^{118}Sn(^{55}Mn,3nγ) 2013Ha02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. M. Baglin[1], E. A. Mccutchan[2], S. Basunia[1]	NDS 153, 1 (2018)	1-Oct-2018

E=260 MeV; stack of two 0.6 mg/cm^2 ^{118}Sn targets; Gammasphere detector array (101 Compton-suppressed Ge detectors); measured Eγ, Iγ, $\gamma\gamma$ coin, angular distribution ratios R.
Dataset includes ^{120}Sn(^{55}Mn,5nγ), E=253 MeV.

^{170}Re Levels

E(level)[†]	J$^\pi$[‡]	Comments
0.0		
0.0+x[@]	(9$^-$)	Additional information 1.
0.0+y[&]	(10$^+$)	Additional information 2.
83.20+x[#] *20*	(10$^-$)	
215.1+x[@] *3*	(11$^-$)	
263.80+y[a] *20*	(11$^+$)	
403.8+x[#] *3*	(12$^-$)	
543.3+y[&] *3*	(12$^+$)	
622.2+x[@] *3*	(13$^-$)	
817.4+y[a] *3*	(13$^+$)	
889.6+x[#] *3*	(14$^-$)	
1036.4+y[&] *3*	(14$^+$)	
1169.4+x[@] *3*	(15$^-$)	
1226.6+y[a] *3*	(15$^+$)	
1341.8+y[&] *4*	(16$^+$)	
1486.8+x[#] *4*	(16$^-$)	
1487.5+y[a] *4*	(17$^+$)	
1662.8+y[&] *5*	(18$^+$)	
1806.2+x[@] *4*	(17$^-$)	
1870.4+y[a] *5*	(19$^+$)	
2114.4+y[&] *5*	(20$^+$)	
2146.3+x[#] *4*	(18$^-$)	
2392.6+y[a] *5*	(21$^+$)	
2472.4+x[@] *4*	(19$^-$)	
2702.8+y[&] *5*	(22$^+$)	
2778.2+x[#] *4*	(20$^-$)	
3041.8+y[a] *5*	(23$^+$)	
3057.4+x[@] *4*	(21$^-$)	
3332.8+x[#] *4*	(22$^-$)	
3400.5+y[&] *6*	(24$^+$)	
3636.7+x[@] *4*	(23$^-$)	
3771.4+y[a] *6*	(25$^+$)	
3953.2+x[#] *4*	(24$^-$)	
4151.7+y[&] *6*	(26$^+$)	
4310.5+x[@] *5*	(25$^-$)	
4532.0+y[a] *6*	(27$^+$)	
4675.4+x[#] *5*	(26$^-$)	
4926.6+y[&] *6*	(28$^+$)	

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^{118}Sn(^{55}Mn,3nγ) 2013Ha02 (continued)

^{170}Re Levels (continued)

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
5084.9+x@ 5	(27⁻)	5952.2+x@ 5	(29⁻)	6899.2+x@ 7	(31⁻)	7885.2+x@ 9	(33⁻)
5322.1+ya 6	(29⁺)	6155.2+ya 7	(31⁺)	7049.2+ya 9	(33⁺)	7983.2+y?a 10	(35⁺)
5494.7+x# 5	(28⁻)	6402.0+x# 5	(30⁻)	7371.0+x# 7	(32⁻)	8388.0+x# 9	(34⁻)
5736.3+y& 6	(30⁺)	6601.3+y& 8	(32⁺)	7517.3+y?& 9	(34⁺)		

† From least squares fit to Eγ, including lines with uncertain placement.
‡ Tentative values from 2013Ha02; see comments on bands. Consistent with deduced band structure and observed γ multipolarity.
# Band(A): $\pi h_{11/2}\otimes\nu i_{13/2}$, α=0. Tentative J^π assigned by 2013Ha02 based on systematics of neighboring nuclei and configuration proposed for sequence. Initial alignment≈6ħ; AB alignment blocked but BC alignment occurs At ħω=0.29 MeV, close to value predicted by cranked shell model, so ν $i_{13/2}$ orbital is probably involved. The π $h_{11/2}$ orbital is yrast for low J In ^{169}Re. Observed B(M1)/B(E2) ratios agree well with those expected for the proposed configuration.
@ Band(a): $\pi h_{11/2}\otimes\nu i_{13/2}$, α=1. See comment on signature partner band.
& Band(B): $\pi h_{11/2}\otimes\nu h_{9/2}$, α=0. Tentative J^π assigned by 2013Ha02 based on proposed configuration (for which theoretical B(M1)/B(E2) ratios following the AB crossing agree with the experimental ones). An additional band crossing is observed At ħω=0.37 MeV, probably associated with a pair of $i_{13/2}$ quasineutrons.
a Band(b): $\pi h_{11/2}\otimes\nu h_{9/2}$, α=1. See comment on signature partner band.

γ(^{170}Re)

Eγ	Iγ†	Ei(level)	J_i^π	E_f	J_f^π	Mult.‡	Comments
x		0.0+x	(9⁻)	0.0			
83.2 2	≈35#	83.20+x	(10⁻)	0.0+x	(9⁻)		
115.2 2	8.0 6	1341.8+y	(16⁺)	1226.6+y	(15⁺)		
131.9 2	≈95#	215.1+x	(11⁻)	83.20+x	(10⁻)	D	Mult.: R=0.59 3.
145.7 2	19 2	1487.5+y	(17⁺)	1341.8+y	(16⁺)		
175.3 2	20 1	1662.8+y	(18⁺)	1487.5+y	(17⁺)		
188.6 2	≈105@	403.8+x	(12⁻)	215.1+x	(11⁻)	D	Mult.: R=0.59 2.
190.1 2	4.4 3	1226.6+y	(15⁺)	1036.4+y	(14⁺)		
207.6 2	19 2	1870.4+y	(19⁺)	1662.8+y	(18⁺)		
218.5 2	100 4	622.2+x	(13⁻)	403.8+x	(12⁻)	D	Mult.: R=0.62 2.
219.0 2	4.7@ 4	1036.4+y	(14⁺)	817.4+y	(13⁺)		
244.0 2	17 1	2114.4+y	(20⁺)	1870.4+y	(19⁺)		
263.8 2	≈6#	263.80+y	(11⁺)	0.0+y	(10⁺)		
267.4 2	90 5	889.6+x	(14⁻)	622.2+x	(13⁻)	D	Mult.: R=0.64 2.
274.1 2	2.9 2	817.4+y	(13⁺)	543.3+y	(12⁺)		
275.4 2	34 2	3332.8+x	(22⁻)	3057.4+x	(21⁻)	D	Mult.: R=0.57 2.
278.3 2	14 1	2392.6+y	(21⁺)	2114.4+y	(20⁺)		
279.1 2	37 4	3057.4+x	(21⁻)	2778.2+x	(20⁻)		Mult.: R=0.67 3 for doublet.
279.5 2	2.9# 3	543.3+y	(12⁺)	263.80+y	(11⁺)		
279.7 2	76 8	1169.4+x	(15⁻)	889.6+x	(14⁻)		Mult.: R=0.67 3 for doublet.
303.8 2	30 3	3636.7+x	(23⁻)	3332.8+x	(22⁻)		Mult.: R=0.62 3 for doublet.
305.9 2	38 5	2778.2+x	(20⁻)	2472.4+x	(19⁻)		Mult.: R=0.62 3 for doublet.
310.2 2	16 1	2702.8+y	(22⁺)	2392.6+y	(21⁺)		
316.5 2	22 3	3953.2+x	(24⁻)	3636.7+x	(23⁻)		Mult.: R=0.65 3 for doublet.
317.4 2	67 4	1486.8+x	(16⁻)	1169.4+x	(15⁻)		Mult.: R=0.65 3 for doublet.
319.4 2	56 6	1806.2+x	(17⁻)	1486.8+x	(16⁻)		Mult.: R=0.65 3 for doublet.
320.6 2	≈19@	403.8+x	(12⁻)	83.20+x	(10⁻)		
326.1 2	43 3	2472.4+x	(19⁻)	2146.3+x	(18⁻)	D	Mult.: R=0.64 2.

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^{118}Sn(^{55}Mn,3nγ) 2013Ha02 (continued)

γ(^{170}Re) (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
339.0 *2*	17 *1*	3041.8+y	(23$^+$)	2702.8+y	(22$^+$)		
340.1 *2*	45 *3*	2146.3+x	(18$^-$)	1806.2+x	(17$^-$)	D	Mult.: R=0.64 *2*.
357.3 *2*	19 *1*	4310.5+x	(25$^-$)	3953.2+x	(24$^-$)	D	Mult.: R=0.61 *3*.
358.6 *2*	12 *1*	3400.5+y	(24$^+$)	3041.8+y	(23$^+$)		
364.9 *2*	16 *1*	4675.4+x	(26$^-$)	4310.5+x	(25$^-$)	D	Mult.: R=0.68 *4*.
370.9 *2*	4.8 *5*	3771.4+y	(25$^+$)	3400.5+y	(24$^+$)		
380.3 *2*	7.6 *8*	4151.7+y	(26$^+$)	3771.4+y	(25$^+$)		
380.4 *2*	4.8 *5*	4532.0+y	(27$^+$)	4151.7+y	(26$^+$)		
394.6 *2*	3.8 *4*	4926.6+y	(28$^+$)	4532.0+y	(27$^+$)		
395.5 *2*	2.9 *3*	5322.1+y	(29$^+$)	4926.6+y	(28$^+$)		
407.1 *2*	≈30[@]	622.2+x	(13$^-$)	215.1+x	(11$^-$)		
409.2 *2*	3.5 *2*	1226.6+y	(15$^+$)	817.4+y	(13$^+$)		
409.5 *2*	9.5 *8*	5084.9+x	(27$^-$)	4675.4+x	(26$^-$)		
409.8 *2*	7.1 *6*	5494.7+x	(28$^-$)	5084.9+x	(27$^-$)		
414.2 *5*	<2	5736.3+y	(30$^+$)	5322.1+y	(29$^+$)		
419.0 *5*	<2	6155.2+y	(31$^+$)	5736.3+y	(30$^+$)		
449.9 *5*	<2	6402.0+x	(30$^-$)	5952.2+x	(29$^-$)		
451.7 *2*	5.7 *4*	2114.4+y	(20$^+$)	1662.8+y	(18$^+$)		
457.5 *2*	4.4 *2*	5952.2+x	(29$^-$)	5494.7+x	(28$^-$)		
485.8 *2*	46 *4*	889.6+x	(14$^-$)	403.8+x	(12$^-$)		
493.1 *2*	3.5[@] *3*	1036.4+y	(14$^+$)	543.3+y	(12$^+$)		
522.2 *2*	8.7 *6*	2392.6+y	(21$^+$)	1870.4+y	(19$^+$)		
547.2 *2*	49 *4*	1169.4+x	(15$^-$)	622.2+x	(13$^-$)	Q	Mult.: R=0.99 *8*.
553.6 *2*	4.7 *3*	817.4+y	(13$^+$)	263.80+y	(11$^+$)		
554.6 *2*	23 *2*	3332.8+x	(22$^-$)	2778.2+x	(20$^-$)		Mult.: R=0.78 *6*; low for ΔJ=2 transition implied by level scheme.
579.3 *2*	14 *1*	3636.7+x	(23$^-$)	3057.4+x	(21$^-$)	Q	Mult.: R=1.02 *8*.
585.0 *2*	36 *3*	3057.4+x	(21$^-$)	2472.4+x	(19$^-$)		
588.4 *2*	9.8 *7*	2702.8+y	(22$^+$)	2114.4+y	(20$^+$)		
597.2 *2*	47 *3*	1486.8+x	(16$^-$)	889.6+x	(14$^-$)		Mult.: R=0.72 *3*; low for ΔJ=2 transition implied by level scheme.
620.4 *2*	20 *2*	3953.2+x	(24$^-$)	3332.8+x	(22$^-$)	Q	Mult.: R=1.03 *8*.
631.9 *2*	27 *2*	2778.2+x	(20$^-$)	2146.3+x	(18$^-$)	Q	Mult.: R=1.05 *5*.
636.9 *2*	52 *3*	1806.2+x	(17$^-$)	1169.4+x	(15$^-$)	Q	Mult.: R=0.98 *4*.
649.2 *2*	15 *1*	3041.8+y	(23$^+$)	2392.6+y	(21$^+$)		
659.5 *2*	40 *3*	2146.3+x	(18$^-$)	1486.8+x	(16$^-$)	Q	Mult.: R=0.94 *4*.
666.1 *2*	42 *3*	2472.4+x	(19$^-$)	1806.2+x	(17$^-$)	Q	Mult.: R=0.99 *8*.
673.9 *2*	10.0 *7*	4310.5+x	(25$^-$)	3636.7+x	(23$^-$)		
697.6 *2*	9.9 *7*	3400.5+y	(24$^+$)	2702.8+y	(22$^+$)		
722.2 *2*	10 *1*	4675.4+x	(26$^-$)	3953.2+x	(24$^-$)		
729.6 *2*	7.2 *5*	3771.4+y	(25$^+$)	3041.8+y	(23$^+$)		
751.3 *2*	7.8 *6*	4151.7+y	(26$^+$)	3400.5+y	(24$^+$)		
760.6 *2*	7.6 *5*	4532.0+y	(27$^+$)	3771.4+y	(25$^+$)		
774.4 *2*	7.9 *5*	5084.9+x	(27$^-$)	4310.5+x	(25$^-$)		
774.8 *2*	6.1 *4*	4926.6+y	(28$^+$)	4151.7+y	(26$^+$)		
790.1 *2*	3.8 *3*	5322.1+y	(29$^+$)	4532.0+y	(27$^+$)		
809.7 *2*	2.9 *2*	5736.3+y	(30$^+$)	4926.6+y	(28$^+$)		
819.3 *2*	8.0 *6*	5494.7+x	(28$^-$)	4675.4+x	(26$^-$)		
833.0 *5*	<2	6155.2+y	(31$^+$)	5322.1+y	(29$^+$)		
865.0 *5*	<2	6601.3+y	(32$^+$)	5736.3+y	(30$^+$)		
867.3 *2*	5.0 *3*	5952.2+x	(29$^-$)	5084.9+x	(27$^-$)		
894.0 *5*	<2	7049.2+y	(33$^+$)	6155.2+y	(31$^+$)		
907.3 *2*	2.9 *3*	6402.0+x	(30$^-$)	5494.7+x	(28$^-$)		
916.0[&] *5*	<2	7517.3+y?	(34$^+$)	6601.3+y	(32$^+$)		
934.0[&] *5*	<2	7983.2+y?	(35$^+$)	7049.2+y	(33$^+$)		

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^{118}Sn(^{55}Mn,3nγ) 2013Ha02 (continued)

γ(^{170}Re) (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π
947.0 *5*	<2	6899.2+x	(31$^-$)	5952.2+x	(29$^-$)
969.0 *5*	<2	7371.0+x	(32$^-$)	6402.0+x	(30$^-$)
986.0 *5*	<2	7885.2+x	(33$^-$)	6899.2+x	(31$^-$)
1017.0 *5*	<2	8388.0+x	(34$^-$)	7371.0+x	(32$^-$)

[†] Intensity relative to I(219γ)=100.
[‡] Assigned by evaluator based on R, the ratio of summed Iγ from the 5 rings of detectors nearest to 90° (71°, 81°, 90°, 99°, 101°) to that from detectors At backward angles (122°, 130°, 143°, 148°, 163°), normalized so known pure D (ΔJ=1) and pure Q (ΔJ=2) transitions have values of R=0.6 and 1.0, respectively.
[#] Estimated by authors based on intensity balance.
[@] Estimated by authors based on intensity balance and branching ratio.
[&] Placement of transition in the level scheme is uncertain.

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Level Scheme

Intensities: Relative I_γ

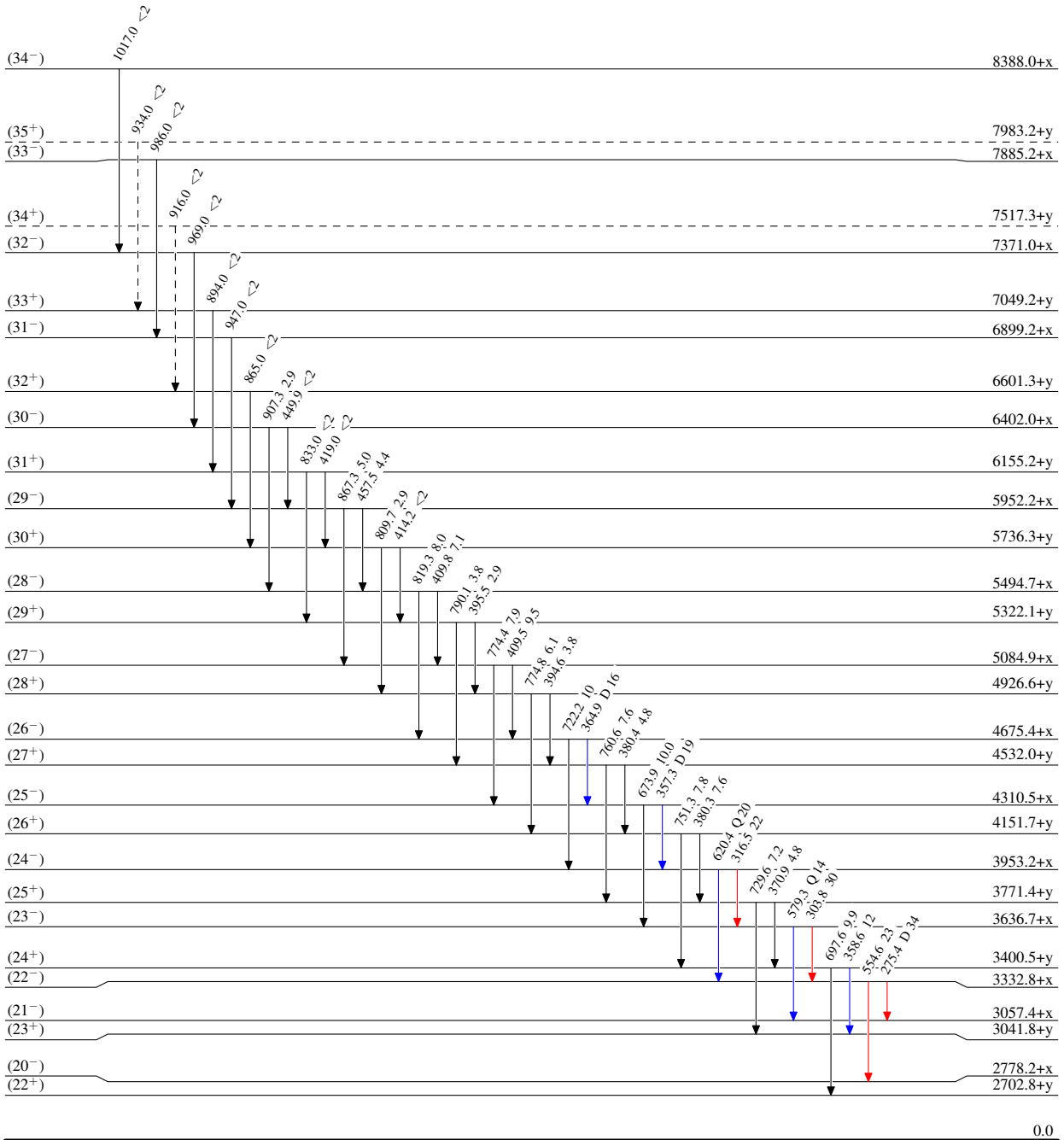
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)



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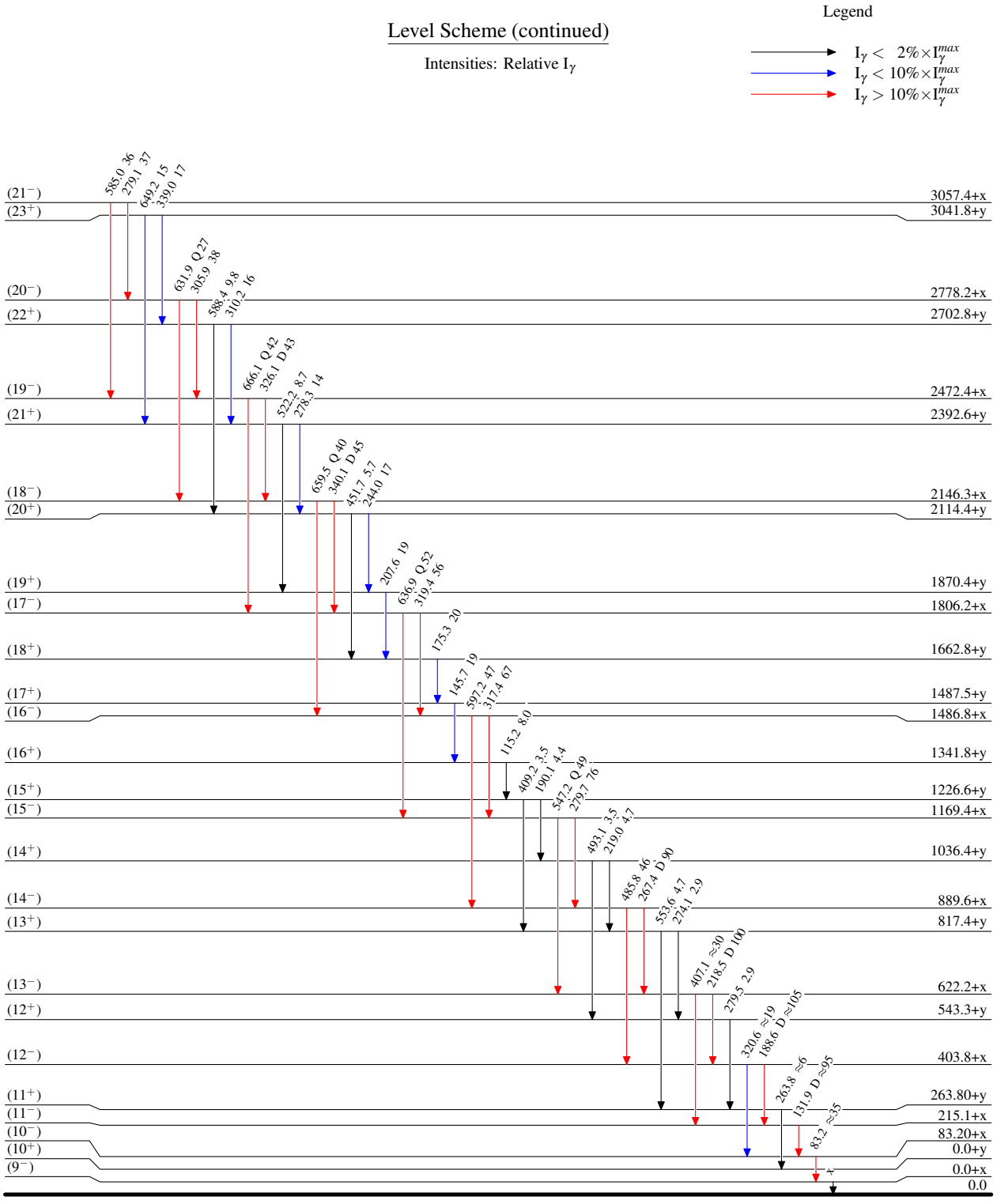
Level Scheme (continued)

Intensities: Relative I_γ



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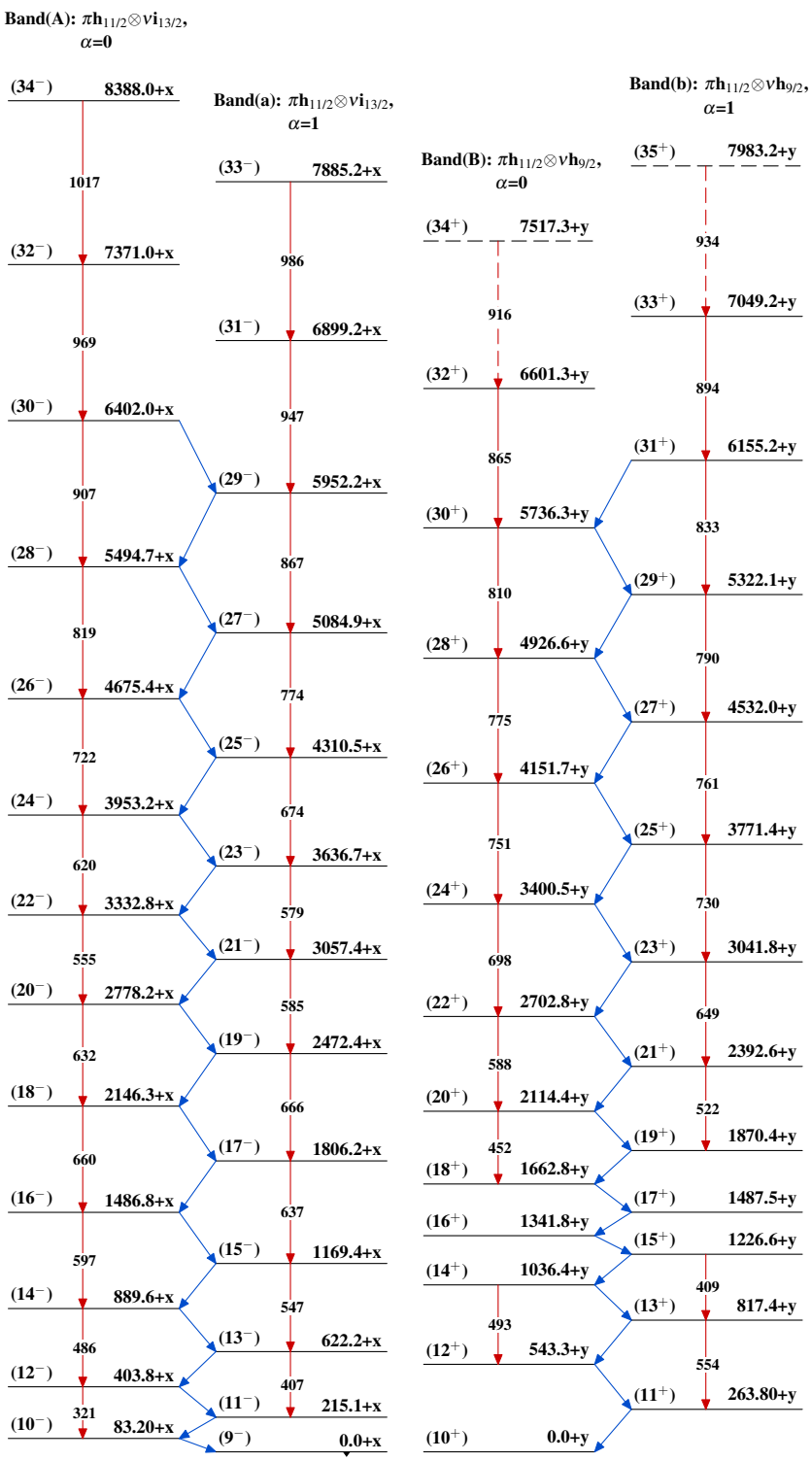

$^{170}_{75}Re_{95}$