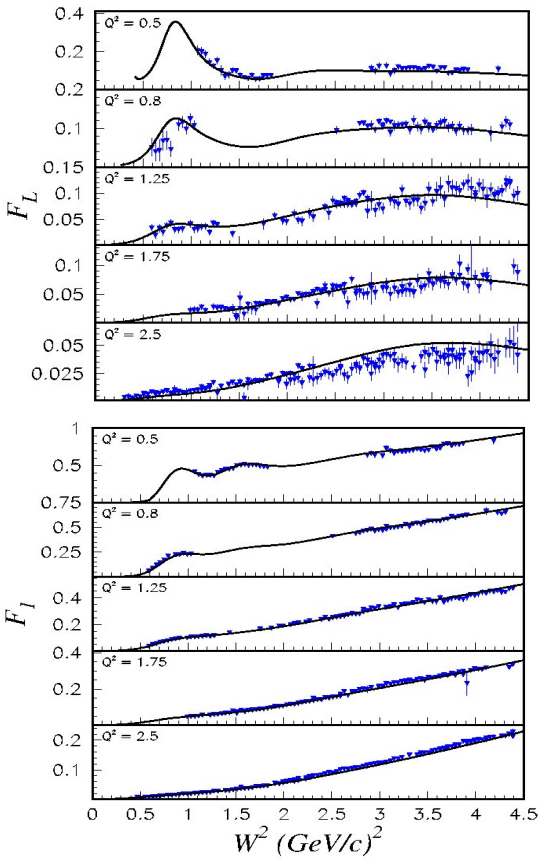
Precision e-A Cross Sections and Modeling e-A interactions: Jlab E04-001 (JUPITER) – A Bodek

WIN2021 Poster Session Thu; June 8, 2021: Arie Bodek, Eric Christy, Cynthia Keppel

E04-00112 Carbon Preliminary L/T results For low Q^2



(1) Broad Kinematic coverage encompassing entire QE and resonance region. Precision ($\Delta\sigma/\sigma$ < 1.6% pt-pt)
for L/T separations: -> determination of F_1, F_2 R For 12C, 27Al, 56Fe, 63Cu and Deuteron

Extract difference in nuclear effects in L and T structure functions. This difference is not currently modeled in MC generators,

Ingredients: Fit to entire worlds data on H, D, Various Nuclei including photoproduction

- **nucleon level (p, n) F_1, F_L structure functions (determined from global fits to proton and deuteron data)**
- **nucleon level G_E, G_M form factors (determined from fits to proton and deuteron elastic / QE data.**
- **QE smearing: Super-Scaling distribution-works**
- **IE smearing: Gaussian smearing (independent Fermi momentum param.)**
- **IE medium modifications (EMC) parameterization applied at nucleon level (before momentum smearing).**
- **2-body current contribution near QE / D** from meson / Isobar exchange parameterized by **distorted Gaussian assuming quasi-deuteron cutoff @ ~x_b = 2.**

Fit range: 0.045 < Q^2 < 22. 0.0 < W^2 < 50.

Carbon Fit Results: Much better with Transverse 2 body currents, and with Q dependent optical potential for Δ(1232)

Summary: Fit describes all inclusive data for 0.0<Q^2<22 for F_1, F_2, R. Provides a standard for all models.

No need for additional inclusive electron scattering data

Spokepersons: Arie Bodek
Thia Keppel
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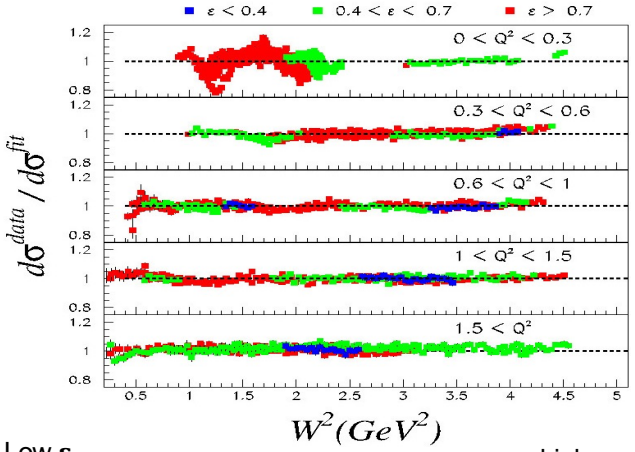
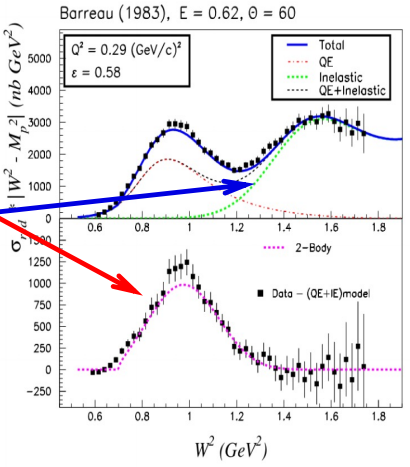
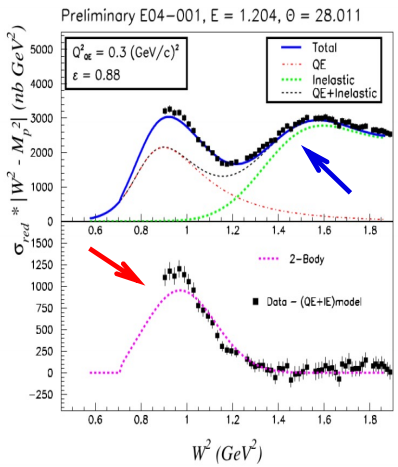
Completed Ph.D students: Sheren Alsami
Ibrahim Albayrak
Vahe Mamyen

RESULTS 12C Fit Residuals in resonance region



Low ε high ε





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Universal fit to world data with extraction of Meson Exhange Current Structure function→ Predicts MEC structure functions for neutrino experiment in a model independent way.