LOW-LYING NEUTRON-HOLE TRANSITIONS IN THE ^{207}Pb(p,p') REACTION AT 135 MeV

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Comparison of our results at 61 MeV[1] with similar experiments at E_p=20 and 35 MeV show an apparently strong decrease of the core polarization mechanism as E_p increases, especially for the L=4 and L=7 transitions (see the table below from ref. 1). The valence contribution for each neutron-hole transition was comparable to the magnitude of the core polarization contribution in each case (see for example the L=7 cross section in Fig. 1 from Ref. 1), in contrast to other transitions to normal parity states in previous work[2] where the core polarization almost completely dominated the cross sections.

The purpose of this experiment at E_p=135 MeV was to check if this apparent energy dependence of core polarization would continue to much higher energies. The experimental data were accumulated in September 1976, during our first beam run at the IUCF. The data reduction was done for most angles with the program Autofit at IUCF, but with hand summation at the larger angles where the poorer peak shapes of these weak states was not reliably evaluated by Autofit. Fig. 2 shows a logarithmic plot of the counts recorded at 24° with the external Faraday cup. The measured cross section for the L=7 transition to the 1.63 MeV state has a shape quite different from our collective model calculation with real and imaginary deformations. W.G. Love (University of Georgia) is currently working on the microscopic model calculations for these cross

Table 1.

Microscopic model core-coupling parameters and effective charges, collective deformation parameters

E_{ex} MeV	J_i^π	J_f^π	L	E_p MeV	A_L^a		e_{eff}	
0.570	$\frac{1}{2}^-$	$\frac{5}{2}^-$	2	20.2	0.033	(0.031)[b]	1.0	(1.0)[b]
				35.0	0.030[c]		0.95[c]	(0.85)[d]
				61.2	0.020	(0.025)[b]	0.63	(0.79)[b]
				EM	0.030[e]		0.95	
0.898	$\frac{1}{2}^-$	$\frac{3}{2}^-$	2	20.2	0.030	(0.030)[b]	0.83	(0.83)[b]
				35.0	0.027[c]		0.74[c]	(0.87)[d]
				61.2	0.020	(0.027)[b]	0.55	(0.74)[b]
				EM	0.028[e]		0.76	
2.34	$\frac{1}{2}^-$	$\frac{7}{2}^-$	4	20.2	0.038	(0.038)[b]	0.99	(0.99)[b]
				35.0	0.023[c]		0.61[c]	(0.78)[d]
				61.2	0.015	(0.019)[b]	0.39	(0.49)[b]
1.63	$\frac{1}{2}^-$	$\frac{13}{2}^+$	7	20.2	0.030	(0.030)[b]	0.69	(0.69)[b]
				35.0	0.019[c]		0.43[c]	(0.41)[d]
				61.2	0.010	(0.012)[b]	0.23	(0.28)[b]

[a] 'Best fit' optical model parameters except where stated otherwise, collective core polarization

[b] Central interaction normalized by elastic volume integrals from experiments

[c] Reference 15

[d] 'Microscopic core' calculations

sections for the excitation of the states at 0.570 MeV, 0.898 MeV, 1.63 MeV and 2.34 MeV. We have also extracted the cross section for the doublet at 2.64 MeV. Our overall resolution was 90 keV.

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1) Alan Scott, M. Owais, and W.G. Love, Nucl. Phys., to be published.

2) M.L. Whiten, A. Scott, and G.R. Satchler, Nucl. Phys. A181, 417 (1972): W.G. Love, Nucl. Phys. A192, 49 (1972): A. Scott, M. Owais, and F. Petrovich, Nucl. Phys. A226, 109 (1974).

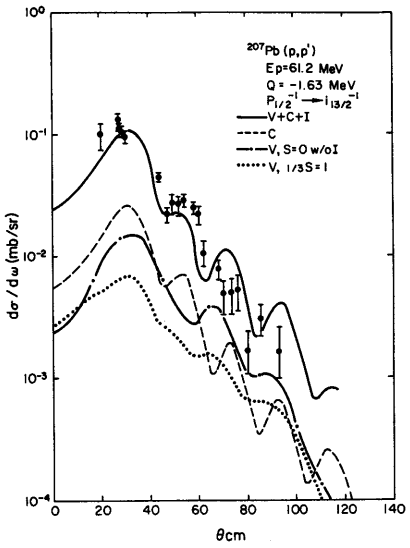

Figure 1.

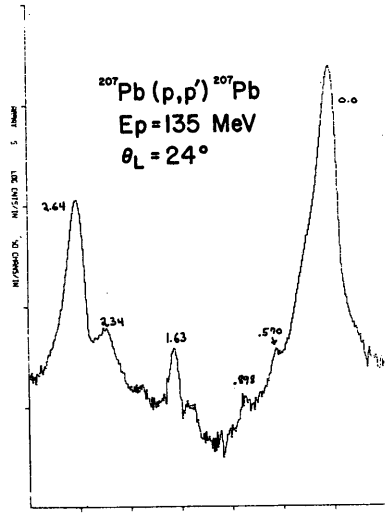

Figure 2.