Isovector effective NN interaction in $^{28}\mathrm{Si}(\vec{p},\vec{n})^{28}\mathrm{P}(6^-)$ at 198 MeV

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Polarization transfer measurements of nucleon inelastic scattering and nucleon charge-exchange reactions provide a way to investigate the effective NN interaction in nuclei. Stephenson *et al.* [1] have reported comparisons between experimental and theoretical results for $^{28}\mathrm{Si}(\vec{p},\vec{p}\,')^{28}\mathrm{Si}(6^-,T=1)$ at $T_p = 198$ MeV, where the transition form factor is adjusted to reproduce the transverse electron scattering data. For the spin-dependent interaction in nuclei, Stephenson *et al.* claim that the spin-longitudinal component is reduced by a factor of two whereas the normal spin-transverse component is significantly enhanced. These modifications can be accounted for in part by using a reduced medium-modified ρ-meson mass in nuclei. However, isospin-mixing effects can also explain the modifications in part [2]. Thus it is very important to determine whether the observed differences are due to medium modifications of NN amplitudes in nuclei.

In this paper, we present measurements of the cross section and a complete set of polarization observables for the excitation of the 6^-, $T=1$ state at $E_x = 4.94$ MeV in $^{28}\mathrm{P}$ using the $(\vec{p},\vec{n})$ reaction at $T_p = 198$ MeV. Figure 1 shows four polarized cross sections as a function of momentum transfer. The open circles are the $(\vec{p},\vec{p}\,')$ results of Stephenson *et al.* [1]. These data are multiplied by a factor of two to take into account the difference of the isospin Clebsch–Gordan (CG) coefficients for (p,n) and (p,p'). The $(\vec{p},\vec{n})$ and $(\vec{p},\vec{p}\,')$ results are in good agreement with each other within uncertainties. Thus we can exclude the possibility of isospin mixing effects [2] which might be responsible for the discrepancy between experimental and theoretical results observed in the $(\vec{p},\vec{p}\,')$ case.

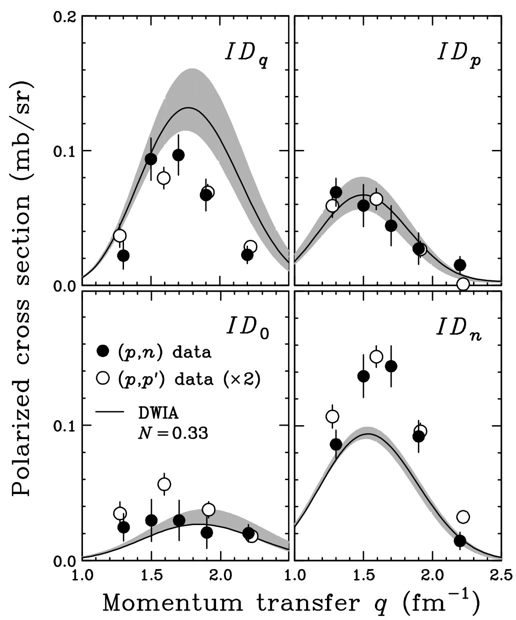

Figure 1: Measured polarized cross sections for $^{28}\mathrm{Si}(p,n)^{28}\mathrm{P}(6^-)$ at $T_p = 198$ MeV (closed circles). The solid curves are DWIA calculations and the band represents their OMP dependence. The open circles are (p,p') results [1], multiplied by a factor of two, as explained in the text.

References

[1] E. J. Stephenson et al., Phys. Rev. Lett. **78** (1997) 1636.

[2] E. J. Stephenson and F. Sammarruca, in: Proceedings of SGR97, 1998, p. 369.