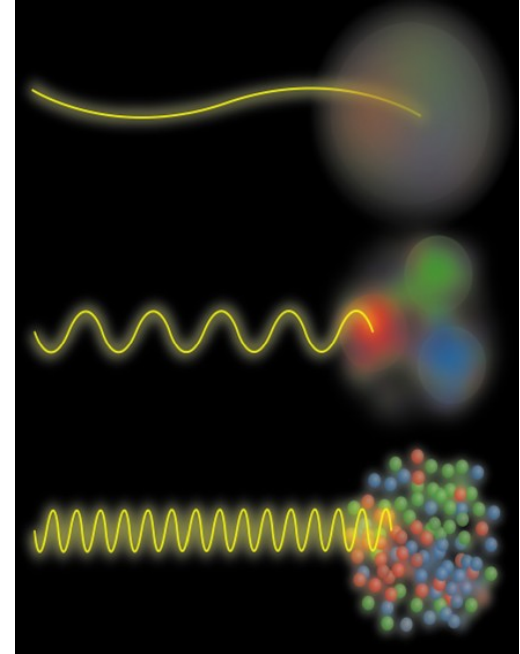
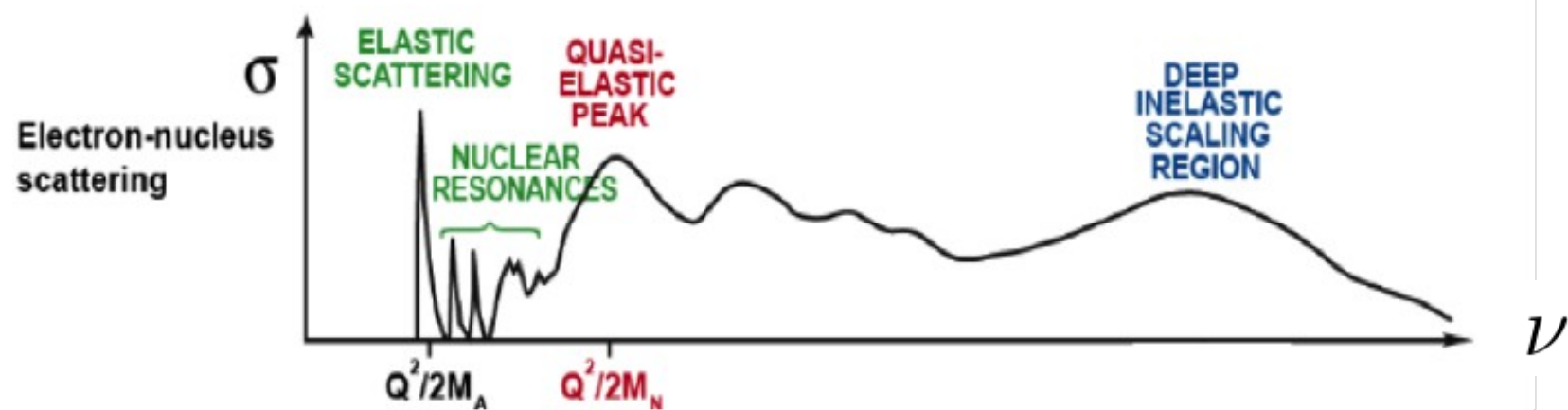
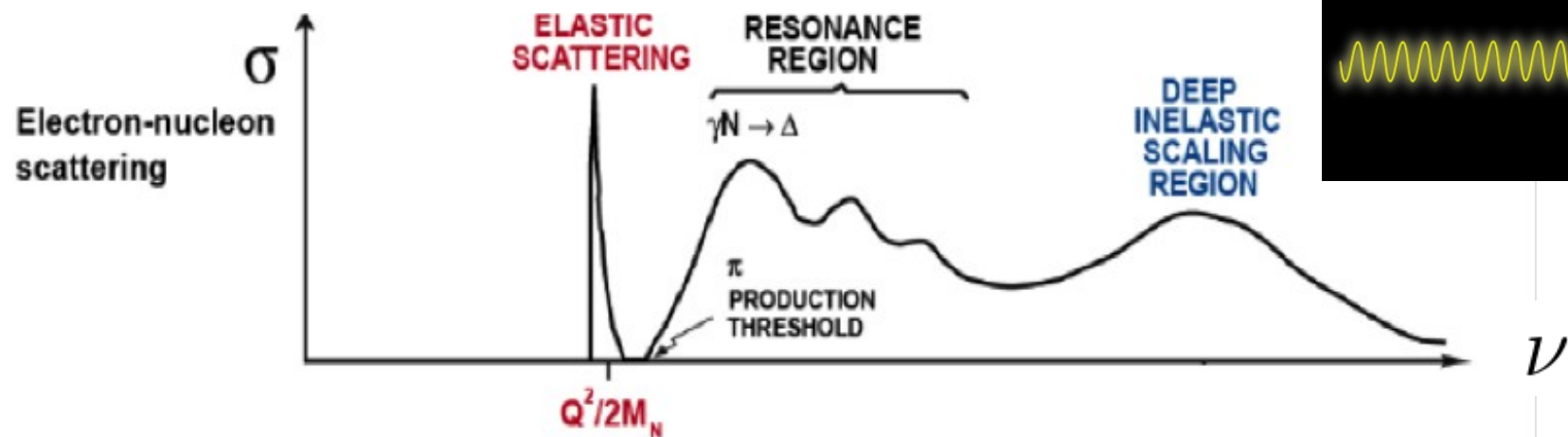


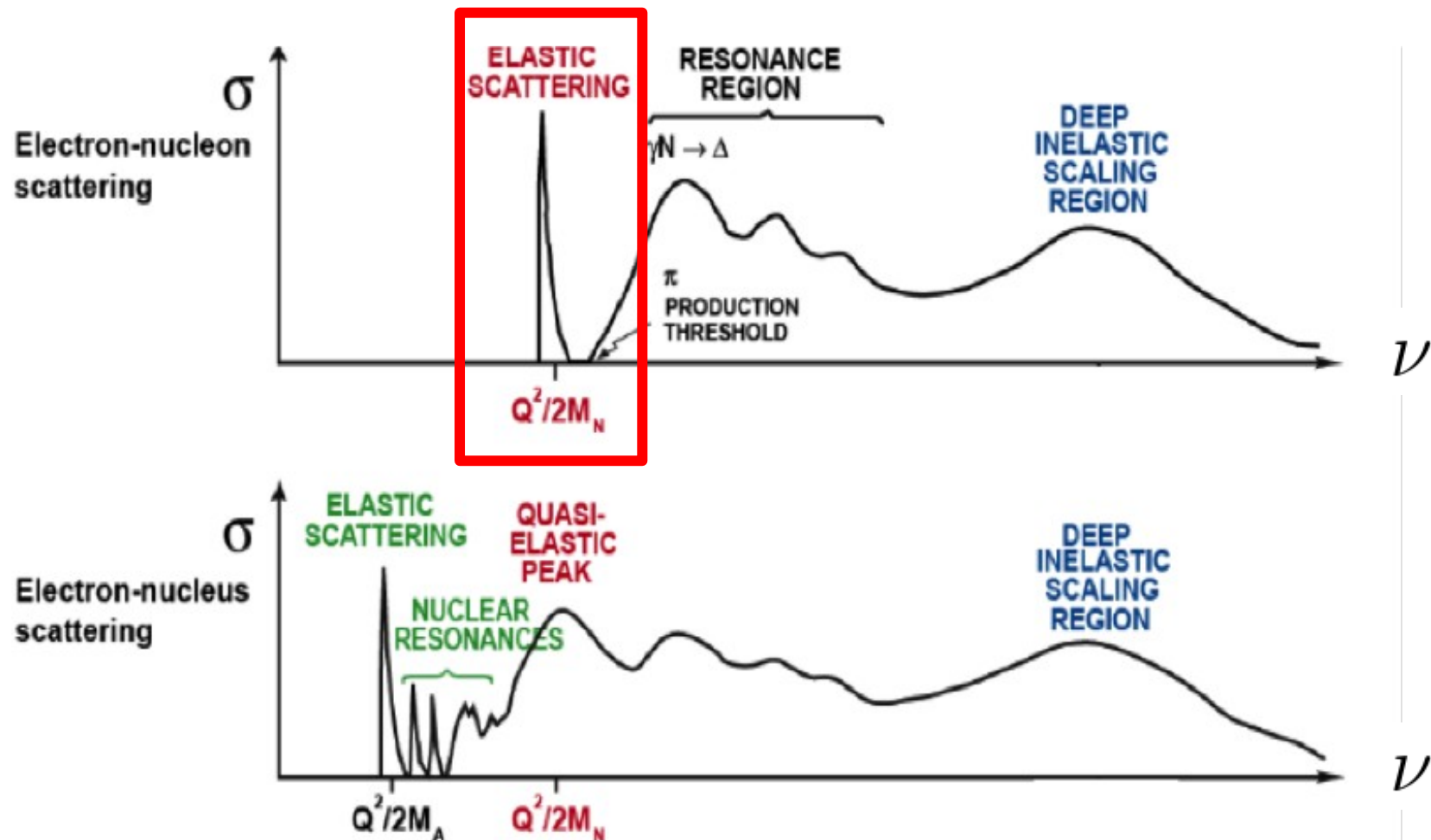
Studying Nucleon Structure through Inclusive Electron Scattering

Barak Schmookler
Stony Brook University



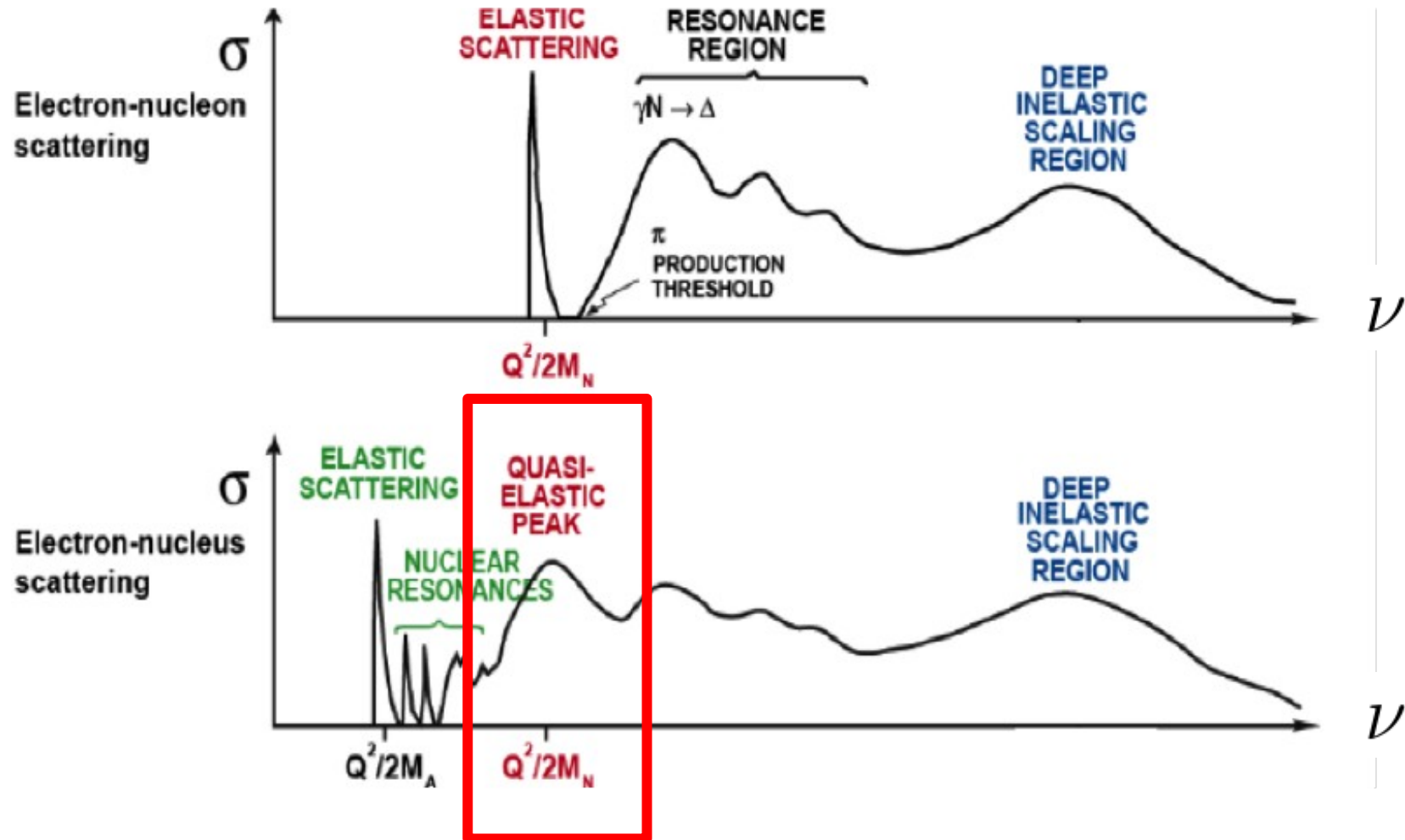
Elastic electron-proton Scattering:

Provides information on the Electromagnetic structure of the Proton



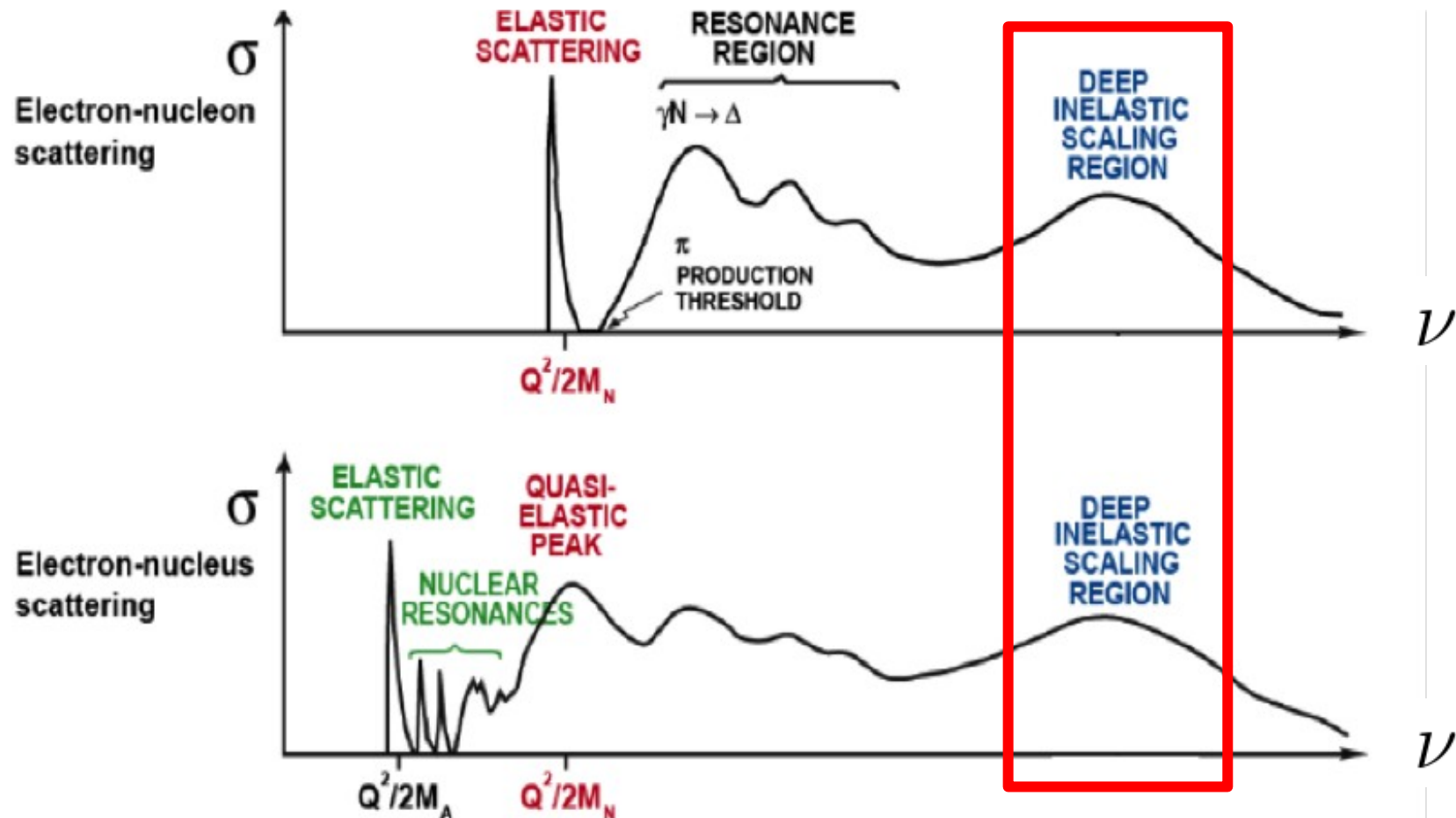
Quasi-Elastic (QE) Scattering:

Provides information on how the Nucleons move and pair in the Nucleus

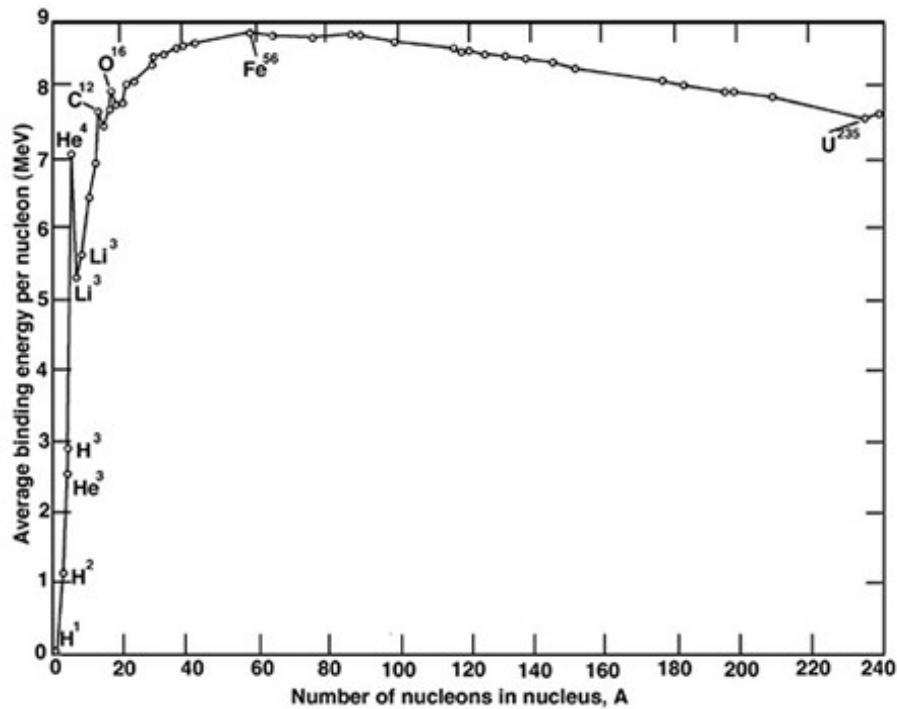


Deep Inelastic Scattering (DIS):

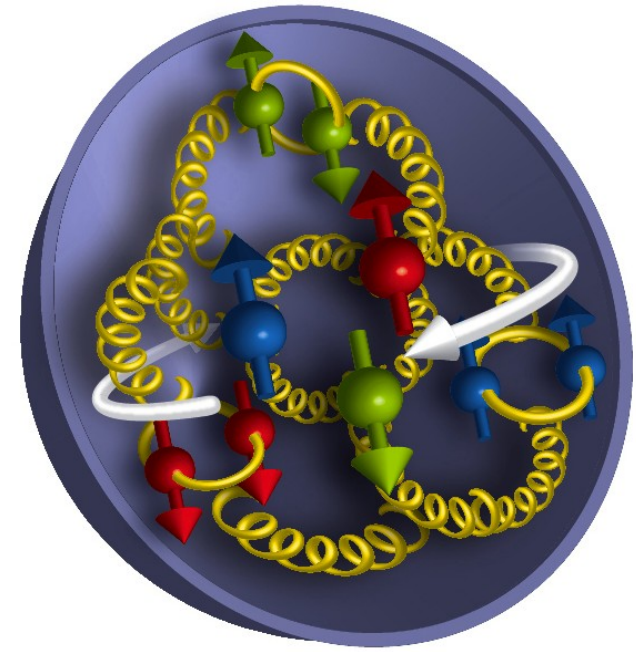
Provides information on the underlying Partonic structure of the Nucleons



Scale Separation in the Nucleus

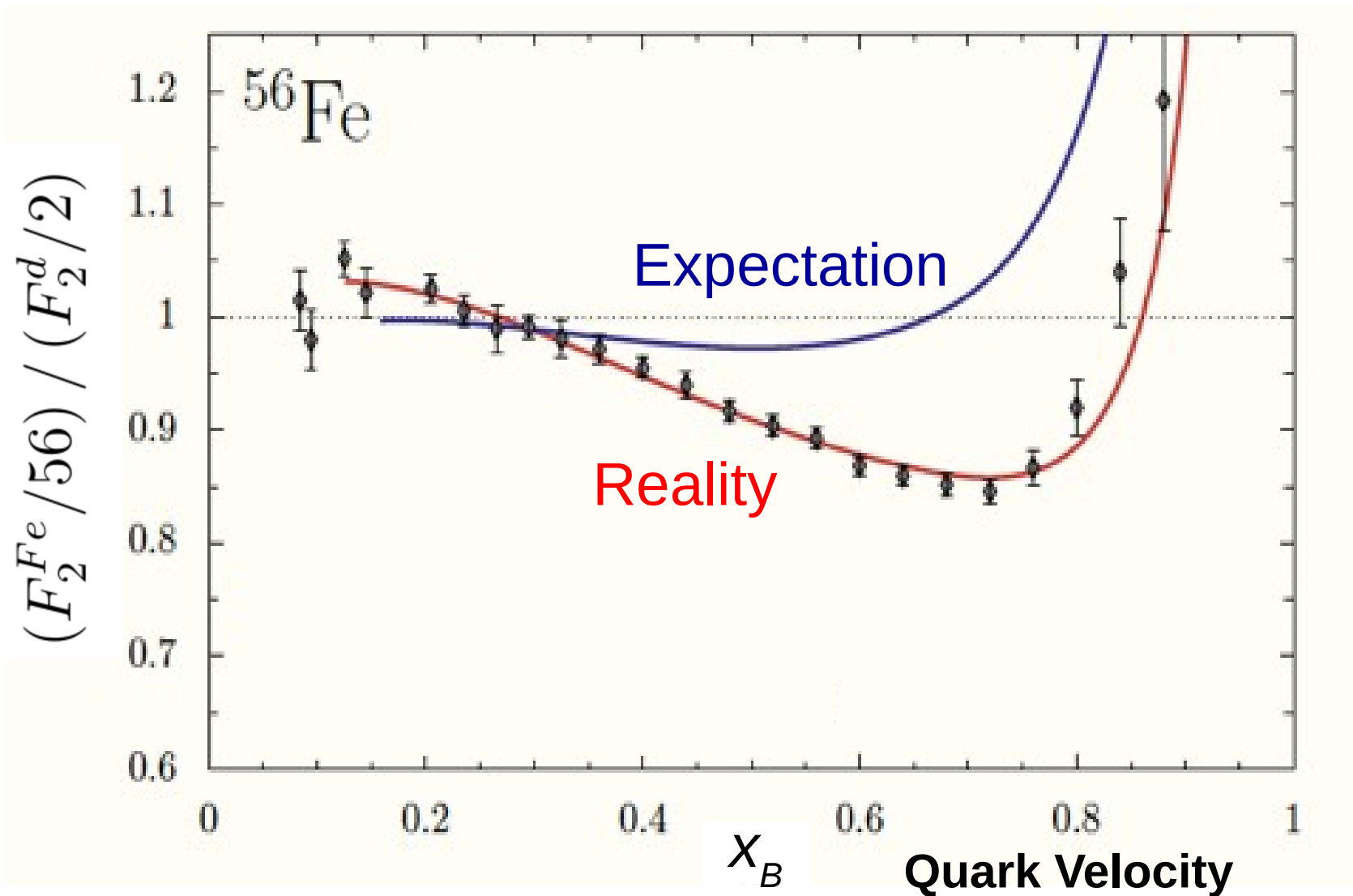


Weak Binding: MeV

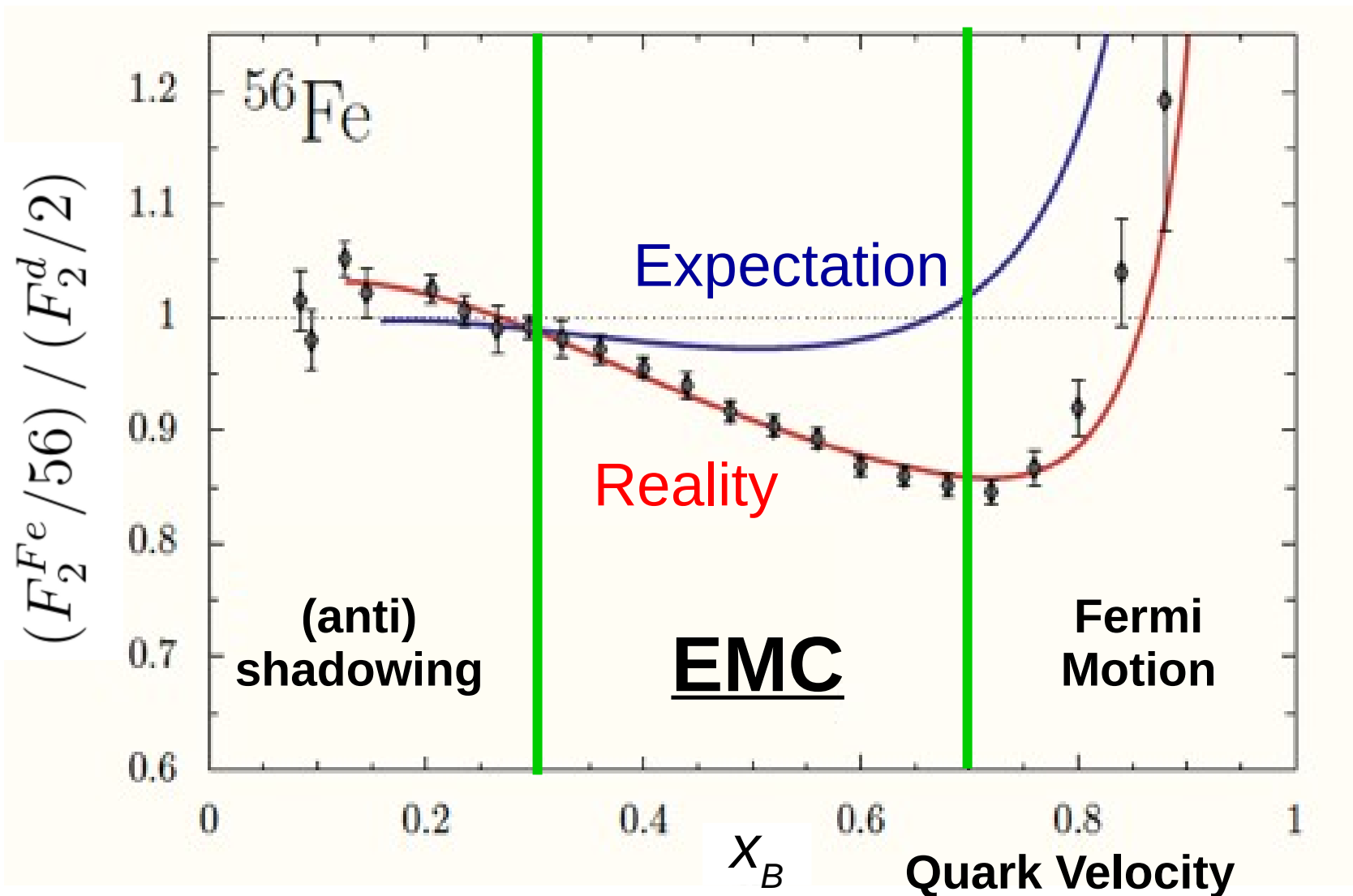


Strong Binding: GeV

The EMC Effect

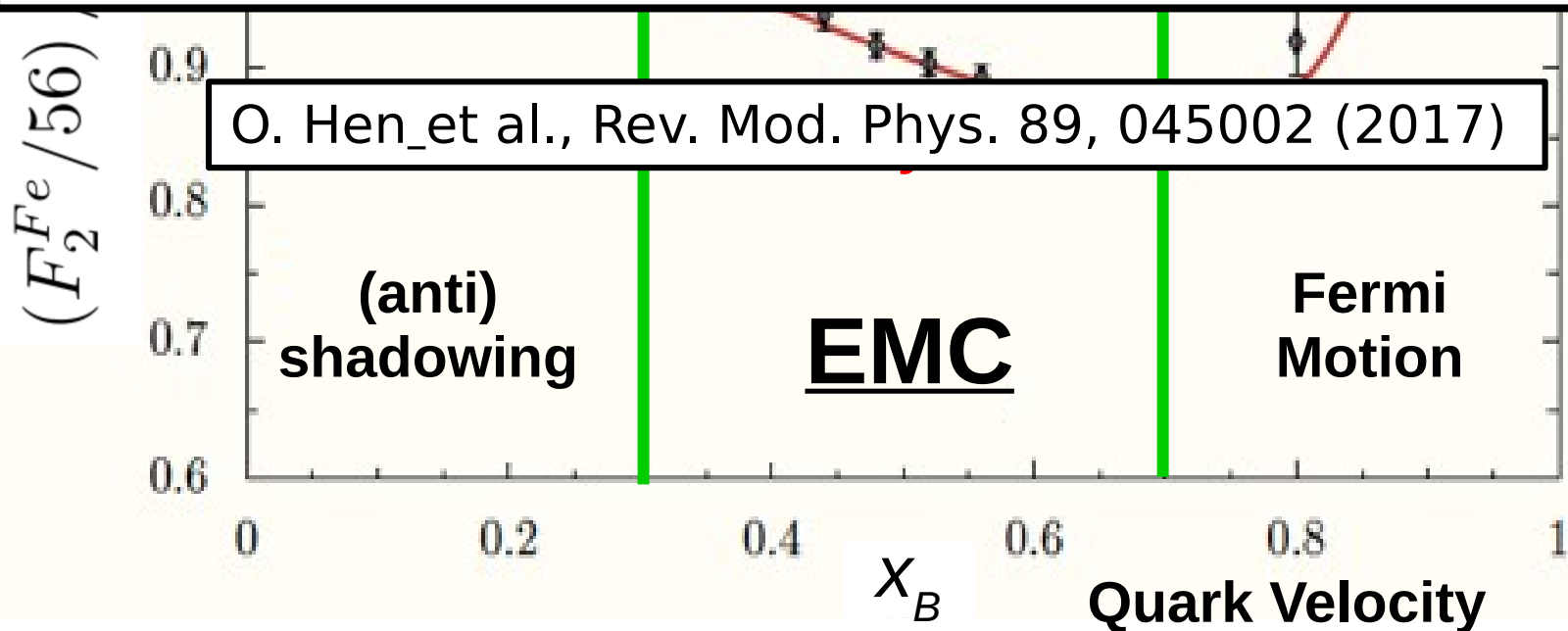


The EMC Effect – Quarks Move “Slower” in the Nucleus

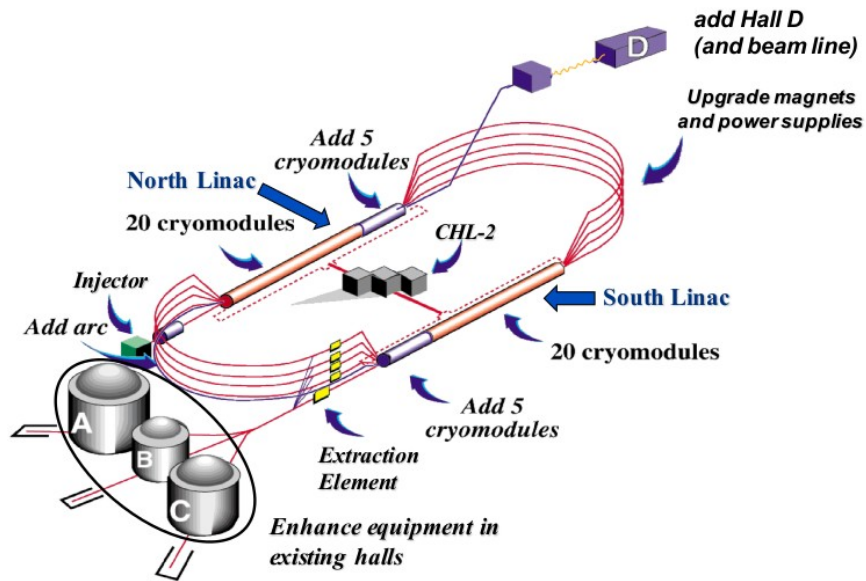


The EMC Effect – Quarks Move “Slower” in the Nucleus

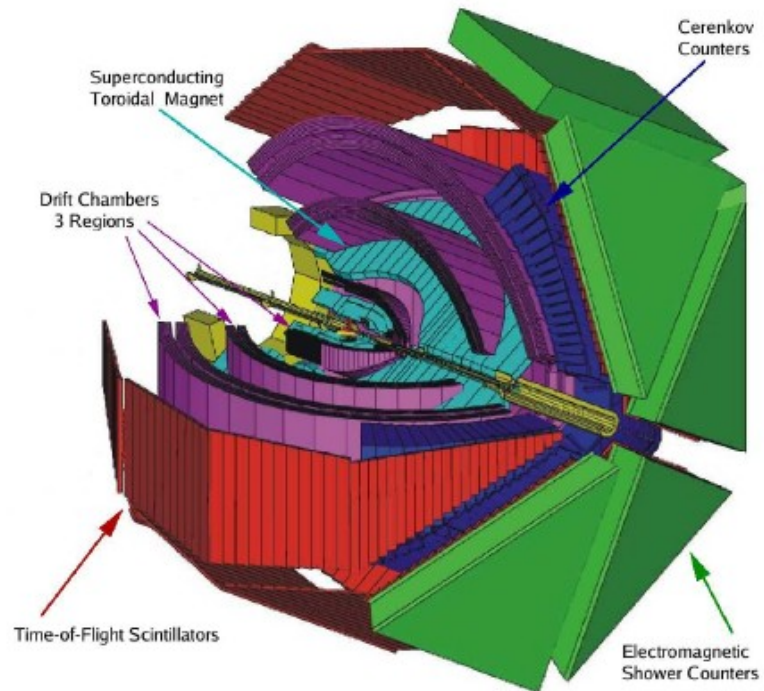
35 Years, 1000+ Papers
Still No Consensus!!!



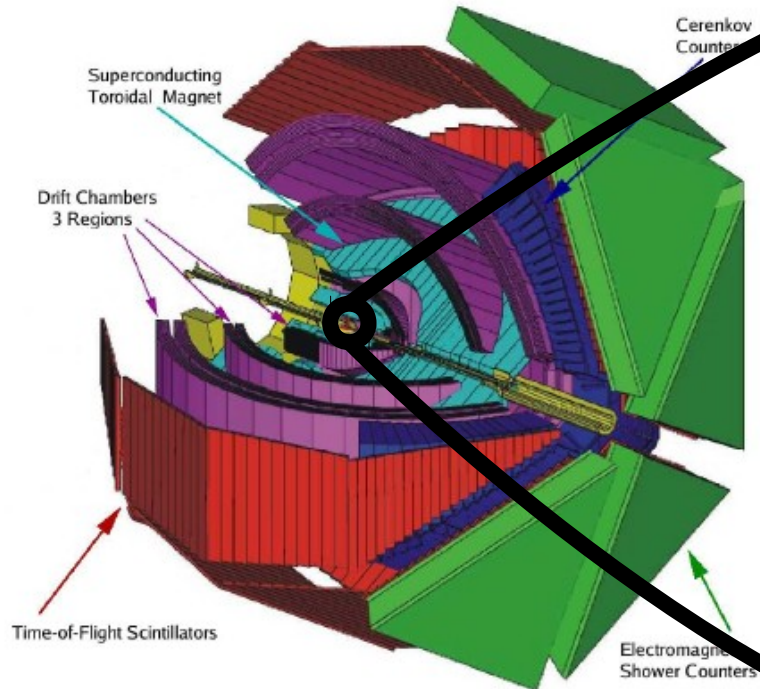
Thomas Jefferson National Accelerator Facility (JLab)



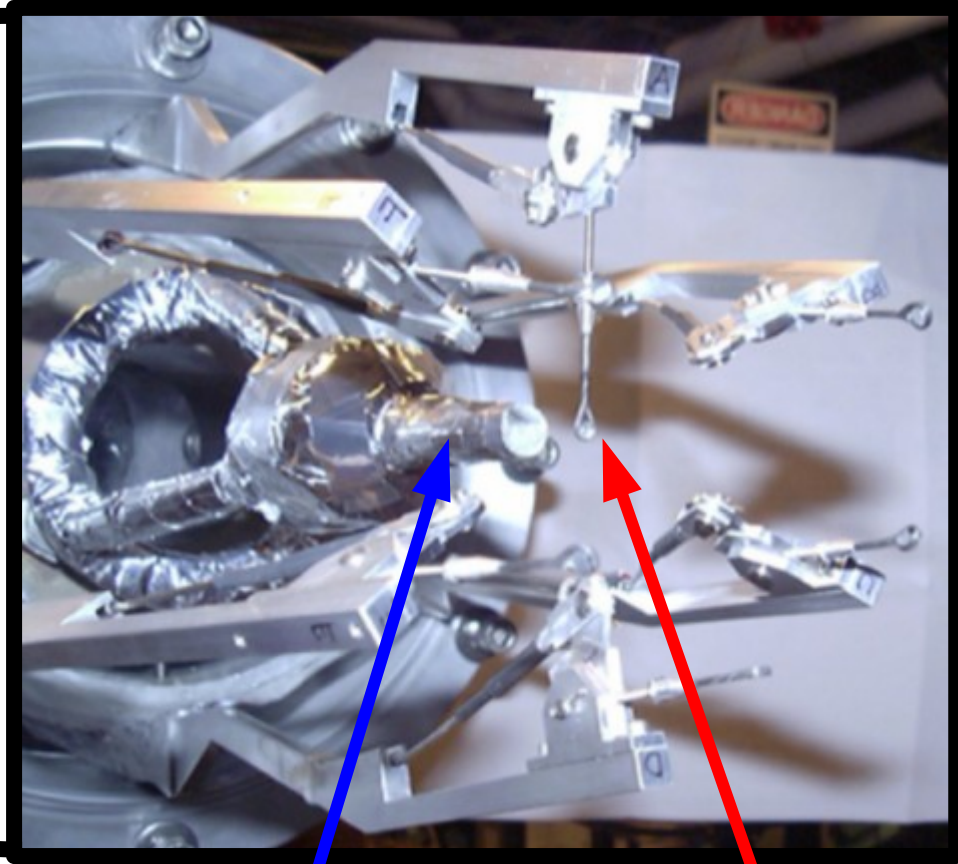
The CLAS Detector in Hall B at JLab



The CLAS Detector in Hall B at JLab



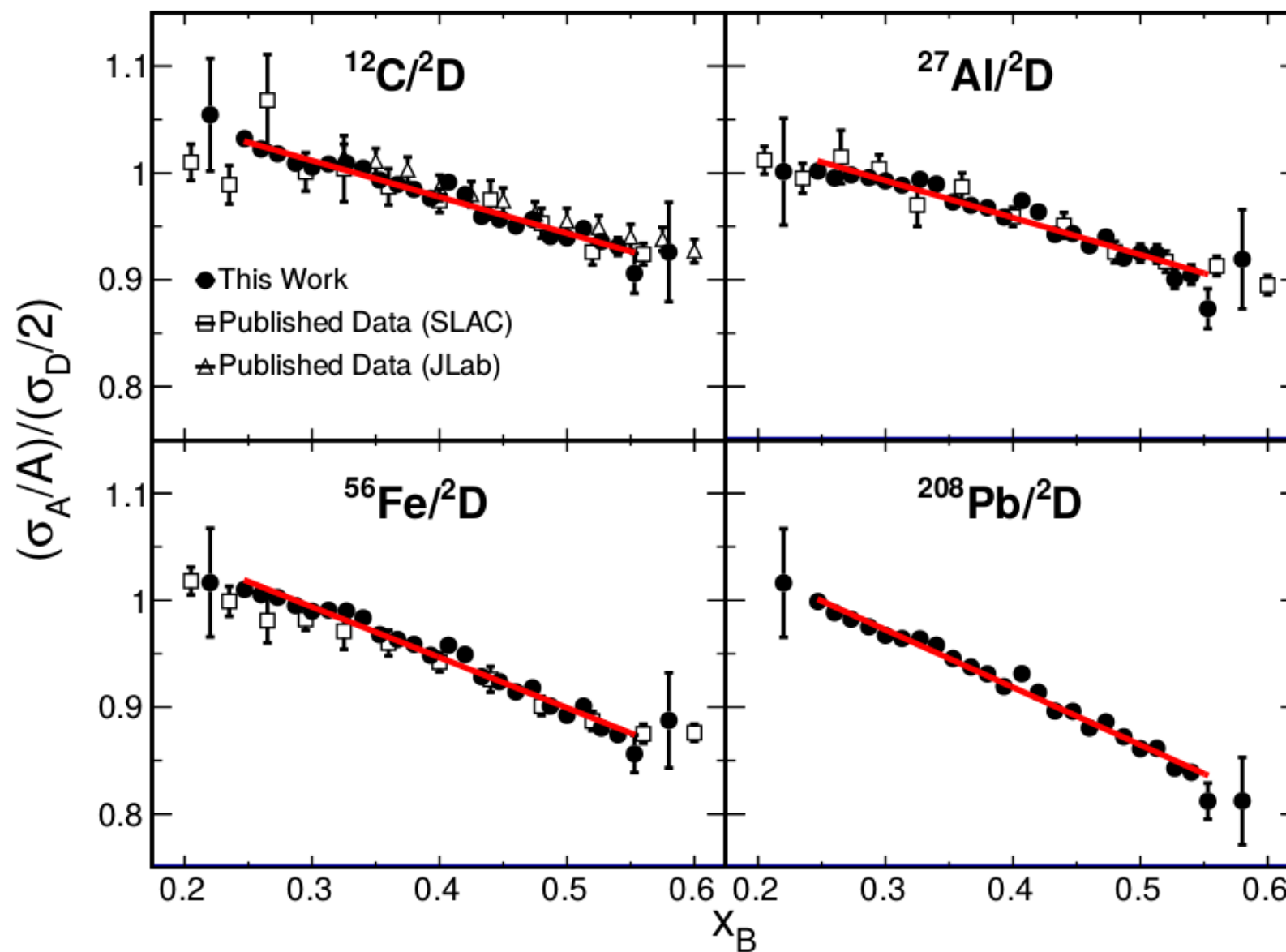
5.01 GeV Incident Electrons



Liquid Hydrogen
or Deuterium

C, Al, Fe, or Pb

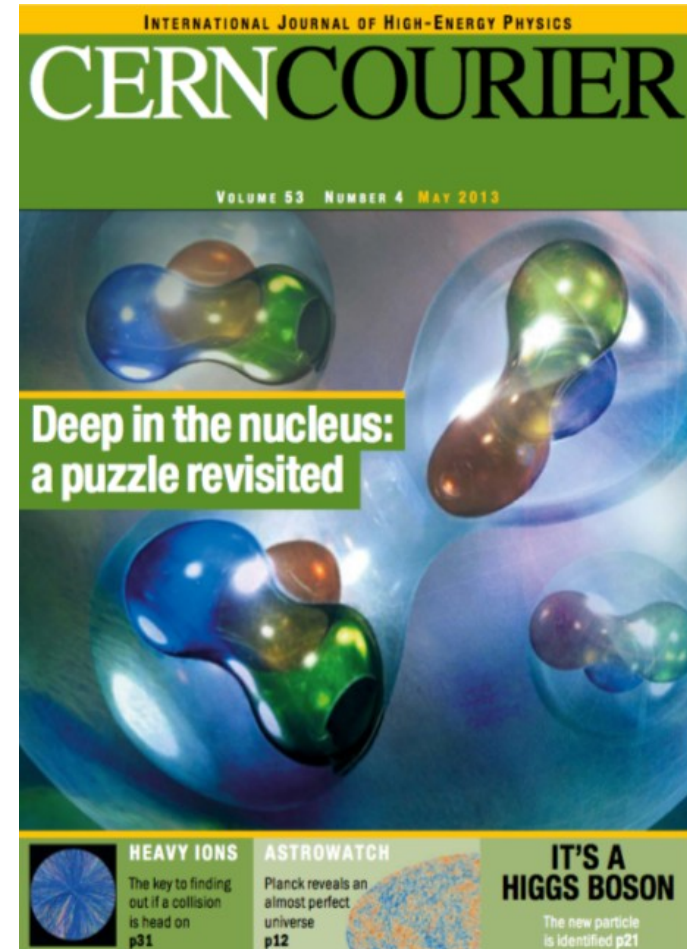
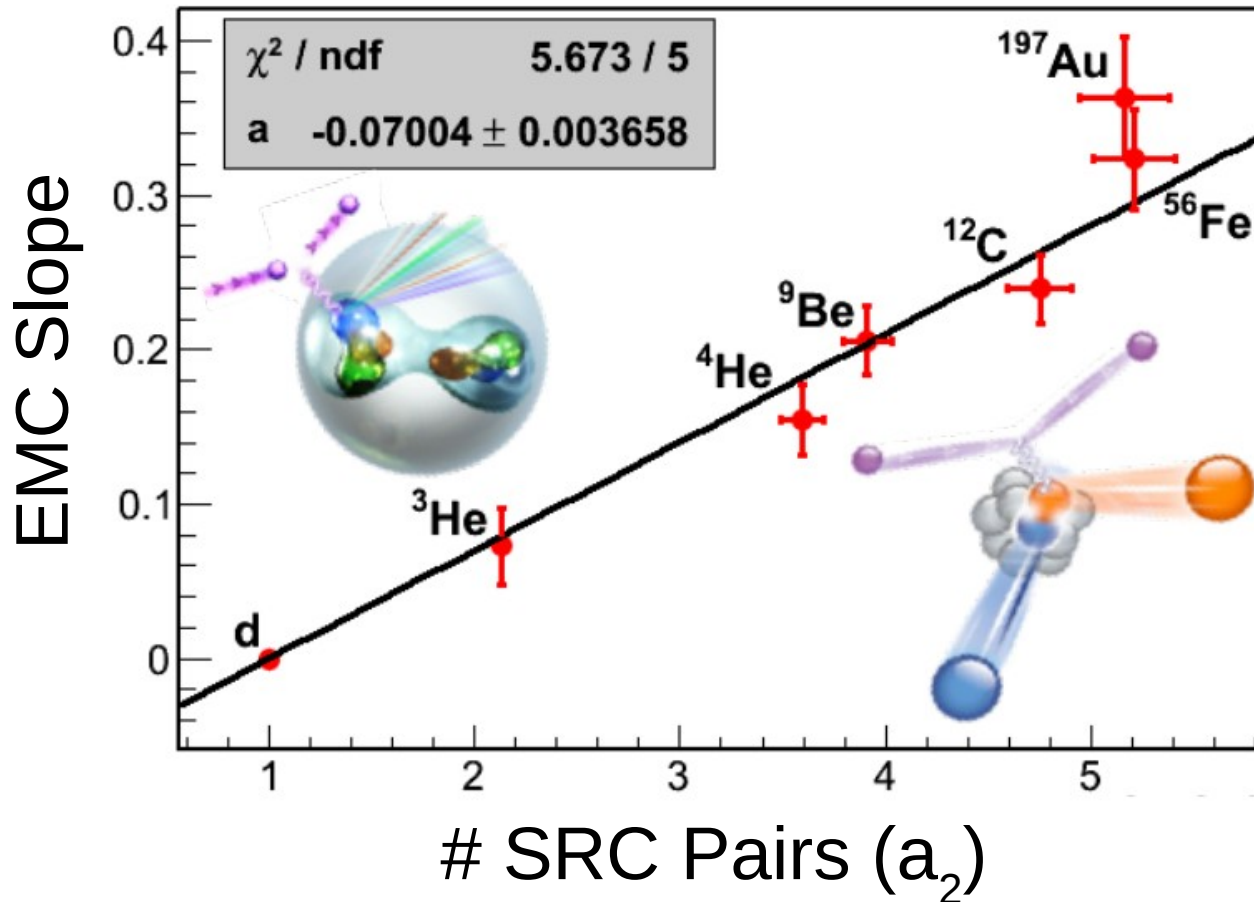
Our New EMC Effect Measurements



Current Explanations of the EMC Effect

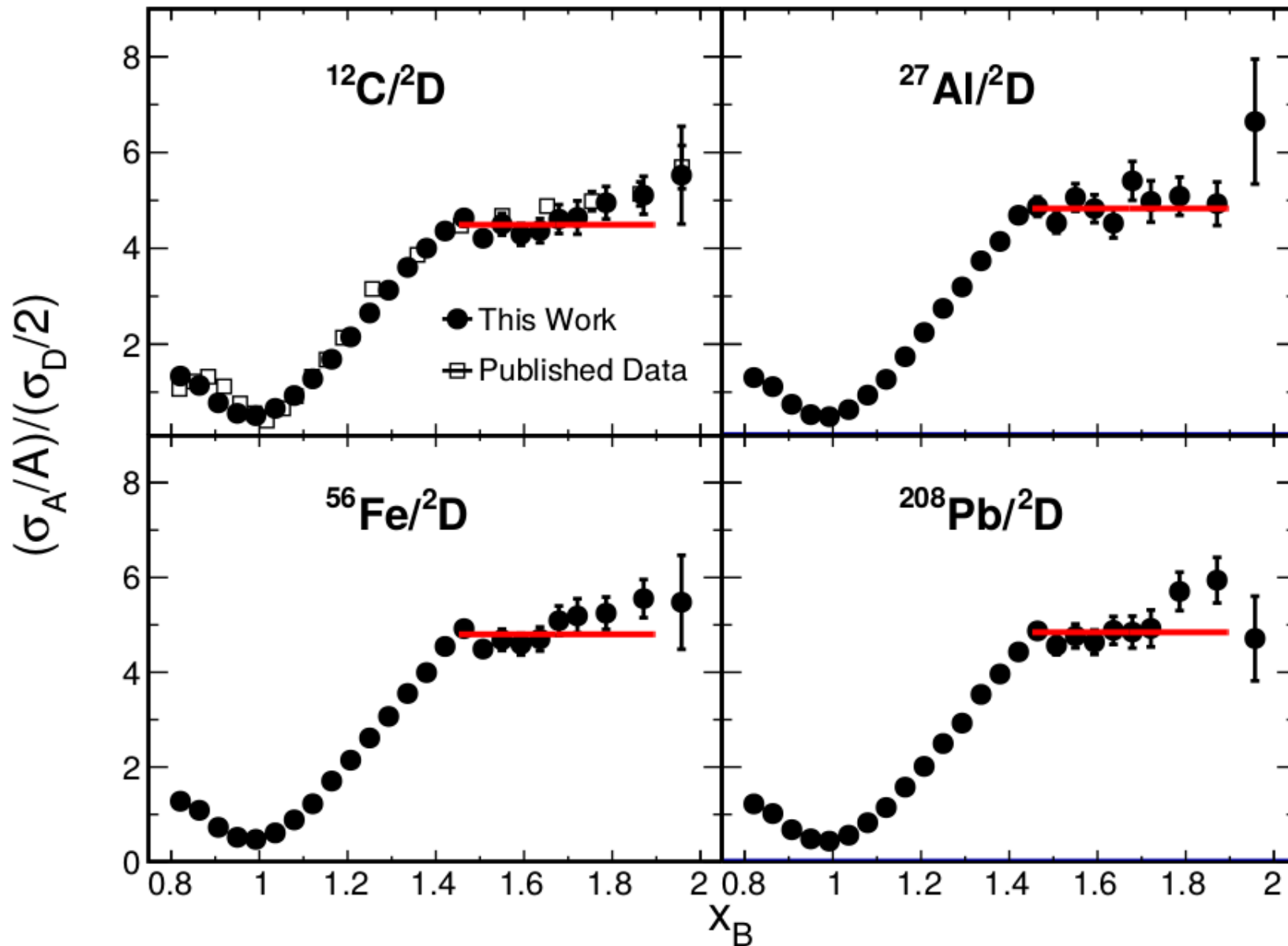
- Two leading approaches for describing the EMC effect:
 - All nucleons are slightly modified when bound in nuclei
 - Nucleons are unmodified most of the time, but are modified significantly when they fluctuate into SRC pairs

Observed EMC-SRC Correlation



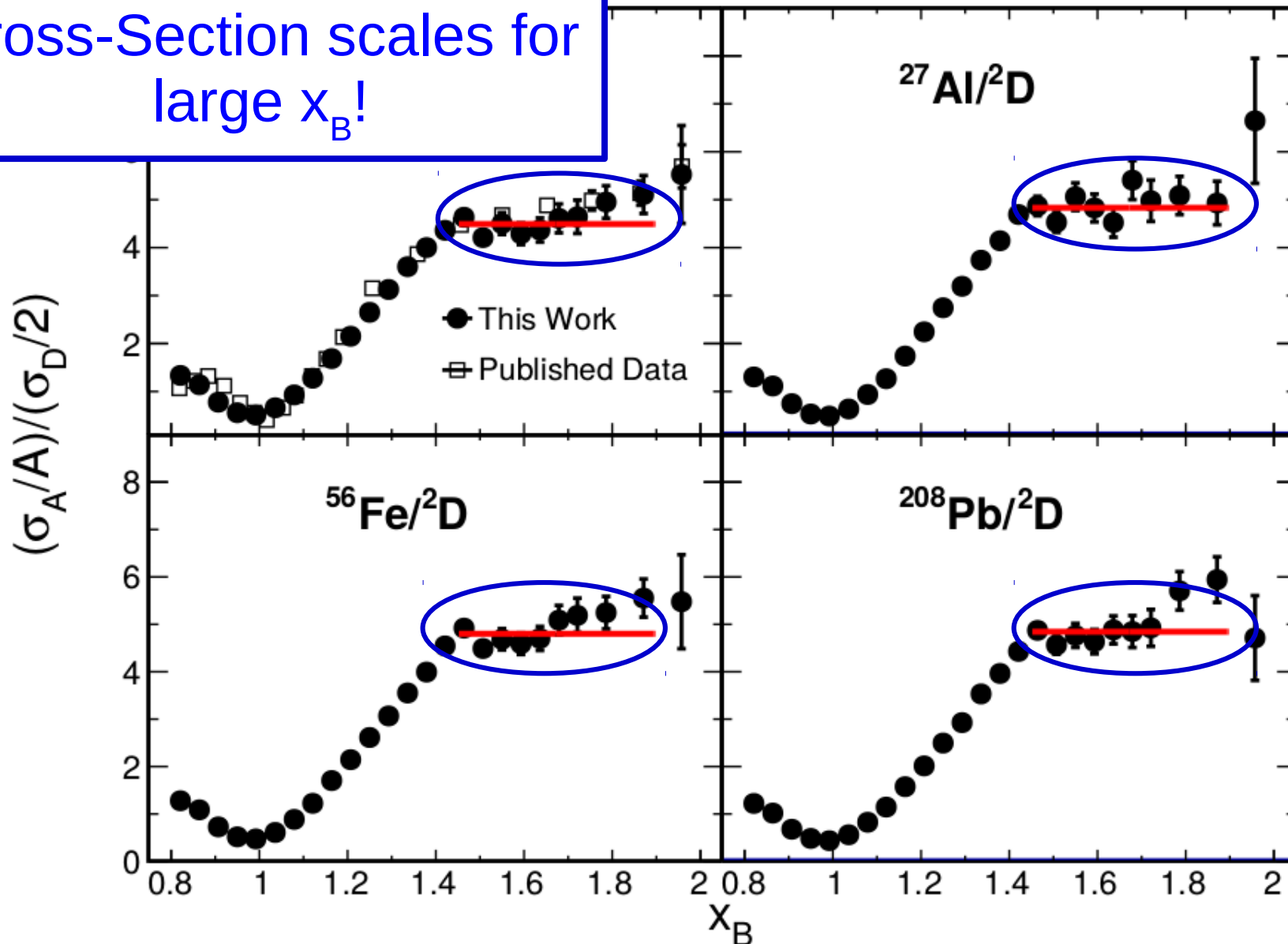
L. Weinstein et. al., Phys. Rev. Lett.06, 052301 (2011)
O. Hen et al. Phys. Rev. C 85 047301 (2012).
O. Hen et al., Rev. Mod. Phys. 89, 045002 (2017)

Per-Nucleon Cross-Section Ratios



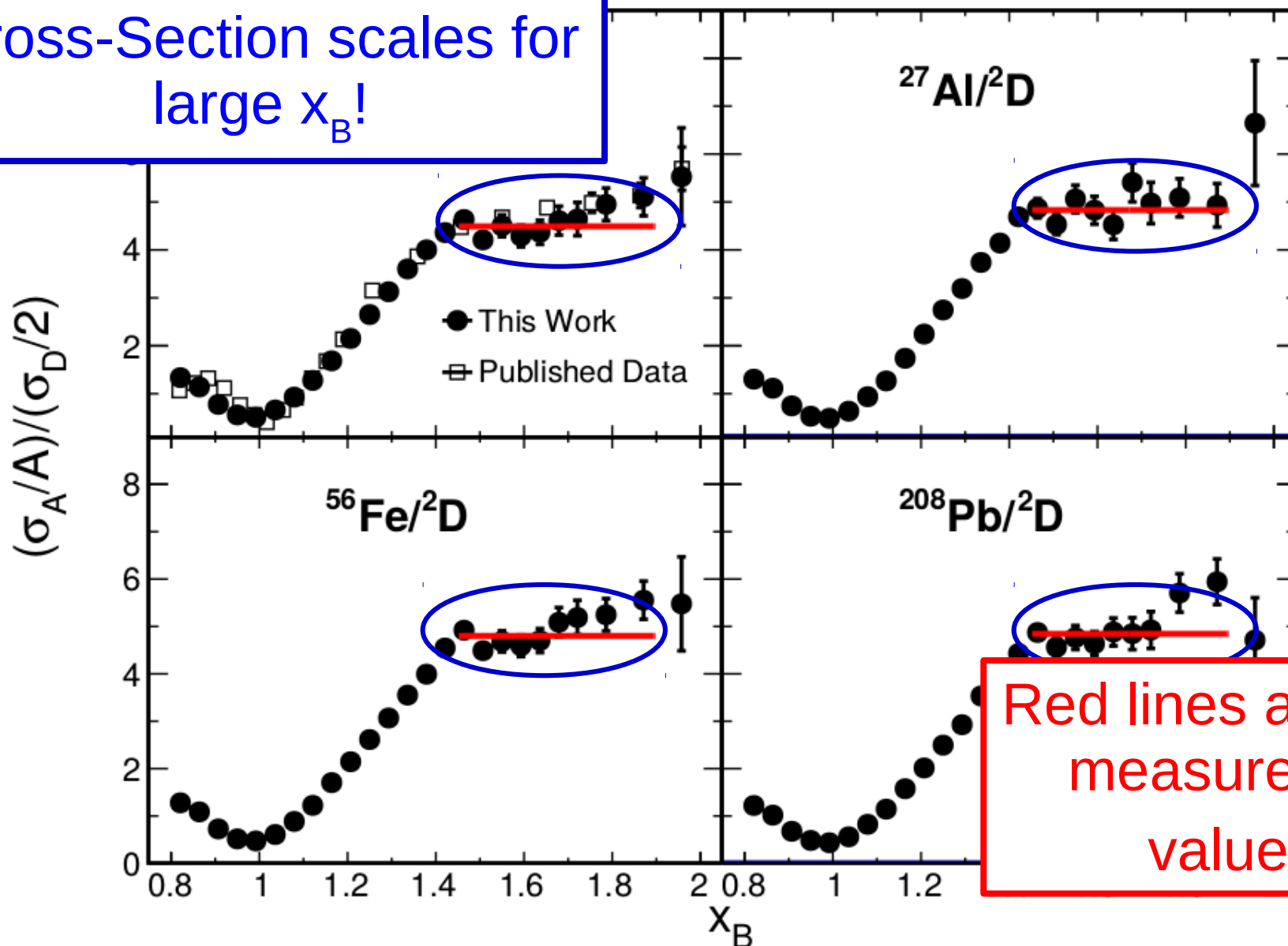
Per-Nucleon Cross-Section Ratios

Cross-Section scales for large x_B !



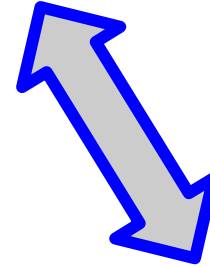
Per-Nucleon Cross-Section Ratios

Cross-Section scales for large x_B !

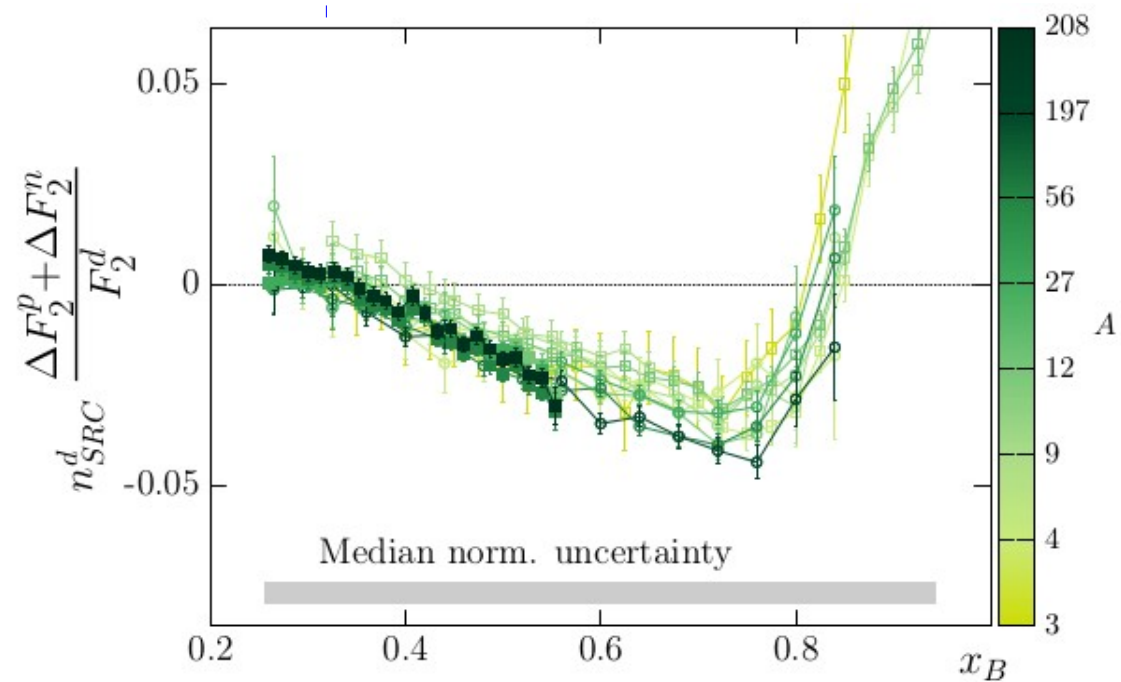
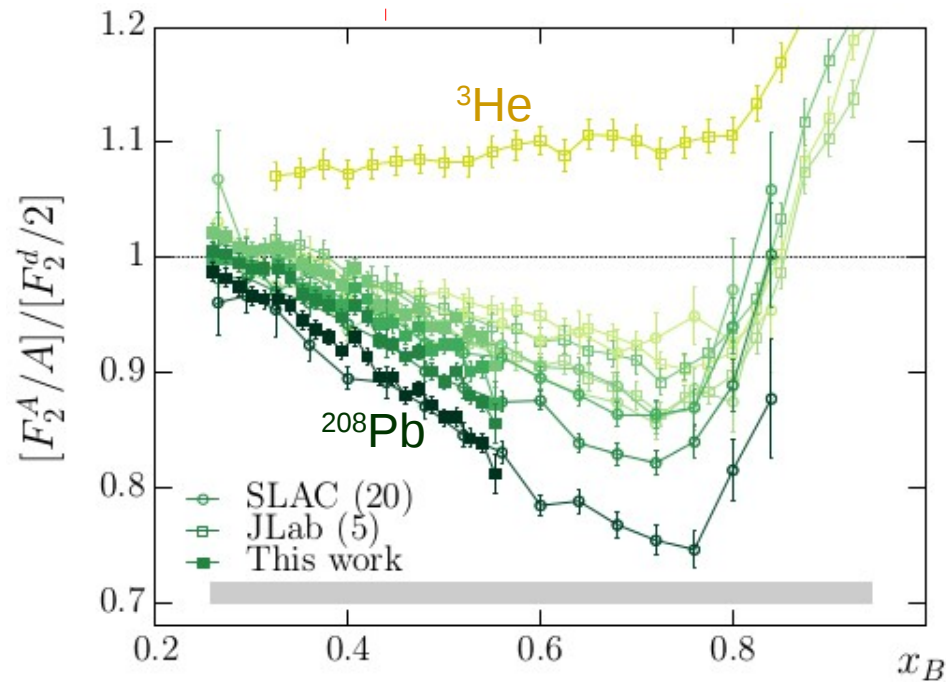


Red lines are the measured a_2 values

$$\frac{F_2^A/A}{F_2^d/2} = \left(a_2 - 2\frac{N}{A}\right) \left(n_{SRC}^d \frac{\Delta F_2^p + \Delta F_2^n}{F_2^d}\right) + 2 \cdot \frac{Z - N}{Z + N} \cdot \frac{F_2^p}{F_2^d} + 2\frac{N}{A}$$



Universal!!



np-SRC Fluctuations in Nuclei

