

Complete set of polarization transfer coefficients for the ${}^3\text{He}(p, n)$ reaction at 346 MeV

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We present the double-differential cross-section and a complete set of polarization transfer coefficients for the ${}^3\text{He}(p, n)3p$ reaction at $T_p = 346$ MeV and a reaction angle $\theta_{\text{lab}} = 0^\circ$. Polarization transfer coefficients are sensitive to the spin-parity J^π of an excited state [1], and thus they are sensitive to the presence of a resonance that has a fixed J^π .

Figure 1 shows the double-differential cross-section I and the complete set of polarization transfer coefficients $D_{NN}(0^\circ)$ and $D_{LL}(0^\circ)$ for the ${}^3\text{He}(p, n)$ reaction at $T_p = 346$ MeV and $\theta_{\text{lab}} = 0^\circ$. The dashed curves in Fig. 1 represent the corresponding free NN values with the FA07 phase-shift solution [2] of the on-line Scattering Analysis Interactive Dial-in (SAID) Facility. The measured $D_{NN}(0^\circ)$ values are close to the corresponding free NN values. This supports the predominance of quasi-elastic scattering processes in this reaction. However, significant discrepancies are observed in $D_{LL}(0^\circ)$, which are presumably the result of the three-proton $T = 3/2$ resonance. The J^π value of the $T = 3/2$ resonance is estimated to be $1/2^-$ [3], and the solid curve in the top panel represents the $1/2^-$ resonance distribution. The present $D_{ii}(0^\circ)$ data can be reproduced reasonably well by considering the $1/2^-$ resonance contributions as shown by the solid histograms in the lower two panels.

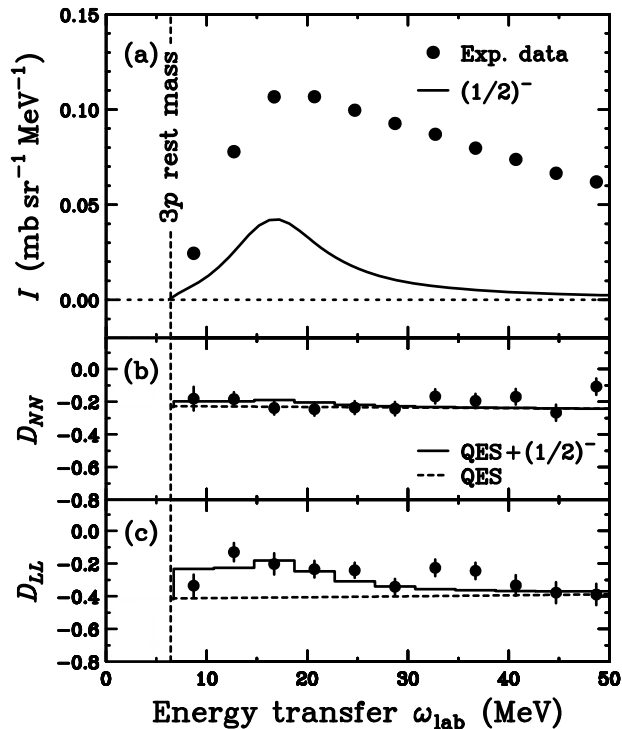


Figure 1: (a) The estimated $J^\pi = 1/2^-$ $T = 3/2$ resonance cross-section (solid curve) compared with the total cross-section (filled circles) for the ${}^3\text{He}(p, n)$ reaction at $T_p = 346$ MeV and $\theta_{\text{lab}} = 0^\circ$. (b) The $D_{NN}(0^\circ)$ values including the $J^\pi = 1/2^-$ resonance contributions (solid histogram) compared with the experimental data (filled circles). The dashed curve represents the corresponding free NN values with the FA07 phase-shift solution [2]. (c) Same as (b), but for $D_{LL}(0^\circ)$.

References

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