Adopted Levels, Gammas

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Achterberg, O. A. Capurro, G. V. Marti	NDS 110,1473 (2009)	31-May-2008

Q(β^-)=−9.67×10^3 *6*; S(n)=10698 *18*; S(p)=3239 *23*; Q(α)=5572.9 *22* 2012Wa38
Note: Current evaluation has used the following Q record $ −9670 60 *10699* 18 *3240* 23 *5573*.4 *26* 2003Au03.
Q(β^+)=4254 *23* keV (2003Au03).

^{178}Pt Levels

Cross Reference (XREF) Flags

A ^{182}Hg α decay
B ^{178}Au ε decay
C (HI,xnγ)

E(level)†	Jπ‡	$T_{1/2}$#	XREF	Comments
0.0@	0$^+$	20.7 s *7*	ABC	%ε+%β^+=92.3 *3*; %α=7.7 *3* $T_{1/2}$: Weighted average of 20 s *1* (2000Ko16), 22 s *2* (1993Me13), and 21 s *1* (1982Bo04). %α: From Iα(5440α)=7.5% *3* (1980Sc09) and Iα(5284α)/Iα(5440α)=0.028 *10* (1970Ha18). Isotope shift: $\Delta\langle r^2\rangle$ =−0.529 *16* fm^2 relative to ^{194}Pt (2000Le40,1999Sa40,1999Ro28). Deformation variation: $\Delta\langle\beta^2\rangle$ =0.0261 *14* relative to ^{194}Pt (2000Le40,1999Ro28); deformation parameter $(\langle\beta^2\rangle)^{1/2}$=0.216 *5* (1999Sa40,1999Ro28). RMS charge radius, $\langle r_0^2\rangle^{1/2}$=5.372 *7* fm (2004An14).
170.30@ *10*	2$^+$		ABC	
421.0& *6*	0$^+$	<0.7 ns	AB	$T_{1/2}$: From ^{182}Hg α decay (1993Wa03).
427.40@ *14*	4$^+$	37.5 ps *32*	BC	
653.2& *6*	2$^+$		B	Jπ: Based on the electron conversion coefficient values for the 483.0 keV transition. This assignment is also supported by the angular correlation measurements of the 483.0-170.4 keV cascade (1999Da18).
765.17@ *18*	6$^+$	10.9 ps *8*	BC	
1001.2 *10*	(3)		B	Jπ: Assignment suggested by the angular correlations in ^{178}Au ε decay (see dataset).
1058.2& *7*	(4$^+$)		B	Jπ: Assignment supported by the angular correlations in ^{178}Au ε decay (see dataset).
1178.33@ *20*	8$^+$		BC	$T_{1/2}$: Half-life of 3.7 *4* ps (1986Dr05) uncertain due to contaminants in the spectrum.
1345.7 *5*			BC	
1426.1 *8*			B	
1476.7& *6*	(6$^+$)		B	Jπ: Based on the K electron conversion coefficient for the 711.5 keV transition which indicates an M1 or E0 component (1999Da18).
1573.5a *3*	5$^-$		BC	
1581.5 *10*			B	
1633.1 *11*			B	
1661.32@ *22*	10$^+$		C	
1746.8 *10*			B	
1810.0b *4*	(6$^-$)		C	
1814.3a *3*	7$^-$		C	B(E1,636.3)/B(E2,241.5)=9.2 *20* 10^{-7} b^{-1}, and B(E1,1047.9)/B(E2,241.5)=0.38 *11* 10^{-7} b^{-1} (2000Ko16).
2029.7 *5*			C	

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Adopted Levels, Gammas (continued)

^{178}Pt Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
2118.8[b] *4*	(8⁻)	C	B(E1,940.4)/B(E2,308.8)=5.5 *12* 10^{-7} b^{-1} (2000Ko16).
2137.6[a] *4*	9⁻	C	B(E1,476.4)/B(E2,323.1)=13.6 *29* 10^{-7} b^{-1} (2000Ko16).
2197.0[&] *8*	(8⁺)	B	
2209.0[@] *11*	12⁺	C	
2344.5 *11*		B	
2495.9[b] *4*	(10⁻)	C	B(E1,834.6)/B(E2,377.1)=2.1 *9* 10^{-7} b^{-1} (2000Ko16).
2534.3[a] *4*	11⁻	C	
2813.6[@] *11*	14⁺	C	
2925.1[b] *6*	(12⁻)	C	
2996.0[a] *6*	13⁻	C	
3408.0?[b]	(14⁻)	C	
3459.2[@] *11*	16⁺	C	
3514.5[a] *7*	15⁻	C	
4077.2[a] *8*	(17⁻)	C	
4110.1[@] *11*	(18⁺)	C	
4664.9[a] *9*	(19⁻)	C	
4753.7[@] *14*	(20⁺)	C	
5282.5[a] *12*	(21⁻)	C	
5430.4[@] *16*	(22⁺)	C	
5928.1[a] *15*	(23⁻)	C	
6159.4?[@]	(24⁺)	C	
6601.2?[a]	(25⁻)	C	

[†] The level energies are from a least-squares adjustment to the adopted γ-ray energies.

[‡] Spin-parity assignments are from 2000Ko16 (based mainly on angular distributions and anisotropy information) and/or 1999Da18 (founded on γ-γ angular correlations and internal conversion coefficients).

[#] From lifetime measurements using the recoil distance technique (1986Dr05) unless otherwise noted.

[@] Band(A): gs band yrast rotational band. The irregular low-spin structure observed in this yrast band has been attributed to the perturbation due to two coexisting shapes (prolate and near-spherical) in the low-energy structure of this band (1986Dr05,1999Da18).

[&] Band(B): Non-yrast, even spin, π=+ band. Established from ^{178}Au ε decay (1999Da18).

[a] Band(C): Odd spin, π=− band. Several arguments are given in 2000Ko16 to justify these assignments. The level sequence of this band may be interpreted as a decoupled two-quasiparticle $\pi h_{9/2}$ rotational band with an admixture of octupole vibrations at low spin (1999So01).

[b] Band(D): Even spin, π=− band. Spins are assigned tentatively, based on population intensity arguments. The proposed assignments would seem to be supported by the systematics of neighboring even-even Os and Pt isotopes. For further discussion see the (HI,Xγ) dataset and references quoted there.

Adopted Levels, Gammas (continued)

γ(^{178}Pt)

E_i(level)	J_i^π	E_γ[†]	I_γ[#]	E_f	J_f^π	Mult.[‡]	δ	α[&]	Comments
170.30	2+	170.3 *1*		0.0	0+	E2		0.630	E_γ: 1993Wa03 report E(γ)=171 keV.
421.0	0+	250.6[@]		170.30	2+				
		421.0[@]		0.0	0+	E0			This transition proceeds only by electron conversion (1999Da18) (see also ^{178}Au ε decay dataset below).
427.40	4+	257.1 *1*		170.30	2+	E2		0.1578	B(E2)(W.u.)=195 *17*
653.2	2+	232.1[@]	≈17	421.0	0+				
		483.0[@]	100	170.30	2+	E0+(M1)+E2	4.2	0.0301	Mult.: A_2=−0.01 *9*, A_4=+0.27 *11*; α_K(exp)=0.11 *1*, α_L(exp)=0.010 *2*, α_M(exp)=0.0025 *4*. Theory: α_K=0.0225, α_L=0.00581, α_M=0.00141.
		653.2[@]	55 *15*	0.0	0+	E2		0.01330	Mult.: α_K(exp)<0.04, theory: α_K(E2)=0.0103, α_K(M1)=0.0322.
765.17	6+	337.7 *1*		427.40	4+	E2		0.0698	B(E2)(W.u.)=186 *14*
1001.2	(3)	573.7[@a]		427.40	4+				
		830.9[@]		170.30	2+	(M1)		0.0210	Mult.: A_2=−0.14 *13*, A_4=−0.20 *17*; α_K(exp)=0.06 *4*, theory: α_K(M1)=0.0174, α_K(E2)=0.00634.
1058.2	(4+)	405.0[@]	45 *12*	653.2	2+				
		630.6[@]	100	427.40	4+	(E0+M1+E2)		0.028 *14*	Mult.: α_K(exp)<0.09 (electron line contaminated by a strong K electron line from the 624 keV transition in ^{178}Os).
		888.1[@a]	≈50	170.30	2+				
1178.33	8+	413.2 *1*		765.17	6+	(E2)		0.0401	B(E2)(W.u.)=206 *23*
1345.7		580.0[a]	≈10	765.17	6+				
		918.3 *4*	100	427.40	4+				E_γ: 1999Da18 list E(γ)=917.6 keV.
1426.1		998.4[@]	64 *36*	427.40	4+				
		1256.1[@]	100	170.30	2+				
1476.7	(6+)	418.3[@]	74 *30*	1058.2	(4+)				
		711.5[@]	94 *24*	765.17	6+	(E0+M1+E2)		0.021 *10*	Mult.: α_K(exp)=0.020 *9*, theory: α_K=0.017 *9*.
		1049.3[@]	100	427.40	4+				
1573.5	5−	808.0 *4*	100	765.17	6+	(E1)		0.00315	
		1147.1 *4*	75 *13*	427.40	4+	(E1)		1.66×10^{-3}	E_γ: 1999Da18 give E(γ)=1145.7 keV for this transition.
1581.5		1154.1[@]		427.40	4+				
1633.1		867.9[@]		765.17	6+				
1661.32	10+	483.0 *1*		1178.33	8+	(E2)		0.0270	
1746.8		1319.4[@]		427.40	4+				
1810.0	(6−)	1044.8 *4*		765.17	6+	(E1)		0.00196	
1814.3	7−	241.5 *4*	27 *6*	1573.5	5−	E2		0.193	Mult.: R=1.2 *2*.
		636.3 *4*	100	1178.33	8+	E1		0.00502	Mult.: R=0.6 *1*; A_2=−0.17 *9*, A_4=+0.07 *12*. B(E1)=5.7 *14* 10^{-5} W.u., deduced by 2000Ko16 from their

$^{178}_{78}Pt_{100}$-3

Adopted Levels, Gammas (continued)

γ(^{178}Pt) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[#]	E_f	J_f^π	Mult.[‡]	α[&]	Comments
								experimental ratio B(E1,636.3)/B(E2,241.5)=9.2 *20* 10^{-7} b^{-1}, and a calculated B(E2,241.5) assuming Q_0=6.4 *3* eb from 1986Dr05.
1814.3	7^-	1047.9 *4*	19 *4*	765.17	6^+	(E1)	0.00195	B(E1)=0.24 *7* 10^{-5} W.u., deduced by 2000Ko16 from their experimental ratio B(E1,1047.9)/B(E2,241.5)=0.38 *11* $10^{-7}b^{-1}$, and a calculated B(E2,241.5) assuming Q_0=6.4 *3* eb from 1986Dr05.
2029.7		1264.5 *4*		765.17	6^+			
2118.8	(8^-)	308.8 *4*	47 *8*	1810.0	(6^-)	E2	0.0904	Mult.: R=1.1 *2*.
		940.4 *4*	100	1178.33	8^+	(E1)	0.00237	B(E1)=3.5 *8* 10^{-5} W.u., deduced by 2000Ko16 from their experimental ratio B(E1,940.4)/B(E2,308.8)=5.5 *12* 10^{-7} b^{-1}, and a calculated B(E2,308.8) assuming Q_0=6.4 *3* eb from 1986Dr05.
2137.6	9^-	323.1 *4*	100	1814.3	7^-	E2	0.0792	Mult.: R=1.3 *1*; A_2=+0.21 *12*, A_4=−0.03 *14*.
		476.4 *4*	54 *10*	1661.32	10^+	(E1)	0.00916	B(E1)=8.8 *21* 10^{-5} W.u., deduced by 2000Ko16 from their experimental ratio B(E1,476.4)/B(E2,323.1)=13.6 *29* 10^{-7} b^{-1}, and a calculated B(E2,323.1) assuming Q_0=6.4 *3* eb from 1986Dr05.
2197.0	(8^+)	720.2[@]	60 *22*	1476.7	(6^+)			
		1018.3[@a]	≈20	1178.33	8^+			
		1432.0[@]	100	765.17	6^+			
2209.0	12^+	547.7		1661.32	10^+	(E2)	0.0199	
2344.5		530.2[@]		1814.3	7^-			
2495.9	(10^-)	377.1 *4*	100	2118.8	(8^-)	E2	0.0513	Mult.: R=1.3 *2*.
		834.6 *4*	21 *9*	1661.32	10^+	(E1)	0.00296	B(E1)=1.4 *6* 10^{-5} W.u., deduced by 2000Ko16 from their experimental ratio B(E1,834.6)/B(E2,377.1)=2.1 *9* 10^{-7} b^{-1}, and a calculated B(E2,377.1) assuming Q_0=6.4 *3* eb from 1986Dr05.
2534.3	11^-	396.7 *1*		2137.6	9^-	E2	0.0447	Mult.: R=1.2 *2*; A_2=+0.16 *4*, A_4=−0.06 *6*.
2813.6	14^+	604.6 *1*		2209.0	12^+	(E2)	0.01582	
2925.1	(12^-)	429.2 *4*		2495.9	(10^-)	E2	0.0364	Mult.: R=1.3 *2*.
2996.0	13^-	461.7 *4*		2534.3	11^-	E2	0.0302	Mult.: R=1.4 *2*, A_2=+0.30 *11*, A_4=−0.10 *12*.
3408.0?	(14^-)	483[a] *1*		2925.1	(12^-)	(E2)	0.0270	
3459.2	16^+	645.6 *1*		2813.6	14^+	(E2)	0.01365	
3514.5	15^-	518.5 *4*		2996.0	13^-	E2	0.0227	Mult.: R=1.4 *2*.
4077.2	(17^-)	562.7 *4*		3514.5	15^-	(E2)	0.0187	
4110.1	(18^+)	650.9 *4*		3459.2	16^+	(E2)	0.01340	
4664.9	(19^-)	587.7 *4*		4077.2	(17^-)	E2	0.01688	Mult.: R=1.4 *3*.
4753.7	(20^+)	643.6 *8*		4110.1	(18^+)	(E2)	0.01374	
5282.5	(21^-)	617.6 *8*		4664.9	(19^-)	(E2)	0.01507	
5430.4	(22^+)	676.7 *8*		4753.7	(20^+)	(E2)	0.01230	
5928.1	(23^-)	645.6 *8*		5282.5	(21^-)	(E2)	0.01365	
6159.4?	(24^+)	729[a] *1*		5430.4	(22^+)	(E2)	0.01047	
6601.2?	(25^-)	673[a] *1*		5928.1	(23^-)	(E2)	0.01245	

$^{178}_{78}Pt_{100}$-4

Adopted Levels, Gammas (continued)

$\gamma(^{178}Pt)$ (continued)

† Unless otherwise noted, the energy values are from 2000Ko16. Uncertainties of $\Delta(E\gamma)=0.8$ for $I\gamma<1$, $\Delta(E\gamma)=0.4$ for $1\leq I\gamma\leq 10$ and $\Delta(E\gamma)=0.1$ for $I\gamma>10$, are estimates by the evaluators, based on values suggested in 2000Ko16. No uncertainties are reported by the authors of 1999Da18.

‡ From γ-ray angular distributions and anisotropy ratios (2000Ko16), mixing ratios δ(E2/M1) obtained from angular correlations (1999Da18), membership in γ ray cascades connecting levels in rotational bands, and character of interband transitions.

Relative photon branching for each level are calculated from relative $I\gamma$ of 2000Ko16 or 1999Da18.

@ From 1999Da18.

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

a Placement of transition in the level scheme is uncertain.

$^{178}_{78}Pt_{100}$-5

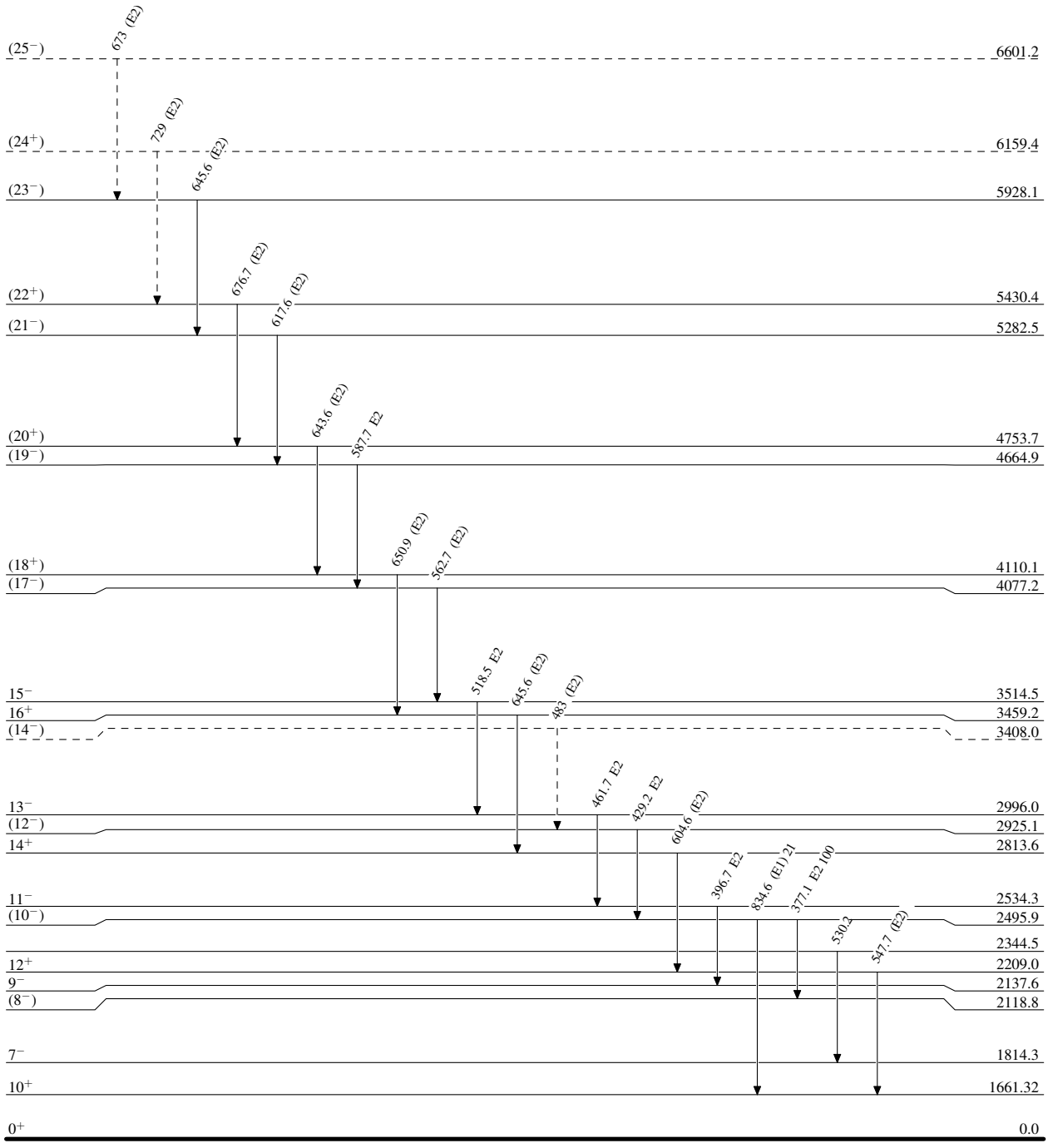
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



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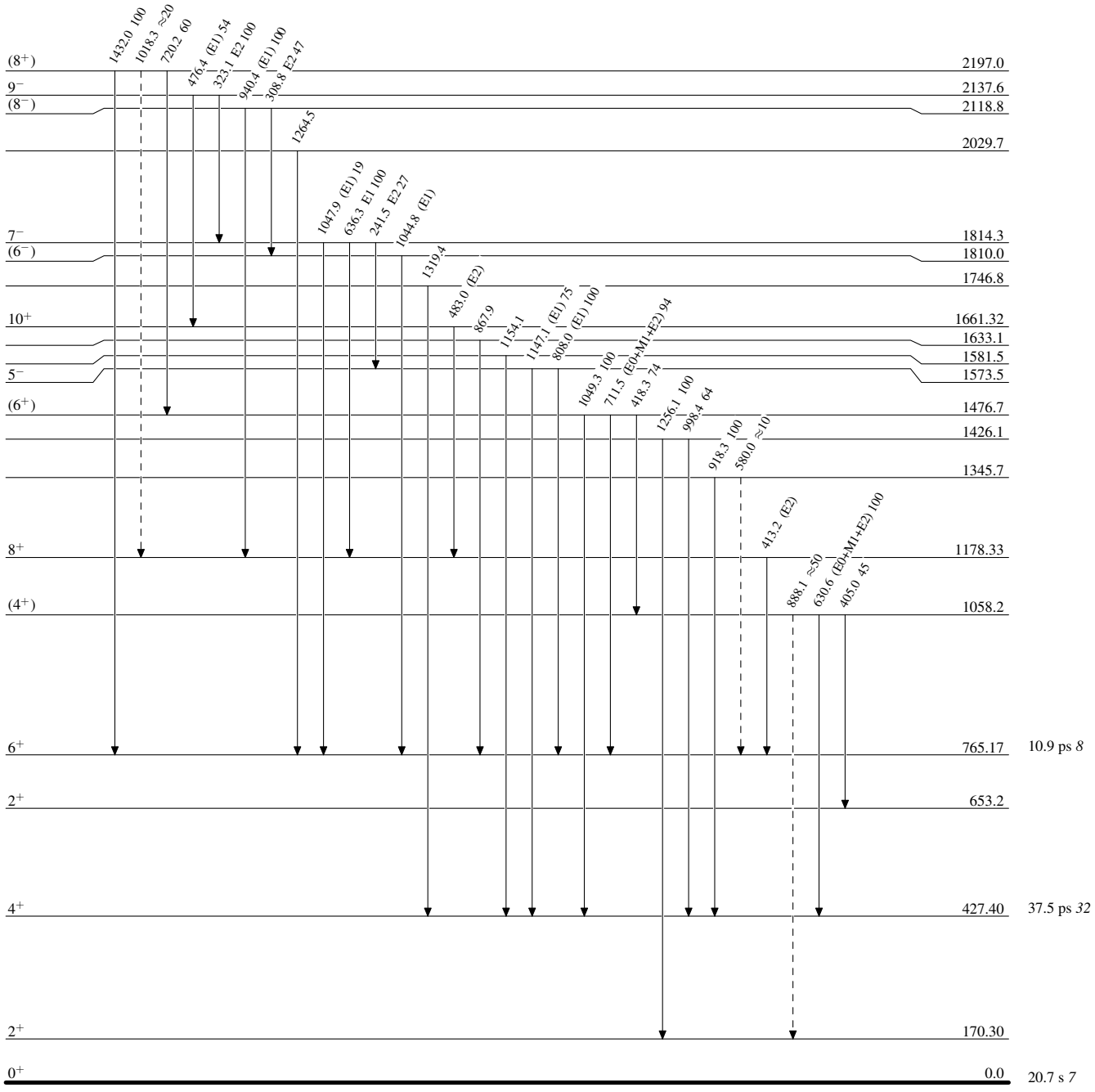
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

- - - - - - ► γ Decay (Uncertain)



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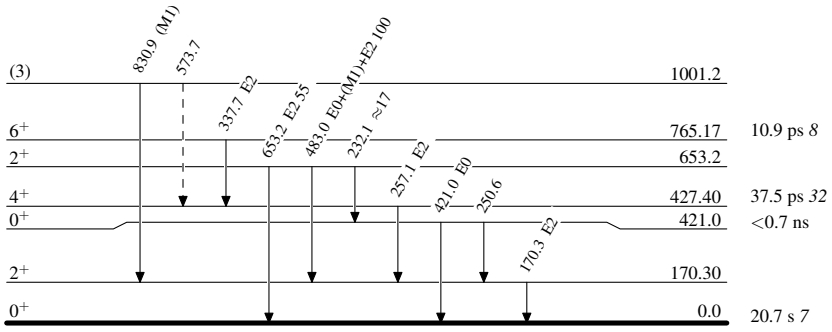
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

– – – – – – ► γ Decay (Uncertain)



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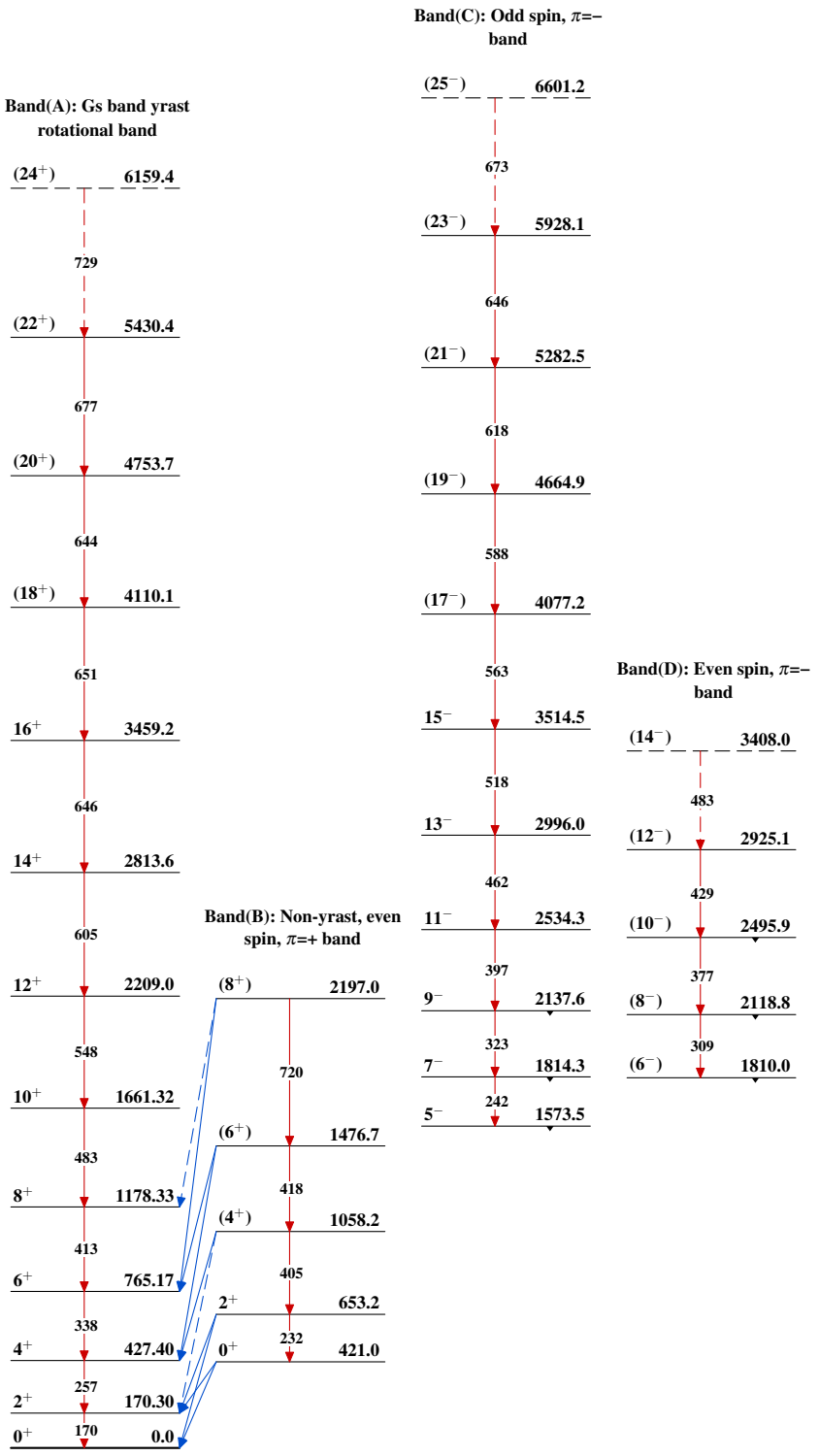
Adopted Levels, Gammas



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