Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 185, 2 (2022)	23-Aug-2022

Q(β^-)=−6048 *13*; S(n)=7906 *12*; S(p)=4446 *15*; Q(α)=2808 *22* 2021Wa16
Q(ε)=3795 *9*, Q(εp)=1286 *9*, S(2n)=19641 *13*, S(2p)=6915 *9* (2021Wa16).
Other measurements:
Mass measurement (Penning-trap method): 2000Be42 (also 2001Bo59, 1997Be63).
Half-life of fully-ionized atom in its isomeric state at 2661 keV has been measured by separating the nuclei produced in fragmentation of ^{209}Bi projectile and storing these nuclides in the cooler ring (ESR) at GSI. Measured $T_{1/2}$=11 s *1* as compared to 0.490 s *15* for the neutral atom (2003Li42). In the same experiment decay of the bare atom in its g.s. was detected but half-life could not be measured.
Additional information 1.
Theoretical studies: consult the NSR database at www.nndc.bnl.gov/nsr/ for 14 references for structure and one for radioactive decay listed under 'document records' which can be accessed through web retrieval of the ENSDF database at www.nndc.bnl.gov/ensdf/.
High-spin part of the level scheme is based on results from 1996Gu17 in ^{122}Sn(^{32}S,5nγ) and 2002Go06 in ^{141}Pr(^{16}O,p7nγ).
Configuration assignments to low-spin levels from 1994Me13 in ^{149}Ho ε decay.

^{149}Dy Levels

Possible SD structure exists in ^{149}Dy, as deduced by 2000Ap01 from a weak continuum, with a total SD intensity of 1.8% *5*, in a ridge in the $\gamma\gamma$-coin matrix in ^{120}Sn(^{34}S,5nγ) reaction. However, no discrete SD band structure has yet been found in this experiment; with an upper limit of population of 0.9% relative to the intensity of the relevant reaction channel.

Cross Reference (XREF) Flags

A	^{149}Ho ε decay (21.0 s)	F	^{122}Sn(^{32}S,5nγ)
B	^{149}Ho ε decay (56 s)	G	^{136}Ce(^{16}O,3nγ)
C	^{149}Dy IT decay (0.490 s)	H	^{141}Pr(^{16}O,p7nγ)
D	^{153}Er α decay (37.1 s)	I	^{152}Gd(α,7nγ)
E	^{120}Sn(^{32}S,3nγ)		

E(level)†	J$^\pi$#	$T_{1/2}$	XREF	Comments
0.0	7/2$^-$	4.2 min *2*	ABCDEFGHI	%ε+%β^+=100 μ=−0.119 *7* (1989Ra17,2019StZV) Q=−0.62 *5* (1989Ra17,2021StZZ) Evaluated rms charge radius=5.06 fm *24* (2013An02). Evaluated difference in charge radius: δ<r^2>(^{148}Dy,^{149}Dy)=+0.119 fm^2 *13* (2013An02). J$^\pi$: f$_{7/2}$ neutron state (1994Me13); allowed ε feeding to 5/2$^-$ levels (1728, 1876) levels and 9/2$^-$ level (1841) in ^{149}Tb. $T_{1/2}$: weighted average of 4.2 min *2* (1993Al03), 4.1 min *2* (1975To03), 4.6 min *4* (x ray(t)) and 5.1 min *9* (α(t)) (1973Bi06). Other: 8 min *2* (1958To27,1959To27). $T_{1/2}$: decay of fully-ionized atoms (where %β^+=100) was detected by 2003Li42; but half-life could not be measured since it is too long compared to the storage times possible in their experiment. With %ε=0, predicted $T_{1/2}$ of bare atom is 40 min *5* (2003Li42). μ,Q: 1989Ra17 compilations quotes μ and Q from Neugart et al. (priv. comm. 1987) who used collinear laser-spectroscopic technique. The same values are quoted by 2019StZV and 2021StZZ.
1034.60 *20*	(3/2$^-$)		B	J$^\pi$: probable p$_{3/2}$ neutron state (1994Me13).

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Adopted Levels, Gammas (continued)

^{149}Dy Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$	XREF	Comments
1073.23 *9*	$(13/2)^+$	12.5 ns *15*	A C EFGHI	Jπ: E3 1073.2γ to $7/2^-$; probable member of configuration=$\nu f_{7/2}\otimes(3^-$ in ^{148}Dy) multiplet (1994Me13,1980Da18). This state is also mixed with $i_{13/2}$ neutron state (1980Da18). $T_{1/2}$: from γγ(t) in (^{16}O,3nγ) (1980Da18). Other: 13 ns *3* in (1976St01).
1090.73 *12*	$(9/2^-)$		A	Jπ: probable $h_{9/2}$ neutron state (1994Me13); allowed ε+β^+ transition from $(11/2^-)$ parent.
1406.70 *28*	$(1/2^+)$		B	Jπ: probable member of configuration=$\nu f_{7/2}\otimes(3^-$ in ^{148}Dy) multiplet (1994Me13).
1501.0 *4*	$(3/2^+)$		B	Jπ: probable $d_{3/2}$ neutron hole state (1994Me13).
1572.80 *35*	$(3/2^+)$		B	Jπ: probable member of configuration=$\nu f_{7/2}\otimes(3^-$ in ^{148}Dy) multiplet (1994Me13).
1583.64 *14*	$(11/2^-)$		A F H	Jπ: probable member of configuration=$\nu f_{7/2}\otimes(2^+$ in ^{148}Dy) multiplet (1994Me13); evidence of ε+β^+ feeding from $(11/2^-)$ parent.
1626.3 *5*	$(5/2^+)$		B	Jπ: probable member of configuration=$\nu f_{7/2}\otimes(3^-$ in ^{148}Dy) multiplet (1994Me13).
1663.45 *16*	$(9/2^+)$		A	Jπ: probable member of configuration=$\nu f_{7/2}\otimes(3^-$ in ^{148}Dy) multiplet (1994Me13); evidence of ε+β^+ feeding from $(11/2^-)$ parent.
1703.71 *20*	$(11/2)^+$		A	Jπ: probable member of configuration=$\nu f_{7/2}\otimes(3^-$ in ^{148}Dy) multiplet (1994Me13); 630.3γ M1(+E2) to $(13/2)^+$.
1712.79 *18*	$(9/2^-)$		A	Jπ: probable member of configuration=$\nu f_{7/2}\otimes(2^+$ in ^{148}Dy) multiplet (1994Me13).
1727.5 *6*	(1/2)		B	Jπ: either of 1727.5 and 1775.6 levels could be $p_{1/2}$ or $s_{1/2}$ neutron hole state (1994Me13).
1775.6 *5*	(1/2)		B	Jπ: see comment for 1727.5 level.
1782.21? *30*	$(7/2^+)$		A	Jπ: probable member of configuration=$\nu f_{7/2}\otimes(3^-$ in ^{148}Dy) multiplet (1994Me13).
2165.82 *28*	$(9/2,11/2,13/2)^+$		A	Jπ: M1(+E2) 462.1γ to $(11/2)^+$.
2251.84 *13*	$(17/2)^+$		C EFGHI	Jπ: E2 1178.6γ to $(13/2)^+$. Configuration=$\pi h_{11/2}\otimes\pi s_{1/2}\otimes\nu f_{7/2}$ (1983JuZY) or configuration=$\nu f_{7/2}\otimes(5^-$ in ^{148}Dy) (1980Da18).
2291.74 *22*	$(11/2^-,13/2^-)$[@]		A	Jπ: 1218.5γ to $(13/2)^+$.
2312.22 *30*	$(9/2^-,11/2^-)$[@]		A	Jπ: 2312.2γ to $7/2^-$.
2321.19 *24*	$(9/2^-,11/2^-)$[@]		A	Jπ: 2321.2γ to $7/2^-$.
2358.0 *6*	$(9/2^-,11/2^-)$[@]		A	Jπ: 694.5γ to $(9/2^+)$.
2402.44 *31*	$(11/2^-,13/2^-)$[@]		A	Jπ: 1329.2γ to $(13/2)^+$.
2409.18 *22*	$(9/2^-,11/2^-)$[@]		A	Jπ: 2409.1γ to $7/2^-$.
2466.23 *29*	$(9/2^-,11/2^-)$[@]		A	Jπ: 2467.4γ to $7/2^-$; evidence of ε+β^+ feeding from $(11/2^-)$ parent.
2487.23 *19*	$(9/2^-,11/2^-)$[@]		A	Jπ: 2487.2γ to $7/2^-$.
2550.44 *17*	$(21/2)^+$		C EFGHI	Jπ: E2 298.6γ to $(17/2)^+$. Configuration=$\pi h_{11/2}\otimes\pi d_{3/2}\otimes\nu f_{7/2}$ (1983JuZY) or configuration=$\nu f_{7/2}\otimes(7^-$ in ^{148}Dy) (1980Da18).
2607.08 *26*	$(11/2^-)$[@]		A	Jπ: 1534.0γ to $(13/2)^+$, 2607.0γ to $7/2^-$.
2660.94 *34*	$(27/2)^-$	0.490 s *15*	C EFGHI	%IT=99.3 *3*; %ε+%β^+=0.7 *3* Jπ: E3 110.5γ to $(21/2)^+$. $T_{1/2}$: from γγ(t) and γ(t) in ^{149}Dy IT decay. For fully-ionized $^{149}Dy^{66+}$, $T_{1/2}$=11 s *1* (2003Li42). %IT from %ε+%β^+=0.7 *3* in 1988Ba02.

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Adopted Levels, Gammas (continued)

^{149}Dy Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$	XREF	Comments
				Configuration=$\pi h^2_{11/2}\otimes\nu f_{7/2}$ (1983JuZY) or configuration=$\pi h^2_{11/2}\otimes$(10$^+$ in ^{148}Dy) (1980Da18). For fully-ionized atom, %ε=0 (2003Li42).
2718.5? *4*	(9/2$^-$,11/2$^-$)[@]		A	Jπ: 2718.5γ to 7/2$^-$.
2728.64 *32*	(9/2$^-$,11/2$^-$,13/2$^-$)[@]		A	Jπ: 1637.9γ to (9/2$^-$).
2771.0 *6*	(1/2$^+$,3/2$^+$)		B	Jπ: probable member of configuration=$\pi h_{11/2}\otimes\nu h_{9/2}\otimes\pi s_{1/2}$ multiplet (1994Me13); possible allowed β feeding from (1/2$^+$) parent.
2788.6 *5*	(1/2$^+$,3/2$^+$)		B	Jπ: probable member of configuration=$\pi h_{11/2}\otimes\nu h_{9/2}\otimes\pi s_{1/2}$ multiplet (1994Me13); possible allowed β feeding from (1/2$^+$) parent.
2789.17 *22*	(9/2$^-$,11/2$^-$)[@]		A	Jπ: 1125.7γ to (9/2$^+$), 1698.5γ to (9/2$^-$); evidence of $\varepsilon+\beta^+$ feeding from (11/2$^-$) parent.
2827.32 *19*	(11/2$^-$)		A	Jπ: 1753.4γ to (13/2)$^+$, 2827.4γ to 7/2$^-$; allowed $\varepsilon+\beta^+$ transition from (11/2$^-$) parent; probable member of configuration=$\pi h^2_{11/2}\otimes\nu h_{9/2}$ multiplet (1994Me13).
2882.79 *23*	(11/2$^-$,13/2$^-$)[@]		A	Jπ: 1809.7γ to (13/2)$^+$.
2938.1 *6*	(1/2$^+$,3/2$^+$)		B	Jπ: probable member of configuration=$\pi h_{11/2}\otimes\nu h_{9/2}\otimes\pi s_{1/2}$ multiplet (1994Me13).
2980.40 *25*	(9/2$^-$,11/2$^-$)[@]		A	Jπ: 2980.3γ to 7/2$^-$.
3014.2? *4*	(9/2$^-$,11/2$^-$)[@]		A	Jπ: 3014.2γ to 7/2$^-$.
3049.5 *4*	(9/2$^-$,11/2$^-$,13/2$^-$)[@]		A	Jπ: 1958.8γ to (9/2$^-$).
3079.14 *14*	(11/2$^-$)		A	Jπ: 3079.1γ to 7/2$^-$, 2006.0γ to (13/2)$^+$; allowed $\varepsilon+\beta^+$ transition from (11/2$^-$) parent; probable member of configuration=$\pi h^2_{11/2}\otimes\nu h_{9/2}$ multiplet (1994Me13).
3129.54 *20*	(11/2$^-$)[@]		A	Jπ: 3129.5γ to 7/2$^-$, 2056.2γ to (13/2)$^+$.
3180.04 *23*	(9/2$^-$,11/2$^-$,13/2$^-$)[@]		A	Jπ: 2089.3γ to (9/2$^-$).
3202.54 *29*	(9/2$^-$,11/2$^-$)[@]		A	Jπ: 3202.5γ to 7/2$^-$.
3312.55 *30*	(9/2$^-$,11/2$^-$,13/2$^-$)[@]		A	Jπ: 2221.4γ to (9/2$^-$); 1729.0γ to (11/2$^-$).
3348.65 *32*	(9/2$^-$,11/2$^-$,13/2$^-$)[@]		A	Jπ: 2257.9γ to (9/2$^-$).
3362.8 *4*	(9/2$^-$,11/2$^-$)[@]		A	Jπ: 3362.8γ to 7/2$^-$.
3490.41 *25*	(9/2$^-$,11/2$^-$)[@]		A	Jπ: 3490.3γ to 7/2$^-$.
3645.1 *4*	(29/2)$^+$		EFGHI	Jπ: ΔJ=1, E1 984.2γ to (27/2)$^-$. Configuration=$\pi h^2_{11/2}\otimes\nu f_{7/2}\otimes$(3$^-$ in ^{148}Dy) (1983JuZY,1980Da18).
3885.1 *5*	(31/2$^+$)		EFGHI	Jπ: ΔJ=1, (M1) 240.0γ to (29/2)$^+$.
4084.4 *6*	(33/2$^+$)		EFGHI	Jπ: ΔJ=1, (M1) γ to (31/2$^+$).
5222.3[‡] *6*	(35/2$^+$)		EFGHI	Jπ: ΔJ=(2) 1336.9γ to (31/2$^+$).
5477.5[‡] *6*	(37/2$^+$)		EFGHI	Jπ: E2, ΔJ=2 1393.2γ to (33/2$^+$), (M1) γ to (35/2$^+$).
5747.5[‡] *6*	(39/2$^+$)		EFGHI	Jπ: (M1) 270.0γ to (37/2$^+$).
5929.2? *7*			G I	
6177.6[‡] *6*	(41/2$^+$)		EFGHI	Jπ: (M1) γ to (39/2$^+$); ΔJ=2 γ to (37/2$^+$).
6328.3 *8*			F H	
6677.8 *7*			F H	
6891.1 *7*			F H	
6918.7 *7*	(41/2$^+$)		EFGHI	Jπ: from $\gamma\gamma(\theta)$(DCO) in (^{32}S,5nγ).
7156.5 *7*	(41/2$^+$)		F H	Jπ: from $\gamma\gamma(\theta)$(DCO) in (^{32}S,5nγ).
7241.4 *7*			FGHI	
7409.6 *6*	(43/2$^+$)		EFGHI	Jπ: from $\gamma\gamma(\theta)$(DCO) in (^{32}S,5nγ).
8044.6? *11*			H	
8270.6? *11*			H	
8519.6 *12*	(49/2$^+$)	28 ns *2*	EF HI	μ=+10.0 *15* (2003Wa28,2020StZV) Jπ: from systematics of N=83 isotones, see figure 4 of 2002Go06 in

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Adopted Levels, Gammas (continued)

^{149}Dy Levels (continued)

E(level)[†]	J^{π}[#]	XREF	Comments
			^{141}Pr(^{16}O,p7nγ). The location of this isomer proposed by 2002Go06 is still tentative due to tentative connections of the 28-ns isomer with the low-lying levels. $T_{1/2}$: $\gamma\gamma$(t); weighted average of 29 ns *3* (1979Ha29), 36 ns *8* (1980Da18), 25 ns *5* (1980Ja16) and 28 ns *3* (1981Ha17). Other: 50 ns *15* (1976St01). See ^{152}Gd(α,7nγ) dataset. μ: from TDPAD (2003Wa28) using pulsed ^{132}Xe beam. Configuration=$\pi h^2_{11/2} \otimes \nu(f_{7/2},h_{9/2},i_{13/2},d^{-2}_{3/2\ 0})$ gives calculated g=0.46 (2002Go06).
9115.0 *13*	(51/2)[&]	F H	
9409.3 *14*	(53/2)[&]	F H	
9782.4 *14*	(53/2)[&]	F H	
10238.7 *14*	(55/2)[&]	F H	
11200.8 *15*		H	
11905.0 *15*		F H	
11951.2 *15*	(57/2)[&]	F H	
12209.4 *15*		F H	
12555.3 *15*	(57/2)[&]	F H	
12753.1 *15*	(59/2)[&]	F H	
12812.4 *16*		F H	
13088.2 *16*	(61/2)[&]	F H	
13115.3 *16*		F H	
13727.8 *17*		H	
13949.3 *17*		H	

[†] From a least-squares fit to γ-ray energies, assuming $\Delta E\gamma$=0.3 keV for Eγ values quoted to tenth of a keV and 1 keV otherwise where not given. Absolute energies of levels above 7410.5 remain uncertain due to tentative connections of the 28-ns isomer with the low-lying levels.

[‡] Member of configuration=$\pi h^3_{11/2} \otimes \pi d^{-1}_{5/2} \otimes \nu f_{7/2}$ by 1983JuZY in (α,7nγ) and (^{16}O,3nγ). The $d_{5/2}$ proton orbital could be $g_{7/2}$ also (1983JuZY).

[#] From shell-Model predictions and systematics (1994Me13) for levels with J≤13/2, unless otherwise noted.

[@] Probable member of configuration=$\pi h^2_{11/2} \otimes \nu h_{9/2}$ multiplet (1994Me13). Possible β feeding from (11/2$^-$) parent suggests (9/2,11/2,13/2).

[&] Tentative assignments based on $\gamma\gamma(\theta)$(DCO) data in ^{122}Sn(^{32}S,5nγ) (1996Gu17); spins proposed by 1996Gu17 have been adjusted upwards by two units due to revised J^{π} for the 28-ns isomer.

Adopted Levels, Gammas (continued)

γ(^{149}Dy)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.	δ	α[&]	Comments
1034.60	(3/2$^-$)	1034.6 *2*	100	0.0	7/2$^-$				
1073.23	(13/2)$^+$	1073.2 *1*	100	0.0	7/2$^-$	E3[#]		0.00557 *8*	B(E3)(W.u.)=45 *+6−5* E_γ: weighted average of 1073.1 *2* from ^{149}Ho ε decay (21.1 s), 1073.2 *1* from ^{149}Dy IT decay (0.490 s), 1073.2 *3* from (^{32}S,3nγ), and 1073.2 *2* from (α,7nγ).
1090.73	(9/2$^-$)	1090.4 *3*	100	0.0	7/2$^-$				
1406.70	(1/2$^+$)	372.1 *2*	100	1034.60	(3/2$^-$)	E1[#]		0.01017 *14*	
1501.0	(3/2$^+$)	94.3 *3*	100	1406.70	(1/2$^+$)	M1(+E2)[#]	<0.7[‡]	2.92 *10*	
1572.80	(3/2$^+$)	166.1 *2*	100	1406.70	(1/2$^+$)	M1(+E2)[#]	<1.5[‡]	0.52 *4*	
1583.64	(11/2$^-$)	511 *2*	12 *4*	1073.23	(13/2)$^+$				
		1583.7 *2*	100 *2*	0.0	7/2$^-$				
1626.3	(5/2$^+$)	591.7 *5*	100	1034.60	(3/2$^-$)	(E1)[‡]		0.00356 *5*	
1663.45	(9/2$^+$)	590.1 *5*	13 *4*	1073.23	(13/2)$^+$				
		1663.4 *2*	100 *2*	0.0	7/2$^-$				
1703.71	(11/2)$^+$	613.0 *2*	18 *4*	1090.73	(9/2$^-$)				
		630.3 *5*	100 *15*	1073.23	(13/2)$^+$	M1(+E2)[‡]	<2.5[‡]	0.0131 *35*	
1712.79	(9/2$^-$)	1712.9 *2*	100	0.0	7/2$^-$				
1727.5	(1/2)	692.9 *6*	100	1034.60	(3/2$^-$)				
1775.6	(1/2)	741.0 *5*	100	1034.60	(3/2$^-$)				
1782.21?	(7/2$^+$)	1782.2[a] *3*	100	0.0	7/2$^-$				
2165.82	(9/2,11/2,13/2)$^+$	462.1 *3*	100 *26*	1703.71	(11/2)$^+$	M1(+E2)[‡]	<1.0[‡]	0.032 *4*	
		1092.6 *4*	87 *44*	1073.23	(13/2)$^+$				
2251.84	(17/2)$^+$	1178.6 *1*	100	1073.23	(13/2)$^+$	E2[#]		2.18×10^{-3} *3*	E_γ: from (α,7nγ). Other: 1178.6 *3* from (^{32}S,3nγ).
2291.74	(11/2$^-$,13/2$^-$)	1218.5 *2*	100	1073.23	(13/2)$^+$				
2312.22	(9/2$^-$,11/2$^-$)	2312.2 *3*	100	0.0	7/2$^-$				
2321.19	(9/2$^-$,11/2$^-$)	1230.4 *4*	27 *11*	1090.73	(9/2$^-$)				
		2321.2 *3*	100 *11*	0.0	7/2$^-$				
2358.0	(9/2$^-$,11/2$^-$)	694.5 *6*	100	1663.45	(9/2$^+$)				
2402.44	(11/2$^-$,13/2$^-$)	1329.2 *3*	100	1073.23	(13/2)$^+$				
2409.18	(9/2$^-$,11/2$^-$)	1318.5 *3*	100 *4*	1090.73	(9/2$^-$)				
		2409.1 *3*	30 *6*	0.0	7/2$^-$				
2466.23	(9/2$^-$,11/2$^-$)	1375.2 *3*	100 *6*	1090.73	(9/2$^-$)				
		2467.4[a] *6*	15 *6*	0.0	7/2$^-$				
2487.23	(9/2$^-$,11/2$^-$)	1396.5 *2*	70 *8*	1090.73	(9/2$^-$)				
		2487.2 *3*	100 *7*	0.0	7/2$^-$				
2550.44	(21/2)$^+$	298.6 *1*	100	2251.84	(17/2)$^+$	E2[#]		0.0654 *9*	E_γ: from (α,7nγ).
2607.08	(11/2$^-$)	1534.0 *5*	28 *10*	1073.23	(13/2)$^+$				
		2607.0 *3*	100 *10*	0.0	7/2$^-$				

$^{149}_{66}Dy_{83}$-5

Adopted Levels, Gammas (continued)

γ(^{149}Dy) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.	α[&]	Comments
2660.94	$(27/2)^-$	110.5 *3*	100	2550.44	$(21/2)^+$	E3[#]	27.6 *6*	B(E3)(W.u.)=0.325 *14* E_γ: weighted average of 110.4 *3* from (^{32}S,3nγ) and 110.8 *4* from (α,7nγ).
2718.5?	$(9/2^-,11/2^-)$	2718.5[a] *4*	100	0.0	$7/2^-$			
2728.64	$(9/2^-,11/2^-,13/2^-)$	1637.9 *3*	100	1090.73	$(9/2^-)$			
2771.0	$(1/2^+,3/2^+)$	1736.4 *6*	100	1034.60	$(3/2^-)$			
2788.6	$(1/2^+,3/2^+)$	1754.0 *5*	100	1034.60	$(3/2^-)$			
2789.17	$(9/2^-,11/2^-)$	1125.7 *2*	100 *5*	1663.45	$(9/2^+)$			
		1698.5 *4*	75 *7*	1090.73	$(9/2^-)$			
2827.32	$(11/2^-)$	1114.8 *3*	8.4 *13*	1712.79	$(9/2^-)$			
		1736.6 *5*	100 *21*	1090.73	$(9/2^-)$			
		1753.4 *4*	16 *4*	1073.23	$(13/2)^+$			
		2827.4 *3*	58 *2*	0.0	$7/2^-$			
2882.79	$(11/2^-,13/2^-)$	1791.9 *3*	58 *6*	1090.73	$(9/2^-)$			
		1809.7 *3*	100 *14*	1073.23	$(13/2)^+$			
2938.1	$(1/2^+,3/2^+)$	1531.4 *5*	100	1406.70	$(1/2^+)$			
2980.40	$(9/2^-,11/2^-)$	1889.7 *3*	75 *13*	1090.73	$(9/2^-)$			
		2980.3 *4*	100 *18*	0.0	$7/2^-$			
3014.2?	$(9/2^-,11/2^-)$	3014.2[a] *4*	100	0.0	$7/2^-$			
3049.5	$(9/2^-,11/2^-,13/2^-)$	1958.8 *4*	100	1090.73	$(9/2^-)$			
3079.14	$(11/2^-)$	1415.6 *3*	27 *3*	1663.45	$(9/2^+)$			
		1495.5 *2*	84 *2*	1583.64	$(11/2^-)$			
		1988.4 *2*	100 *4*	1090.73	$(9/2^-)$			
		2006.0 *5*	12 *5*	1073.23	$(13/2)^+$			
		3079.1 *3*	32 *3*	0.0	$7/2^-$			
3129.54	$(11/2^-)$	1545.9 *2*	100 *8*	1583.64	$(11/2^-)$			
		2056.2 *5*	21 *12*	1073.23	$(13/2)^+$			
		3129.5 *4*	28 *6*	0.0	$7/2^-$			
3180.04	$(9/2^-,11/2^-,13/2^-)$	2089.3 *2*	100	1090.73	$(9/2^-)$			
3202.54	$(9/2^-,11/2^-)$	2111.8 *3*	100 *19*	1090.73	$(9/2^-)$			
		3202.5 *6*	58 *23*	0.0	$7/2^-$			
3312.55	$(9/2^-,11/2^-,13/2^-)$	1729.0 *3*	100 *10*	1583.64	$(11/2^-)$			
		2221.4 *6*	98 *39*	1090.73	$(9/2^-)$			
3348.65	$(9/2^-,11/2^-,13/2^-)$	2257.9 *3*	100	1090.73	$(9/2^-)$			
3362.8	$(9/2^-,11/2^-)$	3362.8 *4*	100	0.0	$7/2^-$			
3490.41	$(9/2^-,11/2^-)$	2399.7 *3*	100 *18*	1090.73	$(9/2^-)$			
		3490.3 *4*	79 *15*	0.0	$7/2^-$			
3645.1	$(29/2)^+$	984.2 *2*	100	2660.94	$(27/2)^-$	E1[#@]	1.29×10^{-3} *2*	E_γ: weighted average of 984.0 *3* from (^{32}S,3nγ) and 984.3 *2* from (α,7nγ).
3885.1	$(31/2^+)$	240.0 *3*		3645.1	$(29/2)^+$	(M1)[#]	0.2060 *30*	E_γ: from (α,7nγ) and (^{32}S,3nγ). Mult.: also supported by γ(θ) in (α,7nγ) and γγ(θ)(DCO) in (^{32}S,5nγ) with ΔJ=1.

Adopted Levels, Gammas (continued)

γ(^{149}Dy) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.	α[&]	Comments
4084.4	(33/2$^+$)	199.5 *3*	100	3885.1	(31/2$^+$)	(M1)[#@]	0.342 *5*	E_γ: weighted average of 199.6 *3* from (^{32}S,3nγ) and 199.4 *3* from (α,7nγ).
5222.3	(35/2$^+$)	1138.2	33 *5*	4084.4	(33/2$^+$)			
		1336.9 *3*	100 *7*	3885.1	(31/2$^+$)	(Q)		E_γ: weighted average of 1336.8 *3* from (^{32}S,3nγ) and 1337.2 *4* from (α,7nγ). Mult.: from γ(θ) in (α,7nγ), with ΔJ=(2).
5477.5	(37/2$^+$)	255.2 *2*	51 *5*	5222.3	(35/2$^+$)	(M1)[#]	0.1744 *25*	E_γ: weighted average of 255.7 *3* from (^{32}S,3nγ) and 255.0 *2* from (α,7nγ). I_γ: others: 107 *30* from (^{16}O,3nγ), ≈33 from (α,7nγ).
		1393.2 *3*	100 *7*	4084.4	(33/2$^+$)	E2	1.61×10^{-3} *2*	E_γ: weighted average of 1393.0 *3* from (^{32}S,3nγ) and 1393.7 *5* from (α,7nγ). I_γ: others: 100 *10* from (^{16}O,3nγ), 100 *22* from (α,7nγ).
5747.5	(39/2$^+$)	270.0 *2*	100 *7*	5477.5	(37/2$^+$)	(M1)[#]	0.1498 *21*	E_γ: weighted average of 270.1 *3* from (^{32}S,3nγ) and 270.0 *2* from (α,7nγ).
		525.4	28.9 *22*	5222.3	(35/2$^+$)			
5929.2?		451.7	100	5477.5	(37/2$^+$)			E_γ: from (α,7nγ).
6177.6	(41/2$^+$)	248.4[a]		5929.2?				E_γ: from (α,7nγ).
		430.3 *2*	100 *7*	5747.5	(39/2$^+$)	(M1)[#]	0.0437 *6*	E_γ: weighted average of 430.2 *3* from (^{32}S,3nγ) and 430.3 *2* from (α,7nγ).
		699.8 *3*	23 *5*	5477.5	(37/2$^+$)			E_γ: from (^{32}S,3nγ).
6328.3		580.8	100	5747.5	(39/2$^+$)			
6677.8		930.5	100	5747.5	(39/2$^+$)			
6891.1		213.0		6677.8				
		1143.5		5747.5	(39/2$^+$)			E_γ: placement from 2002Go06 in (^{16}O,p7nγ); a 1143.6γ placed to feed the 13116 level by 1996Gu17 in (^{32}S,5nγ).
6918.7	(41/2$^+$)	741.1 *3*	100	6177.6	(41/2$^+$)			E_γ: from (^{32}S,3nγ).
7156.5	(41/2$^+$)	479.2	100 *25*	6677.8				
		1408.9	18 *5*	5747.5	(39/2$^+$)			
7241.4		350.0	32 *7*	6891.1				
		1064.1	100 *17*	6177.6	(41/2$^+$)			
7409.6	(43/2$^+$)	168.1	10.3 *9*	7241.4				
		253.3	15 *3*	7156.5	(41/2$^+$)			
		491.1	100 *6*	6918.7	(41/2$^+$)			
		1231.8 *3*	55 *6*	6177.6	(41/2$^+$)	(D,E2)		E_γ: from (^{32}S,3nγ). Mult.: from α(exp) in (α,7nγ) (1983JuZY).
8044.6?		635[a]		7409.6	(43/2$^+$)			
8270.6?		861[a]		7409.6	(43/2$^+$)			
8519.6	(49/2$^+$)	249[a]		8270.6?				
		475[a]		8044.6?				249γ and 475γ from ^{141}Pr(^{16}O,p7nγ) only.
9115.0	(51/2)	595.4	100	8519.6	(49/2$^+$)			
9409.3	(53/2)	294.2	100	9115.0	(51/2)			
9782.4	(53/2)	667.5	100	9115.0	(51/2)			

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Adopted Levels, Gammas (continued)

γ(^{149}Dy) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π
10238.7	(55/2)	456.5	100 *13*	9782.4	(53/2)	12753.1	(59/2)	848.2	100 *20*	11905.0	
		829.3	63 *13*	9409.3	(53/2)	12812.4		603.1		12209.4	
11200.8		962.1		10238.7	(55/2)			861.0		11951.2	(57/2)
11905.0		704.2	100	11200.8		13088.2	(61/2)	335.1	100	12753.1	(59/2)
11951.2	(57/2)	750.4	100	11200.8		13115.3		303.1	100	12812.4	
12209.4		1008.6	100	11200.8		13727.8		613		13115.3	
12555.3	(57/2)	1354.3		11200.8				915		12812.4	
12753.1	(59/2)	197.7	70 *8*	12555.3	(57/2)	13949.3		834		13115.3	
		543.7	80 *20*	12209.4				1137		12812.4	
		802.0		11951.2	(57/2)						

† From ^{149}Ho ε decay (1994Me13) up to the 3490 level and from (^{32}S,5nγ) (1996Gu17) and/or (^{16}O,p7nγ) (2002Go06) above this energy. Exceptions are high-spin levels of 2251.8, 2550.4 and 2660.9 keV, which decay by single γ rays, and for which source dataset of Eγ values are specified in comments.

‡ From ce data in ^{149}Ho ε decay (1994Me13).

From ce data in (^{16}O,3nγ) (1980Da18).

@ Also supported by γ(θ) in (α,7nγ) and γγ(θ)(DCO) in (^{32}S,5nγ), with ΔJ=1 for dipole or ΔJ=2 for quadrupole where applicable.

& 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.

a Placement of transition in the level scheme is uncertain.

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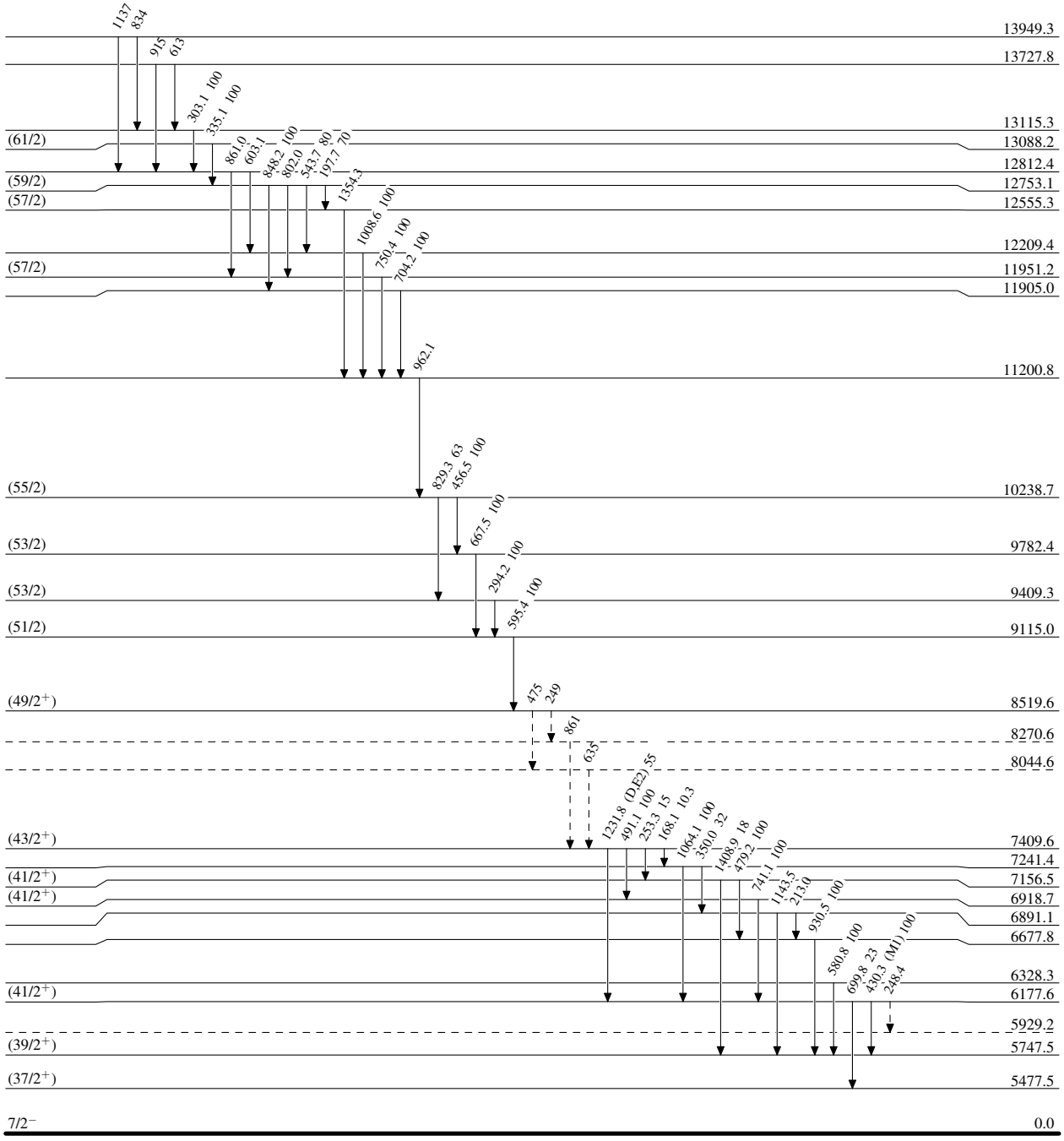
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{149}_{66}Dy_{83}$

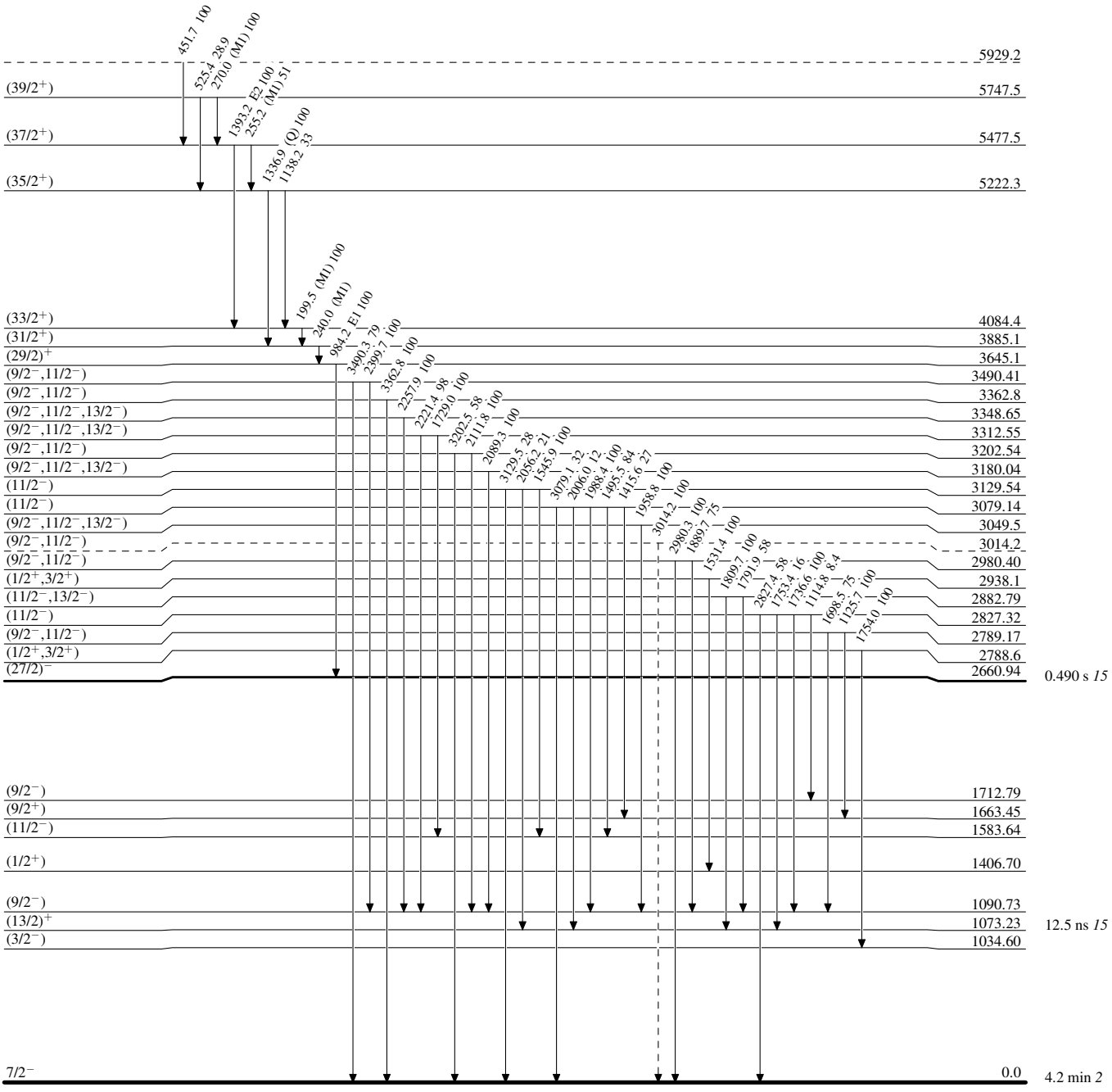
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{149}_{66}Dy_{83}$

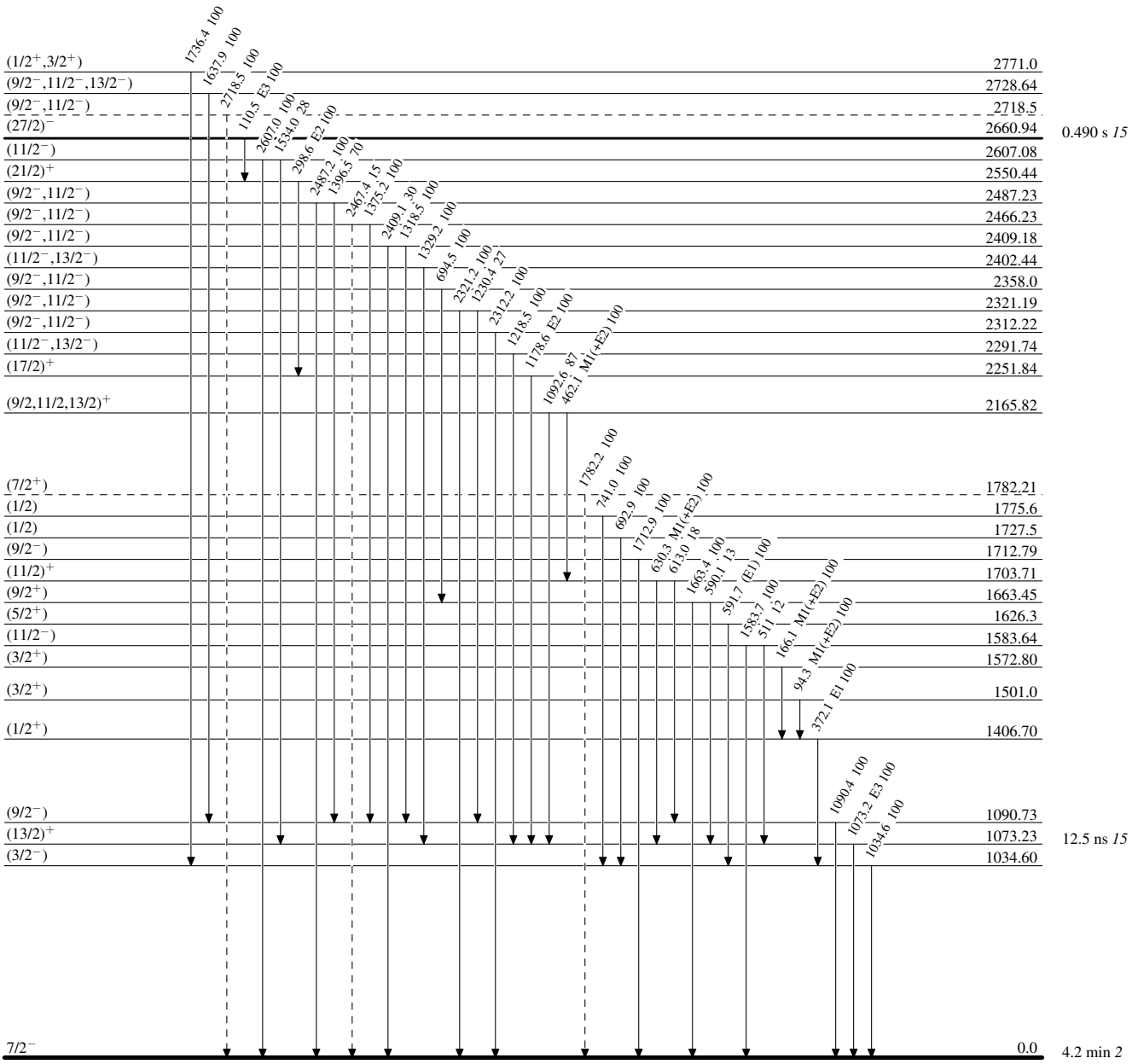
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{149}_{66}Dy_{83}$