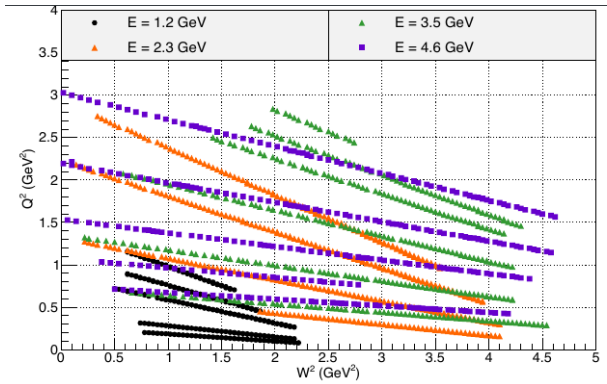
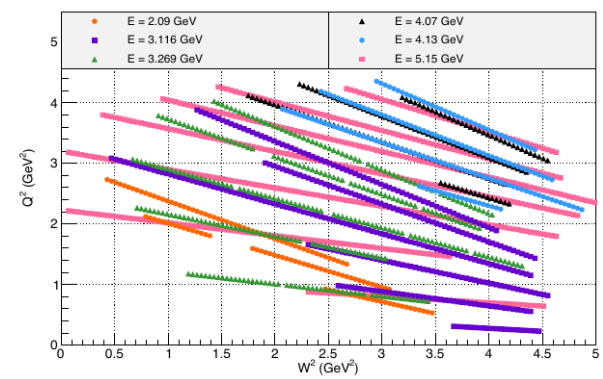
Precision e-A Cross Sections and Modeling: Jefferson Lab E04-001 (JUPITER1) to be published 2021

Kinematic Coverage 2 running periods





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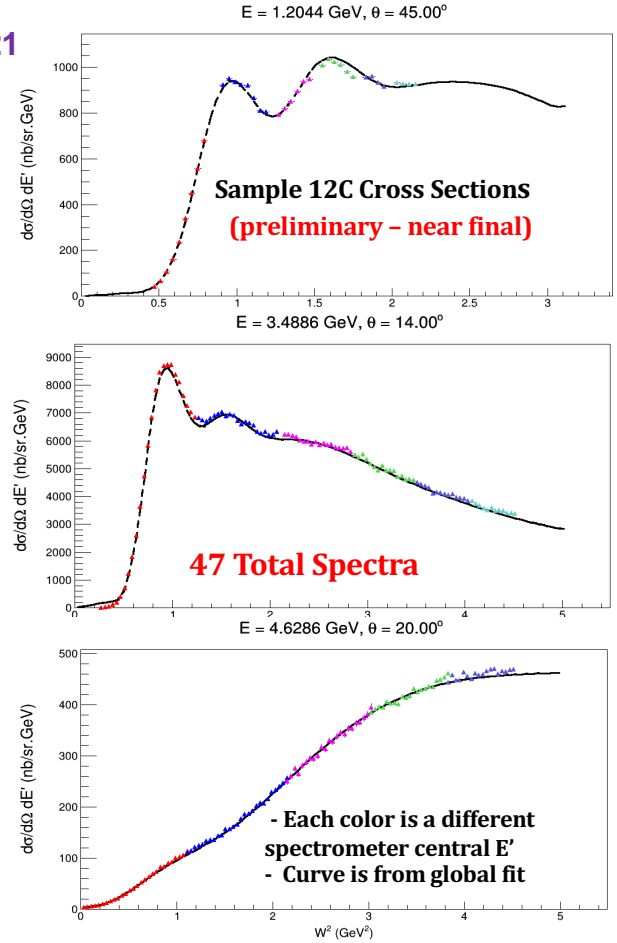
- **Broad Kinematic coverage encompassing entire QE and resonance region.**
- **Precision cross sections ($\Delta\sigma/\sigma$ < 1.6% pt-pt) for L/T separations:**

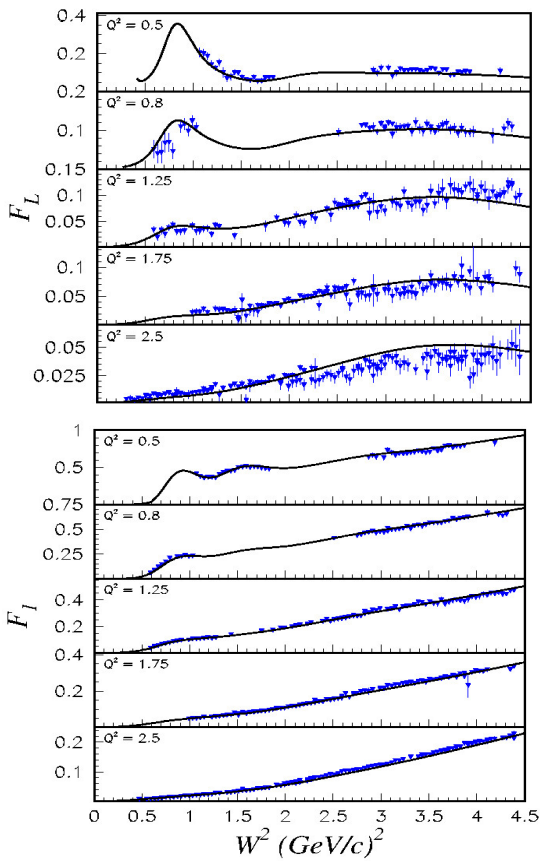
  => determination of F_1, F_2 R in range of nuclei.
- **Special very low Q^2 data for neutrino community.**
- **Multiple nuclear targets:**

  12C, 27Al, 56Fe, 63Cu

  Also Deuteron (companion experiments E02-109 and E06-009).



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



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

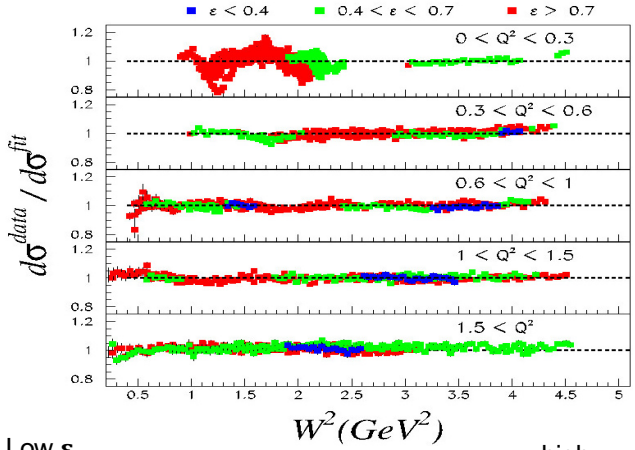
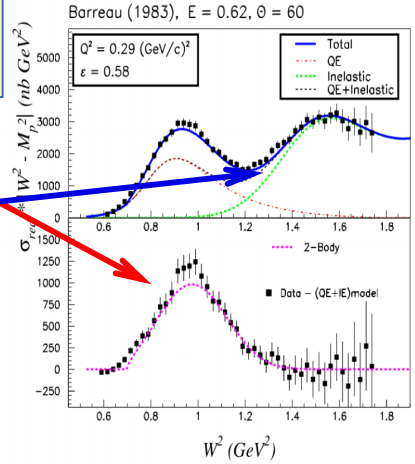
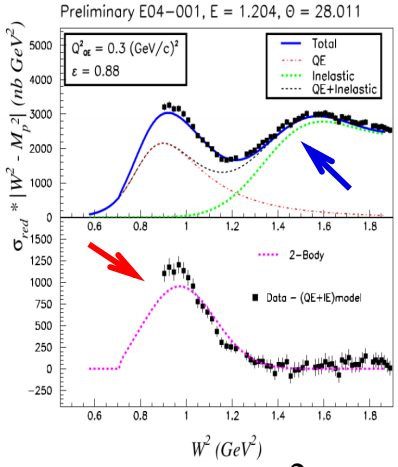
- **nucleon level (p, n) F_1, F_L structure functions (determined from global fits to proton and deuteron data)**
- **nucleon level G_E, G_M form factors (determined from fits to proton and deuteron elastic / QE data.**
- **QE smearing**: **Super-Scaling distribution-works**
- **IE smearing: Gaussian 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 to compare to individual data sets or more data. Future experiments should focus on hadronic final states

RESULTS **12C Fit Residuals in resonance region**



Low ε high ε