The BONuS12 Experiment Measuring the Neutron Structure Function at large Bjorken-x

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Abstract

The BONuS experiment using Jefferson Lab's CLAS detector has been designed to study the nearly free neutron structure by using the spectator tagging technique. The backscattered spectator protons in $d(e, e'p)X$ deep-inelastic scattering with momenta <100 MeV/c are detected by a Radial Time Projection Chamber (RTPC), thereby selecting electron-scattering events off nearly free neutrons. The recent upgrade of Jefferson Lab to 11 GeV electron beam energy will extend the kinematic range to a higher Bjorken x of $\sim$ 0.85. The collaboration is presently preparing the BONuS12 experiment, which is expected to take data in early 2020 using the upgraded CLAS12 detector. A new and enlarged RTPC is being build, using a new drift gas and a new data acquisition system, and new simulation and particle tracking software is being developed. This presentation includes a status update of the BONuS12 experiment with an overview of the spectator tagging technique to study the free neutron structure function.

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