

The $^{120}\text{Sn}(p,t)^{118}\text{Sn}$ Reaction at 21 MeV

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The $^{120}\text{Sn}(p,t)^{118}\text{Sn}$ reaction has been studied in a high resolution measurement at 21 MeV proton incident energy.

37 transitions to the final states of ^{118}Sn up to an excitation energy $E_x=3.597$ MeV have been measured, of which 8 have been observed for the first time.

A DWBA analysis of the experimental data, performed assuming a semimicroscopic dineutron cluster pickup mechanism, allows to extract the transferred angular momentum L .

Table 1 summarizes the results obtained in the present experiment. The adopted energies, spins and parities of the ^{118}Sn levels are listed in comparison with the results of the present work: the energies, the spin and parity values, and

the integrated cross sections from 10° to 65° . Our quoted energies are estimated to have an uncertainty of ± 3 keV. Absolute cross sections are estimated with a systematic uncertainty of $\pm 15\%$ and reported with the statistical error.

We have made spin and parity assignments for all the observed levels. In particular with respect to the adopted levels [1], we report 17 confirmations, 13 new assignments and the removal of 4 ambiguities. Two unresolved doublets and one triplet have been also observed, giving 6 confirmations and one new assignment.

References

[1] K. Kitao Nucl. Data Sheets **75** (1995) 99

Table 1: Levels of ^{118}Sn

Adopted		Present experiment		
E_{exc} (keV)	J^π	E_{exc} (MeV)	J^π	σ_{int} (μb)
0.0	0^+	0.0	0^+	2250 ± 14
1229.666	2^+	1.230	2^+	613 ± 12
1758.31	0^+	1.758	0^+	32 ± 2
2042.882	2^+	2.043	2^+	13 ± 1
2056.91	0^+	2.057	0^+	33 ± 2
2120	(2^+)			
2280.342	4^+	2.280	4^+	28 ± 2
2321.23	5^-	2.323	$5^-+3^-+2^+$	415 ± 6
2324.846	3^-			
2328.02	2^+			
2403.22	2^+	2.403	2^+	16 ± 1
2408	4^+			
2488.871	4^+	2.489	4^+	71 ± 2
2496.88	0^+	2.497	0^+	20 ± 1
2530				
2574.91	7^-	2.575	7^-	25 ± 1
2577	2^+			
2677.35	2^+	2.677	2^+	44 ± 2
2725	$1^+, 2^+, 3^+$			
2733.789	4^+	2.734	4^+	119 ± 3
2738.01	1^+			
2773.94	4^-			
2817	$(4^-, 5^-, 6^-)$			
2817.17	(3^-)			
2878.70	$4, 5, 6^+$	2.879	5^-	8 ± 1
2889	(8^+)			
2903.87	2^+	2.904	2^+	25 ± 1
2929.72	$0^+, 1^+$	2.930	0^+	10 ± 1

Adopted		Present experiment		
E_{exc} (keV)	J^π	E_{exc} (MeV)	J^π	σ_{int} (μb)
2934	(2 ⁺)			
2963.437	4 ⁺			
		2.963	5 ⁻	115 ± 3
2972	4 ⁺			
2991				
2999.45	6 ⁺			
3015.21	1,2,3			
3020	0 ⁺			
3048.35	4			
3052.16	7 ⁺ ,8 ⁺			
3057.22	2 ⁺	3.057	2 ⁺	6 ± 1
3089.21	+			
3108.06	9 ⁺ ,10 ⁺			
		3.108	7 ⁻	1 ± 0.3
3137.48	0 ⁺	3.137	0 ⁺	3 ± 1
3159.35	4 ⁺			
3190				
		3.218	0 ⁺	7 ± 1
3227.67	2 ⁺ ,3 ⁺			
3228.37	2 ⁺	3.228	2 ⁺	6 ± 1
3231	(8 ⁺)			
3237		3.237	0 ⁺	1 ± 0.5
3252.03	(3 ⁺)	3.252	6 ⁺	4 ± 1
3262.53	3 ⁺			
3270.67	1			
3274		3.274	1 ⁻ + 3 ⁻	15 ± 1
3286				
3308.54	2 ⁺			
		3.309	1 ⁻ + 2 ⁺	6 ± 1
3317	0 ⁻ ,1 ⁻ ,2 ⁻			
3344	(3 ⁻)	3.344	3 ⁻	8 ± 1
3355.86	2 ⁺			
		3.355	0 ⁺	12 ± 1
3363	0 ⁺ ,1 ⁺			
3374.60	4 ⁺			
		3.375	5 ⁻	38 ± 2
3386.30	3 ⁺			
3389				
		3.395	5 ⁻	7 ± 1
3409				
3427.11	3 ⁺			
		3.427	3 ⁻	9 ± 1
3441				
3460.49	4 ⁺			
3462.63	(2 ⁻ ,3 ⁻)	3.463	2 ⁺	19 ± 1
3475				
		3.524	2 ⁺	9 ± 1
3540.57	1 ⁺ ,2 ⁺ ,3 ⁺			
3541	(6 ⁺ ,7 ⁻)	3.541	3 ⁻	4 ± 1
3558.9	7 ⁻ ,8 ⁻ ,9 ⁻			
		3.559	6 ⁺	5 ± 1
3576	(2 ⁻ ,3 ⁻ ,4 ⁻)			
		3.585	2 ⁺	43 ± 2
3592.54	4 ⁺			
3597	2 ⁺	3.597	2 ⁺	10 ± 1