On the problem of model independent extraction of neutron structure functions from deuterium data.

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We know much less about the neutron than the proton due to the absence of free neutron targets. Neutron information has to be extracted from data on nuclear targets like deuterium. This requires corrections for off-shell and binding effects which are not known from first principles and therefore are model-dependent. As a consequence, the same data can be interpreted in different ways, leading to different conclusions about important questions such as d/u quark ratio at large momentum fraction x.

The Barely Off-shell NUcleon Structure (BONUS) experiment at Jefferson Lab addressed this problem by tagging spectator protons in coincidence with inelastic electron scattering from deuterium. A novel compact radial time projection chamber was built to detect low-momentum, backward moving protons, ensuring that the scattering took place on a loosely bound neutron. This allowed collecting data in the kinematic region where off-shell, binding, target fragmentation, and final state interaction effects are minimized.

The scattered electron was detected with Jefferson Lab's CLAS spectrometer. Data were taken at beam energies of 2, 4 and 5 GeV. We will present the experimental verification of the method as well as results on the extracted structure function F_2^n of the neutron, and the ratio of neutron to proton structure functions F_2^n/F_2^p both in the resonance and deep inelastic regions.