ANALYZING POWERS FOR THE $^{13}$C AND $^{208}$Pb(p,d) REACTIONS AT 123 MeV

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We have measured differential cross sections and analyzing powers for the first two levels in the $^{13}$C (p,d) reaction and the first six levels in the $^{208}$Pb(p,d) reaction at 123 MeV bombarding energy. The experimental method was the same as that described in the preceding report. Several preliminary analyzing-power distributions for the $^{208}$Pb(p,d) reaction appear in Figures 1 through 4.

The $^{13}$C(p,d)$^{12}$C analyzing powers for the transitions to the 0$^+$ ground state (p$^1/2$ pickup) and the 4.44-MeV 2$^+$ level (p$^3/2$ pickup) are quite similar to those observed at 65 MeV$^2$ and 200 MeV.$^3$ The DWBA description of them is quite poor. The failure is comparable to that reported$^4$ for the $^{24}$Mg(p,d)$^{23}$Mg (2.36-MeV 1$^+/2$ level) at 95 MeV.$^1$

In contrast to the $^{13}$C(p,d)$^{12}$C data, the $^{208}$Pb(p,d) analyzing powers show only slight $j>$ vs. $j<$ dependence based on comparisons of p$^1/2$ vs. p$^3/2$ and f$^5/2$ vs. f$^7/2$ angular distributions. All analyzing-power angular distributions show significant structure which becomes more pronounced for decreasing angular-momentum transfer.

Zero-range DWBA calculations were performed as described in Ref. 5 using optical potentials P7P and D3P of that reference. Some of these calculations appear as the solid curves of Figs. 1-4. Generally there is reasonably good agreement with the analyzing-power data in contrast with the very poor agreement observed for the lighter targets. Only for the 3.409-MeV 9/2$^+$ level data shown in Fig. 4 is the agreement qualitatively poor.

Further analysis of these data is in progress.

1) D. W. Miller et al., 5th International Symposium on Polarization Phenomena in Nuclear Physics, Santa Fe, 1980, and contribution to this Ann. Rept.


Figure 1. Analyzing power data for the $^{208}$Pb(p,d) reaction at $T_p = 123$ MeV leading to the 0.898-MeV $3/2^-$ level compared with zero range DWBA calculations.

Figure 2. Analyzing power results compared with zero-range DWBA calculations for the 1.633-MeV $13/2^+$ state.

Figure 3. Analyzing power result compared with zero-range DWBA calculations for the 2.34-MeV state.

Figure 4. Analyzing power results compared with zero-range DWBA calculations for the 3.409-MeV $9/2^-$ state.