Microscopic DWBA Calculations of the ^{112}Sn(p,t)^{110}Sn Angular Distributions

B.F. Bayman [a], A. Covello [b], A. Gargano [b], P. Guazzoni [c], L. Zetta [c], G. Graw, R. Hertenberger, H.-F. Wirth, and M. Jaskóla [d]

[a] School of Physics and Astronomy, University of Minnesota, Minneapolis, U.S.A.
[b] Dipartimento di Scienze Fisiche dell'Università and I.N.F.N, I-80126 Napoli, Italy
[c] Dipartimento di Fisica dell'Università and I.N.F.N, I-20133 Milano, Italy
[d] Soltan Institute for Nuclear Studies, Warsaw, Poland

In order to analyze the (p,t) transitions populating the yrast 0^+, 2^+,4^+,6^+ levels of ^{110}Sn, microscopic DWBA calculations have been performed assuming ^{100}Sn as a closed core and letting the valence neutrons occupy the five single-particle (sp) orbits in the 50-82 shell. The sp energies [1] have been determined by an analysis of light Sn isotopes [2]. The two-body effective interaction has been derived from the CD-Bonn nucleon-nucleon interaction [3]. The transfer amplitude calculation has been performed in an approach based on a chain calculation across nuclei differing by two in nucleon number: the chain calculation method (CCM) works in the seniority scheme and states up to seniority 4 are included [2]. The transfer amplitudes are defined as:

$$\langle {}^{110}Sn, J, i_g | A\_J(j_a j_b) | {}^{112}Sn, g.s. \rangle \qquad (1)$$

where A_J($j_a j_b$) is the one pair annihilation operator (the two particles are in the SP levels j_a and j_b and are coupled to angular momentum J). In Table 1 the transfer amplitudes are reported for the yrast 0^+,2^+,4^+,6^+ (i_g=1) levels in ^{110}Sn for each angular momentum J. In Fig. 1 the comparison between experimental data (dots) and the results of the calculations (solid lines) are shown. The same overall normalization, chosen to produce a good fit for the ground state, is used. While the agreement is very good for the 0^+,2^+,4^+ yrast levels of ^{110}Sn the calculation overpredicts the cross section of the yrast 6^+ state by a factor of about 2.

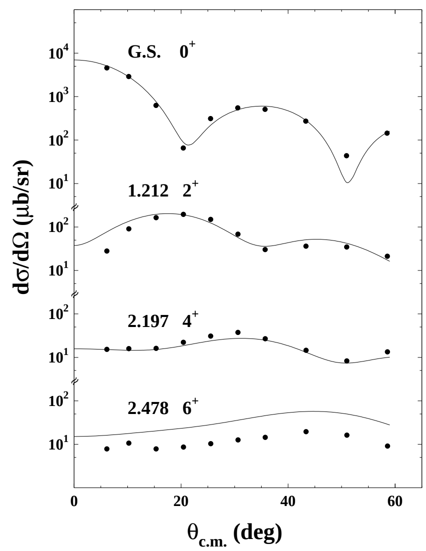

Fig. 1: Experimental (dots) and theoretical microscopic (solid lines) angular distributions for the transitions to several ^{110}Sn levels

References

[1] P. Guazzoni *et al.*, Annual report 2004, p. 13

[2] P. Guazzoni, L. Zetta, A. Covello, A. Gargano, G. Graw, R. Hertenberger, H.-F. Wirth, and M. Jaskóla, Phys.Rev. **C69** (2004) 024619

[3] R. Machleidt, Phys. Rev. **C63** (2001) 024001

j_a	j_b	J=0^+	J=2^+	J=4^+	J=6^+
7/2	7/2	-1.5660	0.6472	0.6638	-0.3742
5/2	5/2	-1.0686	0.4022	0.2430	
3/2	3/2	-0.6824	0.0321		
1/2	1/2	-0.5180			
-11/2	-11/2	-0.9400	-0.0139	-0.0161	0.0307
7/2	5/2		-0.1335	-0.3071	0.6255
7/2	3/2		0.0817	0.0525	
7/2	1/2			-0.0766	
5/2	3/2		0.0406	0.0593	
5/2	1/2		0.0941		
3/2	1/2		-0.0265		

Table 1: Transfer amplitudes of yrast J=0^+, 2^+, 4^+, 6^+ levels of ^{110}Sn