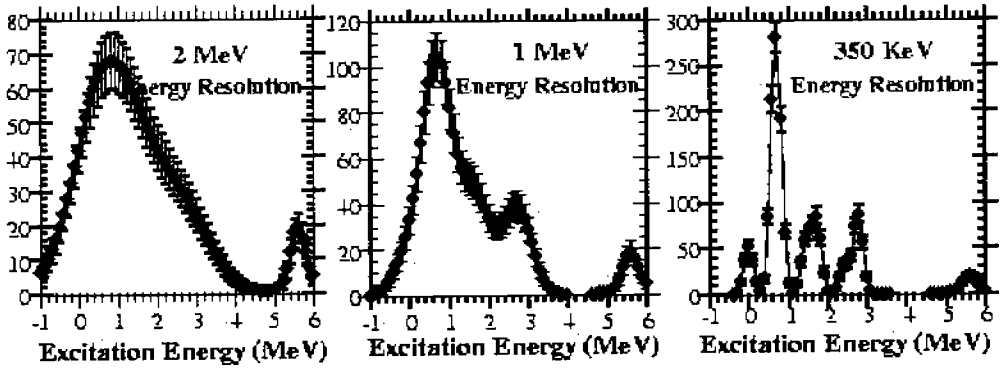


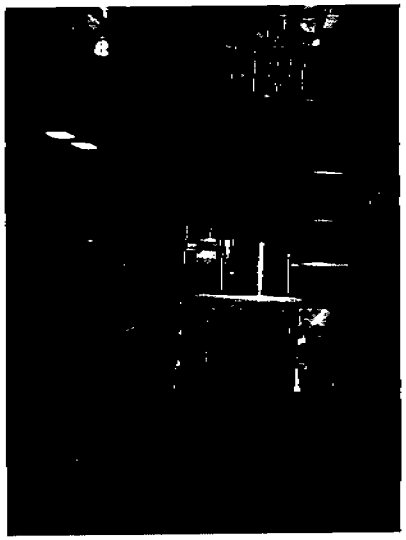


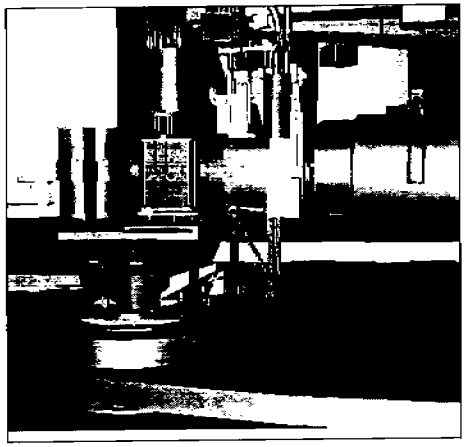
Data have not been scaled to common W

t-dependence expected to be much flatter for pion

Future Hall A Kaon Experiments

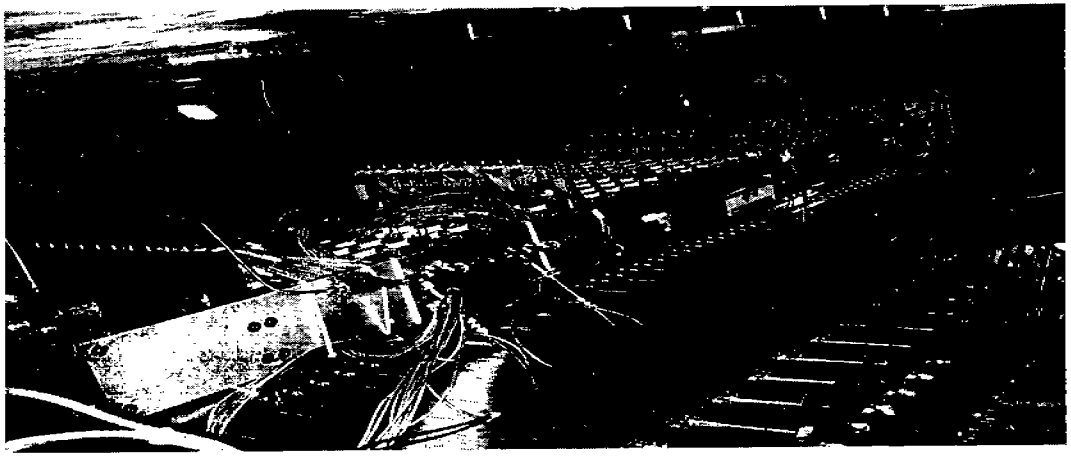






1st septum magnet used for GDH, summer 2003
2nd septum magnet being installed
Experiment to start in December 2003

Future Hall A Kaon Experiments



RICH constructed for improved PID
Tested with beam during E98-108
See F. Garibaldi's talk