

XXIV International Workshop on Deep-Inelastic Scattering and Related Subjects (DIS16)



Contribution ID: 309

Type: **not specified**

Disentangling the EMC effect

Thursday, April 14, 2016 11:46 AM (20 minutes)

The deep inelastic scattering (DIS) cross section for scattering from bound nucleons differs from that of free nucleons. This experimental phenomena, known as the EMC effect, was first discovered 30 years ago and still lack an accepted theoretical explanation. In recent years it became accepted that any explanation to the EMC must include modification of the bound nucleon structure function due to the nuclear medium. Understanding the physical mechanism driving this modification is the focus of a large ongoing experimental and theoretical effort.

There are two main approaches to explain this mechanism. On one hand it was proposed that the strong mean field in the nucleus modify all the bound nucleons. On the other hand the strength of the EMC effect was found to be linearly correlated with the relative amount of Two-Nucleon Short Range Correlated pairs (2N-SRC) in nuclei. The observed correlation indicates that the EMC effect, like 2N-SRC pairs, is related predominantly to the high momentum (large virtuality) nucleons in the nucleus.

In the last few years several experiments were proposed to the updated 12 GeV JLab and the future Electron Ion Collider (EIC) that will test which one of the proposed theories is correct. We will review the EMC and SRC studies, their implication to asymmetric nuclear system, and present the planned experiments aimed at studying the origin of the EMC effect.

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Session Classification: WG7 Future Experiments

Track Classification: Future Experiments