strengths for the first two 5^+ states. In the $^{60}Ni(d,\alpha)^{58}Co$ reaction, the transitions to the states at 2.69, 2.94, and 4.79 MeV in ^{58}Co exhibit distinct L=6 patterns, whereas states at 0.03(5^+), 0.37(5^+) and 5.04 MeV are excited with clear L=4 angular distributions. A comparison of the observed L=6 transition strengths with the predictions of the two interactions shows that the SDI interaction splits the total $(1f_{7/2})^{-2}{}_{J=7,T=0}$ transfer strength into many little pieces. In contrast, the KB interaction predicts a localization of the 7^+ transfer strength that is in considerably better agreement with the experimental results.

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Table 1. $^{58}Ni(d,\alpha)^{56}Co$: Comparison of experimental transition strengths with microscopic DWBA predictions. The theoretical predictions are normalized to unity for the 2.28 MeV transition.

J^π_f	E_x(MeV) Exp.	SDI	KB	σ_{exp}/σ_{th} SDI	KB
5^+_1	0.58	0.67	0.58	3.96	1.80
5^+_2	1.01	1.45	1.20	4.12	2.48
7^+_1	2.28	2.68	2.29	1.00	1.00
6^+_1	2.37	2.24	2.29	0.27	0.83
7^+_2	3.54	3.72	3.70	6.20	0.93

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STUDY OF THE $(\vec{d},{}^6Li)$ REACTION

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The $(\vec{d},{}^6Li)$ reaction has been used for a number of years to study nuclear clustering phenomena.[1] However, such studies have been limited by their inability to distinguish between shapes of the angular distributions of different ℓ-transfers greater than about 4. Calculations which we have performed suggest that the vector analyzing powers obtained when such reactions are initiated with polarized incident deuteron beams might be extremely valuable in differentiating between much larger ℓ-transfers than could be done with the cross sections alone. This might extend the usefulness of such experiments into a much higher angular momentum domain.

We have therefore begun a program of study of the $(\vec{d},{}^6Li)$ reaction at E_d = 80 MeV. The polarized deuterons were produced by the IUCF polarized ion source, which gave a beam of about 50 nA on target. The beam vector polarization, typically about P_z =

0.60, was measured in a helium polarimeter between the two cyclotrons. Reaction ^{6}Li particles were momentum analyzed using the QDDM magnetic spectrograph and detected using the helical wire counter and two plastic scintillators. In order to discriminate between reaction ^{6}Li particles and α-particles, the helix voltage was reduced about 300 V from its normal operating level, thus allowing the helix anode signal to be used as a ΔE signal.

A preliminary run was taken of the ^{24}Mg($\vec{d}$,^{6}Li)^{20}Ne reaction. Angular distributions were taken from 10° to 40° in 5° steps for the 0^+(g.s.), 2^+ (1.63 MeV) and 4^+(4.25 MeV) levels. The data are presently being analyzed, and will be compared to reaction calculations when the analysis is completed.

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SOME ^{10}B+α REACTIONS AT 150 MeV

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Both single telescope and coincident telescope data for the final state ^{6}Li and α particles from ^{10}B+α reactions with a thin ^{10}B target and the 150 MeV IUCF α beam have been obtained.

Preliminary analysis provides angular distributions for the ^{10}B(α,^{6}Li)^{8}Be* reactions which are similar to those previously published.[1] Figs. 1 and 2 show the distributions and predictions from the code DWUCK for the ground state and 2.9 MeV ^{8}Be state. Table 1 gives the DWUCK parameters used. All predictions are for L=2, J=3.

Breakup data for the ^{10}B+α to (^{6}Li,^{6}Li,d) and (^{6}Li,α,α) final states indicate that the quasifree processes do not dominate the breakup cross section and that phase space or simultaneous breakup processes contribute overwhelmingly to the (^{6}Li,α,α) final state cross section.

The ground state of ^{10}B, which is T=0, $J^\pi=3^+$, should have an appreciable component of the α+^{6}Li$_{2.18}$ cluster structure with orbital angular momentum L = 0,2,4.[2] The pole graph of Fig. 3 depicts the ^{10}B+α quasifree scattering processes in which the transferred particle (labelled ^{6}Li) can be either a ^{6}Li or a ^{6}Li$_{2.18}$. These two modes can be distinguished by measuring the L=0 and L=2 components of the Fourier transforms of the α-^{6}Li relative-motion wave function.

Table 1. ^{10}B(α,^{6}Li)^{8}Be DWUCK Parameters

	V	r	a	W	r_W	a_W	r_c
α	100	1.25	0.8	20	1.60	0.60	1.3
^{6}Li	40	1.48	0.5	5	1.86	0.86	1.3

(Potential strengths in MeV, geometry parameters in fm)