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Probing the Neutron Structure with the Bonus Experiment

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Electron-proton scattering experiments have been providing a large amount of data on the proton structure function. However, because of the instability of the free neutron, fewer experiments have been able to study the neutron structure function. The BONuS collaboration at Jefferson Laboratory addresses this challenge by scattering electrons off a deuterium target, using a RTPC capable of detecting the recoiling low-momentum spectator protons near the target. Events of electrons scattering on almost free neutrons are selected by constraining the spectator protons to very low momenta and very backward scattering angles.

In 2005, BONuS successfully measured the neutron structure with scattering electrons of up to 5.3 GeV energy. An extension of this measurement has been approved using the newly upgraded 11 GeV electron beam and CLAS12 (CEBAF Large Acceptance Spectrometer). For this new set of measurements, a new RTPC detector using GEM trackers is being developed to allow measurements of spectator protons with momentum as low as 70 MeV/c. Results from the previous run, as well as upgrades and developments of the future run, will be presented.

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