Measurement of $A_x$ and $A_z$ asymmetries in the quasi-elastic $^3\text{He}(\vec{e}, e'd)$ reaction

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Abstract

We propose a study of the quasi-elastic $^3\text{He}(\vec{e}, e'd)p$ reaction in Hall A with the polarized $^3\text{He}$ target in conjunction with the High-Resolution Spectrometers and the large-acceptance spectrometer BigBite. The purpose of this measurement is to study the $S'$-state contributions to the $^3\text{He}$ ground-state wave-function and to test the state-of-the-art Faddeev calculations of the three-body system.

Beam-target asymmetries $A_x$ and $A_z$ will be measured in the range of recoil momenta $p_r$ from 0 to about 200 MeV/$c$, in both parallel and perpendicular kinematics. At $p_r \lesssim 70$ MeV/$c$, the D state will be highly suppressed and the asymmetries will be uniquely sensitive to the interference of the S and $S'$ states. At larger recoil momenta, the contribution of the D state will be increasingly important.

Beam energy of 2.4 GeV and the polarized $^3\text{He}$ target of Hall A will be used. We request 520 hours of beam-time.

This proposal is based on the favourable review of the Letter of Intent by PAC 20, and has been endorsed by the entire Hall A Collaboration.

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