(HI,xnγ):SD 2003Wi04,1997Mc02,1991He11

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 113, 1871 (2012)	15-Jun-2012

Additional information 1.

Others: 1993Pl01, 1994He15, 1994Pl02, 1995As04, 1995Du07, 2000Ci05, 2000Mc01, 2003Wi04, 2003WiZZ, 2005Wi01, 2005Wi21, 2009Wi01.

Data set includes all SD band information obtained from (HI,xnγ) studies. For data from (HI,xnγ) studies of normally deformed states, see separate data sets.

For quasicontinuous decay spectrum of superdeformed band In ^{192}Pb, see 2000Mc01 and 2000Ci05.

For discussion of trend of superdeformed level energies In ^{192}Pb, ^{194}Pb and ^{196}Pb, see 2005Wi21.

For two-level mixing model calculations of probability for decay from yrast SD band levels of ^{192}Pb, ^{194}Pb and ^{196}Pb to normal deformation states, see 2009Wi01.

1991He11: ^{173}Yb(^{24}Mg,5nγ) E=128, 132 MeV; HERA detector array. Deduced SD band from γ, 2-fold γγ coin and excitation function data.

1993Pl01: ^{173}Yb(^{24}Mg,5nγ) E=132 MeV; 12 Compton-suppressed Ge and 50 BGO detector array, Pb-backed thick target; measured γ, γγ coin. No evidence found for a SD band in ^{192}Pb. See also 1994Pl02.

1994He15: ^{148}Sm(^{48}Ca,4nγ) E=205 MeV. Au-backed target; preliminary results.

1995As04: ^{173}Yb(^{24}Mg,5nγ) E=140 MeV. Thin target; measured Eγ, Iγ, γγγ coin. Deduced SD band from γγ data using GAMMASPHERE array containing 49 Compton-suppressed Ge detectors. The existence of SD band proposed in earlier studies at the same laboratory (1991He11,1994He15) was confirmed.

1995Du07: ^{168}Er(^{30}Si,6nγ) E=159 MeV. Measured γ, γγ coin (4-fold and higher) using a 39-detector (EUROGAM 2) array; deduced SD band.

1997Mc02: ^{173}Yb(^{24}Mg,5nγ) E=134.5 MeV. 1 mg/cm^2 enriched ^{173}Yb target with gold backing (27° to beam); GAMMASPHERE array (92 Compton-suppressed Ge detectors). Measured Eγ, Iγ, γγ coin; identified discrete γ connecting yrast SD band to normal deformation state. The 2057.7γ reported by 1997Mc02 is reported at 2059 and placed differently by 2003Wi04.

2003Wi04: ^{168}Er(^{29}Si,5nγ) E=154 MeV. 1.1 mg/cm^2 enriched ^{168}Er target with lead backing; GAMMASPHERE array. Measured Eγ, Iγ, γγ coin, γ(θ); identified six discrete γ transitions connecting yrast SD band to normal deformed states. More precise γ-ray energies are given in 2003WiZZ.

2005Wi01: ^{168}Er(^{29}Si,5nγ) E=154 MeV. 1 mg/cm^2 and 5 mg/cm^2 enriched ^{168}Er targets, with and without Pb backing, respectively; GAMMASPHERE array (101 escape-suppressed Ge detectors); measured Eγ, lifetimes by Doppler-shift attenuation method (DSAM), deduced transition quadrupole moments for SD band transitions.

^{192}Pb Levels

E(level)[†]	Jπ[‡]
0	0^+
853.8 *2*	2^+
1236.9 *4*	(2^+)
1355.6 *3*	4^+
1859.9 *4*	$(5)^-$
1921.0 *4*	6^+
2303.8 *4*	8^+
2323.4 *4*	$(7)^-$
2507.4 *4*	$(8)^-$
2514.5 *4*	$(9)^-$
2520.5 *4*	$(8)^+$
2562.5 *4*	8^+
2581.3 *5*	$(10)^+$
2624.2 *9*	(12^+)
2743.7 *7*	$(11)^-$
2789.9 *5*	(9^+)
3304.3 *8*	
4425.2[#] *6*	(8^+)

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(HI,xnγ):SD 2003Wi04,1997Mc02,1991He11 (continued)

^{192}Pb Levels (continued)

E(level)†	Jπ‡	Comments
4640.0# *6*	(10+)	
4902.4# *6*	(12+)	
5206.1# *6*	(14+)	
5550.7# *6*	(16+)	
5935.3# *6*	(18+)	Q(transition)=21.6 *+31−26* (2005Wi01).
6359.0# *7*	(20+)	Q(transition)=20.9 *+16−15* (2005Wi01).
6820.5# *7*	(22+)	Q(transition)=21.6 *+15−13* (2005Wi01).
7319.2# *7*	(24+)	Q(transition)=19.2 *+11−7* (2005Wi01).
7854.5# *9*	(26+)	Q(transition)=19.0 *7* (2005Wi01).
8424.8# *11*	(28+)	
9029.5# *13*	(30+)	
9669.5?# *16*	(32+)	

† From least-squares fit to Eγ.

‡ From Adopted Levels.

Band(A): SD band (1991He11,1994He15,1995Du07,1995As04,1997Mc02, 2003Wi04,2005Wi01). <Q_0> =19.6 *+5−4* (2005Wi01, from lifetime data; quoted uncertainty is statistical; systematic uncertainty=2.0). SD band identified from excitation function data and from γγ coin with known transitions in ^{192}Pb. However, 1993Pl01 report that no evidence was found for such a band (<0.2% population limit) in the reaction ^{173}Yb(^{24}Mg,5nγ) E=132 MeV. Transitions assigned by 1991He11 to this band are given alternative assignments in neighboring nuclides. 1994He15 reaffirm existence of this band and provide some evidence of appearance of this band with estimated percent population ≈0.35 in ^{148}Sm(^{48}Ca,4nγ) at E=205 MeV, while 1994Pl02 maintain that further experiments are needed to verify the SD band in ^{192}Pb. 1995Du07 confirm transition assignments of 1991He11 and confirm existence of this band. Transitions connecting the SD band members to the normal deformed states are reported by 2003Wi04 (also 2003WiZZ) and 1997Mc02. Lifetimes from DSAM are measured by 2005Wi01 and transition quadrupole moments deduced.

γ(^{192}Pb)

Eγ†	Ei(level)	J_i^π	E_f	J_f^π	Mult.	α[d]	I(γ+ce)‡	Comments
44.0[c] *10*	2624.2	(12+)	2581.3	(10)+				
60.8[c] *4*	2581.3	(10)+	2520.5	(8)+				
66.9[c] *4*	2581.3	(10)+	2514.5	(9)−				
120.6[c]	2743.7	(11)−	2624.2	(12+)				
162.5[c] *3*	2743.7	(11)−	2581.3	(10)+				
184.0[c] *2*	2507.4	(8)−	2323.4	(7)−				
191.1#@ *2*	2514.5	(9)−	2323.4	(7)−			0.16 *4*	
210.7[c] *2*	2514.5	(9)−	2303.8	8+				
214.8 *2*	4640.0	(10+)	4425.2	(8+)	[E2]	0.335	0.05 *2*	other Eγ: 215.6 *10* (1995Du07). Not reported by 1995As04.
216.7[c]	2520.5	(8)+	2303.8	8+				
x260.5& *3*								Eγ: forms doublet with 262γ (1997Mc02).
262.4 *1*	4902.4	(12+)	4640.0	(10+)	[E2]	0.1741	0.45 *3*	other Eγ: 262.5 *3* (1995Du07), 263.0 (1995As04). other I(γ+ce): 0.75 *13* (1991He11); 0.65 from fig. 3 of 2003Wi04.
277.3[c] *6*	2581.3	(10)+	2303.8	8+				
303.7 *1*	5206.1	(14+)	4902.4	(12+)	[E2]	0.1114	0.87 *3*	other Eγ: 304.2 *4* (1995Du07).

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(HI,xnγ):SD 2003Wi04,1997Mc02,1991He11 (continued)

γ(^{192}Pb) (continued)

E_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[d]	$I_{(\gamma+ce)}$[‡]	Comments
								other I(γ+ce): 1.06 *13* (1991He11); 0.98 from fig. 3 of 2003Wi04.
344.6 *1*	5550.7	(16^+)	5206.1	(14^+)	[E2]	0.0773	1.00 *4*	other Eγ: 345.2 *3* (1995Du07). other I(γ+ce): 1.00 *19* (1991He11).
382.8#@ *2*	2303.8	8^+	1921.0	6^+			0.19 *2*	
384.6 *1*	5935.3	(18^+)	5550.7	(16^+)			0.85 *7*	other Eγ: 384.8 *4* (1995Du07), 385.6 *3* (1991He11). other I(γ+ce): 1.50 *19* (1991He11).
402.4[c] *2*	2323.4	$(7)^-$	1921.0	6^+				
423.7 *2*	6359.0	(20^+)	5935.3	(18^+)			0.67 *6*	other Eγ: 423.9 *4* (1995Du07). other I(γ+ce): 1.25 *25* (1991He11).
x425.9& *4*								Eγ: forms doublet with 424γ (1997Mc02).
x458.8& *2*								Eγ: forms doublet with 461γ (1997Mc02).
461.5 *2*	6820.5	(22^+)	6359.0	(20^+)			0.31 *4*	other Eγ: 462.2 *4* (1995Du07), 463.4 (1995As04). I(γ+ce): 0.75 *19* (1991He11).
463.4#@ *2*	2323.4	$(7)^-$	1859.9	$(5)^-$			0.23 *4*	
x465.3& *3*								Eγ: forms doublet with 463γ (1997Mc02).
486.1#@ *2*	2789.9	(9^+)	2303.8	8^+			0.06 *2*	
x489.9& *4*								
x495.8& *3*								Eγ: forms doublet with 499γ (1997Mc02).
498.7 *2*	7319.2	(24^+)	6820.5	(22^+)			0.27 *5*	other Eγ: 499.0 *6* (1995Du07), 500.0 (1995As04). other I(γ+ce): 0.9 *4* (1991He11).
501.8#@ *2*	1355.6	4^+	853.8	2^+			0.69 *5*	
504.3#@ *2*	1859.9	$(5)^-$	1355.6	4^+			0.16 *2*	
535.3 *5*	7854.5	(26^+)	7319.2	(24^+)				Eγ: from 1995Du07. I(γ+ce): 0.81 *15* (1991He11).
565.4#@ *2*	1921.0	6^+	1355.6	4^+			0.49 *4*	
570.3 *6*	8424.8	(28^+)	7854.5	(26^+)				Eγ: from 1995Du07. Other Eγ: 571.4 (1995As04). I(γ+ce): 0.6 *3* (1991He11).
x596.2@ *4*							0.06 *3*	
599.5#@ *2*	2520.5	$(8)^+$	1921.0	6^+			0.13 *3*	
604.7 *7*	9029.5	(30^+)	8424.8	(28^+)				Eγ: from 1995Du07.
x631.9@ *4*							0.028 *16*	Eγ is close to that for a known transition in ^{191}Pb (1997Mc02).
640[e]	9669.5?	(32^+)	9029.5	(30^+)				Eγ: from 1995Du07. Other Eγ: 636 (1991He11).
641.6#@ *2*	2562.5	8^+	1921.0	6^+			0.13 *2*	
x645.8& *4*								
741.8@ *6*	3304.3		2562.5	8^+			0.033 *16*	
853.8#@ *2*	853.8	2^+	0	0^+			0.69 *5*	
x856.4& *4*								Eγ: forms doublet with 853γ (1997Mc02).
1236.9@ *4*	1236.9	(2^+)	0	0^+			0.032 *14*	
x1333.4@ *5*							0.023 *13*	Not coincident with transitions between low-spin yrast levels.
x1477.7@ *6*							0.032 *13*	Not coincident with transitions between low-spin yrast levels.
2058.1 *6*	4640.0	(10^+)	2581.3	$(10)^+$			0.030[a] *3*	Eγ: weighted average of 2057.7 *6* (1997Mc02)

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(HI,xnγ):SD 2003Wi04,1997Mc02,1991He11 (continued)

γ(^{192}Pb) (continued)

E_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	$I_{(\gamma+ce)}$ [‡]	Comments
						and 2058.9 *8* (2003WiZZ). Placement is from 2003Wi04. 1997Mc02 tentatively placed γ feeding the $(9)^-$ 2514.4 level rather than the $(10)^+$ 2581 level; however, it is present In data correlated with delayed transitions, so it either feeds an isomer or, alternatively, a higher-lying level that feeds an isomer. The decay curve of the level it feeds identifies the isomer As the $(10)^+$ 2581 level. other I(γ+ce): 0.041 *12* (1997Mc02); 0.08 from fig. 3 of 2003Wi04. Mult.: A_2=+0.44 *19* (2003Wi04), consistent with ΔJ=0 or 2.
2079.0[b] *12*	4640.0	(10^+)	2562.5	8^+	0.008[a] *3*	In prompt coincidence with 262-keV SD band transition and with transitions below the isomers (2003Wi04).
2119.0[b] *14*	4640.0	(10^+)	2520.5	$(8)^+$	0.015[a] *3*	
2125.0[b] *14*	4640.0	(10^+)	2514.5	$(9)^-$	0.0150[a] *25*	
2160.0[b] *12*	4902.4	(12^+)	2743.7	$(11)^-$	0.010[a] *5*	not In prompt coincidence with 262-keV SD band transition or with transitions below the isomers (2003Wi04). other I(γ+ce): 0.02 from fig. 3 of 2004Wi04.
2321.0[b] *12*	4902.4	(12^+)	2581.3	$(10)^+$	0.0200[a] *23*	Mult.: A_2=+0.6 *5* (2003Wi04), consistent with ΔJ=0 or 2. other I(γ+ce): 0.02 from fig. 3 of 2003Wi04.

† From 1997Mc02, except as noted. See 1991He11, 1995As04, 1995Du07 for additional Eγ data for transitions within the SD-band.

‡ Intensities are relative to Ti(345γ)=1.00. They are from 1997Mc02 [(^{24}Mg,5nγ); E=134.5 MeV], except as noted. Intensities attributed to 1991He11 have been read from the authors′ intensity plot and have been normalized so Ti(345γ)=1.00 (as in 1997Mc02); they are from (^{24}Mg,5nγ), E=128, 132 MeV. These two sets of I(γ+ce) data differ significantly.

From Adopted Gammas; transition shown In level scheme by 1997Mc02 and/or 2003Wi04.

@ γ observed in coincidence with SD-band gammas (1997Mc02).

& Apparently coincident with SD-band transitions; however, a false coincidence could arise either from the proximity of a γ to an SD-band γ, or from lineshape distortion of an SD-band γ due to the backed target.

a From table I of 2003Wi04. note that, In some cases, a different value appears In fig. 3; those cases are indicated In comments.

b From 2003WiZZ. Eγ data from 2003Wi04 are quoted to nearest keV and do not indicate uncertainty.

c From Adopted Gammas; transition shown In level scheme by 1997Mc02 and/or 2003Wi04.

d Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

e Placement of transition in the level scheme is uncertain.

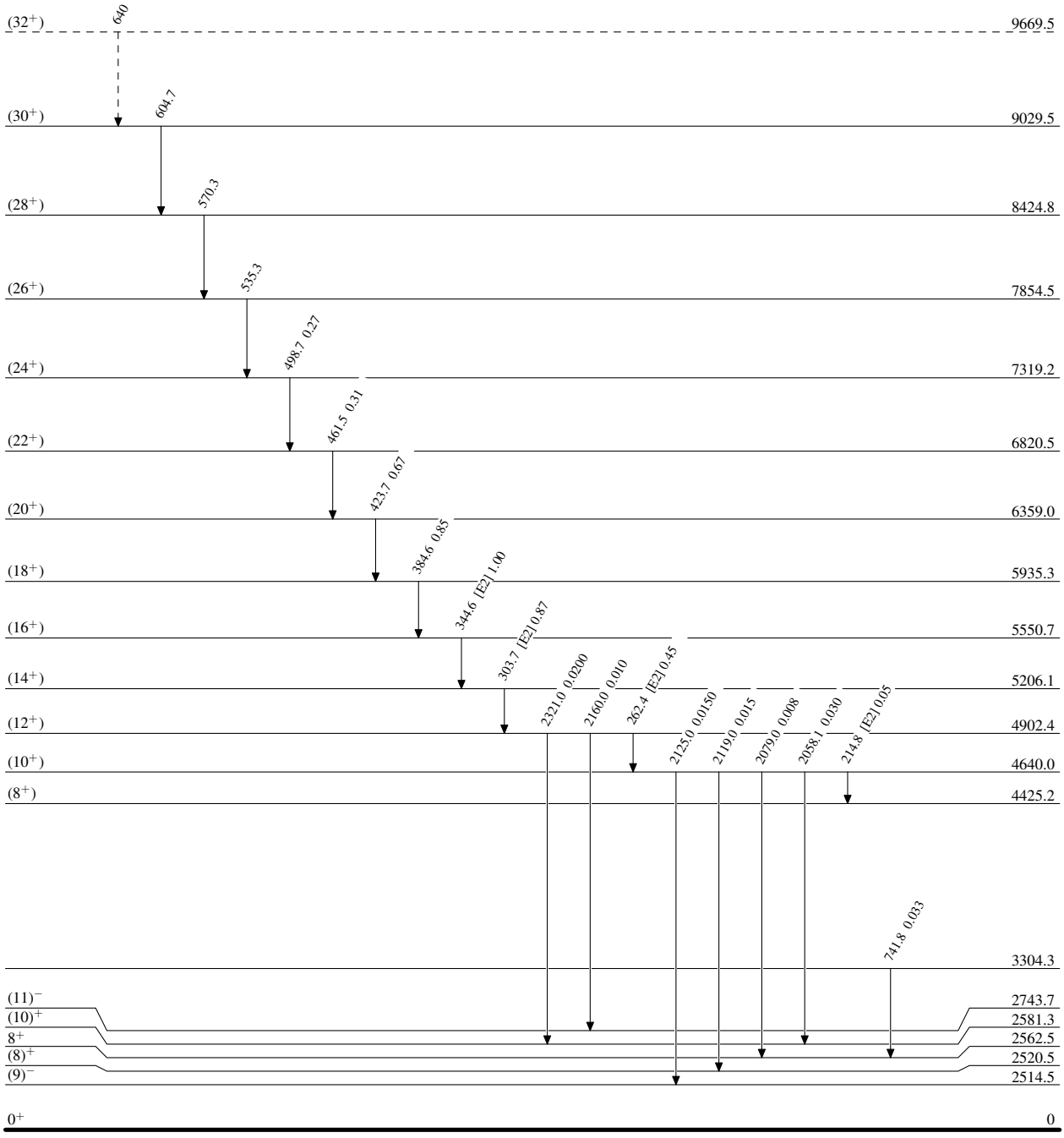
x γ ray not placed in level scheme.

Legend

(HI,xnγ):SD 2003Wi04,1997Mc02,1991He11

Level Scheme

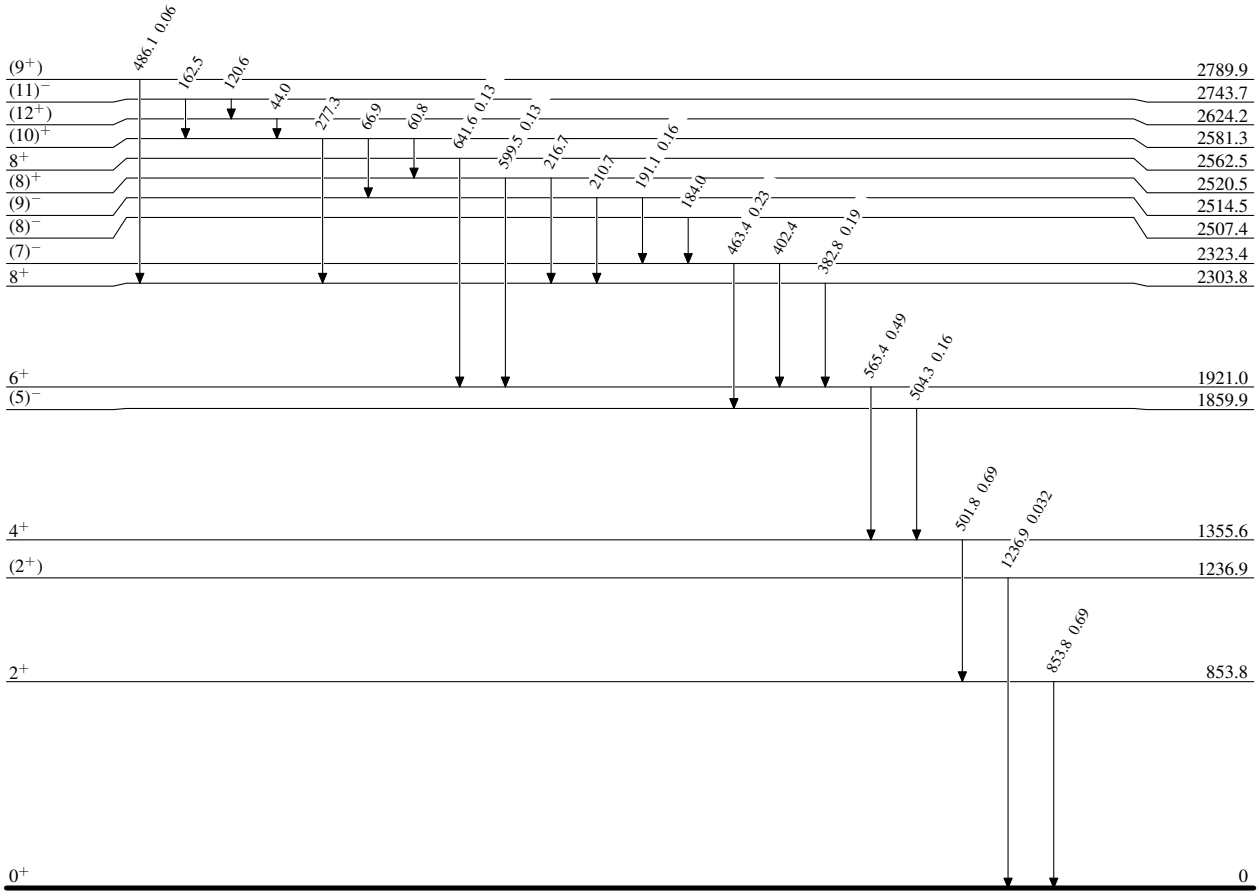
γ Decay (Uncertain)



$^{192}_{82}Pb_{110}$

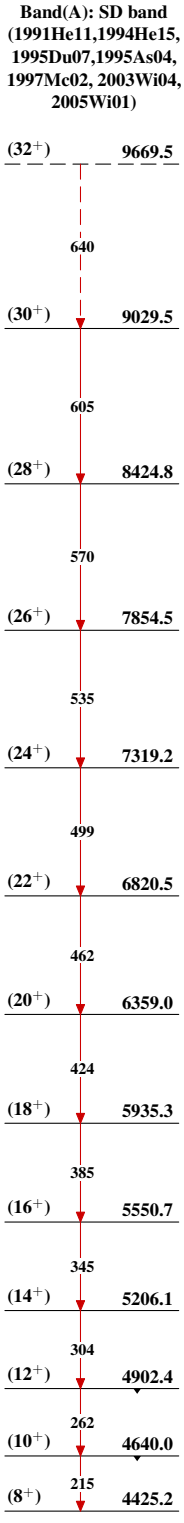
(HI,xnγ):SD 2003Wi04,1997Mc02,1991He11

Level Scheme (continued)



$^{192}_{82}Pb_{110}$

(HI,xnγ):SD 2003Wi04,1997Mc02,1991He11



$^{192}_{82}Pb_{110}$