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Beam-Normal Asymmetry of Pion Electroproduction in the Delta(1232) Region BRANDON BUNCHER, CARL CARLSON, College of William and Mary — We made theoretical calculations of the normal beam spin asymmetry in the reaction $ep \to e'\Delta(1232)$. The $\Delta(1232)$ is a nucleon excited state with spin-$\frac{3}{2}$, and decays rapidly into a proton or neutron plus a corresponding pion. The normal beam spin asymmetry has the incoming electron polarized perpendicular to the scattering plane, and is defined as $A_n = \frac{N_R - N_L}{N_R + N_L}$, where N_R (N_L) is the number of electrons scattered in the positive (negative) direction relative to $\hat{p} \times \hat{s}$, where $\hat{p}$ is the unit vector in the direction of the electron's momentum and $\hat{s}$ is the unit vector in the direction normal to the scattering plane. The normal beam asymmetry is small and proportional to the electron mass, and is present even in the one-photon exchange approximation. There is experimental data on A_n available as a byproduct of the Q_{weak} experiment, though the relevant formulas are not present in the literature. We have derived the formulas, and have evaluated them in terms of the standard multipole amplitudes, which are the basic amplitudes for pion electroproduction, $ep \to e'\pi N$ (including $\Delta(1232)$ production and subsequent decay).

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