

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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