^{117}Sn(^{19}F,4nγ) 1988Sh17,2001Ko30

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Yu. Khazov, A. A. Rodionov and S. Sakharov, Balraj Singh	NDS 104, 497 (2005)	10-Feb-2005

1988Sh17: E=87 MeV. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma(\theta)$(DCO).

2001Ko30: E=88 MeV. Measured Eγ and $\gamma\gamma$ using a Compton-suppressed HPGe detector array in conjunction with a 14 element BGO multiplicity filter. See ^{104}Pd(^{32}S,3pnγ) for possible chiral-doublet partner assignments.

All data are from 1988Sh17, unless otherwise stated.

Low energy section of the level scheme differs in γ-ray and J^π assignments from those in other in-beam γ-ray data sets (from 1998Pe05 and 1999Ko21) and in Adopted Levels.

^{132}Pr Levels

E(level)[†]	J$^\pi$[‡]	Comments
0+x[@]	(7$^-$)	
115.94+x[&] *15*	(8$^-$)	E(level): 261.0+x in Adopted Levels, decaying to 145+x, (7$^-$) level.
283.54+x[b] *18*	(8$^+$)	E(level): 381.0+x in Adopted Levels decaying to 98.0+x, (6$^-$) level. J$^\pi$: (7$^+$) in Adopted Levels.
294.52+x[@] *15*	(9$^-$)	
413.40+x[b] *21*	(9$^+$)	J$^\pi$: (10$^+$) in Adopted Levels. E(level): 598.1+x in Adopted Levels.
523.32+x[&] *18*	(10$^-$)	
679.81+x[b] *21*	(10$^+$)	J$^\pi$: (11$^+$) in Adopted Levels.
800.82+x[&] *19*	(11$^-$)	
920.34+x[b] *21*	(11$^+$)	J$^\pi$: (12$^+$) in Adopted Levels.
989.8+x[a] *3*	(10)	J$^\pi$: (11$^+$) in Adopted Levels.
1009.0+x[c] *3*	(10)	J$^\pi$: (11$^+$) in Adopted Levels.
1112.88+x[&] *19*	(12$^-$)	
1304.08+x[b] *23*	(12$^+$)	J$^\pi$: (13$^+$) in Adopted Levels.
1315.7+x[c] *3*		J$^\pi$: (12$^+$) in Adopted Levels.
1465.57+x[@] *22*	(13$^-$)	
1530.4+x[a] *3*	(12)	J$^\pi$: (13$^+$) in Adopted Levels.
1625.54+x[b] *25*	(13$^+$)	J$^\pi$: (14$^+$) in Adopted Levels.
1740.4+x[c] *4*		J$^\pi$: (13$^+$) in Adopted Levels.
1840.73+x[&] *24*	(14$^-$)	
2078.3+x[b] *3*	(14$^+$)	J$^\pi$: (15$^+$) in Adopted Levels.
2109.3+x[c] *4*		J$^\pi$: (14$^+$) in Adopted Levels.
2191.3+x[a] *4*	(14)	J$^\pi$: (15$^+$) in Adopted Levels.
2249.4+x[@] *3*	(15$^-$)	
2474.0+x[b] *3*	(15$^+$)	J$^\pi$: (16$^+$) in Adopted Levels.
2666.5+x[&] *4*	(16$^-$)	
2936.4+x[a] *4*	(16)	J$^\pi$: (17$^+$) in Adopted Levels.
2958.0+x[b] *3*	(16$^+$)	J$^\pi$: (17$^+$) in Adopted Levels.
3104.1+x[@] *4*	(17$^-$)	
3417.4+x[b] *4*	(17$^+$)	J$^\pi$: (18$^+$) in Adopted Levels.
3543.5+x[&] *4*	(18$^-$)	
3728.9+x[a] *5*	(18)	J$^\pi$: (19$^+$) in Adopted Levels.
3892.1+x[b] *4*	(18$^+$)	J$^\pi$: (19$^+$) in Adopted Levels.
4000.1+x[#@] *4*	(19$^-$)[#]	
4431.7+x[#b] *4*	(19$^+$)[#]	

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^{117}Sn(^{19}F,4nγ) 1988Sh17,2001Ko30 (continued)

^{132}Pr Levels (continued)

† From least-squares fit to Eγ's. The energy scale differs from that in Adopted Levels and in other in-beam γ-ray data sets. In order to match the energy scales and to account for differences in the low-energy section of the level scheme as compared to that in Adopted Levels (based mainly on 1998Pe05 and 1999Ko21), add 145 keV for negative parity levels and 185 keV for other levels, except for 283.5+x level, for which 97.5 keV should be added. See Adopted Levels and gammas for decay of 283.5+x and 115.9+x levels to two different levels rather than a common level at 0+x shown here.

‡ From γγ(θ)(DCO) data and associated band structures. These assignments differ from those in the Adopted Levels which are mainly based on the studies by 1998Pe05 and 1999Ko21.

Level not reported by 1998Pe05.

@ Band(A): Band based on (7$^-$), α=1.

& Band(a): Band based on (7$^-$), α=0.

a Band(B): Doubly-decoupled band.

b Band(C): $\pi h_{11/2}\nu h_{11/2}$ (2001Ko30).

c Band(D): chiral-doublet partner of $\pi h_{11/2}\nu h_{11/2}$ (2001Ko30).

γ(^{132}Pr)

E_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.†	α@	$I_{(\gamma+ce)}$	Comments
116.1 *2*	115.94+x	(8$^-$)	0+x	(7$^-$)	(M1)	0.86	79 *7*	α(K)= 0.731; α(L)= 0.1004; α(M)=0.02113; α(N+..)=0.00578 DCO=0.63 *3*.
130.3 *2*	413.40+x	(9$^+$)	283.54+x	(8$^+$)	(M1)	0.62	100	α(K)= 0.528; α(L)= 0.0726; α(M)=0.01522; α(N+..)=0.00417 DCO=0.69 *3*.
178.5 *2*	294.52+x	(9$^-$)	115.94+x	(8$^-$)	(M1)	0.258	54 *5*	α(K)= 0.2196; α(L)= 0.0300; α(M)=0.00629; α(N+..)=0.00172 DCO=0.90 *7*.
192.7 *2*	1112.88+x	(12$^-$)	920.34+x	(11$^+$)			0.9 *3*	
228.6 *2*	523.32+x	(10$^-$)	294.52+x	(9$^-$)	(M1)	0.131	34 *3*	α(K)= 0.1120; α(L)=0.01520; α(M)=0.00319; α(N+..)=0.00087 DCO=0.56 *11*.
240.5 *2*	920.34+x	(11$^+$)	679.81+x	(10$^+$)	(M1)	0.114	46 *4*	α(K)= 0.0977; α(L)=0.01324; α(M)=0.00278; α(N+..)=0.00076 DCO=0.83 *7*.
266.7 *2*	679.81+x	(10$^+$)	413.40+x	(9$^+$)	(M1)	0.087	67 *6*	α(K)= 0.0742; α(L)=0.01002; α(M)=0.00210; α(N+..)=0.00058 DCO=0.77 *9*.
277.3 *2*	800.82+x	(11$^-$)	523.32+x	(10$^-$)	(M1)	0.078	22.5 *20*	α(K)= 0.0669; α(L)=0.00902; α(M)=0.00189; α(N+..)=0.00052 DCO=0.81 *12*.
283.7 *2*	283.54+x	(8$^+$)	0+x	(7$^-$)	(E1)	0.0150	136 *13*	α(K)=0.01289; α(L)=0.00170; α(M)=0.00035 DCO=0.81 *8*.
294.2 *2*	294.52+x	(9$^-$)	0+x	(7$^-$)	(E2)	0.054	10.1 *10*	α(K)= 0.0429; α(L)=0.00868; α(M)=0.00188; α(N+..)=0.00050 DCO=1.16 *21*.
306#	1315.7+x		1009.0+x	(10)				
311.3 *2*	1112.88+x	(12$^-$)	800.82+x	(11$^-$)	(M1)	0.058	10.1 *10*	α(K)= 0.0494; α(L)=0.00663; α(M)=0.00139; α(N+..)=0.00038 DCO=0.86 *11*.
321.2 *2*	1625.54+x	(13$^+$)	1304.08+x	(12$^+$)	(M1)	0.053	15.3 *15*	α(K)= 0.0455; α(L)=0.00610; α(M)=0.00128; α(N+..)=0.00035 DCO=0.60 *12*.
352.3 *2*	1465.57+x	(13$^-$)	1112.88+x	(12$^-$)	(M1)	0.0418	7.6 *7*	α(K)= 0.0357; α(L)=0.00478; α(M)=0.00100; α(N+..)=0.00027 DCO=0.80 *19*.

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^{117}Sn(^{19}F,4nγ) 1988Sh17,2001Ko30 (continued)

$\gamma(^{132}Pr)$ (continued)

E_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α[@]	$I_{(\gamma+ce)}$	Comments
368.9 *2*	2109.3+x		1740.4+x				7.8 *7*	DCO=1.41 *11*.
375.1 *2*	1840.73+x	(14$^-$)	1465.57+x	(13$^-$)	(M1)	0.0355	3.2 *4*	α(K)= 0.0304; α(L)=0.00406; α(M)=0.00085; α(N+..)=0.00023 DCO=0.81 *19*.
383.7 *2*	1304.08+x	(12$^+$)	920.34+x	(11$^+$)	(M1)	0.0335	33 *3*	α(K)= 0.0286; α(L)=0.00382; α(M)=0.00080; α(N+..)=0.00022 DCO=0.89 *8*.
396.0 *2*	679.81+x	(10$^+$)	283.54+x	(8$^+$)			7.0 *7*	
396.2 *2*	2474.0+x	(15$^+$)	2078.3+x	(14$^+$)			5.3 *5*	
407.6 *2*	523.32+x	(10$^-$)	115.94+x	(8$^-$)	(E2)	0.0201	29 *3*	α(K)=0.01649; α(L)=0.00284; α(M)=0.00061; α(N+..)=0.00016 DCO=1.04 *13*.
407.6[&] *2*	2249.4+x	(15$^-$)	1840.73+x	(14$^-$)				
418[&]	2666.5+x	(16$^-$)	2249.4+x	(15$^-$)				
424.7 *2*	1740.4+x		1315.7+x				8.0 *8*	DCO=1.24 *8*.
453.3 *2*	2078.3+x	(14$^+$)	1625.54+x	(13$^+$)	(M1)	0.0219	7.9 *7*	α(K)=0.01873; α(L)=0.00249; α(M)=0.00052; α(N+..)=0.00014 DCO=0.53 *15*.
483.6 *2*	2958.0+x	(16$^+$)	2474.0+x	(15$^+$)				
506.1 *2*	800.82+x	(11$^-$)	294.52+x	(9$^-$)	(E2)	0.0110	31 *3*	α(K)=0.00910; α(L)=0.00145 DCO=1.03 *10*.
507.1 *2*	920.34+x	(11$^+$)	413.40+x	(9$^+$)	(E2)	0.0110	22.7 *20*	α(K)=0.00905; α(L)=0.00144 DCO=1.23 *16*.
521.4 *2*	1530.4+x	(12)	1009.0+x	(10)			4.1 *5*	
540.7 *2*	1530.4+x	(12)	989.8+x	(10)			12.8 *10*	DCO=1.07 *13*.
576.5 *2*	989.8+x	(10)	413.40+x	(9$^+$)			14.8 *14*	DCO=0.73 *9*.
589.8 *2*	1112.88+x	(12$^-$)	523.32+x	(10$^-$)			25.5 *20*	DCO=1.23 *13*.
595.5 *2*	1009.0+x	(10)	413.40+x	(9$^+$)			10.5 *10*	DCO=0.57 *6*.
624.3 *2*	1304.08+x	(12$^+$)	679.81+x	(10$^+$)			13.3 *10*	DCO=1.24 *18*.
635.9 *2*	1315.7+x		679.81+x	(10$^+$)			8.3 *8*	
660.9 *2*	2191.3+x	(14)	1530.4+x	(12)			14.9 *14*	DCO=1.01 *14*.
665.1 *2*	1465.57+x	(13$^-$)	800.82+x	(11$^-$)			27.5 *20*	DCO=1.09 *12*.
705.2 *2*	1625.54+x	(13$^+$)	920.34+x	(11$^+$)			17.2 *17*	DCO=1.01 *16*.
727.9 *2*	1840.73+x	(14$^-$)	1112.88+x	(12$^-$)			14.6 *14*	DCO=1.39 *25*.
745.0 *2*	2936.4+x	(16)	2191.3+x	(14)			5.1 *5*	DCO=1.09 *24*.
774.5 *2*	2078.3+x	(14$^+$)	1304.08+x	(12$^+$)			5.5 *5*	
783.8 *2*	2249.4+x	(15$^-$)	1465.57+x	(13$^-$)			13.7 *13*	DCO=1.24 *16*.
792.5 *2*	3728.9+x	(18)	2936.4+x	(16)			<1	
825.8 *2*	2666.5+x	(16$^-$)	1840.73+x	(14$^-$)			8.1 *8*	DCO=1.1 *3*.
847.7 *2*	2474.0+x	(15$^+$)	1625.54+x	(13$^+$)			8.6 *8*	DCO=1.0 *3*.
854.7 *2*	3104.1+x	(17$^-$)	2249.4+x	(15$^-$)			2.8 *5*	
877.0 *2*	3543.5+x	(18$^-$)	2666.5+x	(16$^-$)			2.0 *5*	
880.0 *2*	2958.0+x	(16$^+$)	2078.3+x	(14$^+$)			3.6 *5*	
896.0[‡] *2*	4000.1+x	(19$^-$)	3104.1+x	(17$^-$)			<1	
934.1 *2*	3892.1+x	(18$^+$)	2958.0+x	(16$^+$)			1.4 *3*	
943.4 *2*	3417.4+x	(17$^+$)	2474.0+x	(15$^+$)			2.7 *3*	
1014.2[‡] *2*	4431.7+x	(19$^+$)	3417.4+x	(17$^+$)			<1	

[†] From $\gamma\gamma(\theta)$(DCO) data assuming that $\Delta J=1$ is M1 or E1 and $\Delta J=2$ is E2.
[‡] γ not reported by 1998Pe05.
[#] From 2001Ko30.
[@] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation

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^{117}Sn(^{19}F,4nγ) 1988Sh17,2001Ko30 (continued)

γ(^{132}Pr) (continued)

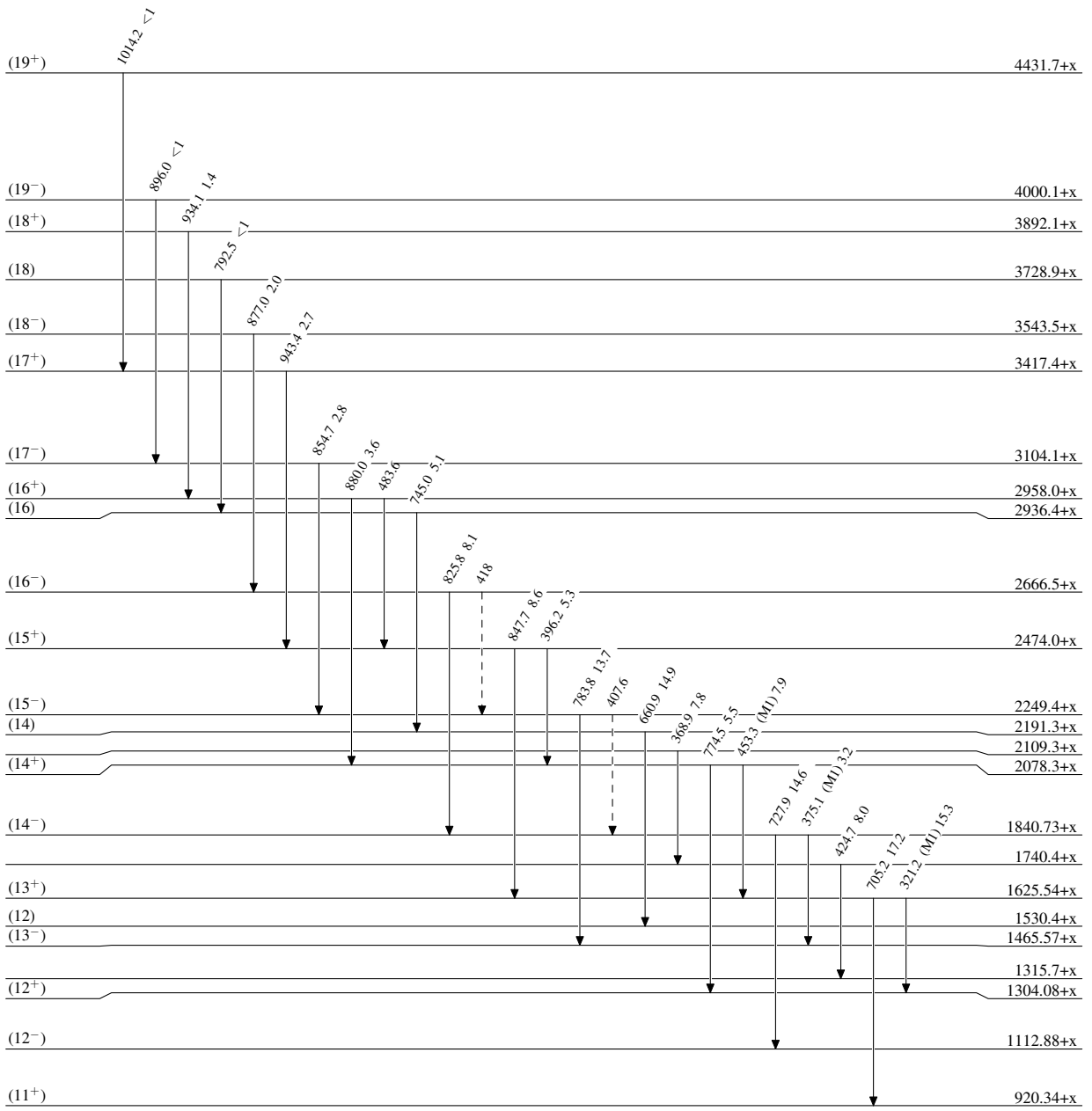
based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
& Placement of transition in the level scheme is uncertain.

Legend

^{117}Sn(^{19}F,4nγ) 1988Sh17,2001Ko30

Level Scheme

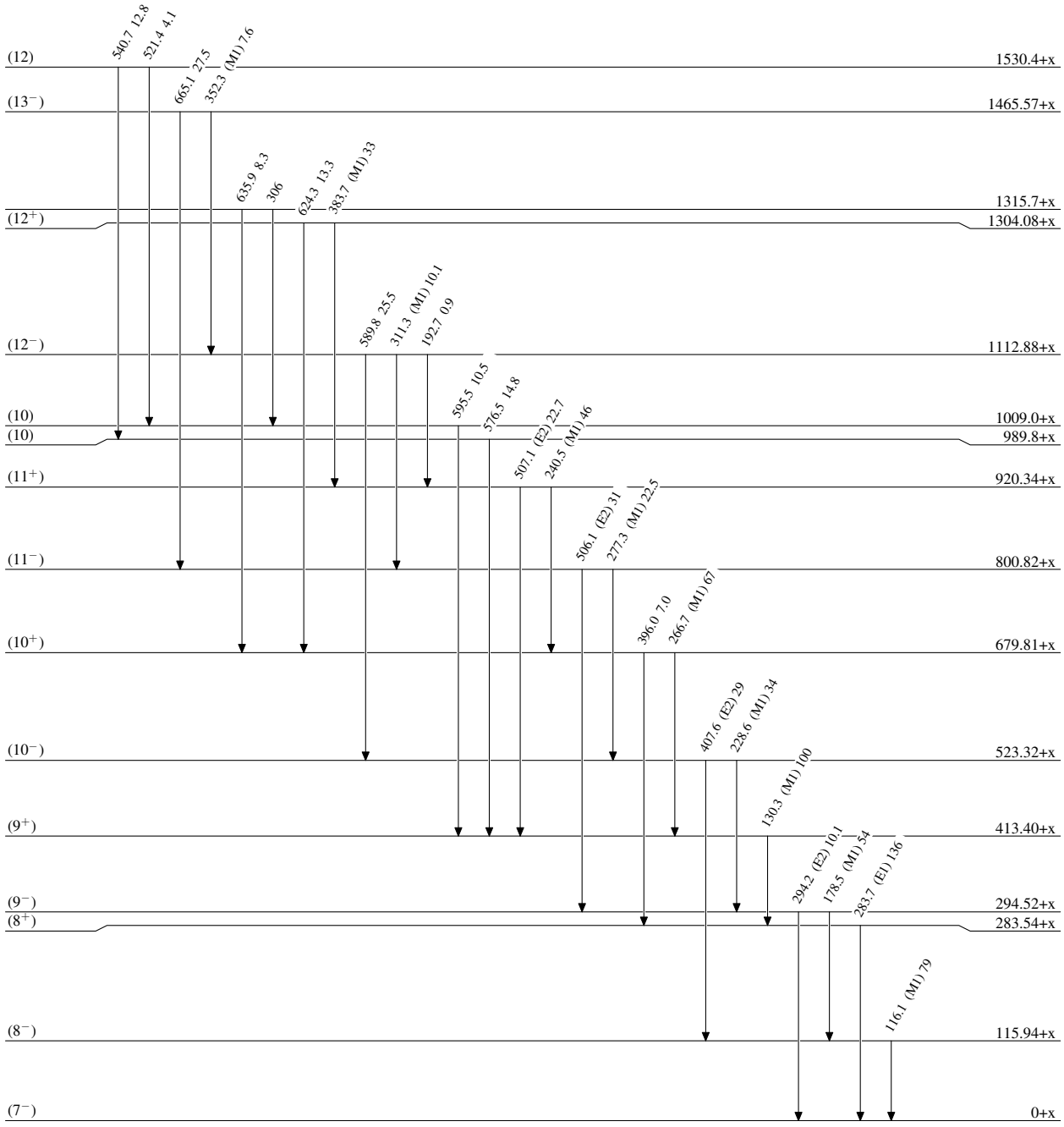
γ Decay (Uncertain)



$^{132}_{59}Pr_{73}$

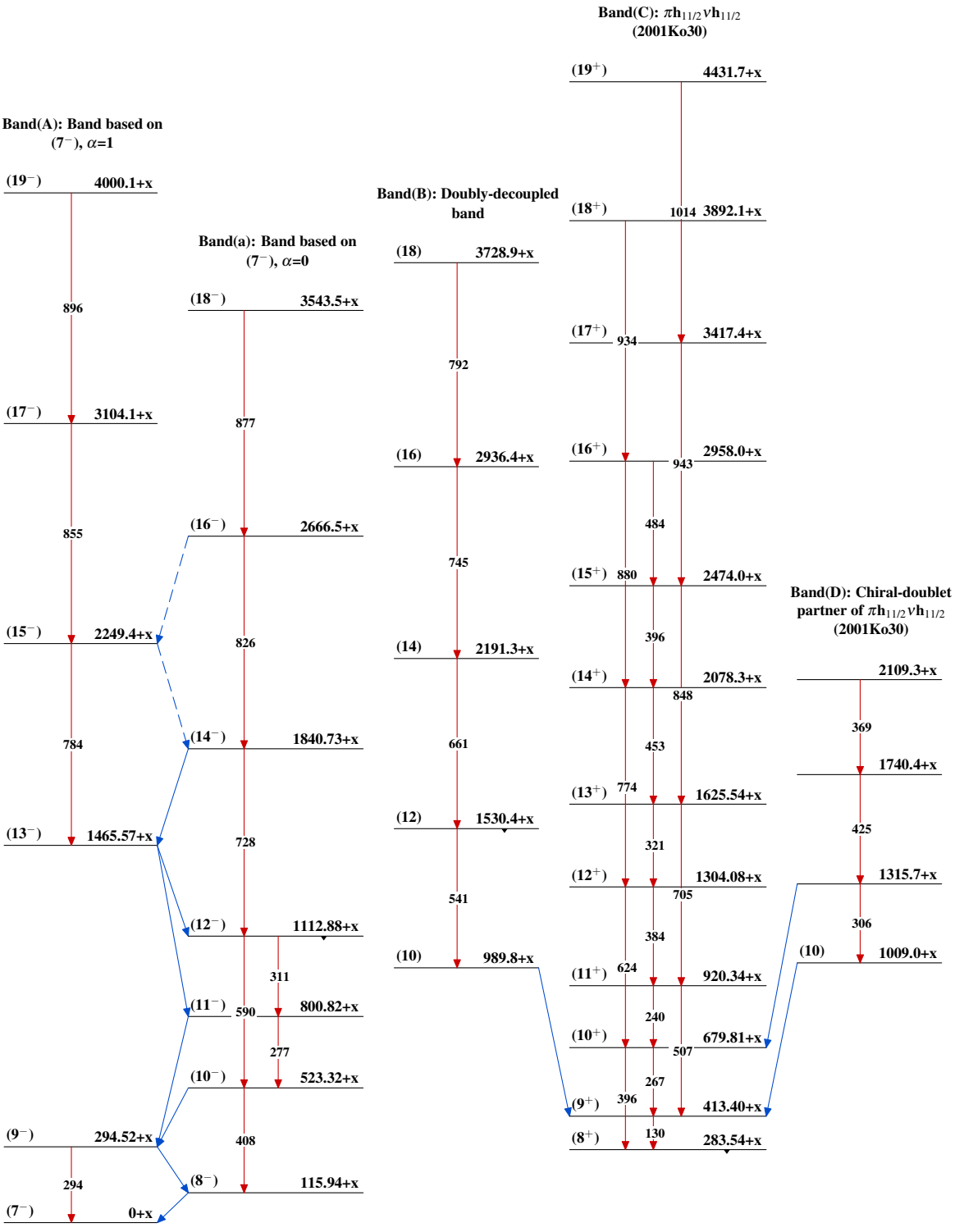
^{117}Sn(^{19}F,4nγ) 1988Sh17,2001Ko30

Level Scheme (continued)



$^{132}_{59}Pr_{73}$

$^{117}Sn(^{19}F,4n\gamma)$ 1988Sh17,2001Ko30



$^{132}_{59}Pr_{73}$