

EMC ratios in Lighter Nuclei

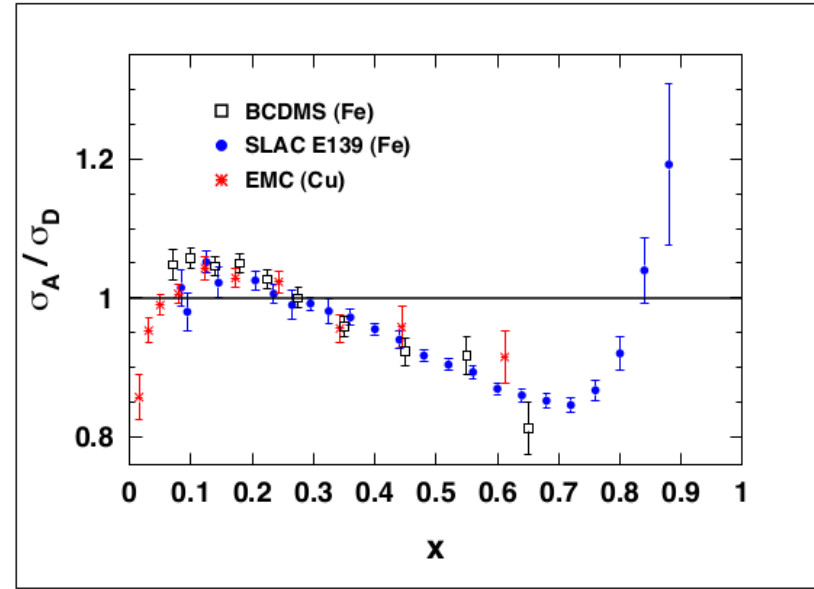
Abishek Karki
Mississippi State University

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Introduction:

- European Muon Collaboration investigate Deep Inelastic Scattering (DIS) of muons on H, D, Fe
- Structure Function:
 - Expected: $F_2^A(x) = ZF_2^p(x) + NF_2^n(x)$
 - Structure fns related to quark distribution
- Naive Expectation: $\sigma_A/\sigma_D = 1$
- Experiment concluded $\sigma_A/\sigma_D \neq 1$
- EMC is measure of medium modification of quark distribution



Motivation :

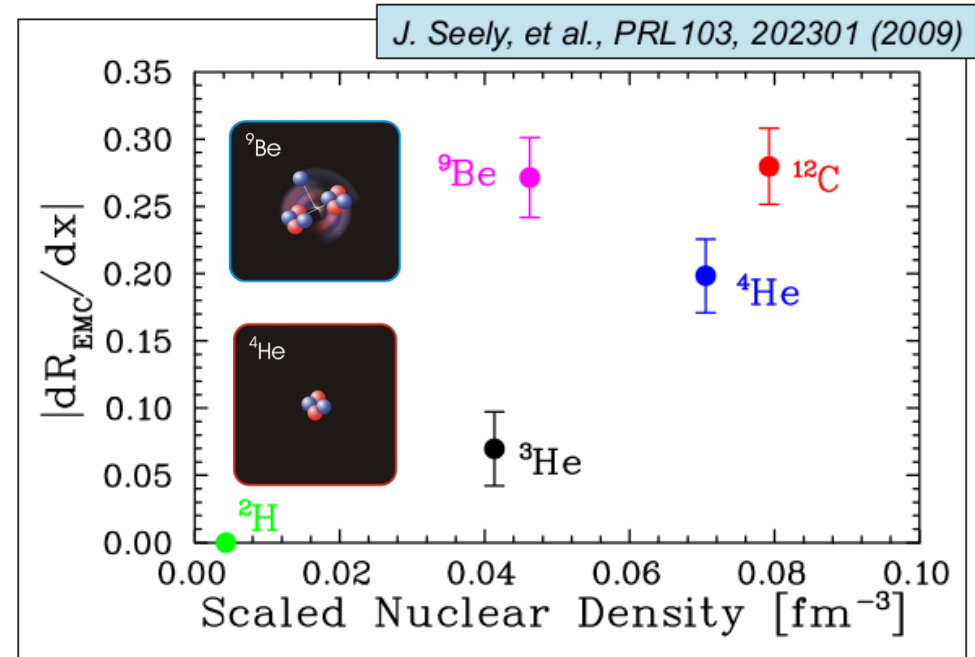
EMC effect and Local Nuclear density

Jlab E03-103

- Measured σ_A/σ_D for ^3He , ^4He , Be, C
- ^3He , ^4He , C EMC effect scales well with density
- Be does not fit the trend

This results suggest that EMC Effect does not scale with average nuclear density

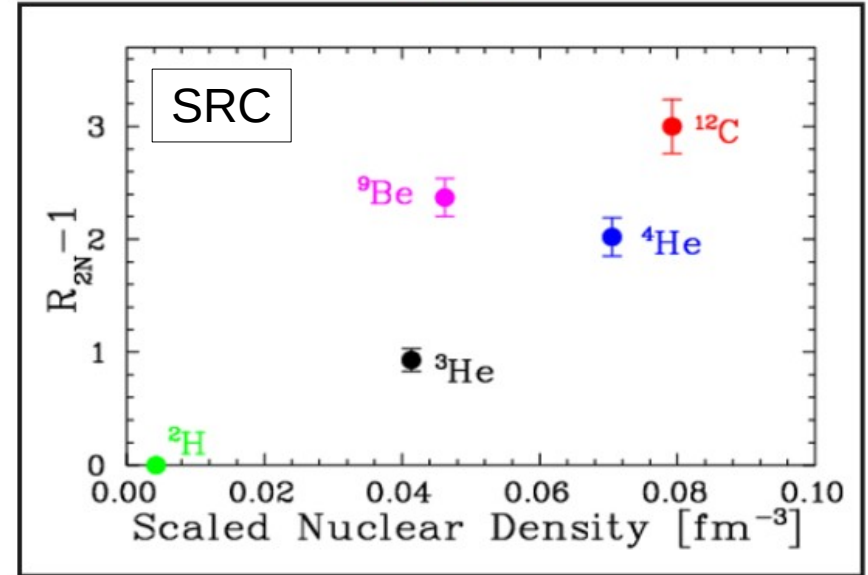
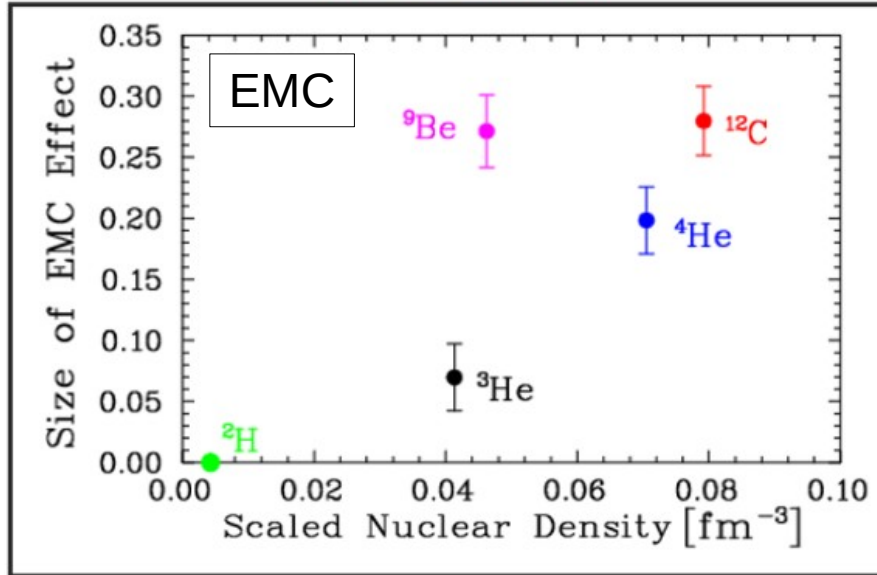
→ Effect rather driven by local density



SRCs And Nuclear Density

SRCs (Short Range Correlation) is configuration when two nucleons come very close such that they are heavily modified

Common Nuclear Dependence

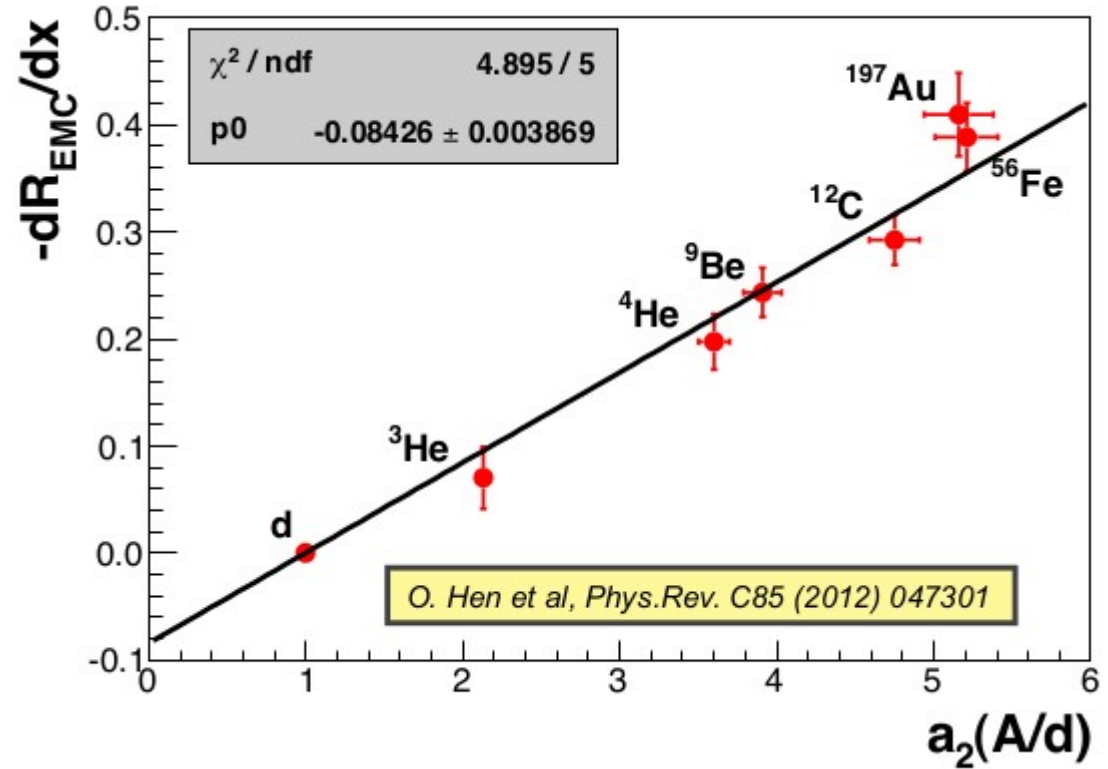


EMC Effect And SRC

Weinstein et al first published the correlation.

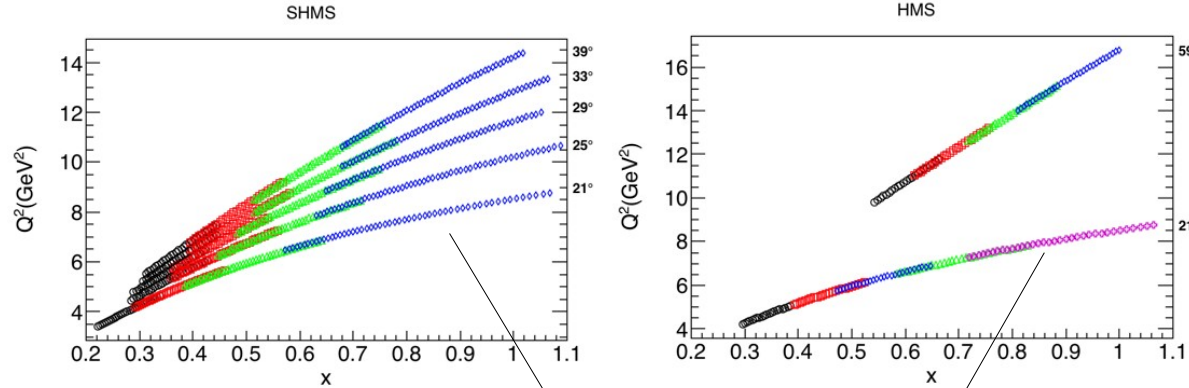
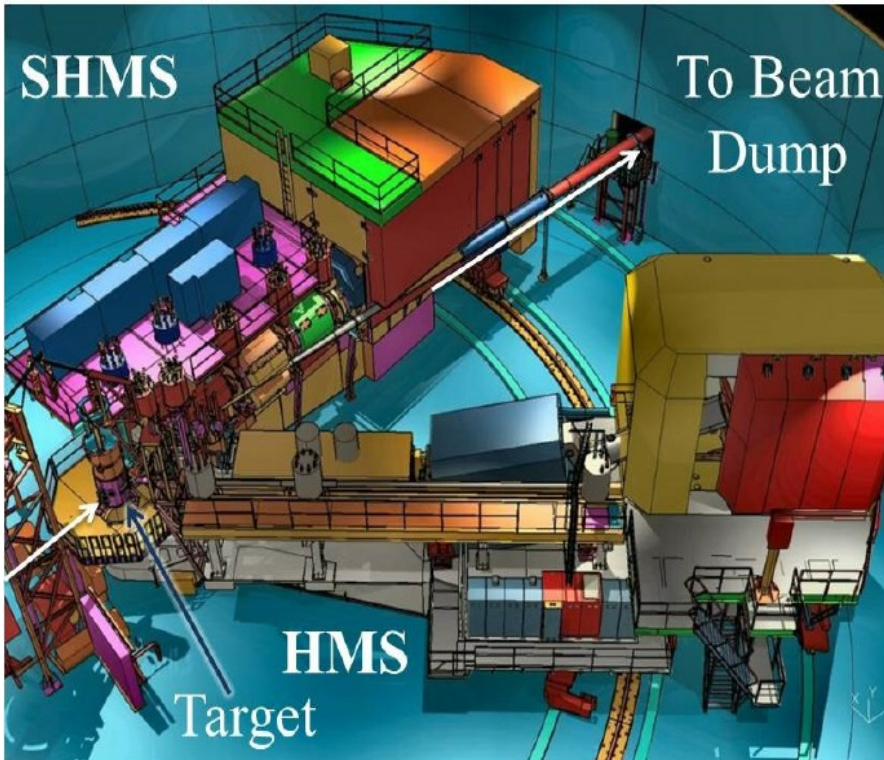
This was followed up by the O. Hen et al when the Jlab Be results became available

This result provides a **quantitative** test of level of correlation between the two effects.



E12-10-008: Setup and Kinematics Coverage

Phase I (spring 2018)



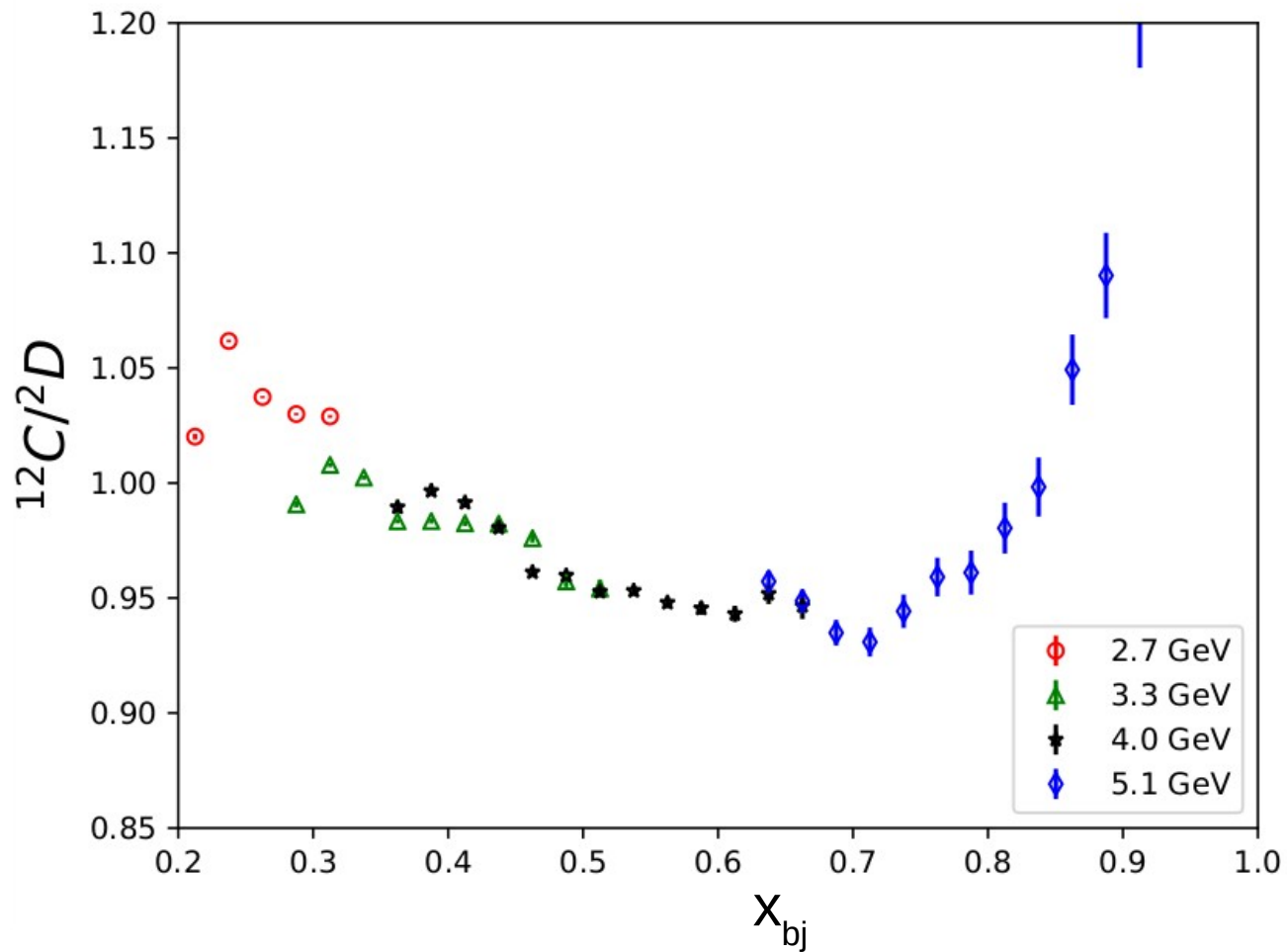
- Beam 10.6 GeV, unpolarized
- Lighter nuclei: ^1H , ^2H , ^9Be , $^{10,11}\text{B}$, ^{12}C
- ^{12}C was taken only at larger angle to look at Q^2 dependence of EMC Effect

First measurement of the EMC effect in $^{10,11}\text{B}$

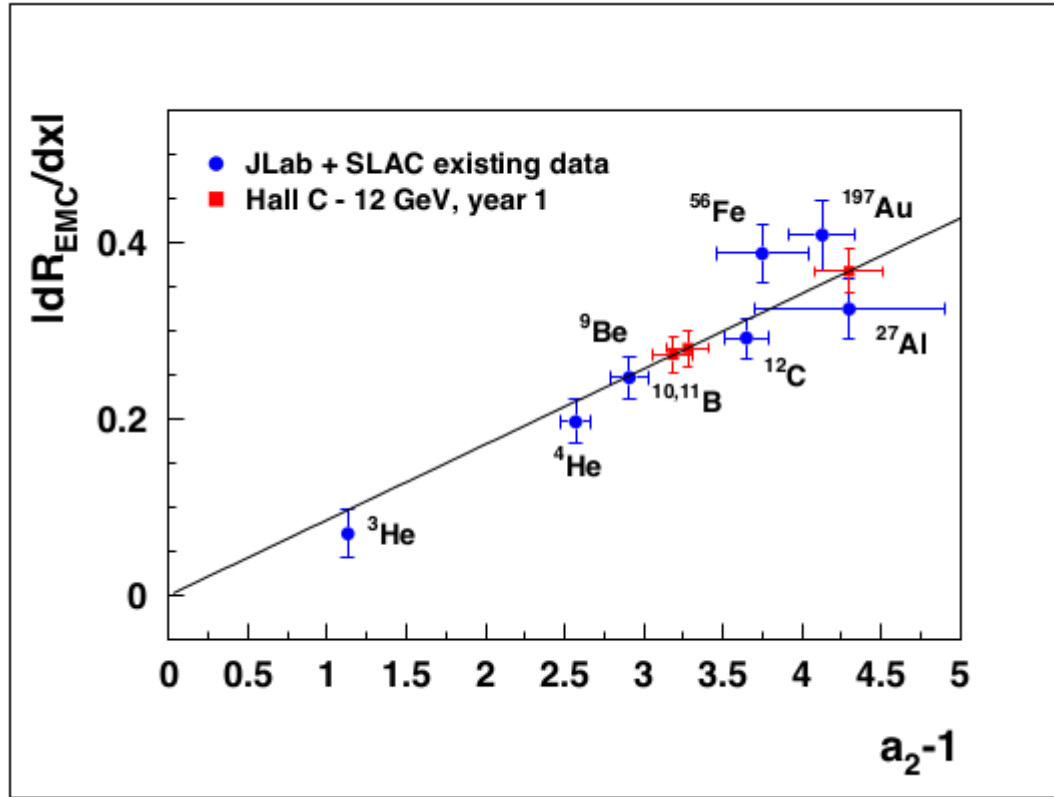
Analysis Status

- We finished detector calibrations.
- We are doing efficiency studies and acceptance study.
- Extraction of EMC ratio's is currently ongoing.
- We are seeing reasonable agreement between SHMS and HMS.
- Carbon ratio looks roughly as expected.
- Need to work on subtraction/modeling of charge symmetric background and radiative corrections.

Preliminary Ratio of Charged Normalized Yield



Projection Plot



Courtesy plot from D. Gaskell

Thank you for your attention