

The structure function of the quasi-free neutron using spectator-tagging in deep-inelastic $D(e,e'p_s)X$ scattering with the CLAS12 Spectrometer

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One of the most intriguing open questions in hadronic physics is the behavior of the nucleon structure functions as $x \rightarrow 1$, where nearly all of the nucleon's momentum is carried by a single quark. Deep-inelastic lepton scattering experiments have provided a wealth of precise data on the proton structure function, but measurements of the neutron counterpart remain limited due to the instability of free neutrons. During the 6 GeV era at Jefferson Lab (JLab), the CLAS collaboration pioneered the spectator-tagging technique to extract the nearly on-shell neutron F_2 structure function in the reaction $D(e,e'p_s)X$, covering the range $0.1 < x < 0.6$. Building upon this approach and using the doubled CEBAF beam-energy, the BONuS12 experiment employs the upgraded CLAS12 spectrometer and a dedicated recoil detector to extend the measurement of the quasi-free neutron F_2 structure function up to $x \approx 0.75$ over a wide kinematic range in Q^2 and W . In this talk, we present the first results from the BONuS12 experiment, compare them with earlier measurements, and discuss their implications for our understanding of the nucleon's partonic structure at large x .