natural parity and unnatural parity strength seen at 160 MeV are no longer evident at 120 MeV. It is not yet clear whether this difference can be attributed to changes in the effective interaction as a function of energy and momentum transfer or whether it is evidence for other reaction mechanisms becoming important at the lower energies. For example, at 120 MeV the amount of multistep contributions might be larger than at 160 MeV. Recent calculations by Esbensen and Bertsch[7] have pointed out the possible importance of multiple scattering even at 200 MeV. Note, however, that randomization of the neutron spin, as might be expected from a simple multiple scattering model, would result in $D_{NN} = 0$. If this effect is indeed important, then comparison of D_{NN} measurements to theoretical DWIA predictions will be valid for spectroscopic purposes only for the highest bombarding energy.

The observed region of positive D_{NN} near $E_x \simeq 40$ MeV in the 120-MeV spectrum must still be explained, especially since positive D_{NN} is the signature for $\Delta S = 0$ in a single step transition and such transitions should be enhanced at the lower bombarding energy relative to $\Delta S = 1$ transitions.

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STRETCHED STATE EXCITATIONS IN THE ^{26}Mg(p,n)^{26}Al REACTION AT 134 MeV

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For a target with a neutron excess, the (p,n) reaction (with $\Delta T = 1$) can excite strength in the final nucleus with isospin T − 1, T, or T + 1, where T is the isospin of the target. By contrast, inelastic electron and proton scattering are restricted to the two highest isospin components. Because the lower isospin component is usually found at lower excitation energies, it usually is fragmented less by configuration mixing. The '0 $\hbar\omega$' stretched states observed in the (p,n) reaction[1] are good examples of T − 1 stretched states. In some cases, usually for lighter nuclei, it is possible also to see T − 1 components of '1 $\hbar\omega$' stretched states; the ^{26}Mg(p,n)^{26}Al reaction is a good example. Because ^{26}Mg is a T = 1 nucleus, the (p,n) reaction can excite T = 0, 1, and 2 isospin components in the ^{26}Al residual nucleus. The (p,p′) and (e,e′) inelastic scattering reactions (with both $\Delta T = 1$ and $\Delta T = 0$), can excite only states in ^{26}Mg, which has $T_z = 1$; thus, these reactions excite only T = 1 and T = 2 components in the final nucleus. Both the (p,p′) and (e,e′) reactions[2,3] have been used to study the isovector 6^- stretched state with the principal configuration $(f_{7/2}, d_{5/2}^{-1})$. The observation that the T = 1 strength is fragmented is not surprising in this deformed nucleus. A state at 18.2 MeV was identified tentatively as a T = 2 state.[3] In our studies of the 6^- strength with the (p,n) reaction, we see (with poorer resolution) the general fragmentation of the T = 1, 6^-strength and even the T = 2 state (at E_x = 18.1 MeV in ^{26}Al), as shown in Fig. 1; however, because the (p,n) reaction can excite T = 0 strength as well, we see the T = 0 component of the 6^-stretched state also. It is observed to be at lower excitation energy and significantly less fragmented than the T = 1 strength. Furthermore, we excite also the (T = 0) 0$\hbar\omega$, 5^+ stretched state with the configuration $(d_{5/2}, d_{5/2}^{-1}$. (This state is known to be the ground state of ^{26}Al.) We see the 0$\hbar\omega$ stretched-state strength to be highly concentrated into this single state. The angular distributions for some of these transitions are shown in Figure 2. Shown also are 'standard' DWIA calculations for comparison.[4] The nuclear structure wave functions assumed are just those expected in the simple shell model. Characteristically, we see a significantly larger normalization factor for the 5^+, '0 $\hbar w$' stretched state than for any other transition. The T = 0, 6^- strength is known from transfer-reaction studies to be concentrated primarily into two states at E = 6.9 and 7.5 MeV. The strength observed in these two states is about 30% of the expected 1p - 1h strength and is in reasonable agreement with that observed recently in (α,t) transfer-reaction studies.[5] At higher excitation energies we see the analog of T = 1, 6^- strength identified in (p,p′) and (e,e′) studies,[2,3] and in the (α,t) studies.[5] This strength is fragmented into at least five different states. The (p,n) reaction, with relatively poor energy resolution, is not the reaction of choice to study such highly-fragmented strength. Finally, near E_x = 18.1 MeV, we see the analog of the T = 2, 6^- state.

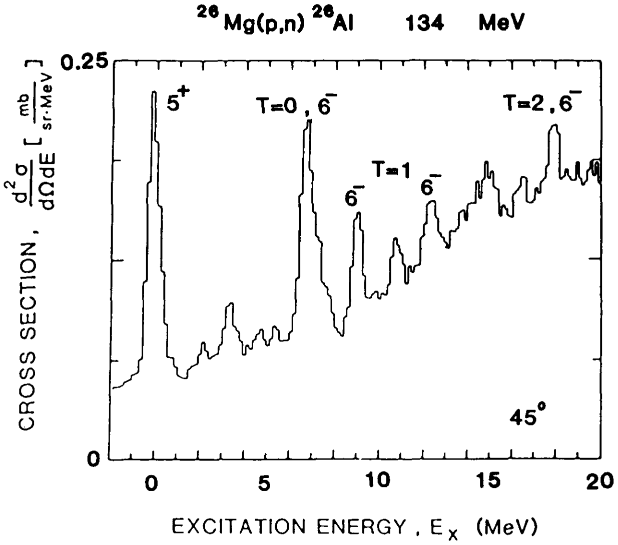

Figure 1. Excitation-energy spectrum for the ^{26}Mg(p,n)^{26} Al reaction at 134 MeV and 45°.

The important information the (p,n) reaction provides to the study of stretched-state strength in the A = 26 system is the excitation of the T = 0, 5^+ and 6^- strengths. These strengths are seen to be more concentrated than that for the higher isospin components. Thus, the lower isospin components provide better tests of the reaction mechanisms and the assumed structure of the target nucleus. The higher isospin components are clearly more sensitive to configuration mixing in the final nucleus and provide important tests of structure calculations which try to describe such mixing.

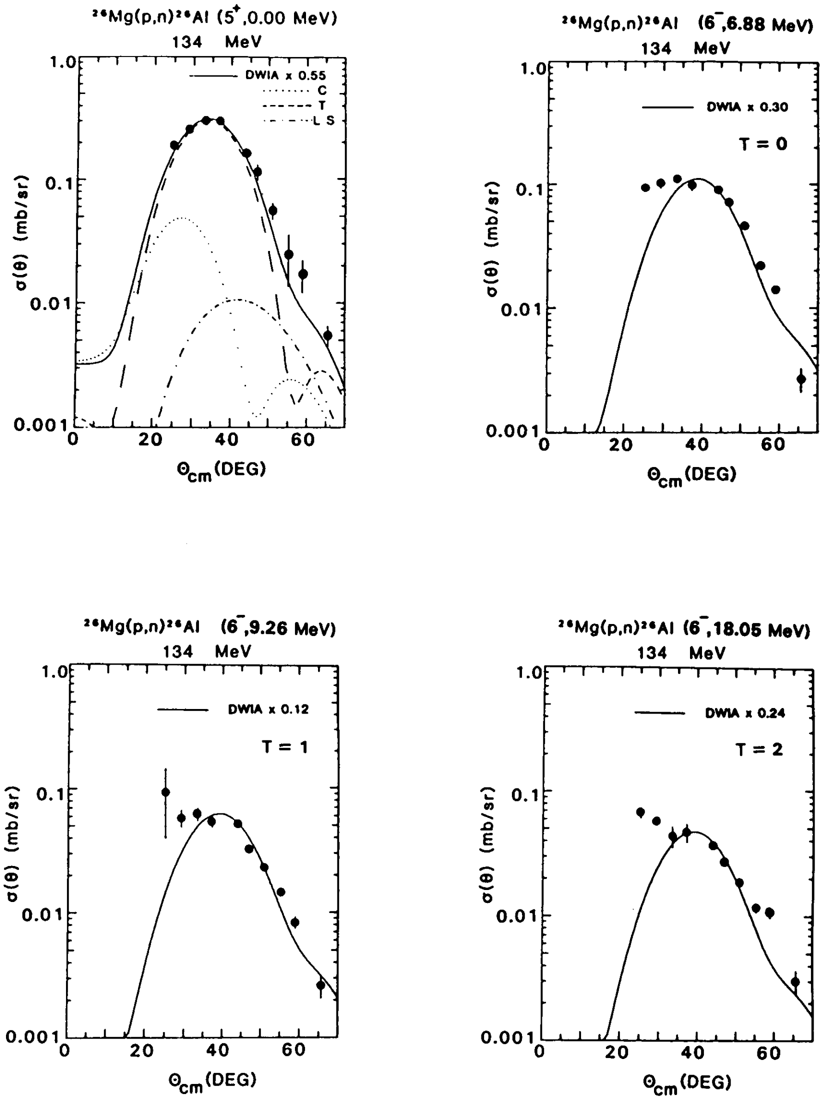

Figure 2. Angular distributions for stretched-state excitations in the $^{26}Mg(p,n)^{26}Al$ reaction at 134 MeV.

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