Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich, Balraj Singh	NDS 111,1211 (2010)	12-Apr-2010

Q(β^-)=−1211 *5*; S(n)=8408 *4*; S(p)=5486.11 *5*; Q(α)=729.4 *13* 2012Wa38
Note: Current evaluation has used the following Q record $ −1210 5 8408 3 5486.11 5 730.2 13 2009AuZZ,2003Au03.
Additional information 1.
Other reactions:
1978HuZP: ^{27}Al(^{136}Xe,x) E=700 MeV. Measured <$T_{1/2}$> of the γ-ray continuum and deduced Q_0, B(E2)(W.u.), and β_2.
1984Ut01: ^{159}Tb(^{7}Li,t) E=77 MeV. Studied ^{7}Li breakup. Serber model.
1980Wi10: ^{159}Tb(^{14}N,^{10}B) E=140 MeV. Measured particle-γ coin and σ.
1996De17: ^{162}Dy(^{58}Ni,^{57}Co) E=240-273 MeV. Measured transfer probability.
1976Go21, 1969Ke05, 1969Be59: ^{165}Ho(γ,2n) E≤30 MeV. Measured σ in a study of giant resonances. 1984Wo04 analyzed the role of neutron multiplicity sorting on the results.
Structure calculations: 1992Bo45, 1977Sc22, 1973Wi02, 1972So12, 1972Ke09.

^{163}Ho Levels

Bands: see 1976Sc19 and 1972Fu09 for values of the parameters derived using least-squares adjustment procedures and including Coriolis and pairing effects.

Cross Reference (XREF) Flags

A	^{163}Dy[+66] β^- decay (48 d)	E	^{162}Dy(p,p) IAR	I	^{164}Er(pol t,α)
B	^{163}Ho IT decay (1.09 s)	F	^{162}Dy(^{3}He,d)	J	^{165}Ho(p,t)
C	^{163}Er ε decay (75.0 min)	G	^{162}Dy(α,t)		
D	^{160}Gd(^{11}B,α4nγ)	H	^{163}Dy(d,2nγ),(p,nγ)		

E(level)	J^π[†]	$T_{1/2}$[‡]	XREF	Comments
0.0[&]	7/2$^-$	4570 y *25*	ABCD FGHIJ	%ε=100 μ=4.22 *4* (1989Al27,2005St24) Q=3.6 *6* (1989Al27,2005St24) $T_{1/2}$: ^{163}Ho^{66+} ion is stable (1997Kl06,1992Ju01). Δ<r^2>(^{163}Ho−^{165}Ho)=−0.117 fm^2 *6* (1989Al27). From an evaluation of nuclear rms charge radii, 2004An14 report <r^2>$^{1/2}$=5.19 fm 3. E(level): population is uncertain in (^{3}He,d). J^π,μ,Q: resonance ionization spectroscopy (1989Al27). Spin also from hyperfine collinear laser spectroscopy (1988NeZZ). Parity: L(p,t)=0 from 7/2$^-$ target. $T_{1/2}$: from 1983Ba32 (uncertainty=50 y at 95% confidence level; isotope-dilution mass spectrometry; four points; 0.35-0.6 y). Others: 4569 y *30* (1988Ka20, isotope-dilution mass spectrometry); 7000 y *200* (1982An19, based on a partial $T_{1/2}$=4.0×10^4 y *12* for M-capture Auger electrons and M x ray) and Q(ε)=2.3 *10* (from ^{163}Dy(d,t), ^{162}Dy(^{3}He,d)); 33 y *23* (1968Ho17); >1000 y (1960Na10).
100.03[@] *6*	9/2$^-$		CD FGHIJ	E(level): population is uncertain in (^{3}He,d). J^π: L=5 and Ay(θ) in (pol t,α).
222.22[&] *7*	11/2$^-$		D FGHIJ	J^π: L=5 and Ay(θ) in (pol t,α).
297.88[a] *7*	1/2$^+$	1.09 s *3*	BCD FGHi	%IT=100 J^π: L(^{3}He,d)=0. $T_{1/2}$: from γ(t) (1967Ge09). Others: 1966Bo02, 1957Ha12.

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Adopted Levels, Gammas (continued)

^{163}Ho Levels (continued)

E(level)	J^{π}[†]	$T_{1/2}$[‡]	XREF	Comments
307.64[a] 8	$3/2^+$		C FGHi	J^{π}: L(^{3}He,d)=2 and Ay(θ) in (pol t,α).
360.36[b] 9	$3/2^+$		C FGHI	J^{π}: L=2 and Ay(θ) in (pol t,α).
366.65[@] 9	$13/2^-$		D H J	J^{π}: ΔJ=(2), E2 γ to $9/2^-$; γ to $11/2^-$.
392.07[a] 10	$5/2^+$		C FGHI	J^{π}: L=2 and Ay(θ) in (pol t,α).
419?			F	
431.18[a] 6	$7/2^+$	0.37 ns 15	CD fgH	J^{π}: ΔJ=(0), E1 γ to $7/2^-$; ΔJ=1 γ to $9/2^-$; ΔJ=(2) γ to $3/2^+$.
439.94[c] 7	$7/2^+$	0.35 ns 15	C fgHi	J^{π}: E1 γ to $7/2^-$; γ to $9/2^-$; L=2+4 and Ay(θ) in (pol t,α) for a 440 doublet.
440.51[b] 8	$5/2^+$		fgHi	J^{π}: L=2+4 and Ay(θ) in (pol t,α).
471.25[d] 10	$(1/2)^-$	≤0.2 ns	FGH	J^{π}: L(^{3}He,d)=1, probable bandhead.
500.38[d] 13	$5/2^-$		CD FGHI	Uncertain in ε decay. J^{π}: L(^{3}He,d)=3 and ΔJ=(1) γ to $3/2^+$.
528.24[b] 9	$7/2^+$		FGHi	J^{π}: L=4 and Ay(θ) in (pol t,α).
531.79[&] 10	$(15/2^-)$		D HiJ	J^{π}: ΔJ=(2), (E2) γ to $11/2^-$; γ to $13/2^-$.
552.05[c] 8	$(9/2^+)$		C FGH	J^{π}: γ's to $7/2^-$ and $9/2^-$; probable band assignment. Uncertain in ε decay.
560[k] 3	$(3/2)^-$		J	J^{π}: L(p,t)=2 from $7/2^-$, probable bandhead.
578.23[d] 13	$(3/2)^-$		FGHI	XREF: I(587). J^{π}: L(^{3}He,d)=1; γ to $1/2^+$.
587.56[a] 7	$(9/2^+)$		FGH	J^{π}: probable band member.
594?			F	
612.80[d] 10	$9/2^-$	≤0.3 ns	D FGHI	J^{π}: L(^{3}He,d)=5; ΔJ=1 γ to $7/2^+$.
614.29[k] 9	$(5/2)^-$		C H J	J^{π}: L(p,t)=2 from $7/2^-$; log ft=8.6 from $5/2^-$; γ to $3/2^+$. Level uncertain in (d,2nγ), (p,nγ).
652.06[a] 8	$(11/2^+)$		D H	J^{π}: ΔJ=(2) γ to $7/2^+$; γ to $9/2^-$.
664.01[b] 9	$(9/2^+)$		H	J^{π}: ΔJ=1 γ to $7/2^+$; ΔJ=(2) γ to $5/2^+$.
688.08[c] 22	$(11/2^+)$		H	J^{π}: ΔJ=1 γ to $9/2^-$, ΔJ=(0) γ to $11/2^-$.
695[k] 3	$(7/2^-)$		J	
710 2	$5/2^+$		FG I	J^{π}: L=2 and Ay(θ) in (pol t,α). configuration=π5/2[402].
719.56[@] 11	$(17/2^-)$		D H J	J^{π}: ΔJ=(2) γ to $13/2^-$, γ to $(15/2^-)$.
746[d] 2	$(7/2)^-$		FG	J^{π}: L(^{3}He,d)=3, band member.
795.44[b] 13	$(11/2^+)$		H J	J^{π}: ΔJ=(2) γ to $7/2^+$, ΔJ=1 γ to $(9/2^+)$.
807[k] 3	$(9/2^-)$		G J	
810.33[d] 10	$(13/2^-)$		D H	J^{π}: ΔJ=1 γ to $(11/2^+)$; γ to $9/2^-$.
844.69[c] 23	$(13/2^+)$		H	J^{π}: ΔJ=1 γ to $11/2^-$; γ to $13/2^-$.
876.00[e] 9	$5/2^+$		C FGHI	Level uncertain in (d,2nγ), (p,nγ). J^{π}: L=2 and Ay(θ) in (pol t,α).
881.92?[a] 13	$(13/2^+)$		H	J^{π}: γ to $(9/2^+)$.
924.43[&] 12	$(19/2^-)$		D H	J^{π}: ΔJ=(2) E2 γ to $(15/2^-)$; γ to $17/2^-$.
926[k] 3	$(11/2^-)$		J	
964.76[a] 11	$(15/2^+)$		D H	J^{π}: ΔJ=(2) γ to $(11/2^+)$; ΔJ=1 γ to $(13/2^-)$.
971[e] 4	$7/2^+$		G I	J^{π}: L=4 and Ay(θ) in (pol t,α).
978.96[b] 13	$(13/2^+)$		H	J^{π}: ΔJ=(2) γ to $(9/2^+)$; γ to $(11/2^+)$.
990 5			FG	J^{π}: L=(4) from σ(^{3}He,d)/σ(α,t) suggests $(7/2^+,9/2^+)$.
1025.6[c] 4	$(15/2^+)$		H	J^{π}: γ to $13/2^-$.
1060 3			G J	
1075[k] 3	$(13/2^-)$		J	
1089[e] 4	$9/2^+$		I	J^{π}: L=4 and Ay(θ) in (pol t,α).

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Adopted Levels, Gammas (continued)

^{163}Ho Levels (continued)

E(level)	J^{π}[†]	$T_{1/2}$[‡]	XREF	Comments
1092.80[d] *14*	(17/2$^-$)		D H	J^{π}: ΔJ=(2) γ to (13/2$^-$).
1113.57[h] *22*	5/2$^-$		C Ij	J^{π}: L=3 and Ay(θ) in (pol t,α).
1114 *2*	(3/2)$^+$		FG j	J^{π}: L(^{3}He,d)=2. Possible K-2 γ-vibration built on π7/2[404], from syst of odd-A Ho.
1154.00[@] *13*	(21/2$^-$)		D H j	J^{π}: γ's to (17/2$^-$) and (19/2$^-$).
1154.65?[b] *22*	(15/2$^+$)		H j	J^{π}: possible γ's to (11/2$^+$) and (13/2$^+$).
1192[h] *3*	7/2$^-$		IJ	J^{π}: L=3 and Ay(θ) in (pol t,α).
1220.1?[c] *3*	(17/2$^+$)		H	J^{π}: possible γ to (15/2$^-$).
1230 *4*			FG IJ	J^{π}: L=(2,3) from σ(^{3}He,d)/σ(α,t) suggests (3/2$^+$,5/2,7/2$^-$).
1259[k] *5*	(15/2$^-$)		J	
1266.3?[a] *4*	(17/2$^+$)		H	J^{π}: possible γ to (13/2$^+$).
1293[h] *4*	9/2$^-$		G IJ	J^{π}: L=5 and Ay(θ) in (pol t,α).
1328 *2*	1/2$^+$		FG	J^{π}: L(^{3}He,d)=0. Possible K-2 γ-vibration built on π5/2[402].
1363.8[a] *4*	(19/2$^+$)		D H	J^{π}: γ to (15/2$^+$).
1372 *5*	7/2$^-$		F J	J^{π}: L(p,t)=0.
1394.2[&] *13*	(23/2$^-$)		D H	J^{π}: possible γ's to (19/2$^-$) and (21/2$^-$).
1400[h] *4*	11/2$^-$		G I	XREF: G(1393). J^{π}: L=5 and Ay(θ) in (pol t,α).
1439[i] *4*	11/2$^-$		FG IJ	J^{π}: L=5 and Ay(θ) in (pol t,α).
1457.7[d] *4*	(21/2$^-$)		D H	J^{π}: γ to (17/2$^-$).
1505.2[f]	(17/2$^+$)	≥15 ns	D	$T_{1/2}$: see the comment in the heavy-ion data set. J^{π}: value deduced from the configuration assignment by 2004Ho19 (in ^{160}Gd(^{11}B,α4nγ)), assuming that this situation is similar to that in the isotone, ^{165}Tm.
1516 *5*			F J	
1554 *5*			FG	
1627.8[g]	(19/2$^+$)		D	
1635[j] *4*	(1/2$^+$)		FG I	J^{π}: L=(0) in (pol t,α).
1663.2[@]	(25/2$^-$)		D	
1666 *5*			FG	
1685 *5*			F	
1709 *5*			F	
1733[j] *4*	5/2$^+$,(3/2$^+$)		F I	XREF: F(1743). E(level): from (pol t,α). Possible doublet. J^{π}: L=2 and Ay(θ) in (pol t,α).
1767.8[f]	(21/2$^+$)		D	
1837.4[a]	(23/2$^+$)		D	
1900.8[d]	(25/2$^-$)		D	
1924.9[g]	(23/2$^+$)		D	
1932.3[&]	(27/2$^-$)		D	
2098.9[f]	(25/2$^+$)		D	
2238.1[@]	(29/2$^-$)		D	
2289.2[g]	(27/2$^+$)		D	
2377.9[a]	(27/2$^+$)		D	
2416.3[d]	(29/2$^-$)		D	
2496.0[f]	(29/2$^+$)		D	
2528.4[&]	(31/2$^-$)		D	
2718.4[g]	(31/2$^+$)		D	

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Adopted Levels, Gammas (continued)

^{163}Ho Levels (continued)

E(level)	J^{π}[†]	$T_{1/2}$[‡]	XREF	Comments
2858.9[@]	(33/2$^-$)		D	
2956.1[f]	(33/2$^+$)		D	
2963.9[a]	(31/2$^+$)		D	
2998.7[d]	(33/2$^-$)		D	
3138.9[&]	(35/2$^-$)		D	
3209.3[g]	(35/2$^+$)		D	
3475.1?[f]	(37/2$^+$)		D	
3642.1[d]	(37/2$^-$)		D	
4342.9[d]	(41/2$^-$)		D	
10373	(1/2$^-$)[#]	<130 keV	E	Γ_p<6 keV E(parent)=350.
10460	(3/2$^-$)[#]	87 keV *60*	E	Γ_p=2.2 keV *12* E(parent)=437.
10540	(7/2)$^-$[#]	<250 keV	E	Γ_p<2 keV E(parent)=517.
10579	(7/2$^-$)[#]	116 keV	E	Γ_p<1.8 keV E(parent)=556.
10824	(7/2)$^-$[#]	115 keV *53*	E	Γ_p=2.7 keV *10* E(parent)=801.
10840	(3/2)$^-$[#]	138 keV *78*	E	Γ_p=3.5 keV *14* E(parent)=817 *30*.
10972	(7/2$^-$)[#]	115 keV	E	Γ_p<1.7 keV E(parent)=949.
11222	(1/2)$^-$[#]	111 keV *46*	E	Γ_p=4.1 keV *12* E(parent)=1199.

[†] In addition to the arguments given with individual levels, the following are also used: γ-deexcitation pattern, membership in a band, and systematics of odd-A Ho isotopes.
[‡] From $\gamma\gamma$(t) in (p,nγ), except as noted.
[#] From L-transfer and excitation function in (p,p).
[@] Band(A): π7/2[523] band, α=+1/2. A=11.12, B=−0.313 eV.
[&] Band(a): π7/2[523] band, α=−1/2. See the comment on the α=+1/2 branch of this band.
[a] Band(B): π1/2[411] band. The rotational-band formula does not provide a good description of this band. (One fit gives A=9.14 keV, B=117 eV, a=−0.70.) This situation is likely due to strong Coriolis coupling with other nearby N=4 orbitals.
[b] Band(C): π3/2[411] band. The rotational-band formula does not provide a good description of this band. (One fit gives A=18.4 keV, B=−291 eV.) This situation is likely due to strong Coriolis coupling with other nearby N=4 orbitals.
[c] Band(D): π7/2[404] band (?). A=12.53, B=−4.52 eV.
[d] Band(E): π1/2[541] band. A=9.99, B=90 eV, a=+2.57.
[e] Band(F): π5/2[413] band. A=13.2, B=3.0 eV.
[f] Band(G): π7/2[523]⊗ν5/2[642]⊗ν5/2[523], $K^{\pi}=17/2^+$. α=+1/2.
[g] Band(g): π7/2[523]⊗ν5/2[642]⊗ν5/2[523], $K^{\pi}=17/2^+$, α=−1/2.
[h] Band(H): π5/2[532] band. A=11.2, A_5=−0.00248.
[i] Band(I): π9/2[514] band (?).
[j] Band(J): π1/2[420] band (?).
[k] Band(K): K-2 γ vibrational band. built on the π7/2[523] g.s. (?).

Adopted Levels, Gammas (continued)

$\gamma(^{163}Ho)$

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.	α #	Comments
100.03	$9/2^-$	100.04 *10*	100	0.0	$7/2^-$			
222.22	$11/2^-$	122.14 *10*	100	100.03	$9/2^-$			
		222.27 *10*	15	0.0	$7/2^-$			
297.88	$1/2^+$	297.88 *10*	100	0.0	$7/2^-$	E3	0.287	B(E3)(W.u.)=0.00264 *8* E_γ: From ^{163}Dy(d,2nγ). Mult.: from α(K)exp in IT decay.
307.64	$3/2^+$	(9.8)		297.88	$1/2^+$	[M1]	98.3	Transition expected from systematics of 1/2[411] band.
360.36	$3/2^+$	52.74 *10*	≈125	307.64	$3/2^+$			
		62.48 *10*	100 *29*	297.88	$1/2^+$			
366.65	$13/2^-$	144.41 *10*	100 *5*	222.22	$11/2^-$			
		266.62 *10*	31 *5*	100.03	$9/2^-$	E2	0.0961	Mult.: from α(K)exp in (d,2nγ).
392.07	$5/2^+$	84.45 *10*	100	307.64	$3/2^+$			
431.18	$7/2^+$	123.52 *10*	13.0 *20*	307.64	$3/2^+$	[E2]	1.298	B(E2)(W.u.)=9.E+1 *4*
		331.12 *10*	15.0 *23*	100.03	$9/2^-$	[E1]	0.01401	B(E1)(W.u.)=1.7×10^{-6} *9*
		431.16 *10*	100 *5*	0.0	$7/2^-$	E1	0.00749	B(E1)(W.u.)=5.2×10^{-6} *22* Mult.: from α(K)exp in (d,2nγ). ΔK=3 forbidden transition is due to band mixing.
439.94	$7/2^+$	339.95 *10*	12.1 *4*	100.03	$9/2^-$	[E1]	0.01314	B(E1)(W.u.)=1.8×10^{-6} *8* I_γ: from ε decay.
		439.94 *10*	100 *2*	0.0	$7/2^-$	E1	0.00715	B(E1)(W.u.)=7.E−6 *3* Mult.: α(K)exp in (d,2nγ).
440.51	$5/2^+$	80.16 *10*	100 *30*	360.36	$3/2^+$			
		142.62 *10*	27 *8*	297.88	$1/2^+$			
471.25	$(1/2)^-$	163.61 *10*	100 *30*	307.64	$3/2^+$	[E1]	0.0854	B(E1)(W.u.)>0.00015
		173.38 *10*	58 *17*	297.88	$1/2^+$	[E1]	0.0732	B(E1)(W.u.)>7.4×10^{-5}
500.38	$5/2^-$	192.74 *10*	100	307.64	$3/2^+$			
528.24	$7/2^+$	87.71 *10*	97 *30*	440.51	$5/2^+$			
		97.03 *10*	100 *30*	431.18	$7/2^+$			
		136.17 *10*	75 *23*	392.07	$5/2^+$			
531.79	$(15/2^-)$	165.14 *10*	100 *5*	366.65	$13/2^-$			
		309.58 *10*	59 *3*	222.22	$11/2^-$	(E2)	0.0607	Mult.: $\gamma(\theta)$ in (d,2nγ) and adopted ΔJ^π.
552.05	$(9/2^+)$	452.00 *10*	100 *15*	100.03	$9/2^-$			
		552.07@ *10*	80@ *24*	0.0	$7/2^-$			
578.23	$(3/2)^-$	280.35 *10*	100	297.88	$1/2^+$			
587.56	$(9/2^+)$	59.25& *10*	71 *21*	528.24	$7/2^+$			
		195.53& *10*	100 *30*	392.07	$5/2^+$			
612.80	$9/2^-$	112.4& *3*	≤1.4	500.38	$5/2^-$	[E2]	1.83 *4*	B(E2)(W.u.)>13
		181.59 *10*	100 *15*	431.18	$7/2^+$	[E1]	0.0648	B(E1)(W.u.)>0.00012
614.29	$(5/2)^-$	253.9‡ *2*	11‡ *2*	360.36	$3/2^+$			
		614.3‡ *1*	100‡ *4*	0.0	$7/2^-$			
652.06	$(11/2^+)$	220.85 *10*	100 *5*	431.18	$7/2^+$			
		552.07@ *10*	20@ *6*	100.03	$9/2^-$			E_γ: γ not reported by 2004Ho19 in the heavy-ion study.
664.01	$(9/2^+)$	135.72 *10*	48 *14*	528.24	$7/2^+$			
		223.54 *10*	100 *15*	440.51	$5/2^+$			
		232.86 *10*	40 *12*	431.18	$7/2^+$			
688.08	$(11/2^+)$	465.9 *3*	55 *17*	222.22	$11/2^-$			
		588.0 *3*	100 *30*	100.03	$9/2^-$			
719.56	$(17/2^-)$	187.76 *10*	100 *15*	531.79	$(15/2^-)$			
		352.90 *10*	71 *11*	366.65	$13/2^-$			
795.44	$(11/2^+)$	131.44 *10*	55 *17*	664.01	$(9/2^+)$			

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Adopted Levels, Gammas (continued)

$\gamma(^{163}Ho)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.	α[#]	Comments
795.44	$(11/2^+)$	267.20 *10*	100 *30*	528.24	$7/2^+$			
810.33	$(13/2^-)$	158.27 *10*	100 *15*	652.06	$(11/2^+)$			
		197.51 *10*	51 *15*	612.80	$9/2^-$			
844.69	$(13/2^+)$	478.0 *3*	≈25	366.65	$13/2^-$			
		622.5 *3*	100 *30*	222.22	$11/2^-$			
876.00	$5/2^+$	436.1[‡] *1*	100[‡] *2*	439.94	$7/2^+$			
		444.8[‡] *2*	3.2[‡] *4*	431.18	$7/2^+$			
		484.0[‡] *3*	1.0[‡] *2*	392.07	$5/2^+$			
		568.4[‡] *2*	3.0[‡] *3*	307.64	$3/2^+$			
		578.1[‡] *2*	4.7[‡] *4*	297.88	$1/2^+$			
		875.8[‡] *2*	24.2[‡] *12*	0.0	$7/2^-$			
881.92?	$(13/2^+)$	294.37[&] *10*	100	587.56	$(9/2^+)$			
924.43	$(19/2^-)$	204.87 *10*	100 *15*	719.56	$(17/2^-)$			
		392.65 *10*	88 *13*	531.79	$(15/2^-)$	E2	0.0303	Mult.: α(K)exp in (d,2nγ).
964.76	$(15/2^+)$	154.40 *10*	15 *5*	810.33	$(13/2^-)$			
		312.73 *10*	100 *15*	652.06	$(11/2^+)$			
978.96	$(13/2^+)$	183.5[&] *3*	≤9	795.44	$(11/2^+)$			
		314.96 *10*	100 *15*	664.01	$(9/2^+)$			
		326.8 *3*	29 *9*	652.06	$(11/2^+)$			
1025.6	$(15/2^+)$	658.9 *3*	100	366.65	$13/2^-$			
1092.80	$(17/2^-)$	127.4		964.76	$(15/2^+)$			E_γ: from 2004Ho19 (heavy-ion data set). γ not reported in (d,2nγ).
		282.48 *10*		810.33	$(13/2^-)$			
1113.57	$5/2^-$	1013.6 *3*	1.8 *2*	100.03	$9/2^-$			
		1113.5 *3*	100 *3*	0.0	$7/2^-$			
1154.00	$(21/2^-)$	229.57 *10*	97 *30*	924.43	$(19/2^-)$			
		434.45 *10*	100 *30*	719.56	$(17/2^-)$			
1154.65?	$(15/2^+)$	175.7[&] *3*	33 *10*	978.96	$(13/2^+)$			
		359.2[&] *3*	100 *30*	795.44	$(11/2^+)$			
1220.1?	$(17/2^+)$	688.3[&] *3*	100	531.79	$(15/2^-)$			
1266.3?	$(17/2^+)$	384.4[&] *3*	100	881.92?	$(13/2^+)$			
1363.8	$(19/2^+)$	399.0 *3*	100	964.76	$(15/2^+)$			
1394.2	$(23/2^-)$	239.6[&] *3*	50 *15*	1154.00	$(21/2^-)$			
		469.0[&] *3*	100 *30*	924.43	$(19/2^-)$			
1457.7	$(21/2^-)$	364.9 *3*	100	1092.80	$(17/2^-)$			
1505.2	$(17/2^+)$	973.1	100	531.79	$(15/2^-)$			
1627.8	$(19/2^+)$	122.2	100	1505.2	$(17/2^+)$			
1663.2	$(25/2^-)$	269.2		1394.2	$(23/2^-)$			
		509.2		1154.00	$(21/2^-)$			
1767.8	$(21/2^+)$	140.0	100	1627.8	$(19/2^+)$			
1837.4	$(23/2^+)$	473.6	100	1363.8	$(19/2^+)$			
1900.8	$(25/2^-)$	443.1	100	1457.7	$(21/2^-)$			
1924.9	$(23/2^+)$	156.9		1767.8	$(21/2^+)$			
		296.8		1627.8	$(19/2^+)$			
		771.2		1154.00	$(21/2^-)$			
1932.3	$(27/2^-)$	269.2		1663.2	$(25/2^-)$			
		537.9		1394.2	$(23/2^-)$			
2098.9	$(25/2^+)$	173.9		1924.9	$(23/2^+)$			
		331.2		1767.8	$(21/2^+)$			
2238.1	$(29/2^-)$	306.0		1932.3	$(27/2^-)$			
		574.9		1663.2	$(25/2^-)$			

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

$\gamma(^{163}Ho)$ (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
2289.2	$(27/2^+)$	190.5		2098.9	$(25/2^+)$	2956.1	$(33/2^+)$	237.8		2718.4	$(31/2^+)$
		364.3		1924.9	$(23/2^+)$			459.8		2496.0	$(29/2^+)$
2377.9	$(27/2^+)$	540.5	100	1837.4	$(23/2^+)$	2963.9	$(31/2^+)$	586	100	2377.9	$(27/2^+)$
2416.3	$(29/2^-)$	515.5	100	1900.8	$(25/2^-)$	2998.7	$(33/2^-)$	582.4	100	2416.3	$(29/2^-)$
2496.0	$(29/2^+)$	206.6		2289.2	$(27/2^+)$	3138.9	$(35/2^-)$	610.5	100	2528.4	$(31/2^-)$
		397.1		2098.9	$(25/2^+)$	3209.3	$(35/2^+)$	253.0		2956.1	$(33/2^+)$
2528.4	$(31/2^-)$	290.6		2238.1	$(29/2^-)$			491.2		2718.4	$(31/2^+)$
		595.9		1932.3	$(27/2^-)$	3475.1?	$(37/2^+)$	266.0[&]		3209.3	$(35/2^+)$
2718.4	$(31/2^+)$	222.4		2496.0	$(29/2^+)$			519[&]		2956.1	$(33/2^+)$
		429.4		2289.2	$(27/2^+)$	3642.1	$(37/2^-)$	643.4	100	2998.7	$(33/2^-)$
2858.9	$(33/2^-)$	330.6		2528.4	$(31/2^-)$	4342.9	$(41/2^-)$	700.8	100	3642.1	$(37/2^-)$
		620.8		2238.1	$(29/2^-)$						

[†] From (d,2nγ), (p,nγ), unless not seen or population uncertain in this reaction.
[‡] From ε decay.
[#] 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.
[@] Multiply placed with intensity suitably divided.
[&] Placement of transition in the level scheme is uncertain.

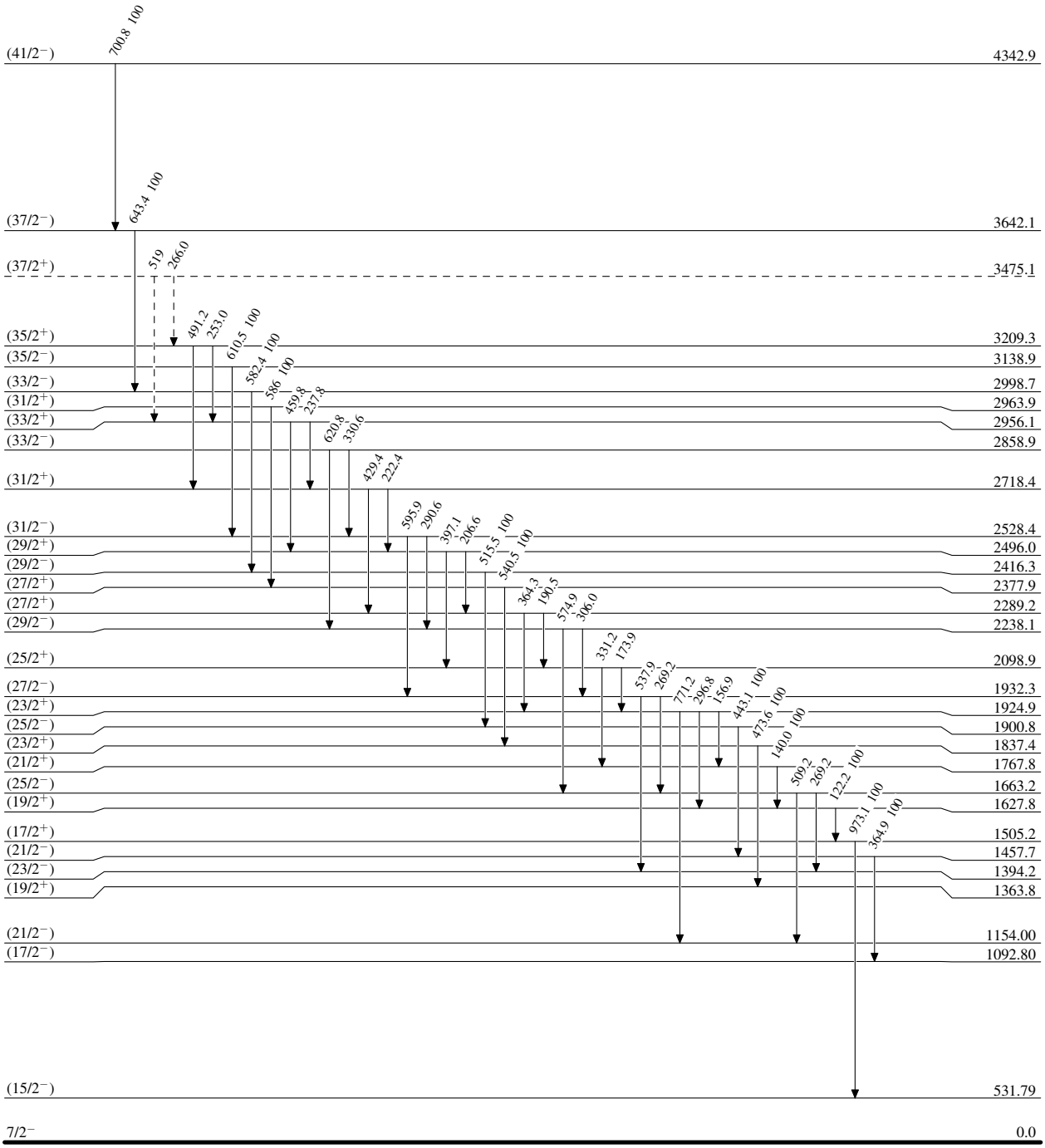
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

- - - - - - ► γ Decay (Uncertain)



$^{163}_{67}Ho_{96}$

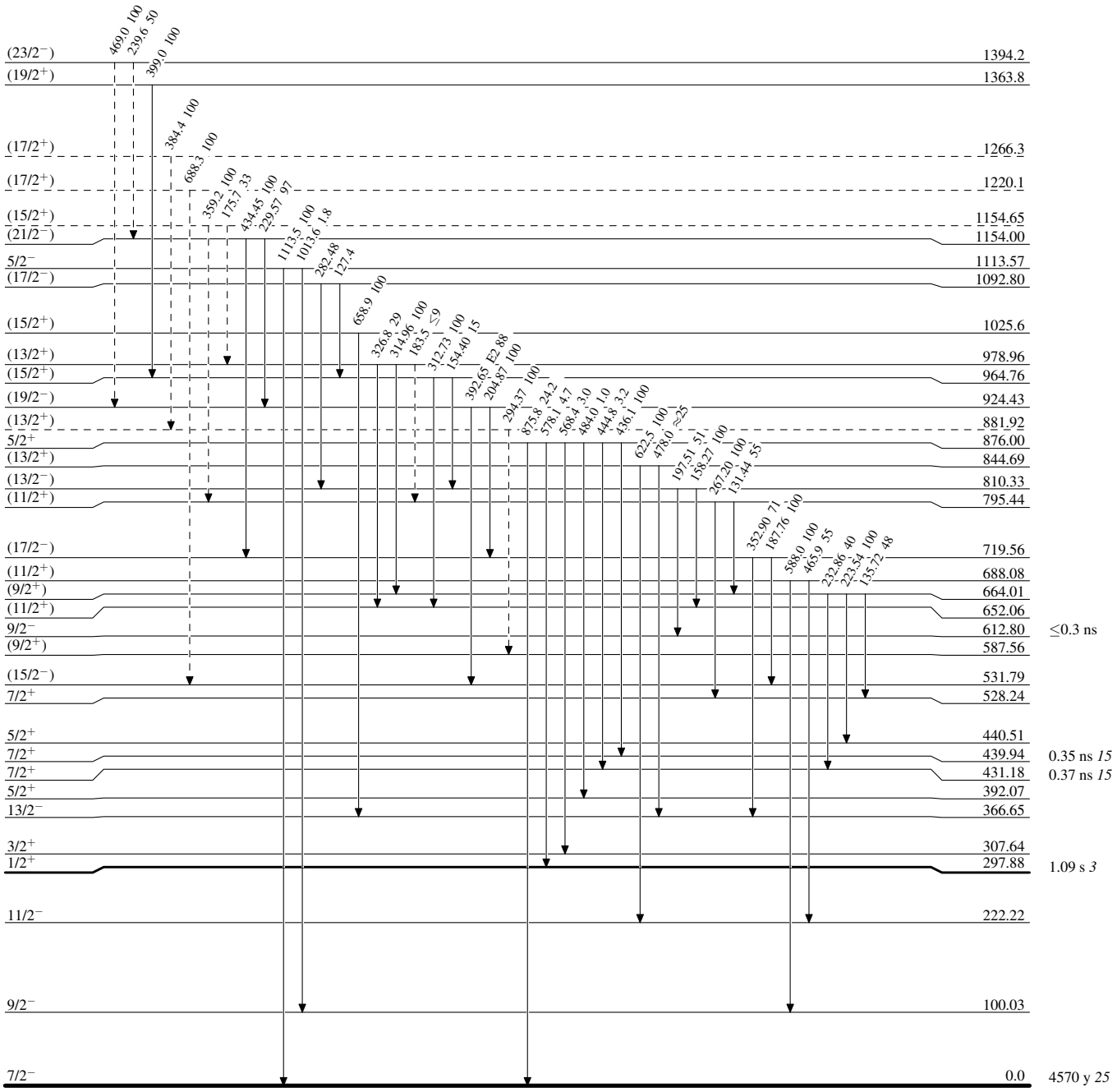
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{163}_{67}Ho_{96}$

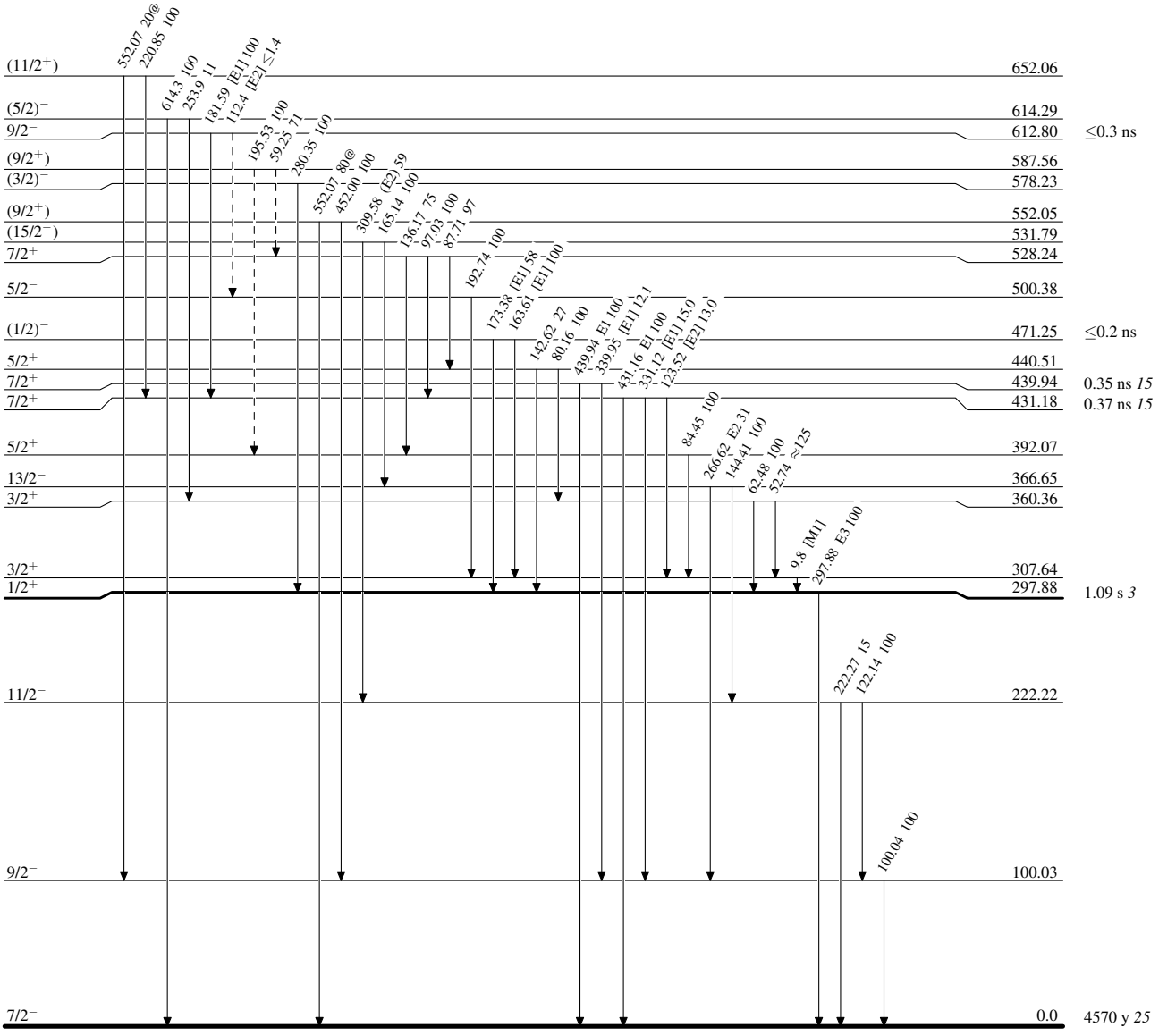
Adopted Levels, Gammas

Legend

Level Scheme (continued)

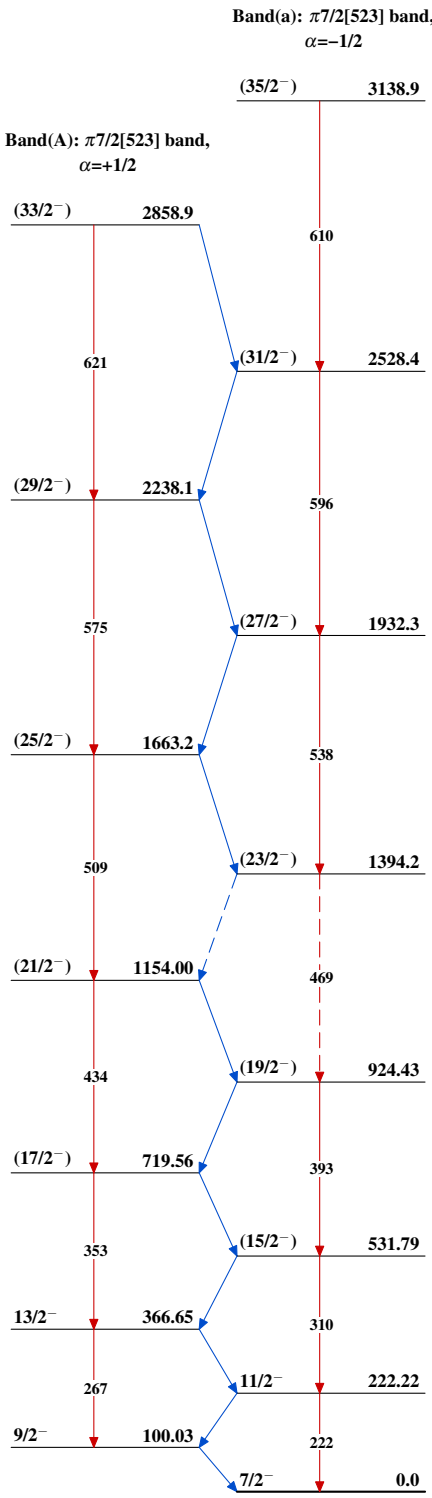
Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

- - - - - - ► γ Decay (Uncertain)



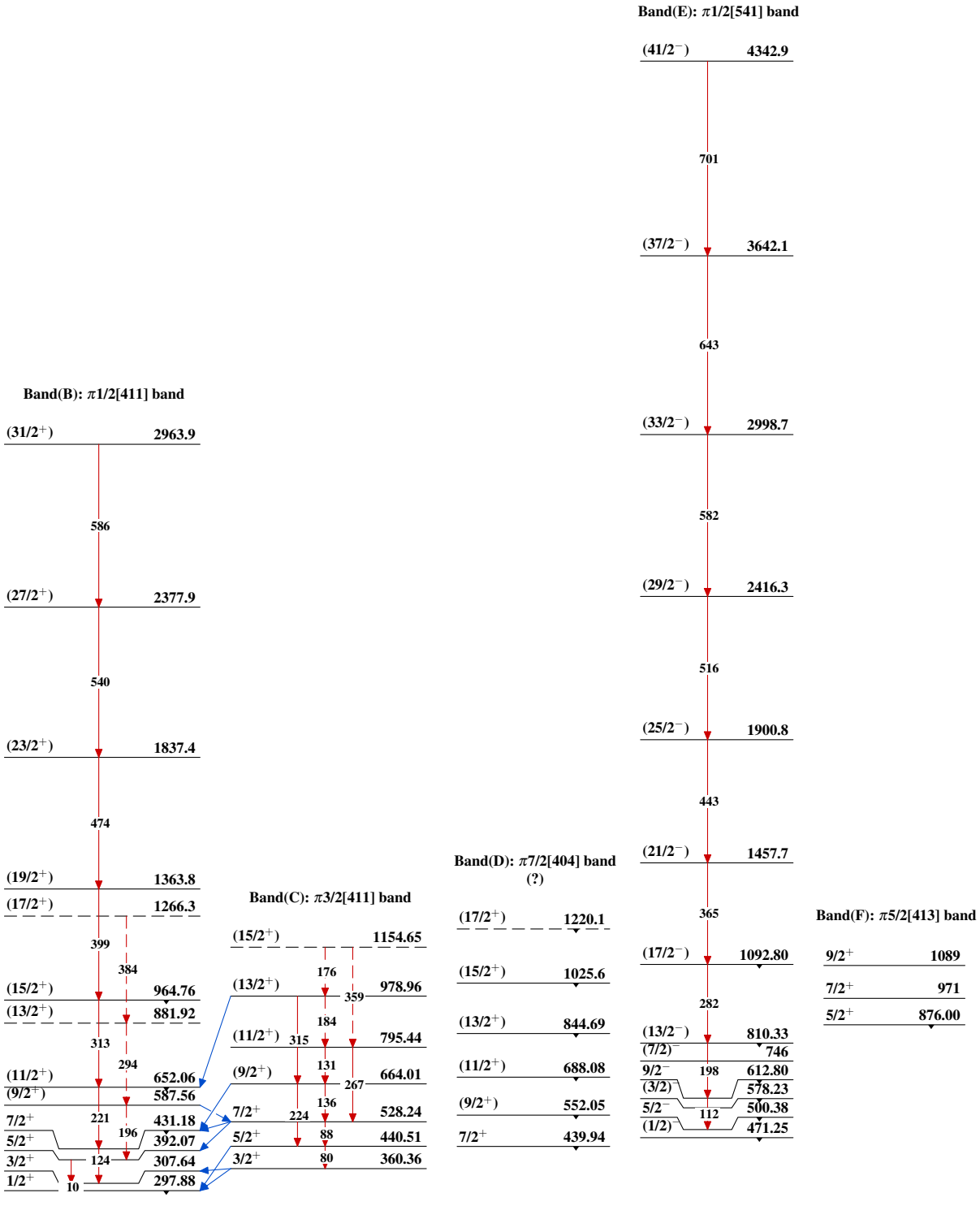
$^{163}_{67}Ho_{96}$

Adopted Levels, Gammas



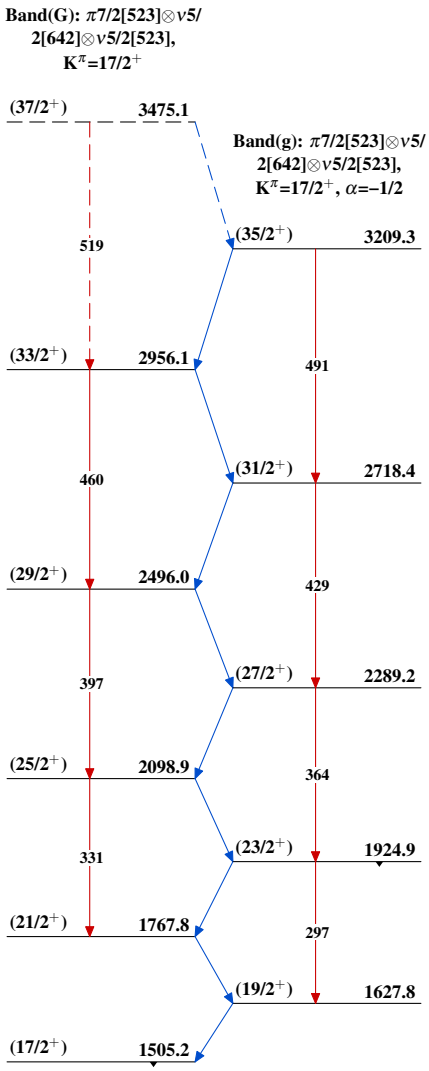
$^{163}_{67}Ho_{96}$

Adopted Levels, Gammas (continued)



$^{163}_{67}Ho_{96}$

Adopted Levels, Gammas (continued)



Band(H): π5/2[532] band

11/2⁻	1400
9/2⁻	1293
7/2⁻	1192
5/2⁻	1113.57

Band(I): π9/2[514] band (?)

11/2⁻	1439

Band(J): π1/2[420] band (?)

5/2⁺,(3/2⁺)	1733
(1/2⁺)	1635

Band(K): K-2 γ vibrational band

(15/2⁻)	1259
(13/2⁻)	1075
(11/2⁻)	926
(9/2⁻)	807
(7/2⁻)	695
(5/2)⁻	614.29
(3/2)⁻	560