Implications for the $\pi NN$ coupling from spin transfer measurements in $pp$ elastic scattering at 200 MeV

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Abstract. A detailed study of spin transfer in $pp$ elastic scattering near 200 MeV has been carried out at the Indiana University Cyclotron Facility. The new data have much smaller uncertainties than all previous measurements, and span a kinematic range selected specifically to maximize sensitivity to the neutral $\pi NN$ coupling constant $g^0$, a fundamental quantity in nuclear physics whose value remains highly controversial. Our results provide strong support for modern potential models of the $NN$ interaction which use a relatively weak pion coupling ($g^0 \approx 13.6$), but disagree significantly with the predictions of models in which $g^0$ is $\sim 14.4$. Working in a one-boson-exchange framework, calculations suggest that most of these latter differences can be removed just by reducing the strength of $g^0$ from 14.4 to 13.6 for the long-range (higher partial wave) pion contributions in these models.

Isospin Identification for $A = 25$ Mirror Nuclei by High Resolution $(p, p')$ and $(^3\text{He}, t)$ Experiments


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Gamow-Teller and $M1$ states excited in $^{25}\text{Mg}(^3\text{He}, t)^{25}\text{Al}$ and $^{25}\text{Mg}(p, p')$ reactions at 0° and 450 MeV incident energy, respectively, have been measured and compared. Good symmetry structure in the mirror nuclei $^{25}\text{Al}$ and $^{25}\text{Mg}$ has been identified up to the highest measured excitation energy of $E_x \sim 16$ MeV.

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