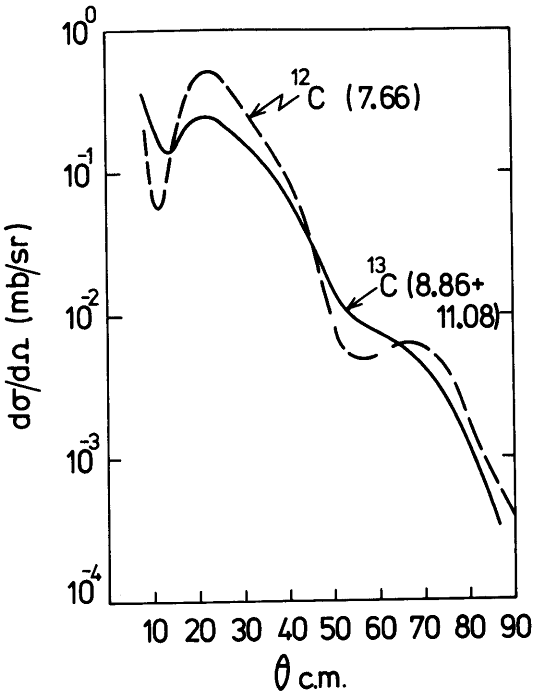

Figure 2. The measured differential cross section for the $^{12}C(p,p')^{12}C^*$ (7.66 MeV) reaction at 135 MeV compared with the sum of the differential cross sections for exciting the 8.86 and 11.08 MeV states of ^{13}C.

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FRAGMENTATION OF HIGH-SPIN PARTICLE-HOLE STATES IN ^{26}Mg

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Systematic information is now being obtained on the excitation of spin-flip degrees of freedom throughout the periodic table from inelastic scattering and charge exchange reactions. An overall systematic quenching of the isovector spin-flip strength has been identified,[1] although the quenching mechanism is not yet understood. Inelastic proton and pion scattering reactions also indicate a large quenching for isoscalar spin-flip excitations, although the systematics of this effect are less well established.[2,3]

Several theoretical explanations have been offered for this reduction in the spin-flip strength. These explanations include: fragmentation of the single-particle strength,[4] mesonic renormalization of the spin current,[5] and the explicit inclusion of Δ(1232) isobar-hole states.[6] It appears that it may be possible to separate these mechanisms by studying the inelastic transition strengths as a function of single-particle occupation probability and as a function of angular momentum. The deformed nuclei in the s-d shell seem to be excellent candidates for such a study. The single-particle occupation probabilities as determined by single-nucleon transfer reactions change rapidly as the ground-state deformation changes. Also, several high-spin, 6^-, and low-spin, 1^+, states are known from previous work.[2,3,7]

We have measured the angular distributions and analyzing powers for polarized proton scattering from ^{26}Mg at 135 MeV incident energy. Angular distributions were measured in 5° steps from a laboratory angle of 10° to 60° for states in the excitation energy range from 0 to 20 MeV. Data analysis is currently under way. A preliminary analysis revealed at least five states which appeared to be 6^- states, based on their angular distributions. At least one 1^+ state also appears evident.

With these data and the previously published data on ^{24}Mg and ^{28}Si,[2] we will be able to study the systematics of the quenching of the spin-flip strength under controlled changes in nuclear structure. This should provide important insight into the underlying quenching mechanism.

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ENERGY DEPENDENCE OF PROTON INELASTIC SCATTERING BETWEEN 80 AND 180 MEV

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Measurements of the energy dependence of proton inelastic scattering are expected to provide a new means of testing predictions inherent in the microscopic distorted-wave impulse approximation (DWIA). In this description, the overall energy dependence for a particular transition arises from the individual energy dependences of 1) the underlying free nucleon-nucleon interaction, 2) the knockon exchange amplitude, and 3) the effects of distortion in the entrance and exit channels.

An investigation of the energy dependence of ^{28}Si(p,p') is in progress at IUCF, utilizing polarized proton beams at 80, 100 and 180 MeV, together with our earlier published results[1] at 135 MeV. Differential cross-section and analyzing-power data have been measured at each of these energies for the elastic scattering, as well as for many of the inelastic transitions. In particular, we have concentrated on the 5^-,T=0 (9.70 MeV), 6^-,T=0 (11.58 MeV) and 6^-,T=1 (14.35 MeV) states, which are the dominant transitions