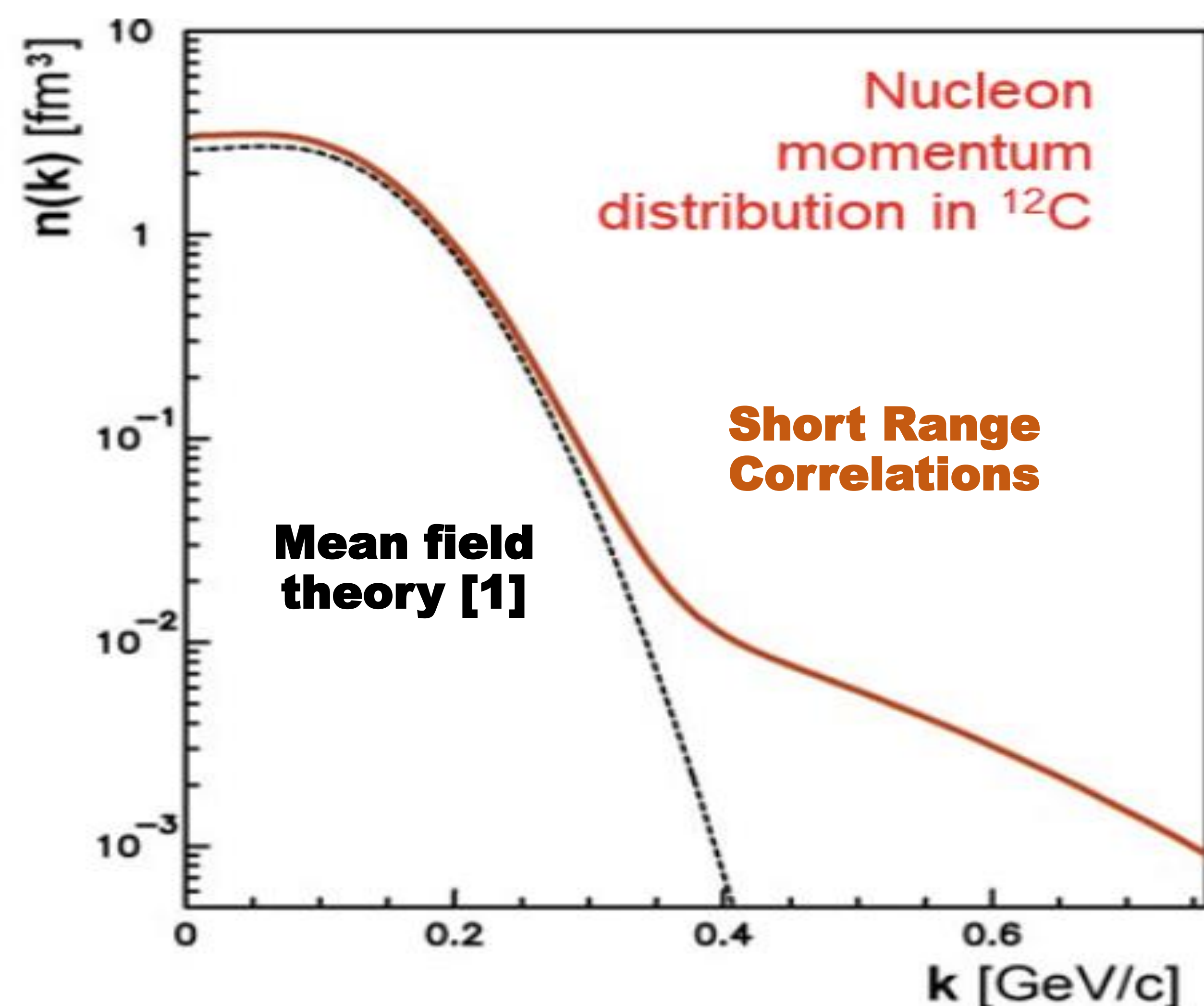


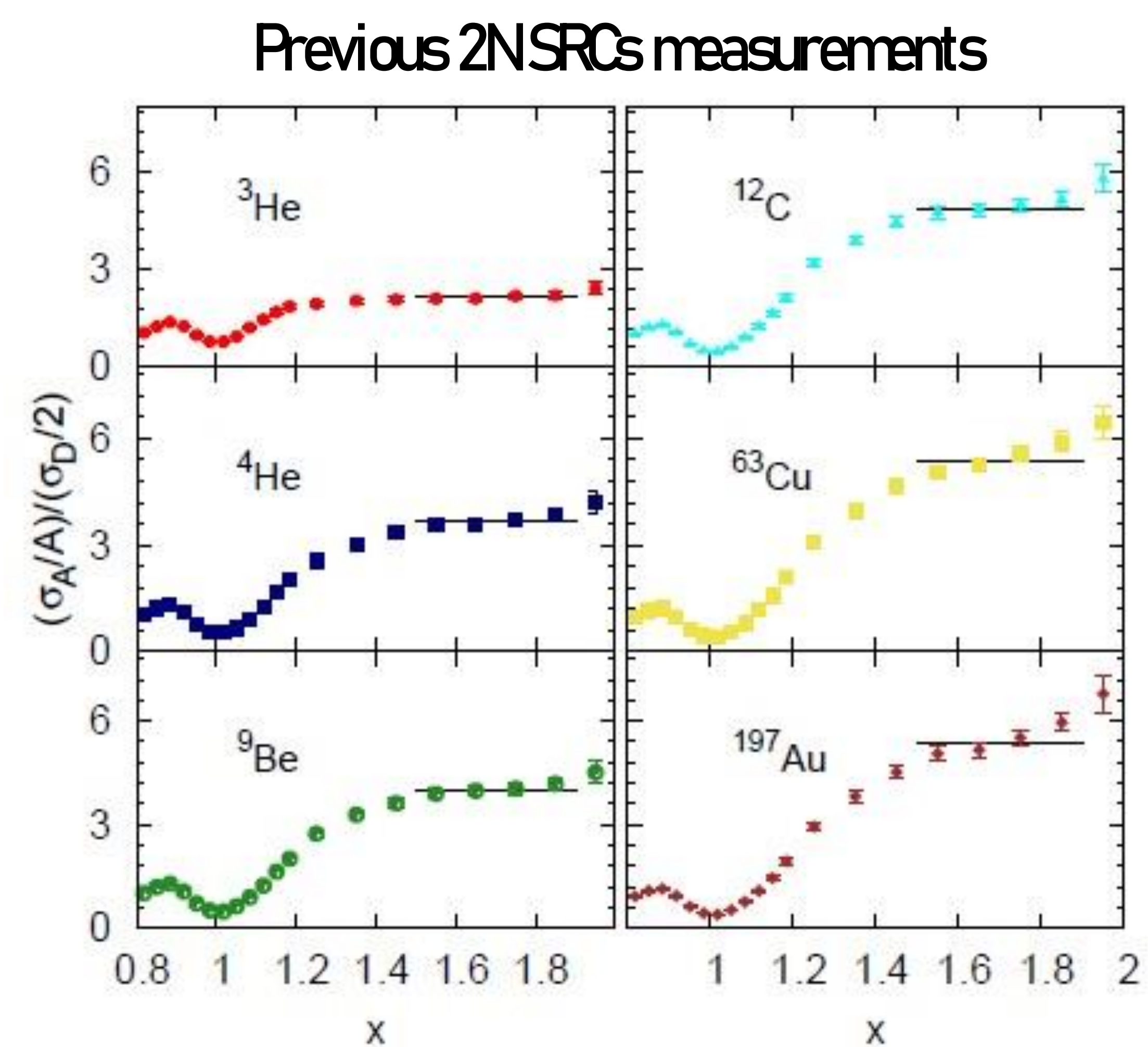
Abstract

- Mean field theory has been a very accurate model at predicting a variety of properties of the nucleus
- However, it fails to predict the distribution of high momentum nucleons within the nucleus.
- To answer this, the SRC picture points to multi-nucleon **Short-Range Correlations (SRCs)** which predicts that a combination of two (and potentially three or more) nucleons come within close proximity of each other and feel the repulsion of a short range nuclear force



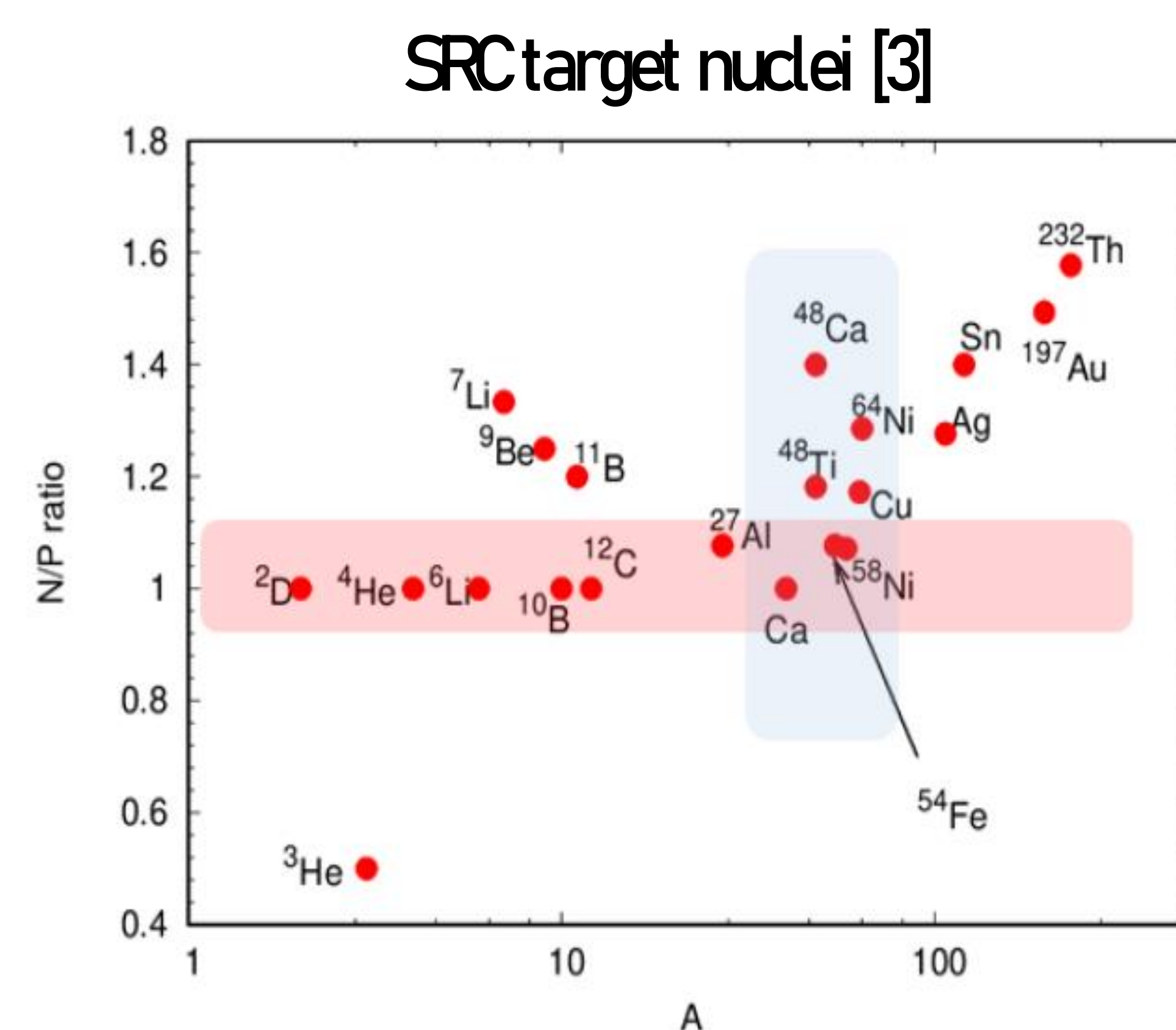
Current 2N SRC measurements [2]

- 2N SRC have been measured in a handful of targets
- Deuterium (^2H) is a 2 nucleon system
- Take cross section ratio of nuclei to Deuterium
- Observe plateau in the $1 < x < 2$ range
- Magnitude of plateau correlates to relative abundance of SRCs



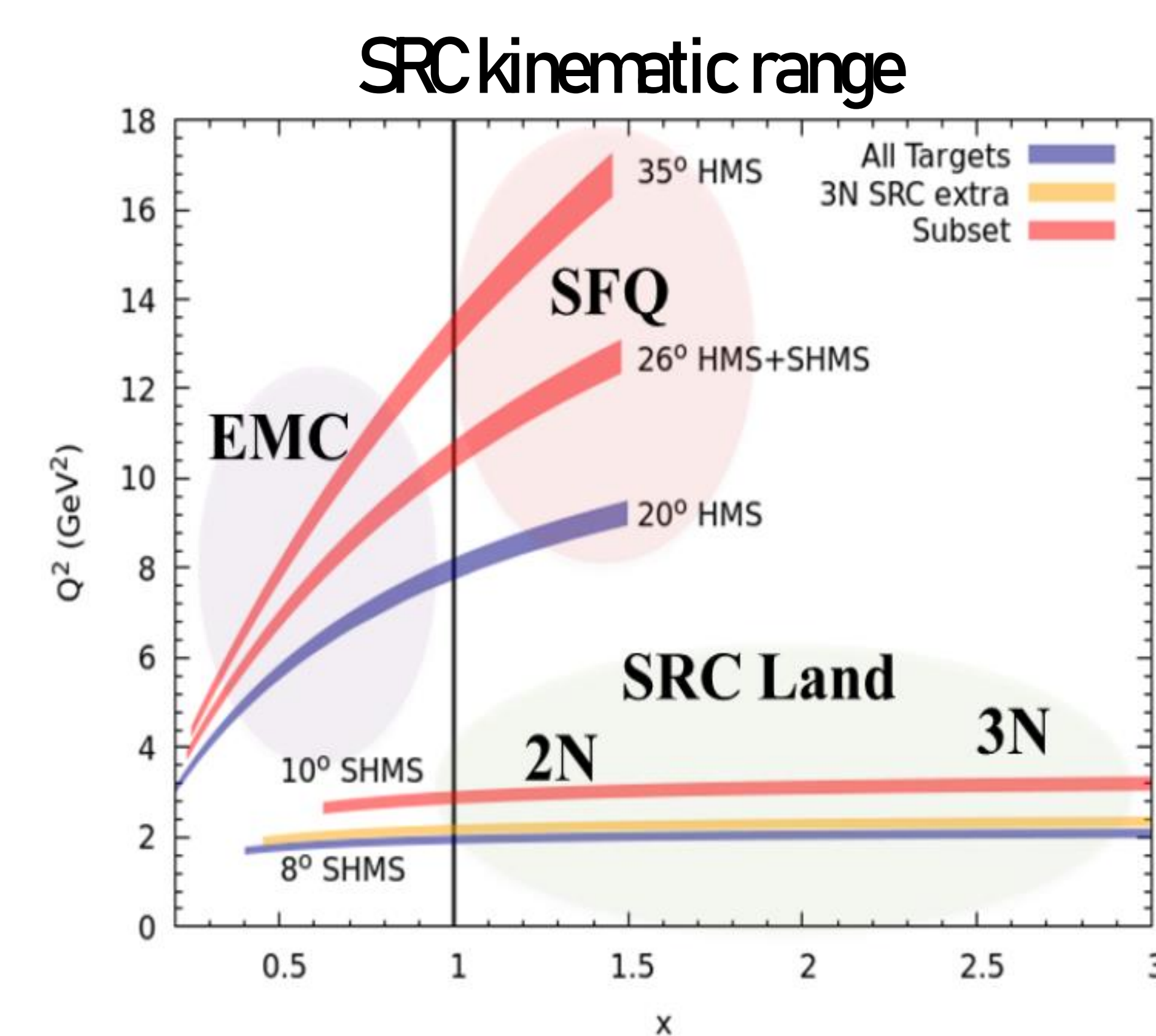
Where we measured

- Vast range of nuclei from heavy to light
- It’s thought that SRCs are primarily Neutron-Proton (NP) pairs
- Targets with $n/p \approx 1$ are in the red region
- Want to study isospin dependence (nn or pp pairs)
- Targets with different isospin measured in blue region
- nn and pp pairs have $\approx 1\%$ contribution to SRCs

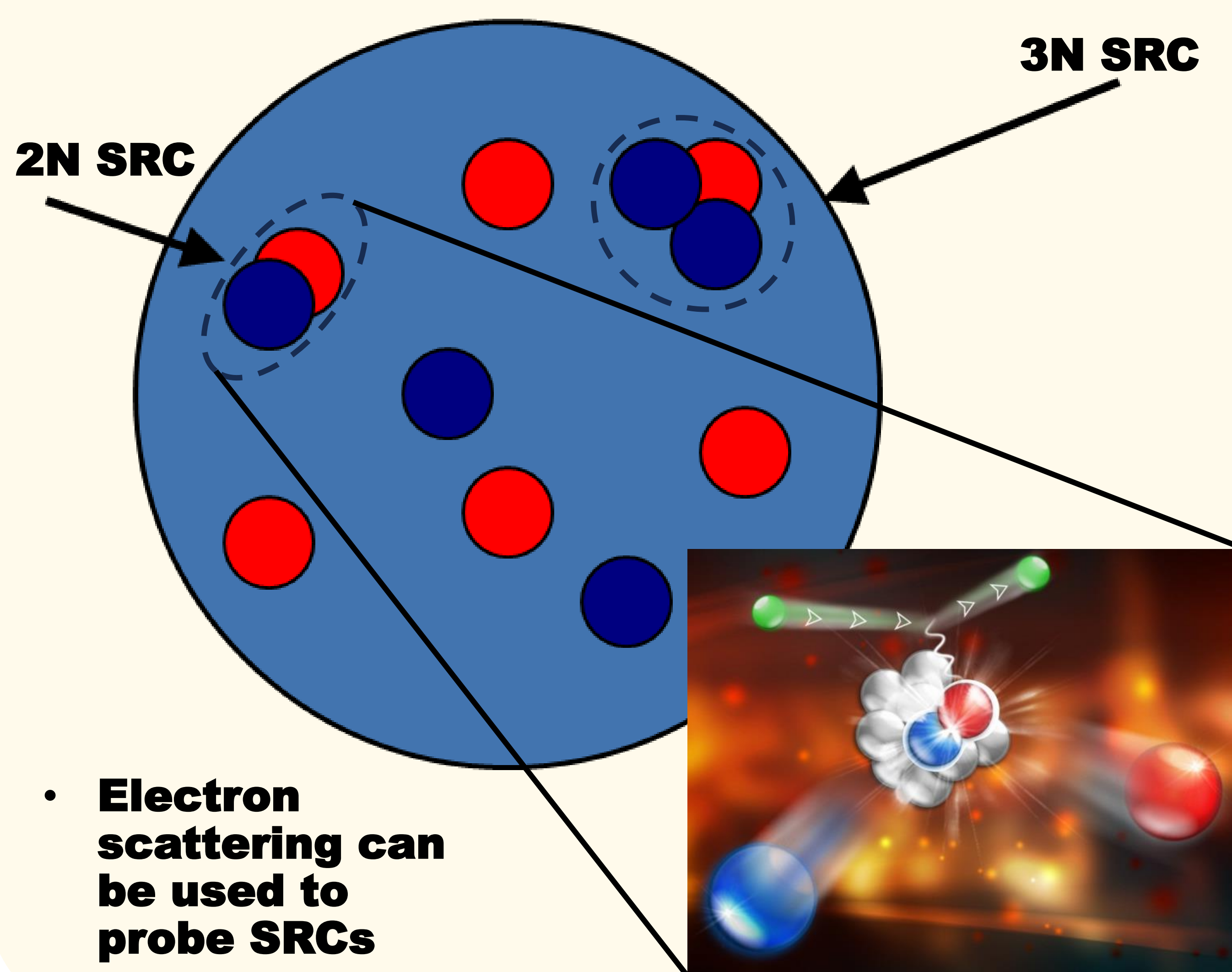


Kinematic regions

- 2 similar experiments took data simultaneously
- SRC requires large x_{bj}
- Measured SRC data at small angles with SHMS in Hall C at Jlab
- 2N and 3N SRC data measured together
- Paired with HMS data measuring EMC effect
- SRC plateau magnitude and EMC size have linear relation

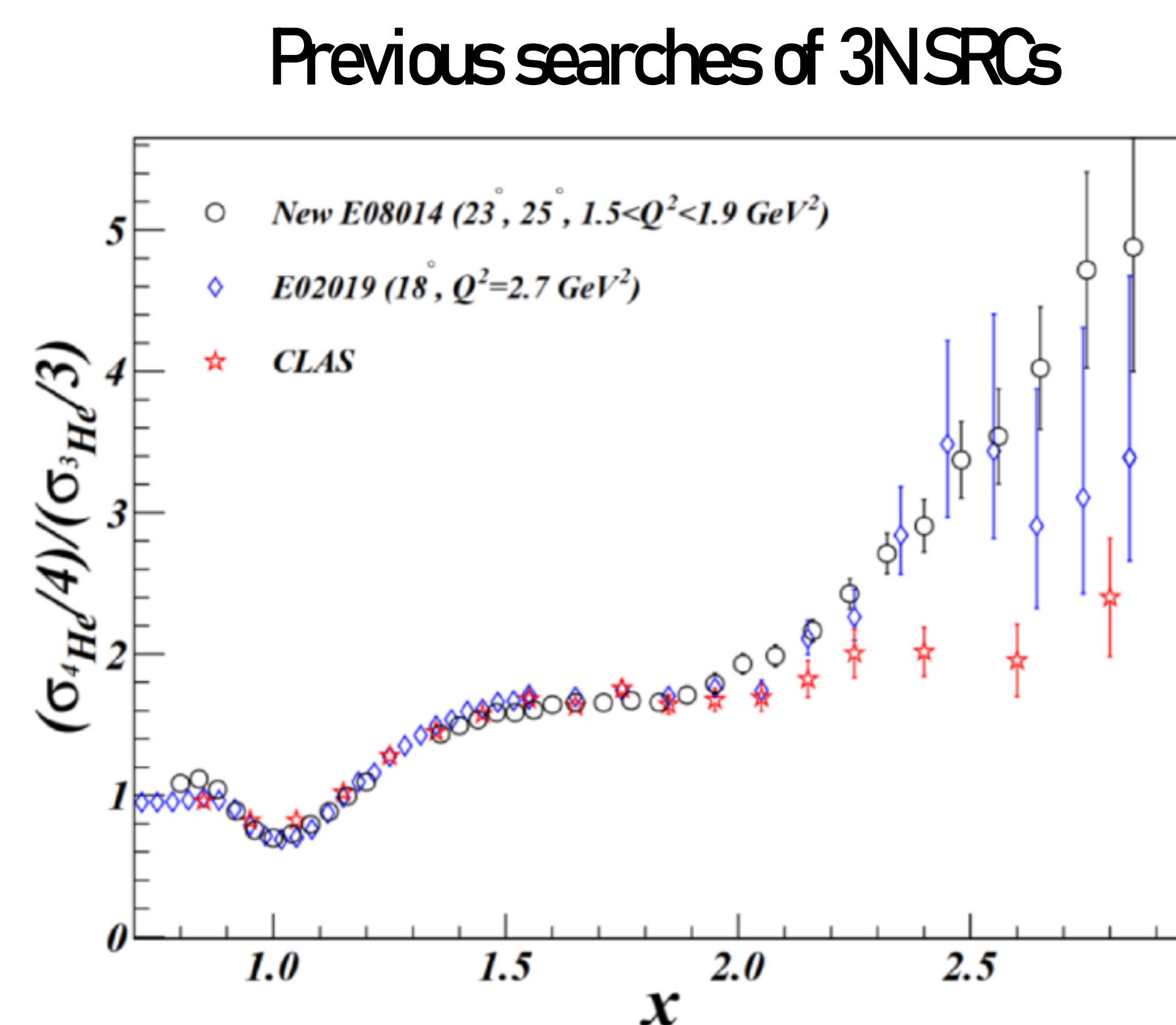


SRC diagram



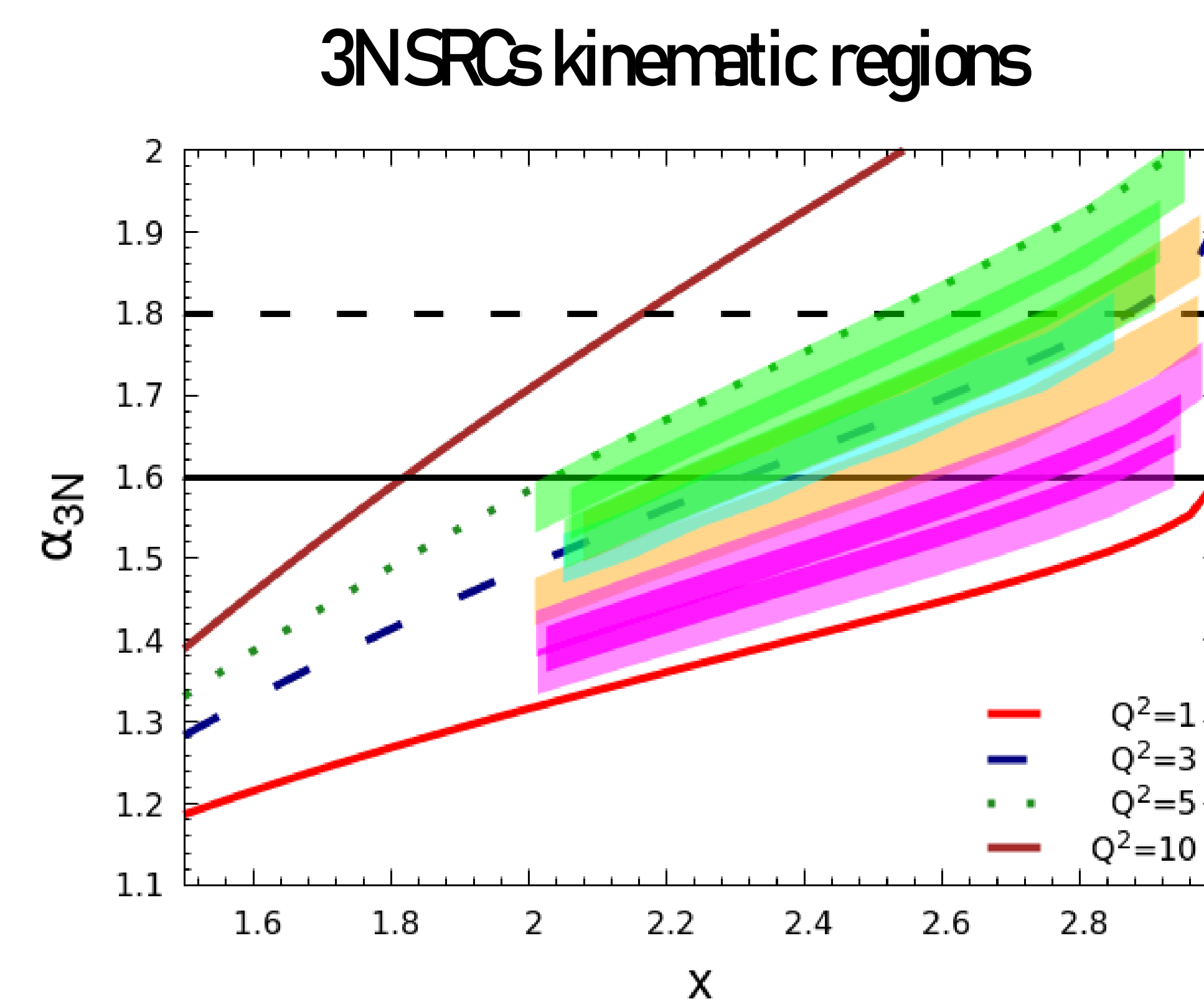
The search for 3N SRC [4]

- Similar to deuterium for 2N SRCs, ^3He is a 3 nucleon system
- Take cross section ratio of nuclei to Helium-3
- Measuring 3N SRCs have been attempted but not observed



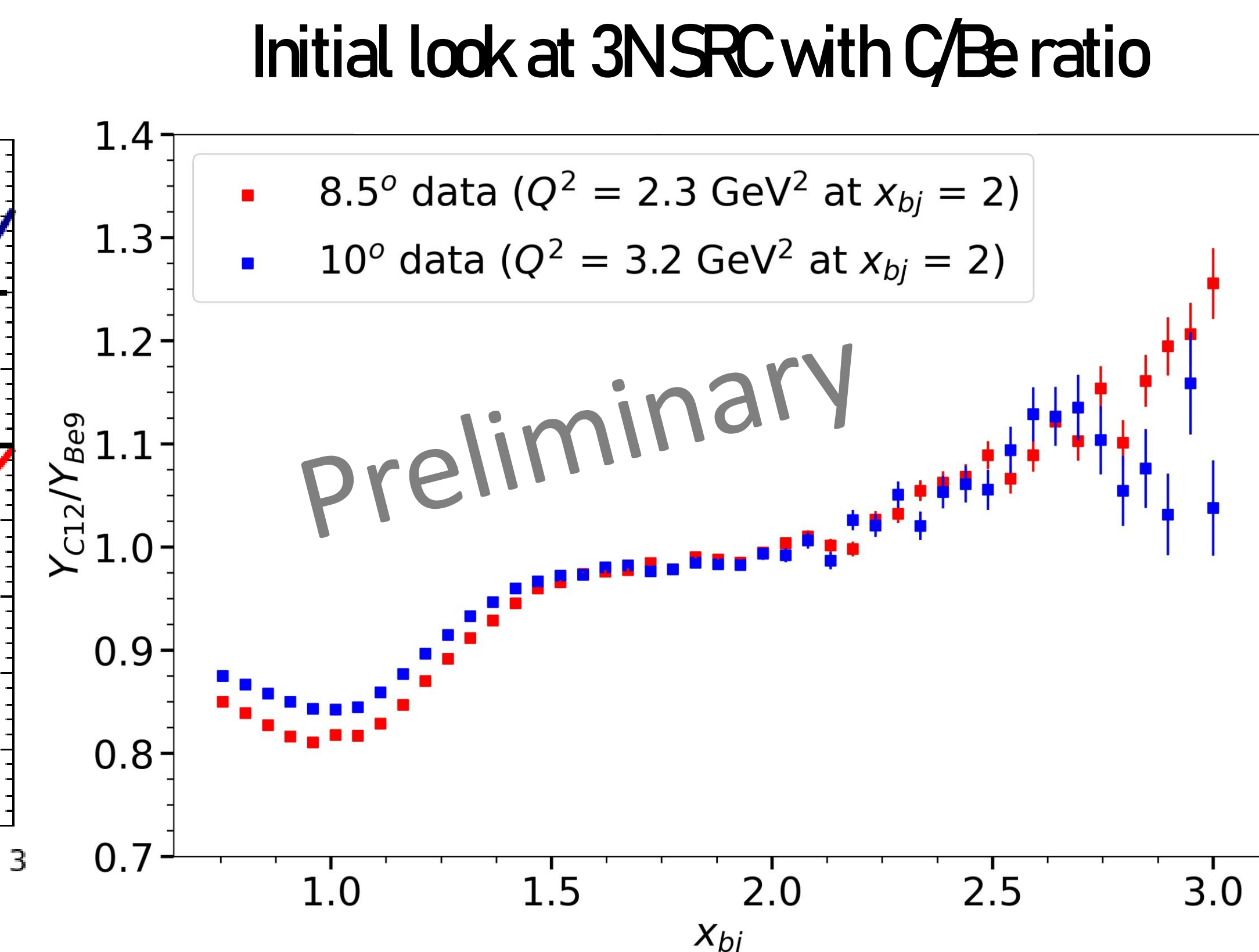
Need higher energies for 3N SRC [5]

- Previous experiments had low Q^2 values
- Light cone variable α_{3N} tell us Q^2 ranges to consider
- Hall A, Hall C (current), Hall C (proposed) search regions



Initial look at XEM2 3N SRC data

- C12 to Be9 in $2 < x_{bj} < 3$ region could also give a 3N SRC plateau
- 8.5° data has lower Q^2 value – no strong plateau
- 10° data has higher Q^2 value – potential 3N SRC plateau!



[1] Atti, C. C. D., & Simula, S. Phys. Rev. A 53(4), 1689–1710 (1996)
 [2] J. Arrington, N. Fomin, and A. Schmidt, Ann. Rev. Nucl. Part. Sci., vol. 72, pp. 307–337, (2022)
 [3] J. Arrington, D. Day, and N. Fomin, Update to Proposal E12-06-105, (2019)
 [4] Ye, Z., & Arrington, J. arXiv.org (2018)
 [5] N. Fomin, J. Arrington, and S. Li, Eur. Phys. J. A, vol. 59, no. 9, p. 205, (2023)