

Investigating the EMC effect in highly-virtual nucleons at Jefferson Lab's Hall B

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We installed a Backward Angle Neutron Detector (BAND) just upstream of the existing CLAS12 spectrometer at Jefferson Lab to detect high momentum neutrons at scattering angles between 160 and 170 degrees. These neutrons are spectators from electron-proton deep inelastic electron scattering (DIS) reactions in deuterium. The scattered electron is detected by CLAS12 while the recoiling neutron is detected by CLAS12 at intermediate angles or by BAND at backward angles, thereby “tagging” the DIS scattering off the proton in the deuteron.

By measuring how the quark-structure of the bound proton (as measured by its “structure function”) varies with its initial momentum (as measured by the spectator neutron momentum), we will be able to directly determine how and why the structure of bound protons differs from free ones. This will help resolve the 35-year-old enigma of the EMC effect. In my talk, I will present the BAND detector and the expected results, along with preliminary results from the Spring 2019 production runs.