

$^{170}\text{Er}(^{238}\text{U}, ^{238}\text{U}'\gamma)$ 2003Wu07,2000Wu01,2000WuZY

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

2000Wu01: E=1358 MeV; GAMMASPHERE array (100 Compton-suppressed Ge detectors) and CHICO 4 π heavy-ion detector array; measured E γ , $\gamma\gamma$ coin, I γ . See also **2000Si32** for experimental details.

2000WuZY: $^{170}\text{Er}+^{238}\text{U}$ at near-barrier energies; (heavy ion)- γ coin (prompt and delayed); measured T_{1/2} from $\gamma\gamma(t)$. Presumably superseded by **2003Wu07**.

 ^{170}Er Levels

E(level) [†]	J π^{\ddagger}	T _{1/2}	Comments
0.0 ^b	0 ⁺		
78.7 ^b	2 ⁺		
260.2 ^b	4 ⁺		
540.7 ^b	6 ⁺		
890.9 [#]	0 ⁺		
914.8 ^b	8 ⁺		
934.0 [@]	2 ⁺		
960.0 [#]	2 ⁺		
1010.4 [@]	3 ⁺		
1103.3 [#]	4 ⁺		
1127.2 [@]	4 ⁺		
1217.4 ^{&}	3 ⁺		
1236.6 [@]	5 ⁺		
1268.8 ^a	4 ⁻	42.8 ns 17	E(level): rounded value from Adopted Levels. T _{1/2} : from 2003Wu07 ; supersedes 42 ns from $\gamma\gamma(t)$ (2000WuZY).
1304.1 ^{&}	4 ⁺		
1350.3 [#]	6 ⁺		
1371.8 ^a	5 ⁻		
1376.5 ^b	10 ⁺		
1401.2 [@]	6 ⁺		
1422.1 ^{&}	5 ⁺		
1495.9 ^a	6 ⁻		
1541.5 ^{&}	6 ⁺		
1556.8 [@]	7 ⁺		
1639.7 ^a	7 ⁻		
1677.2 [#]	8 ⁺		
1694.7 ^{&}	7 ⁺		
1772.8 [@]	8 ⁺		
1804.2 ^a	8 ⁻		
1867.1 ^{&}	8 ⁺		
1919.3 ^b	12 ⁺		
1963.8 [@]	9 ⁺		
1990.5 ^a	9 ⁻		
2061.6 ^{&}	9 ⁺		
2080.7 [#]	10 ⁺		
2188.2 ^a	10 ⁻		
2223.0 [@]	10 ⁺		

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$^{170}\text{Er}(^{238}\text{U}, ^{238}\text{U}'\gamma)$ **2003Wu07,2000Wu01,2000WuZY (continued)**

^{170}Er Levels (continued)

E(level) [†]	J ^π [‡]	E(level) [†]	J ^π [‡]	E(level) [†]	J ^π [‡]	E(level) [†]	J ^π [‡]
2285.3&	10 ⁺	3073.7#	14 ⁺	3891.8&	16 ⁺	4978.2&	19 ⁺
2433.6 ^a	11 ⁻	3073.8@	13 ⁺	3978.9 ^b	18 ⁺	5206.5@	19 ⁺
2444.8@	11 ⁺	3188.2 ^a	14 ⁻	4132.2@	16 ⁺	5334.5&	20 ⁺
2518.8&	11 ⁺	3226.2 ^b	16 ⁺	4232.7#	18 ⁺	5559.4#	22 ⁺
2537.8 ^b	14 ⁺	3275.6&	14 ⁺	4249.8&	17 ⁺	5675.3 ^b	22 ⁺
2551.3#	12 ⁺	3436.0@	14 ⁺	4417.1@	17 ⁺	6142.6&	22 ⁺
2655.4 ^a	12 ⁻	3582.5 ^a	15 ⁻	4446.7 ^a	18 ⁻	6587.0 ^b	24 ⁺
2723.4&	12 ⁺	3584.8&	15 ⁺	4578.8&	18 ⁺	7531.8 ^b	26 ⁺
2813.0@	12 ⁺	3633.7#	16 ⁺	4787.6 ^b	20 ⁺		
2972.6 ^a	13 ⁻	3713.0@	15 ⁺	4883.0#	20 ⁺		
2984.3&	13 ⁺	3791.1 ^a	16 ⁻	4888.4@	18 ⁺		

[†] From fig. 2 of 2000Wu01; authors do not state uncertainties.

[‡] Authors' values, supported by Coulomb excitation strengths, γ decay patterns and strengths, and band-mixing calculations.

Band(A): $K^\pi=0^+$ quasi β vibrational band. Strongly mixed with γ band at $J=4$ (where β - and γ -band energies are almost degenerate); becomes yrast at $J=22$ (2000Wu01).

@ Band(B): $K^\pi=2^+$ γ vibrational band. See comments on β and $K^\pi=3^+$ bands.

& Band(C): $K^\pi=3^+$ band. Significantly mixed with $K=2$ γ band as evidenced by strength of Coulomb excitation of a 3^+ band, presence of K-forbidden E2 transitions to g.s. band and repulsion between $J=12$ and 13 members of this band and the γ band (2000Wu01).

^a Band(D): $K^\pi=4^-$ band. From absolute values of g_K-g_R deduced from branching ratios of $\Delta J=1$ and $\Delta J=2$ transitions, the $K^\pi=4^-$ isomer is interpreted as dominantly $\pi 7/2[523] \otimes \pi 1/2[411]$. Above a rotational frequency of ≈ 200 keV, the additional configuration $\pi 7/2[523] \pi 3/2[411]$ may be involved (2003Wu07).

^b Band(E): $K^\pi=0^+$ g.s. band.

$\gamma(^{170}\text{Er})$

$E_i(\text{level})$	J_i^π	$E_\gamma^{\dagger @}$	E_f	J_f^π	$E_i(\text{level})$	J_i^π	$E_\gamma^{\dagger @}$	I_γ	E_f	J_f^π
78.7	2 ⁺	78.7	0.0	0 ⁺	1371.8	5 ⁻	103.5		1268.8	4 ⁻
260.2	4 ⁺	181.5	78.7	2 ⁺	1376.5	10 ⁺	461.7		914.8	8 ⁺
540.7	6 ⁺	280.5	260.2	4 ⁺	1401.2	6 ⁺	274.0		1127.2	4 ⁺
890.9	0 ⁺	812.3#	78.7	2 ⁺			860.5		540.7	6 ⁺
914.8	8 ⁺	374.1	540.7	6 ⁺			1141.0		260.2	4 ⁺
934.0	2 ⁺	855.4#	78.7	2 ⁺	1422.1	5 ⁺	1161.9		260.2	4 ⁺
960.0	2 ⁺	881.4#	78.7	2 ⁺	1495.9	6 ⁻	124.5 [‡]	10 163 33	1371.8	5 ⁻
1010.4	3 ⁺	932.0#	78.7	2 ⁺			226.6 [‡]	10 100	1268.8	4 ⁻
1103.3	4 ⁺	843.1	260.2	4 ⁺	1541.5	6 ⁺	237.4		1304.1	4 ⁺
		1024.6	78.7	2 ⁺			1000.8		540.7	6 ⁺
1127.2	4 ⁺	193.2	934.0	2 ⁺			1281.3		260.2	4 ⁺
		867.0	260.2	4 ⁺	1556.8	7 ⁺	320.2		1236.6	5 ⁺
		1048.5	78.7	2 ⁺			1016.1		540.7	6 ⁺
1217.4	3 ⁺	1139.0#	78.7	2 ⁺	1639.7	7 ⁻	144.5 [‡]	10	1495.9	6 ⁻
1236.6	5 ⁺	976.4	260.2	4 ⁺			268.0 [‡]	10	1371.8	5 ⁻
1304.1	4 ⁺	1043.9	260.2	4 ⁺	1677.2	8 ⁺	326.9		1350.3	6 ⁺
1350.3	6 ⁺	247.0	1103.3	4 ⁺			762.4		914.8	8 ⁺
		809.6	540.7	6 ⁺			1136.5		540.7	6 ⁺
		1090.1	260.2	4 ⁺	1694.7	7 ⁺	272.6		1422.1	5 ⁺

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$^{170}\text{Er}(^{238}\text{U}, ^{238}\text{U}'\gamma)$ **2003Wu07,2000Wu01,2000WuZY (continued)** $\gamma(^{170}\text{Er})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger@$	I_γ	E_f	J_f^π	$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger@$	E_f	J_f^π
1694.7	7 ⁺	1154.0		540.7	6 ⁺	2813.0	12 ⁺	527.7	2285.3	10 ⁺
1772.8	8 ⁺	371.6		1401.2	6 ⁺			590.0	2223.0	10 ⁺
		858.0		914.8	8 ⁺	2972.6	13 ⁻	539.0 [‡]	2433.6	11 ⁻
		1232.1		540.7	6 ⁺	2984.3	13 ⁺	465.5	2518.8	11 ⁺
1804.2	8 ⁻	164.5 [‡]	10 43 9	1639.7	7 ⁻			539.5	2444.8	11 ⁺
		307.5 [‡]	10 100	1495.9	6 ⁻	3073.7	14 ⁺	522.3	2551.3	12 ⁺
1867.1	8 ⁺	325.6		1541.5	6 ⁺	3073.8	13 ⁺	555.0	2518.8	11 ⁺
		465.9		1401.2	6 ⁺			629.0	2444.8	11 ⁺
		952.3		914.8	8 ⁺	3188.2	14 ⁻	532.7 [‡]	2655.4	12 ⁻
		1326.4		540.7	6 ⁺	3226.2	16 ⁺	688.4	2537.8	14 ⁺
1919.3	12 ⁺	542.8		1376.5	10 ⁺	3275.6	14 ⁺	552.2	2723.4	12 ⁺
1963.8	9 ⁺	407.0		1556.8	7 ⁺	3436.0	14 ⁺	623.0	2813.0	12 ⁺
		1049.0		914.8	8 ⁺			712.6	2723.4	12 ⁺
1990.5	9 ⁻	185.5 [‡]	10 50 12	1804.2	8 ⁻	3582.5	15 ⁻	609.9 [‡]	2972.6	13 ⁻
		351.5 [‡]	10 100	1639.7	7 ⁻	3584.8	15 ⁺	600.5	2984.3	13 ⁺
2061.6	9 ⁺	366.9		1694.7	7 ⁺	3633.7	16 ⁺	560.1	3073.7	14 ⁺
		1146.8		914.8	8 ⁺	3713.0	15 ⁺	639.2	3073.8	13 ⁺
2080.7	10 ⁺	403.5		1677.2	8 ⁺			728.7	2984.3	13 ⁺
		704.2		1376.5	10 ⁺	3791.1	16 ⁻	602.9 [‡]	3188.2	14 ⁻
		1165.9		914.8	8 ⁺	3891.8	16 ⁺	616.2	3275.6	14 ⁺
2188.2	10 ⁻	197.1 [‡]	10 23 6	1990.5	9 ⁻	3978.9	18 ⁺	752.7	3226.2	16 ⁺
		384.1 [‡]	10 100	1804.2	8 ⁻	4132.2	16 ⁺	696.2	3436.0	14 ⁺
2223.0	10 ⁺	450.2		1772.8	8 ⁺			856.6	3275.6	14 ⁺
		846.5		1376.5	10 ⁺	4232.7	18 ⁺	599.0	3633.7	16 ⁺
		1308.2		914.8	8 ⁺	4249.8	17 ⁺	665.0	3584.8	15 ⁺
2285.3	10 ⁺	418.2		1867.1	8 ⁺	4417.1	17 ⁺	704.1	3713.0	15 ⁺
		512.5		1772.8	8 ⁺	4446.7	18 ⁻	655.6 [‡]	3791.1	16 ⁻
		908.8		1376.5	10 ⁺	4578.8	18 ⁺	687.0	3891.8	16 ⁺
2433.6	11 ⁻	244.6 [‡]	10 57 15	2188.2	10 ⁻	4787.6	20 ⁺	808.7	3978.9	18 ⁺
		443.6 [‡]	10 100	1990.5	9 ⁻	4883.0	20 ⁺	650.3	4232.7	18 ⁺
2444.8	11 ⁺	481.0		1963.8	9 ⁺			904.1	3978.9	18 ⁺
		1068.3		1376.5	10 ⁺	4888.4	18 ⁺	756.2	4132.2	16 ⁺
2518.8	11 ⁺	457.2		2061.6	9 ⁺	4978.2	19 ⁺	728.4	4249.8	17 ⁺
		555.0		1963.8	9 ⁺	5206.5	19 ⁺	789.4	4417.1	17 ⁺
		1142.3		1376.5	10 ⁺	5334.5	20 ⁺	755.7	4578.8	18 ⁺
2537.8	14 ⁺	618.5		1919.3	12 ⁺	5559.4	22 ⁺	676.4	4883.0	20 ⁺
2551.3	12 ⁺	470.6		2080.7	10 ⁺			771.8	4787.6	20 ⁺
		632.0		1919.3	12 ⁺	5675.3	22 ⁺	792.3	4883.0	20 ⁺
		1174.8		1376.5	10 ⁺			887.7	4787.6	20 ⁺
2655.4	12 ⁻	221.5 [‡]	10 34 8	2433.6	11 ⁻	6142.6	22 ⁺	808.1	5334.5	20 ⁺
		467.6 [‡]	10 100	2188.2	10 ⁻	6587.0	24 ⁺	911.7	5675.3	22 ⁺
2723.4	12 ⁺	438.1		2285.3	10 ⁺	7531.8	26 ⁺	944.8	6587.0	24 ⁺
		500.4		2223.0	10 ⁺					

† From 2000Wu01, except As noted.

‡ From 2003Wu07; uncertainty \approx 1 keV.

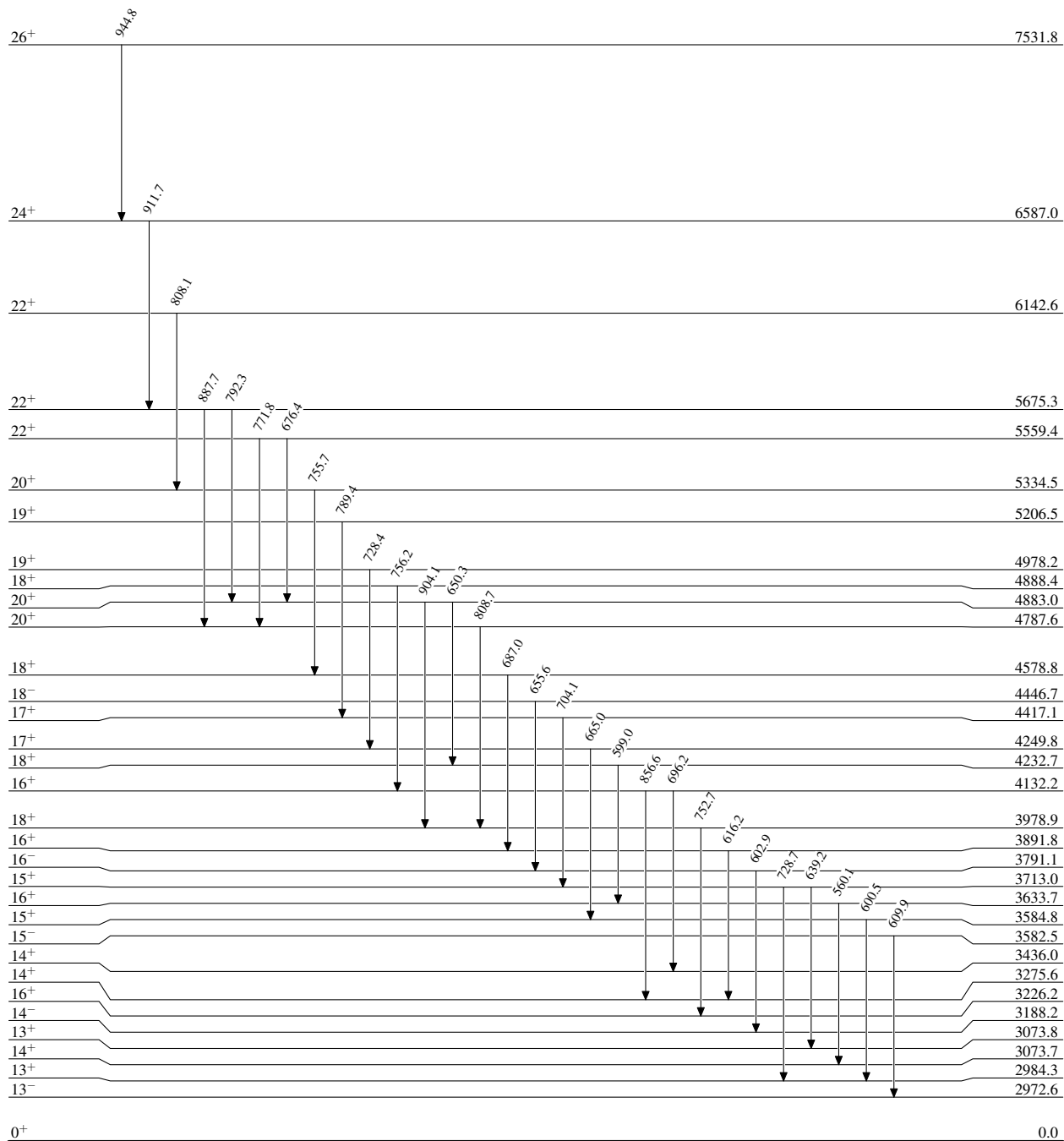
Rounded-off value from Adopted Levels.

@ From level energy difference for transitions indicated in 2000Wu01.

$^{170}\text{Er}(^{238}\text{U}, ^{238}\text{U}'\gamma)$ 2003Wu07,2000Wu01,2000WuZY

Level Scheme

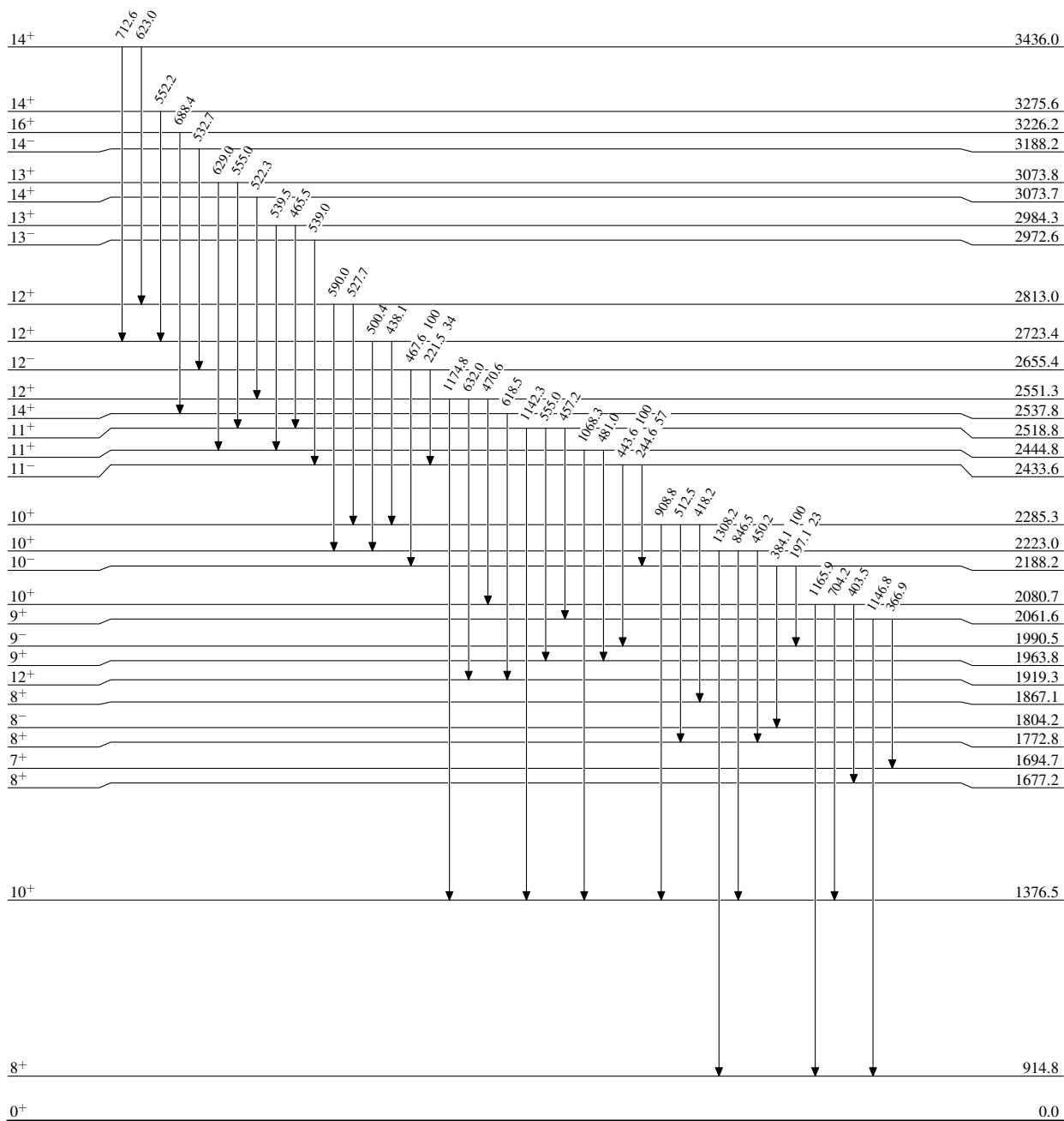
Intensities: Relative photon branching from each level

 $^{170}_{68}\text{Er}_{102}$

$^{170}\text{Er}(^{238}\text{U}, ^{238}\text{U}'\gamma)$ 2003Wu07,2000Wu01,2000WuZY

Level Scheme (continued)

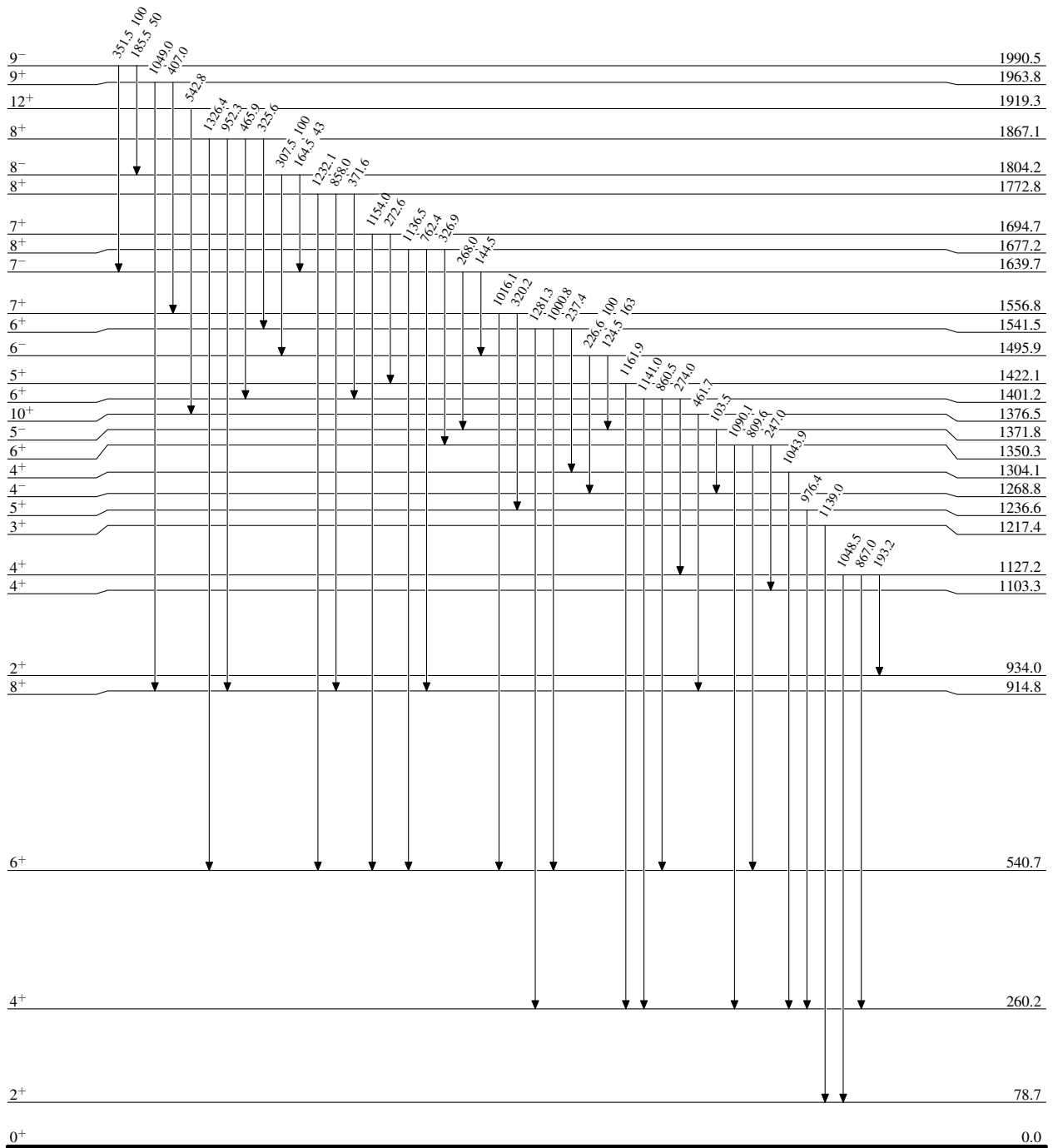
Intensities: Relative photon branching from each level

 $^{170}_{68}\text{Er}_{102}$

$^{170}\text{Er}(^{238}\text{U}, ^{238}\text{U}'\gamma)$ 2003Wu07,2000Wu01,2000WuZY

Level Scheme (continued)

Intensities: Relative photon branching from each level

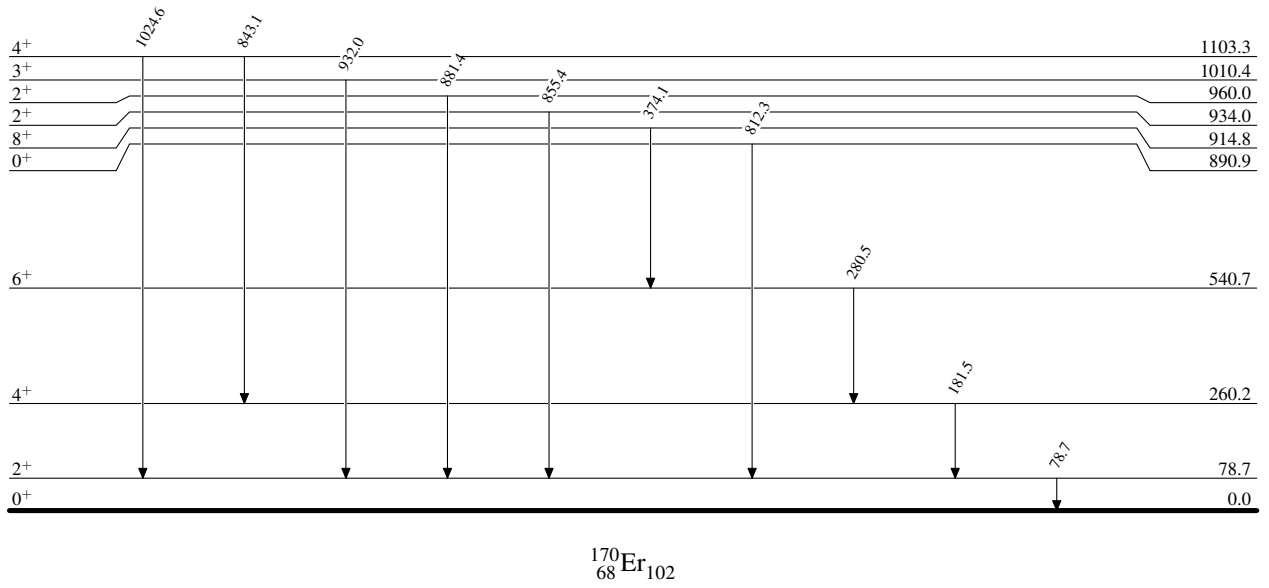


42.8 ns 17

$^{170}\text{Er}(^{238}\text{U}, ^{238}\text{U}'\gamma)$ 2003Wu07,2000Wu01,2000WuZY

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{170}\text{Er}(^{238}\text{U}, ^{238}\text{U}'\gamma)$ 2003Wu07,2000Wu01,2000WuZY