Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	T. D. Johnson and W. D. Kulp(a)	NDS 129, 1 (2015)	27-Jul-2015

Q(β^-)=−3672 *4*; S(n)=11806 *14*; S(p)=5784.1 *11*; Q(α)=−6373 *3* 2012Wa38
Q(β^-n)=−13121 *4* Q(εp)=−7560.3 *16*.
For model calculation of level energies and moments, see 1976Kr12.
Shape evolution in this region discussed in 2011Ro08.
Band structure analysis in 2012Sh36.

^{87}Y Levels

Cross Reference (XREF) Flags

A	^{85}Rb(α,2nγ), ^{74}Ge(^{18}O,4npγ)	F	^{87}Y IT decay (13.37 h)	K	^{86}Sr(p,γ) IAR
B	^{84}Sr(α,p)	G	^{87}Zr β^+ decay	L	^{80}Se(^{11}B,4nγ)
C	^{86}Sr(p,γ)	H	^{88}Sr(p,2nγ)	M	^{87}Sr(p,nγ)
D	^{86}Sr(p,p′),(pol p,p′) IAR	I	^{89}Y(p,t)		
E	^{86}Sr(^{3}He,d), (d,n)	J	^{90}Zr(p,α), (pol p,α)		

E(level)[†]	J$^\pi$	T$_{1/2}$[‡]	XREF	Comments
0.0[b]	1/2⁻	79.8 h *3*	ABC EFGHIJ LM	%ε+%β^+=100 μ=−0.19 *2* μ: from 2007Ch07 using laser spectroscopy. Δ<r^2>=+0.057 fm^2 relative to ^{89}Y (2007Ch07). J$^\pi$: J from atomic-beam resonance (1975Ru06) and π from L=1 in (^{3}He,d). T$_{1/2}$: weighted average of 79.6 h *2* (1984Pr01), and 80.3 h *3* (1969Zo04); both from ^{87}Y ε decay.
380.82[d] *7*	9/2⁺	13.37 h *3*	ABC EFGHIJ LM	%IT=98.43 *11*; %ε+%β^+=1.57 *11* μ=6.24 *2* Q=−0.50 *6* %IT and %EC+%B calculated from measured I$_{\beta+}$=0.75 *5* and theoretical ε/β+ ratio for decay to ^{87}Sr. J$^\pi$: J from atomic-beam resonance (1975Ru06) and π from L=4 in (^{3}He,d). T$_{1/2}$: from 1984Pr01 by γ(t); others: 12.5 *2* (1967Mi13) and 13.2 *2* (1969Zo04). All values are from ^{87}Y ε decay. μ: from 2007Ch07 using laser spectroscopy other: 6.05 *7* (1991Hi04) by nuclear magnetic resonance on oriented nuclei and relative to 6.23 *7* for ^{89m}Y, 6.10 +32-15 (1978Ma02) by nuclear orientation. Q: from 2007Ch07 using laser spectroscopy. Δ<r^2>=+0.032 fm^2 relative to the ground state (2007Ch07).
793.73[b] *8*	5/2⁻	≤10 ns	ABC E GHIJKLM	J$^\pi$: L=3 in (^{3}He,d), Q γ to J^π=1/2⁻ level.
982.89 *10*	3/2⁻		BC E IJK M	J$^\pi$: L=1 in (^{3}He,d) and L=2 in (p,t) from J^π=1/2⁻.
1152.71 *11*	5/2⁺		BC E G J M	J$^\pi$: L=2 in (^{3}He,d) and γ to J^π=9/2⁺ level.
1182.00 *9*	3/2⁻		C IJ M	XREF: I(1177). J$^\pi$: L=2 in (p,t) from J^π=1/2⁻ and J^π=5/2⁻ is ruled out in (p,α).
1203.01 *9*	5/2⁻		BC HIJK M	J$^\pi$: L=2 in (p,t) from J^π=1/2⁻ and J^π=(3/2⁻) is ruled out in (p,α).
1321 *8*			B	
1404.47 *12*	13/2⁺	≤10 ns	Ab e H J LM	XREF: b(1403)e(1400). J$^\pi$: band structure, angular distribution and analyzing powers in (pol p, α).

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Adopted Levels, Gammas (continued)

^{87}Y Levels (continued)

E(level)[†]	J$^\pi$	$T_{1/2}$[‡]	XREF	Comments
1405.3 *4*	$(7/2^+,9/2^+)$[@]	≤10 ns	bC e G	XREF: b(1403)e(1400). J$^\pi$: From intensity arguments in (p,γ). It is unlikely to populate the 1404.47 level at $13/2^+$ in this reaction Also as this level is populated by feeding from a $7/2^-$ at 1979 keV, there is very little liklihood that this level is the same as the $13/2^+$ level at 1404.47.
1504 *8*			B	
1590.92 *14*	$11/2^+$	≤10 ns	A C GH LM	J$^\pi$: From excitation in (p,nγ) J$^\pi$ is limited to $9/2^-$,$11/2^+$, or 13/2. In addtion $\gamma(\theta)$ for the 1210γ transition to the $9/2^+$ level at 380 is consistent only with J=11/2.
1608.31 *12*	$7/2^+,9/2^+$		BC E G M	XREF: B(1618). J$^\pi$: L=4 in (^{3}He,d) for 1605 *4* level.
1609 *5*	$3/2^-$		IJ	J$^\pi$: L=2 in (p,t) from $J^\pi=1/2^-$ and $5/2^-$ ruled out in analyzing power measurements in (p,α),(pol p,α).
1623.50 *21*	(5/2,7/2)		A C H J	J$^\pi$: from γ angular distribution in (p,2nγ).
1629.94 *13*	$(1/2^-,3/2^-)$[@]		C LM	J$^\pi$: other: $7/2^-$ from (p,nγ).
1641 *5*	$1/2^-$		I	J$^\pi$: L=0 in (p,t) from $1/2^-$ level.
1704.7 *4*			C J M	J$^\pi$: (p,nγ) resonance data allows $3/2^+$ or $5/2^+$, while excitation data rules out $5/2^+$. (p,α),(pol p,α) data rule out $5/2^-$ and $3/2^+$.
1719 *4*	$3/2^-,5/2^-$		I	J$^\pi$: L=2 in (p,t) from $1/2^-$.
1756.08 *11*	$5/2$[@]		BC J M	J$^\pi$: $5/2^-$ from (p,nγ) and $5/2^+$ from (p,α),(pol p,α).
1768.2[b] *5*	$(9/2^-)$		L	J$^\pi$: from γ to $(5/2^-)$ level and band structure.
1801.64 *15*	$5/2^-$		C J M	J$^\pi$: From (p,α),(pol p,α).
1814 *5*	$3/2^-,5/2^-$		I	J$^\pi$: L=2 in (p,t) from $1/2^-$.
1849 *3*	$1/2^-$		BC E IJ	E(level): average of 1851 *8* from (α,p), 1848 *4* from (^{3}He,d), 1857 *5* from (p,t) and 1846 *3* from (p,α); other: 1846.7 in (p,γ). J$^\pi$: L=0 in (p,t) from $1/2^-$, L=1 in (^{3}He,d) and (α,p).
1979.95 *12*	$7/2^-$		C IJ M	XREF: C(1979)I(1991)J(1979). J$^\pi$: from L=4 in (p,t) from $1/2^-$ level; $J^\pi=7/2^-$ from (p,α).
2008.8 *3*	(7/2)		B H J LM	XREF: B(2012). J$^\pi$: from $\gamma(\theta)$ (p,2nγ). However, (p,α),(pol p,α) data indicate $11/2^+$. In (p,nγ), the authors give $9/2^-$,$11/2^-$ from excitation, but decay to $5/2^-$ makes the $11/2^-$ assignment very unlikely.
2021 *5*	$(7/2^-,9/2^-)$		B I	XREF: B(2012). J$^\pi$: L=(4) in (p,t) from $1/2^-$.
2038.05 *11*	$(11/2^+)$	≤10 ns	A LM	J$^\pi$: From a $\Delta J=\pm 1$ D+Q transition to $13/2^+$ in (α,2nγ), assumed to be M1+E2 and a γ to $9/2^+$
2072.7 *10*	(3/2,5/2,7/2)		C	J$^\pi$: γ's to $5/2^-$ and $(5/2)^+$ levels.
2073.31 *23*	$(7/2^+,9/2^+)$		G M	J$^\pi$: from γ excitation function in (p,nγ).
2083.0 *5*	$(3/2)^-$		BC E	XREF: B(2103). J$^\pi$: L=1 in (^{3}He,d) and γ to $J^\pi=5/2^+$ 1153 level.
2095 *5*	$3/2^-,5/2^-$		B I	XREF: B(2103). J$^\pi$: L=2 from $1/2^-$ in (p,t).
2112.3 *4*	$5/2^+$		C J M	J$^\pi$: from γ's to $3/2^-$ and $(7/2^+,9/2^+)$ and from (p,α).
2122 *5*	$5/2^+,7/2^+$		I	J$^\pi$: L=3 in (p,t) from $1/2^-$.
2154.60 *18*	$(9/2^-)$		J M	J$^\pi$: allowed values from angular distribution and analyzing powers from (p,α) are $(9/2^-,11/2^+)$ narrowed by γ to $5/2^-$.
2158.9[#] *10*			C	
2165 *5*	$7/2,9/2^-$		I	E(level): from (p,t). J$^\pi$: L=4 in (p,t) from $J^\pi=1/2^-$.
2186.0 *3*	$7/2^-$[&]		C J M	
2202 *5*	$7/2^-,9/2^-$		I	J$^\pi$: L=4 in (p,t) from $1/2^-$.
2202.17 *17*	$7/2^+,9/2^+$		B E G M	J$^\pi$: L=4 in (^{3}He,d). If the 1410 γ to $5/2^-$ is from this level, J$^\pi$ is $7/2^+$; the alternative is that the $7/2^-$,$9/2^-$ 2202 level is also populated in the ^{87}Zr $\varepsilon+\beta+$ decay.

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Adopted Levels, Gammas (continued)

^{87}Y Levels (continued)

E(level)[†]	J$^\pi$	T$_{1/2}$[‡]	XREF	Comments
2209 *3*	3/2$^-$[&]		J	
2210.6[#] *8*	(1/2)[@]		C	
2216 *5*	9/2$^+$,11/2$^+$		I	J$^\pi$: L=5 in (p,t) from 1/2$^-$.
2241.6 *7*	(7/2,9/2$^-$)		G	J$^\pi$: log *ft*=7.4, log $f^{1u}t$=8.3 from J$^\pi$=(9/2)$^+$ and γ to 1609 3/2$^-$ level.
2244.8[#] *6*			C	
2249 *3*	9/2$^-$[&]		J	
2256 *5*	3/2$^-$,5/2$^-$		I	J$^\pi$: L=2 in (p,t) from 1/2$^-$.
2276 *3*	(9/2$^-$&7/2$^+$)[&]		J	
2277.53 *17*	7/2$^-$		BC E M	J$^\pi$: from L=3 in (^{3}He,d) and γ to 9/2$^+$.
2279.4	(7/2$^-$)		C	
2292.3 *10*	5/2$^+$,7/2$^+$		C I	J$^\pi$: L=3 in (p,t) from J$^\pi$=1/2$^-$.
2302.61 *15*	13/2$^+$		D J M	
2314 *5*	(5/2$^+$,7/2$^+$)		I	J$^\pi$: L=(3) in (p,t) from 1/2$^-$.
2344.61 *17*			M	
2353.55 *21*	(7/2,9/2,11/2)		C M	J$^\pi$: from (p,nγ) excitation function analysis.
2365 *3*	7/2$^+$		J	J$^\pi$: J$^\pi$=15/2$^-$ + 7/2$^+$ is assigned from $\sigma(\theta)$ and analyzing power in (p,α)(pol p,α) for the 2365 *236*767 doublet. J$^\pi$=15/2$^-$ is established for the 2367 level giving J$^\pi$=7/2$^+$ for the 2365 level.
2366.92 *15*	15/2$^-$	≤10 ns	A HIJ LM	XREF: I(2374). J$^\pi$: L=8 in (p,t) from 1/2$^-$ and dipole γ to 13/2$^+$.
2400.0 *3*			M	J$^\pi$: γ to 9/2$^+$, but no further restrictions.
2409 *2*	3/2$^+$		C E IJ	E(level): average of 2407 *4* from (^{3}He,d), 2413 *5* from (p,t), and 2408 *3*; other: 2408.3 from (p,γ). J$^\pi$: L=2 in (^{3}He,d) and γ to J$^\pi$=1/2$^-$.
2428.09[d] *15*	17/2$^+$	≤10 ns	A H L	J$^\pi$: From stretched quadrupole presumed E2 to 13/2$^+$ level established by angular correlations in (α,2nγ).
2446 *2*	(5/2)$^+$		C I	E(level): Average of 2445 *2* from (p,γ) and 2451 *5* from (p,t). J$^\pi$: L=3 in (p,t) from J$^\pi$=1/2$^-$ and from comparison of primary γ strength in (p,γ) with the γ strength to the 381 level, it follows J$^\pi$=5/2$^+$.
2449 *3*	9/2$^-$[&]		J	
2479.07[c] *15*	13/2$^-$		A HI L	XREF: I(2486). J$^\pi$: L=6 in (p,t) from J$^\pi$=1/2$^-$. ΔJ=±1 to 11/2$^+$.
2502 *2*	(5/2$^+$)[@]		C	
2532 *2*	11/2$^-$[&]		J	
2532 *2*			C	
2552 *2*	9/2$^+$		C G I	XREF: I(2544). J$^\pi$: L=5 in (p,t) from 1/2$^-$ and γ to 5/2$^+$.
2563.7 *7*	9/2,11/2$^+$		C G IJ	J$^\pi$: L=5 in (p,t) from 1/2$^-$.
2572 *2*	(3/2$^-$)[@]		C	
2599 *3*	9/2$^-$[&]		J	
2602.3 *11*	(7/2)$^+$		G I	J$^\pi$: L=3 in (p,t) from 1/2$^-$ and log *ft*=6.8 and log $f^{1u}t$=7.4 from (9/2)$^+$.
2616 *2*	(3/2$^-$)[@]		C	
2648.91[c] *15*	(15/2$^-$)		A L	J$^\pi$: from Δ=1 γ to 13/2$^-$ and band structure.
2661 *3*	7/2$^+$[&]		J	
2668	(5/2)[@]		C	
2676.06 *15*	17/2$^-$	0.25 ns *10*	A HI L	J$^\pi$: L=8 in (p,t) from 1/2$^-$ and γ angular distribution in (α,2nγ).
2682 *3*	11/2$^+$[&]		J	

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Adopted Levels, Gammas (continued)

^{87}Y Levels (continued)

E(level)†	Jπ	$T_{1/2}$‡	XREF	Comments
2730 *4*	5/2⁻,7/2⁻		E	Jπ: L=3 in (^{3}He,d).
2737 *5*	9/2⁺,11/2⁺		I	Jπ: L=5 in (p,t) from 1/2⁻.
2747 *3*	3/2⁺&		J	
2762	(3/2⁻)@		C	
2801 *3*	(3/2⁺&11/2⁺)&		J	
2808 *5*	9/2⁺,11/2⁺		I	Jπ: L=5 in (p,t) from 1/2⁻.
2808.4[b] *8*	(13/2⁻)		L	Jπ: from γ to (9/2⁻) level and band structure.
2827.20[d] *18*	21/2⁺	0.53 ns *3*	A H L	Jπ: from E2 γ to 17/2⁺ and band structure.
2828 *5*	(3/2,5/2)⁻		I	Jπ: L=(2) in (p,t) from 1/2⁻.
2831 *3*	9/2⁻&		J	
2871 *5*	11/2⁻,13/2⁻		I	Jπ: L=6 in (p,t) from 1/2⁻.
2901 *5*	3/2⁻,5/2⁻		IJ	Jπ: L=2 in (p,t) from 1/2⁻.
2907 *4*	3/2⁺,5/2⁺		C E	Jπ: L=2 in (^{3}He,d).
2960 *3*	(5/2⁺)&		J	
2961.47[c] *18*	17/2⁻		A I L	Jπ: L=8 in (p,t) from 1/2⁻; from γ angular distribution in (α,2nγ), it follows J=17/2.
2986.9 *3*	(19/2⁺)	<49 ps	A L	Jπ: from DCO of γ to 21/2⁺ level. Assigned as 23/2⁺ in previous evaluation (2009He09), but the assignment of (19/2⁺) is still consistent with angular distribution and DCO measurements, and fits better with systematics of yrast states of N=48 isotones (see 1998Sc22 for more detailed discussion).
2995.6 *3*	(17/2)		A	Jπ: from angular distributions in (α,2nγ).
2996 *2*	5/2⁺		C E IJ	XREF: C(2995)I(2997)J(2998). Jπ: L=2 in (^{3}He,d) and (5/2⁺) in (p,α).
2996.1 *11*	(7/2,9/2,11/2)		G	Jπ: log *ft*=6.6, log$f^{1u}t$=6.8 from (9/2)⁺.
3038 *5*	9/2⁺,11/2⁺		I	Jπ: L=5 in (p,t) from 1/2⁻.
3043 *4*	3/2⁺,5/2⁺		E	Jπ: L=2 in (^{3}He,d).
3057 *5*	(5/2⁺,7/2⁺)		I	Jπ: L=(3) in (p,t) from 1/2⁻.
3090 *4*	3/2⁺,5/2⁺		E	Jπ: L=2 in (^{3}He,d).
3093 *5*	9/2⁺,11/2⁺		I	Jπ: L=5 in (p,t) from 1/2⁻.
3094.4 *4*	(21/2)	<49 ps	A	Jπ: from from γ angular distribution in (α,2nγ). Assigned 25/2 in previous evaluation (2002He09) and changed due to having re-assigned the daughter state to (19/2⁺).
3120 *3*	5/2⁺,7/2⁺		E I	E(level): average of 3120 *4* from (^{3}He,d) and 3121 *5* from (p,t). Jπ: L=3 in (p,t) from 1/2⁻.
3120 *10*	(13/2⁻)&		J	
3181 *5*	(13/2⁺,15/2⁺)		I	Jπ: L=(7) in (p,t) from 1/2⁻.
3195 *4*	(1/2⁺)		E	Jπ: L=(0) in (^{3}He,d).
3245 *5*	9/2⁺,11/2⁺		I	Jπ: L=5 in (p,t) from *J*π=1/2⁻.
3262.9 *13*	9/2⁺,11/2⁺		G I	XREF: I(3273). Jπ: L=5 in (p,t) from *J*π=1/2⁻.
3308 *6*	3/2⁺,5/2⁺		E J	E(level): average of 3306 *4* from (^{3}He,d) and 3324 *10* from (p,α). Jπ: L=2 in (^{3}He,d).
3351# *2*	3/2⁺,5/2⁺		C E	Jπ: L=2 in (^{3}He,d).
3402.4[c] *3*	(19/2⁻)		A L	Jπ: from γ to (17/2⁻) and band structure.
3405.2 *11*	3/2⁺,5/2⁺		E G	Jπ: L=2 in (^{3}He,d).
3446.5 *3*	(19/2⁻)		A J L	Jπ: from (D+Q) γ to 17/2⁻ and band placment.
3500	(11/2⁺)&		J	
3552.95[d] *19*	(23/2⁺)	0.083 ps *21*	A L	Jπ: from D γ to 21/2⁺ and band placement.

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Adopted Levels, Gammas (continued)

^{87}Y Levels (continued)

E(level)[†]	J^π	$T_{1/2}$[‡]	XREF	Comments
3595.2 *4*	(21/2,23/2,25/2$^+$)		A	J^π: from γ to the 21/2$^+$ level and no γ to the 2428 17/2$^+$ level.
3595.3 *5*	(21/2$^+$)	0.5 ns *2*	A	J^π: from from γ angular distribution in (α,2nγ). Assigned 25/2 in earlier evaluation (2009He09) and changed due to having re-assigned the daughter state to (19/2$^+$).
3640 *20*			J	
3730	(7/2$^-$)[&]		J	
3766.6[c] *4*	(21/2$^-$)		A L	J^π: (E2) γ to (17/2$^-$) and band structure.
3840	(11/2$^-$)[&]		J	
3908.8 *4*	(23/2$^-$)		L	J^π: from (D+Q) γ to (21/2$^-$) level and γ to (19/2$^-$). and feeding from a ΔJ=1 transition from a (25/2$^-$) level itself fed from a (27/2$^-$) bandhead level.
4039.40[d] *21*	(25/2$^+$)	0.17 ps *4*	A L	J^π: band structure.
4214.1 *3*	(27/2)		A	J^π: from D γ to (25/2) level and band placment.
4555.0 *4*	(23/2$^+$)		L	J^π: from (E2) γ to (19/2$^+$) level ΔJ=1 γ to (21/2$^+$) level.
4564.1 *3*	(23/2$^-$)		L	J^π: from stretched (E2) γ to (19/2$^-$).
4609.66 *19*	25/2$^+$	0.12 ps *4*	L	J^π: from E2 γ to 21/2$^+$.
5228.2 *3*	(25/2$^-$)		L	J^π: γ from 29/2$^{(-)}$ and ΔJ=1 γ to 23/2$^+$.
5288.48[d] *21*	(27/2$^+$)	0.10 ps *3*	L	J^π: from γ to (25/2$^+$) level, γ to (23/2$^+$), and γ ΔJ=1 feeding from (29/2$^-$).
5319.7 *4*	(25/2$^-$)		L	J^π: from (E2) γ to (21/2$^-$) level.
5495.2 *4*	(25/2$^+$)		L	J^π: from ΔJ=1 γ to (23/2$^+$) level and band structure.
5759.59[e] *24*	(27/2$^-$)	>2.1 ps	L	J^π: from ΔJ = 1 γ's to 25/2$^+$ and (25/2$^-$) levels, γ to (23/2$^-$).
5827.1 *3*	(27/2$^+$)		L	J^π: From ΔJ = 1 γ feeding from (29/2$^-$) and (M1+E2) γ to 25/2$^+$.
5934.50[e] *24*	(29/2$^-$)	1.8 ps *4*	L	J^π: from M1 γ to (27/2$^-$) level, γ to (25/2$^-$), and band structure.
6535.5[e] *3*	(31/2$^-$)	0.18 ps *4*	L	J^π: from likely ΔJ=1 γ to (29/2$^-$) level and band structure.
7016.6[e] *3*	(33/2$^-$)	0.11 ps *3*	L	J^π: from likely M1 γ to (31/2$^-$) level.
10537 *11*	5/2$^+$[a]	23 keV *1*	D K	Γ_p=3.44 keV *20*
10923 *11*	1/2$^+$[a]	40 keV *2*	D	Γ_p=14.0 keV *10*
11468 *15*	3/2$^+$[a]	21 keV *2*	D	Γ_p=1.6 keV *2*
11739 *11*	1/2$^+$[a]	33 keV *2*	D	Γ_p=9.5 keV *5*
11900 *11*	1/2$^+$[a]	34 keV *2*	D	Γ_p=11.5 keV *6*
11966 *23*	(3/2)$^+$[a]	25 keV *8*	D	Γ_p=1.4 keV *10*
11966 *23*	(5/2$^+$)[a]	25 keV *8*	D	Γ_p=1.0 keV *8*
12371 *11*	3/2$^+$[a]	24 keV *1*	D	Γ_p=5.2 keV *3*
12661 *14*	1/2$^+$[a]	44 keV *4*	D	Γ_p=11.9 keV *7*
12968 *15*	3/2$^+$[a]		D	
13076 *15*	5/2$^+$[a]		D	

[†] From least-squares fit to γ-ray energies for levels connected by γ's; for other levels from weighted average of all available reaction values, unless otherwise noted. Where uncertainties on Eγ is missing, evaluators assume 1.0 keV.

[‡] From ^{85}Rb(α,2nγ), ^{74}Ge(^{18}O,4npγ), unless indicated otherwise.

[#] From (p,γ), only determined by primary γ spectra.

[@] From comparison of primary γ strength with the γ strength to the 381 level in (p,γ).

[&] From (p,α) from angular distribution and analyzing powers .

[a] From analyzing power and shape of the resonance curve in (p,p′) IAR.

[b] Band(A): 1/2$^-$ ground-state band.

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Adopted Levels, Gammas (continued)

^{87}Y Levels (continued)

[c] Band(B): ΔJ=1 band based on 13/2^{-}.
[d] Band(C): yrast states, positive parity.
[e] Band(D): Other positive parity yrast states.

Adopted Levels, Gammas (continued)

$\gamma(^{87}Y)$

E_i(level)	J^π_i	E_γ[†]	I_γ	E_f	J^π_f	Mult.[‡#]	δ[#]	α[‡a]	Comments
380.82	9/2$^+$	380.79 *7*	100	0.0	1/2$^-$	M4		0.256	B(M4)(W.u.)=2.705 *12* α(K)=0.217 *3*; α(L)=0.0329 *5*; α(M)=0.00575 *8* α(N)=0.000753 *11*; α(O)=4.46$\times10^{-5}$ *7* E_γ,Mult.: from IT decay.
793.73	5/2$^-$	793.7 *1*	100	0.0	1/2$^-$	(E2)		1.09$\times10^{-3}$ *2*	B(E2)(W.u.)>0.0078 α(K)=0.000963 *14*; α(L)=0.0001073 *15*; α(M)=1.83$\times10^{-5}$ *3* α(N)=2.45$\times10^{-6}$ *4*; α(O)=1.671$\times10^{-7}$ *24* Mult.: α(K)(exp)=1.016$\times10^{-3}$ *97* gives mult=M1,E2. Placement in level scheme requires ΔJ=2. See dataset from (p,nγ).
982.89	3/2$^-$	982.9 *1*	100	0.0	1/2$^-$	M1,E2			Mult.: α(K)(exp)=0.55$\times10^{-3}$ *13* gives mult=M1,E2. See (p,ng) dataset.
1152.71	5/2$^+$	771.9 *1*	100	380.82	9/2$^+$	E2			Mult.: α(K)(exp)=1.19$\times10^{-3}$ *33* gives mult=M1,E2. Placement in level scheme requires ΔJ=2. See dataset from (p,nγ).
1182.00	3/2$^-$	1182.1 *1*	100	0.0	1/2$^-$				
1203.01	5/2$^-$	409.2 *1*	9.8 *4*	793.73	5/2$^-$				
		1203.0 *2*	100.0 *16*	0.0	1/2$^-$				
1404.47	13/2$^+$	1024.0 *3*	100	380.82	9/2$^+$	E2		5.91$\times10^{-4}$	B(E2)(W.u.)>0.0022 α(K)=0.000522 *8*; α(L)=5.74$\times10^{-5}$ *8*; α(M)=9.79$\times10^{-6}$ *14* α(N)=1.315$\times10^{-6}$ *19*; α(O)=9.09$\times10^{-8}$ *13* α(K)exp: =0.53$\times10^{-3}$ *13* from (p,nγ). Mult.: M1,E2 from α(K)exp, but placement in level scheme requires ΔJ=2. B(E2)(W.u.) calculated assuming Q is E2.
1405.3	(7/2$^+$,9/2$^+$)	1024.0 *10*	100	380.82	9/2$^+$				
1590.92	11/2$^+$	1210.0 *2*	100	380.82	9/2$^+$	D+Q	+1.0 *4*		B(M1)(W.u.)>3.7$\times10^{-7}$; B(E2)(W.u.)>0.00029 B(M1)(W.u.) and B(E2)(W.u.) calculated assuming D+Q is M1+E2.
1608.31	7/2$^+$,9/2$^+$	1227.5 *1*	100	380.82	9/2$^+$				
1623.50	(5/2,7/2)	444.0[@]	16[@]	1182.00	3/2$^-$				
		643.0[@]	100[@]	982.89	3/2$^-$				
		829.5 *2*	100	793.73	5/2$^-$				
1629.94	(1/2$^-$,3/2$^-$)	836.2[&] *1*	100[&]	793.73	5/2$^-$	M1,E2			α(K)exp: =1.10$\times10^{-3}$ *20* from (p,nγ).
1704.7		501.9[@]	18[@]	1203.01	5/2$^-$				
		523.3 *7*	75 *13*	1182.00	3/2$^-$				I_γ: Iγ=91 in (p,γ).
		910.5[@]	94[@]	793.73	5/2$^-$				
		1704.5 *4*	100 *18*	0.0	1/2$^-$				
1756.08	5/2	574.1 *1*	100 *4*	1182.00	3/2$^-$				
		962.7 *2*	≈36	793.73	5/2$^-$				
1768.2	(9/2$^-$)	974.5 *5*	100	793.73	5/2$^-$				

$^{87}_{39}Y_{48}$-7

Adopted Levels, Gammas (continued)

$\gamma(^{87}Y)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ	E_f	J_f^π	Mult.[‡#]	δ[#]	α[‡a]	Comments
1801.64	$5/2^-$	598.1[@]	16[@]	1203.01	$5/2^-$				
		619.8 *2*	20 *4*	1182.00	$3/2^-$				
		818.5[@]	8[@]	982.89	$3/2^-$				I_γ: $I\gamma$=35 in (p,γ).
		1801.5 *2*	100 *4*	0.0	$1/2^-$				
1849	$1/2^-$	665.2[@]	67[@]	1182.00	$3/2^-$				
		864.1[@]	100[@]	982.89	$3/2^-$				
1979.95	$7/2^-$	574.0[@]	123[@]	1405.3	$(7/2^+,9/2^+)$				I_γ: from (p,γ); not reported in (p,nγ), so placement may be questionable.
		776.9 *1*	100 *4*	1203.01	$5/2^-$				
		827.3 *2*	21 *3*	1152.71	$5/2^+$				
		1186.5 *3*	31 *5*	793.73	$5/2^-$				
2008.8	(7/2)	1215.1 *3*	100	793.73	$5/2^-$				
2038.05	$(11/2^+)$	633.6 *1*	100.0 *16*	1404.47	$13/2^+$	M1+E2	+0.37 *7*	0.00171 *3*	B(M1)(W.u.)>3.6×10^{-6}; B(E2)(W.u.)>0.00098 α(K)=0.001514 *24*; α(L)=0.000167 *3*; α(M)=2.85×10^{-5} *5* α(N)=3.83×10^{-6} *7*; α(O)=2.67×10^{-7} *4* α(K)exp: =1.77×10^{-3} *45*, from (p,nγ). Mult.: Using δ from 1980Fi06 with the α(K)exp from 1980Ta13 and comparing with calculations from BrICC yields the M1+E2 multipolarity.
		1657.2 *1*	99.3 *21*	380.82	$9/2^+$	[M1,E2]		3.48×10^{-4} *6*	B(M1)(W.u.)>1.5×10^{-7}; B(E2)(W.u.)>3.9×10^{-6} α(K)=0.000194 *3*; α(L)=2.09×10^{-5} *3*; α(M)=3.56×10^{-6} *5* α(N)=4.80×10^{-7} *7*; α(O)=3.40×10^{-8} *5*; α(IPF)=0.000130 *5* I_γ: from (p,nγ); other: 49 *4* from ($^{80}Se(^{11}B,4n\gamma)$).
2072.7	(3/2,5/2,7/2)	1279.0[@]	100[@]	793.73	$5/2^-$				
2073.31	$(7/2^+,9/2^+)$	920.6 *2*		1152.71	$5/2^+$				I_γ: Not well determined. (p,nγ), In ^{87}Zr β^+ there is only a weak 921γ, with the spectrum suggesting roughly half that of the 1692γ, whereas (p,nγ) shows the 920γ intensity as slightly less than the 1692γ. In (p,γ) the 920γ intensity is a little over 4 times as high as that of the 1692γ, suggesting, for this case at least, a doublet was observed. In β^+, the 1279γ shown dexciting the 2072.7 was not observed, indicating another level close to this energy, as shown here.
		1692.0 *15*	100 *4*	380.82	$9/2^+$				

$^{87}_{39}Y_{48}$-8

$\gamma(^{87}Y)$ (continued)

E_i(level)	J_i^π	E_γ†	I_γ	E_f	J_f^π	Mult.‡#	Comments
2083.0	(3/2)⁻	880.0@	31@	1203.01	5/2⁻		
		901.3@	97@	1182.00	3/2⁻		
		930.0@b	31@b	1152.71	5/2⁺		
		1100.1@	53@	982.89	3/2⁻		
		2082.8@	100@	0.0	1/2⁻		
2112.3	5/2⁺	706.3@	55@	1405.3	(7/2⁺,9/2⁺)		
		930.0@b	27@b	1182.00	3/2⁻		
		959.7 *4*	100	1152.71	5/2⁺		
2154.60	(9/2⁻)	951.7 *2*	38.8 *14*	1203.01	5/2⁻		
		1773.5 *3*	100 *4*	380.82	9/2⁺		
2158.9		2158.9@	100@	0.0	1/2⁻		
2186.0	7/2⁻	1392.3 *3*	100	793.73	5/2⁻		
2202.17	7/2⁺,9/2⁺	611.2 *2*	30 *3*	1590.92	11/2⁺		I_γ: from (p,nγ); other: 67 *17* from ^{87}Zr β+ decay.
		797.0 *7*	100 *5*	1405.3	(7/2⁺,9/2⁺)		I_γ: 100 *34* from β^+.
		1048 *1*	33 *17*	1152.71	5/2⁺		I_γ: From β^+, as not seen in (p,nγ).
		1410.0 *15*	17 *8*	793.73	5/2⁻		I_γ: From β^+, as not seen in (p,nγ).
		1821.4 *2*	29.8 *20*	380.82	9/2⁺		I_γ: from (p,nγ); other: 50 *17* from ^{87}Zr β+ decay.
2210.6	(1/2)	409.2@	47@	1801.64	5/2⁻		
		2210.4@	100@	0.0	1/2⁻		
2241.6	(7/2,9/2⁻)	633 *1*	100 *50*	1608.31	7/2⁺,9/2⁺		
		836 *1*	100 *50*	1405.3	(7/2⁺,9/2⁺)		
		1862.0 *15*	50 *25*	380.82	9/2⁺		
2244.8		619.7@	77@	1623.50	(5/2,7/2)		
		1042.6@	100@	1203.01	5/2⁻		
		1451.9@	31@	793.73	5/2⁻		
2277.53	7/2⁻	1075.3 *4*	80 *9*	1203.01	5/2⁻		
		1483.8 *2*	100 *14*	793.73	5/2⁻		
		1896.2 *3*	50 *11*	380.82	9/2⁺		
2279.4	(7/2⁻)	1126.9	100	1152.71	5/2⁺		
2292.3	5/2⁺,7/2⁺	1139.6@	100@	1152.71	5/2⁺		
2302.61	13/2⁺	711.4 *3*		1590.92	11/2⁺		I_γ: weak.
		898.6 *2*		1404.47	13/2⁺		I_γ: weak.
		1921.6 *2*	100	380.82	9/2⁺		
2344.61		940.0 *2*	100 *11*	1404.47	13/2⁺		
		1963.9 *2*	100 *11*	380.82	9/2⁺		
2353.55	(7/2,9/2,11/2)	746.6@	100@	1608.31	7/2⁺,9/2⁺		
		949.4@	47@	1405.3	(7/2⁺,9/2⁺)		
		1559.7 *2*		793.73	5/2⁻		E_γ: γ's of 746 and 949 are reported in (p,γ) and 1559 is reported in (p,nγ).
2366.92	15/2⁻	962.4 *1*	100	1404.47	13/2⁺	D	B(E1)(W.u.)>3.8×10^{-8}

$^{87}_{39}Y_{48}$-9

Adopted Levels, Gammas (continued)

γ(^{87}Y) (continued)

E$_i$(level)	J^π_i	E$_γ$[†]	I$_γ$	E$_f$	J^π_f	Mult.[‡#]	δ[#]	α[‡a]	Comments
									α(K)=0.000257 *11*; α(L)=2.77×10^{-5} *13*; α(M)=4.72×10^{-6} *21* α(N)=6.4×10^{-7} *3*; α(O)=4.45×10^{-8} *20* δ: =+0.3 *7* from 1998Sc22.
2400.0		2019.2 *3*	100	380.82	9/2$^+$				
2409	3/2$^+$	2408.3[@]	100[@]	0.0	1/2$^-$				
2428.09	17/2$^+$	1023.6 *1*	100	1404.47	13/2$^+$	E2		5.91×10^{-4}	B(E2)(W.u.)>0.0022 α(K)=0.000522 *8*; α(L)=5.74×10^{-5} *8*; α(M)=9.80×10^{-6} *14* α(N)=1.316×10^{-6} *19*; α(O)=9.10×10^{-8} *13*
2479.07	13/2$^-$	441.1[&] *5*	26[&] *3*	2038.05	(11/2$^+$)	(D+Q)			
		888.2 *1*	100 *5*	1590.92	11/2$^+$	(D)			
2552	9/2$^+$	1400.0 *15*	100 *25*	1152.71	5/2$^+$				
		2172 *2*	50 *25*	380.82	9/2$^+$				
2563.7	9/2,11/2$^+$	973 *1*	50 *13*	1590.92	11/2$^+$				
		1159 *1*	100 *13*	1404.47	13/2$^+$				
		2183.0 *15*	38 *13*	380.82	9/2$^+$				
2602.3	(7/2)$^+$	1808.0 *15*	33 *11*	793.73	5/2$^-$				
		2222.0 *15*	100 *22*	380.82	9/2$^+$				
2648.91	(15/2$^-$)	169.9 *1*	100	2479.07	13/2$^-$	D(+Q)	+0.05 *2*	0.0434 *7*	α(K)=0.0382 *6*; α(L)=0.00435 *7*; α(M)=0.000745 *12* α(N)=9.99×10^{-5} *16*; α(O)=6.84×10^{-6} *11* Mult.: Supported by directional correlation of oriented states in (^{11}B,4nγ).
2676.06	17/2$^-$	27.2 *1*	<5.9	2648.91	(15/2$^-$)	[M1]		7.79	
		247.9 *2*	20.0 *18*	2428.09	17/2$^+$	(E1+M2)	+0.19 *11*	0.010 *4*	B(E1)(W.u.)< 1.4×10^{-5} α(K)=0.009 *3*; α(L)=0.0010 *4*; α(M)=0.00018 *7* α(N)=2.4×10^{-5} *9*; α(O)=1.6×10^{-6} *6* Transition strengths calculated assuming relative intensity of 3 *3* for the 27.2γ, based on (α,2nγ). Using this, B(M2)(W.u.)=37 *+51−31* which exceeds RUL of 1.
		309.1 *1*	100 *12*	2366.92	15/2$^-$	M1+E2	+0.20 *4*	0.00962 *20*	B(M1)(W.u.)=(0.0024 *11*); B(E2)(W.u.)=(1.1 *7*) α(K)=0.00848 *18*; α(L)=0.000953 *22*; α(M)=0.000163 *4* α(N)=2.19×10^{-5} *5*; α(O)=1.51×10^{-6} *3* Mult.: D+Q from (α,2nγ) angular distribution and E1+M2 for δ = +0.2 *4* is eliminated from RUL. δ: from (α,2nγ); other: −0.08 *8* from ^{80}Se(^{11}B,4nγ).
2808.4	(13/2$^-$)	1040.2[&] *5*	100[&]	1768.2	(9/2$^-$)				
2827.20	21/2$^+$	399.1 *1*	100	2428.09	17/2$^+$	E2		0.00792	B(E2)(W.u.)=4.6 *3*

$\gamma(^{87}Y)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ	E_f	J^π_f	Mult.[‡#]	δ[#]	α[‡a]	Comments
									α(K)=0.00695 *10*; α(L)=0.000817 *12*; α(M)=0.0001395 *20* α(N)=1.84×10^{-5} *3*; α(O)=1.176×10^{-6} *17*
2961.47	17/2$^-$	285.4 *1*	100 *6*	2676.06	17/2$^-$	M1(+E2)	+0.07 *28*	0.0114 *14*	α(K)=0.0100 *12*; α(L)=0.00112 *16*; α(M)=0.00019 *3* α(N)=2.6×10^{-5} *4*; α(O)=1.79×10^{-6} *19*
		312.6 *3*	40 *4*	2648.91	(15/2$^-$)	(M1+E2)	−0.4 *3*	0.0102 *17*	α(K)=0.0090 *15*; α(L)=0.00102 *19*; α(M)=0.00018 *4* α(N)=2.3×10^{-5} *5*; α(O)=1.58×10^{-6} *23* I_γ: from ^{80}Se(^{11}B,4nγ).
2986.9	(19/2$^+$)	159.8[&] *1*	100[&] *5*	2827.20	21/2$^+$	(M1+E2)	+0.06 *2*	0.0512 *9*	α(K)=0.0451 *8*; α(L)=0.00515 *10*; α(M)=0.000882 *16* α(N)=0.0001182 *21*; α(O)=8.08×10^{-6} *13* B(M1)(W.u.)>0.078?; B(E2)(W.u.)>4.1? E_γ: Taken from (α,2nγ). δ: from (α,2nγ); other: +0.25 *15* from ^{80}Se(^{11}B,4nγ).
		558.7[&] *5*	35[&] *4*	2428.09	17/2$^+$	[M1,E2]		0.00236 *10*	B(M1)(W.u.)>0.00041; B(E2)(W.u.)>0.092 α(K)=0.00208 *9*; α(L)=0.000231 *12*; α(M)=3.94×10^{-5} *19* α(N)=5.29×10^{-6} *25*; α(O)=3.66×10^{-7} *14*
2995.6	(17/2)	346.7 *2*	100	2648.91	(15/2$^-$)				
2996.1	(7/2,9/2,11/2)	1388.0 *15*	100 *33*	1608.31	7/2$^+$,9/2$^+$				
		2615.0 *15*	100 *67*	380.82	9/2$^+$				
3094.4	(21/2)	107.5 *2*	100	2986.9	(19/2$^+$)	D			
3262.9	9/2$^+$,11/2$^+$	1857.0 *15*	100 *50*	1405.3	(7/2$^+$,9/2$^+$)				
		2883 *2*	100 *75*	380.82	9/2$^+$				
3402.4	(19/2$^-$)	440.9[&] *5*	51[&] *4*	2961.47	17/2$^-$	(M1)		0.00390	α(K)=0.00344 *5*; α(L)=0.000381 *6*; α(M)=6.51×10^{-5} *10* α(N)=8.77×10^{-6} *13*; α(O)=6.12×10^{-7} *9*
		726.4[&] *3*	100[&] *8*	2676.06	17/2$^-$	(M1+E2)	+0.26 *6*	1.24×10^{-3}	α(K)=0.001098 *16*; α(L)=0.0001202 *18*; α(M)=2.05×10^{-5} *3* α(N)=2.76×10^{-6} *4*; α(O)=1.94×10^{-7} *3* δ: from (α,2nγ); other: +0.09 *11* from ^{80}Se(^{11}B,4nγ).
3405.2	3/2$^+$,5/2$^+$	1203 *1*	100	2202.17	7/2$^+$,9/2$^+$				
3446.5	(19/2$^-$)	770.5[&] *3*	100[&]	2676.06	17/2$^-$	(D+Q)	−0.19 *17*	1.08×10^{-3} *2*	δ: from (^{11}B,4nγ).
3552.95	(23/2$^+$)	725.8[&] *1*	100[&]	2827.20	21/2$^+$	D(+Q)	−0.20 *22*	1.24×10^{-3} *2*	α(K)=0.001097 *21*; α(L)=0.0001200 *25*; α(M)=2.05×10^{-5} *5* α(N)=2.76×10^{-6} *6*; α(O)=1.94×10^{-7} *4*

$^{87}_{39}Y_{48}$-11

Adopted Levels, Gammas (continued)

$\gamma(^{87}Y)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ	E_f	J^π_f	Mult.[‡#]	δ[#]	α[‡a]	Comments
									B(M1)(W.u.)=(0.67 *+23−14*) δ: from ^{80}Se(^{11}B,4nγ); other: +0.05 *2* from ^{85}Rb(α,2nγ). B(E2)(W.u.): not calculated due to large uncertainty in mixing ratio.
3595.2	(21/2,23/2,25/2$^+$)	768.0 *3*	100	2827.20	21/2$^+$				
3595.3	(21/2$^+$)	608.4 *3*	100	2986.9	(19/2$^+$)	D+Q	+0.06 *3*		B(M1)(W.u.)=(1.9×10^{-4} *+13−6*); B(E2)(W.u.)=(2.1×10^{-3} *+15−6*)
3766.6	(21/2$^-$)	364.1[&] *5*	100[&] *8*	3402.4	(19/2$^-$)	D+(Q)	−0.15 *20*		
		1090.6[&] *5*	67[&] *8*	2676.06	17/2$^-$	(E2)		5.12×10^{-4}	α(K)=0.000453 *7*; α(L)=4.96×10^{-5} *7*; α(M)=8.47×10^{-6} *12* α(N)=1.138×10^{-6} *16*; α(O)=7.89×10^{-8} *11*
3908.8	(23/2$^-$)	142.2[&] *5*	21[&] *6*	3766.6	(21/2$^-$)	(D+Q)			
		506.4[&] *5*	100[&] *6*	3402.4	(19/2$^-$)	[Q]			
4039.40	(25/2$^+$)	486.4[&] *1*	100[&]	3552.95	(23/2$^+$)	D(+Q)	−0.16 *20*		B(M1)(W.u.)=(1.1 *+4−3*); B(E2)(W.u.)<817 α(K)=0.00276 *10*; α(L)=0.000305 *13*; α(M)=5.21×10^{-5} *22* α(N)=7.0×10^{-6} *3*; α(O)=4.89×10^{-7} *16*
4214.1	(27/2)	174.7 *2*	100	4039.40	(25/2$^+$)	D			
4555.0	(23/2$^+$)	1568.2[&] *5*	100[&] *14*	2986.9	(19/2$^+$)	(E2)		3.50×10^{-4}	α(K)=0.000212 *3*; α(L)=2.29×10^{-5} *4*; α(M)=3.91×10^{-6} *6* α(N)=5.27×10^{-7} *8*; α(O)=3.70×10^{-8} *6*; α(IPF)=0.0001110 *16*
		1727.6[&] *5*	62[&] *19*	2827.20	21/2$^+$				
4564.1	(23/2$^-$)	1011.4[&] *5*	41[&] *17*	3552.95	(23/2$^+$)	(D)			α(K)=0.000232 *4*; α(L)=2.50×10^{-5} *4*; α(M)=4.27×10^{-6} *6* α(N)=5.75×10^{-7} *8*; α(O)=4.03×10^{-8} *6*
		1117.6[&] *3*	100[&] *7*	3446.5	(19/2$^-$)	(E2)		4.86×10^{-4}	α(K)=0.000429 *6*; α(L)=4.70×10^{-5} *7*; α(M)=8.01×10^{-6} *12* α(N)=1.077×10^{-6} *15*; α(O)=7.47×10^{-8} *11*; α(IPF)=1.145×10^{-6} *19*
		1161.7[&] *5*	31[&] *4*	3402.4	(19/2$^-$)				
4609.66	25/2$^+$	569.0[&] *5*	11[&] *3*	4039.40	(25/2$^+$)				
		1056.8[&] *1*	100[&] *25*	3552.95	(23/2$^+$)	D(+Q)	0.04 *18*		
		1782.4[&] *1*	83[&] *17*	2827.20	21/2$^+$	E2		3.91×10^{-4}	B(E2)(W.u.)=4.9 *21* α(K)=0.0001654 *24*; α(L)=1.785×10^{-5} *25*; α(M)=3.04×10^{-6} *5* α(N)=4.10×10^{-7} *6*; α(O)=2.89×10^{-8} *4*; α(IPF)=0.000204 *3*

γ(^{87}Y) (continued)

E_i(level)	J^{π}_i	E_γ[†]	I_γ	E_f	J^{π}_f	Mult.[‡#]	δ[#]	α[‡a]	Comments
5228.2	(25/2⁻)	1189.1[&] *5*	78[&] *11*	4039.40	(25/2⁺)	(D)			
		1319.4[&] *5*	100[&] *11*	3908.8	(23/2⁻)	D(+Q)	0.14 *22*		
		1675.1[&] *5*	56[&] *6*	3552.95	(23/2⁺)	(D)			δ: From (^{11}B,4nγ) δ was −0.27 *27*.
5288.48	(27/2⁺)	678.8[&] *1*	100[&] *18*	4609.66	25/2⁺	(D,Q)			
		1249.0[&] *5*	11.8[&] *18*	4039.40	(25/2⁺)	(D,Q)			
		1735.8[&] *5*	21[&] *3*	3552.95	(23/2⁺)				
5319.7	(25/2⁻)	1553.0[&] *5*	100[&]	3766.6	(21/2⁻)	(E2)		3.48×10^{-4}	α(K)=0.000216 *3*; α(L)=2.34×10^{-5} *4*; α(M)=3.99×10^{-6} *6* α(N)=5.37×10^{-7} *8*; α(O)=3.77×10^{-8} *6*; α(IPF)=0.0001047 *15*
5495.2	(25/2⁺)	940.1[&] *5*	82[&] *9*	4555.0	(23/2⁺)	D+Q	−0.8 *5*		
		1942.2[&] *5*	100[&] *9*	3552.95	(23/2⁺)	D+Q	−0.8 *3*		
5759.59	(27/2⁻)	264.3[&] *5*	12.3[&] *18*	5495.2	(25/2⁺)	(D)			δ: −0.20 *20*. Mult.: Although a calculated mixing ratio of −0.20 *20* for M2/E1 is reported in (^{11}B,4nγ), an M2 component is excluded by RUL for larger half-lives reasonably close to 2.1 ps.
		439.7[&] *5*	14[&] *4*	5319.7	(25/2⁻)	D(+Q)	+0.10 *10*		
		531.5[&] *5*	9[&] *4*	5228.2	(25/2⁻)				
		1195.6[&] *3*	100[&] *7*	4564.1	(23/2⁻)	(E2)		4.26×10^{-4}	B(E2)(W.u.)<2.1 α(K)=0.000370 *6*; α(L)=4.04×10^{-5} *6*; α(M)=6.90×10^{-6} *10* α(N)=9.27×10^{-7} *13*; α(O)=6.45×10^{-8} *9*; α(IPF)=7.38×10^{-6} *11*
		1720.0[&] *3*	95[&] *11*	4039.40	(25/2⁺)	(E1+M2)	−0.14 *10*	5.20×10^{-4}	B(E1)(W.u.)<1.3×10^{-5}?; B(M2)(W.u.)<0.95? α(K)=9.7×10^{-5} *10*; α(L)=1.04×10^{-5} *11*; α(M)=1.78×10^{-6} *18* α(N)=2.39×10^{-7} *24*; α(O)=1.69×10^{-8} *17*; α(IPF)=0.000411 *14* Mult.: (D+Q) from direction correlation of oriented nuclei in ^{80}Se(^{11}B,4nγ) and additional support from level scheme placement.
5827.1	(27/2⁺)	331.7[&] *5*	6.8[&] *17*	5495.2	(25/2⁺)				
		1217.4[&] *3*	100[&] *14*	4609.66	25/2⁺	(M1+E2)	−1.0 *3*	4.14×10^{-4}	α(K)=0.000358 *5*; α(L)=3.89×10^{-5} *6*; α(M)=6.64×10^{-6} *10* α(N)=8.95×10^{-7} *13*; α(O)=6.28×10^{-8} *10*; α(IPF)=9.4×10^{-6} *5*
		1787.8[&] *5*	44[&] *7*	4039.40	(25/2⁺)				
5934.50	(29/2⁻)	107.5[&] *5*	38[&] *4*	5827.1	(27/2⁺)	(D)			
		174.9[&] *1*	100[&] *6*	5759.59	(27/2⁻)	D+Q	−0.20 *12*		
		615.0[&] *5*	21[&] *4*	5319.7	(25/2⁻)				
		646.0[&] *3*	80[&] *6*	5288.48	(27/2⁺)	(D)			Mult.,δ: reported as E1+M2 with δ=−0.5(4), but this δ gives

From ENSDF

$^{87}_{39}$Y$_{48}$-13

Adopted Levels, Gammas (continued)

$\gamma(^{87}Y)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ	E_f	J^π_f	Mult.[‡#]	δ[#]	Comments
								BM2W=4.E+2 +6-4 which is too large and δ must be essentially zero.
5934.50	(29/2⁻)	706.3[&] *5*	44[&] *5*	5228.2	(25/2⁻)			
6535.5	(31/2⁻)	601.0[&] *1*	100[&]	5934.50	(29/2⁻)	(D+Q)	+0.14 *14*	B(M1)(W.u.)=(0.55 *13*); B(E2)(W.u.)=(3.E+1 *+7−3*) α(K)=0.00168 *3*; α(L)=0.000184 *4*; α(M)=3.15×10^{-5} *6* α(N)=4.24×10^{-6} *8*; α(O)=2.97×10^{-7} *5*
7016.6	(33/2⁻)	481.1[&] *1*	100[&]	6535.5	(31/2⁻)	(D+Q)	−0.10 *15*	B(M1)(W.u.)=(1.8 *5*); B(E2)(W.u.)=(9.E+1 *+26−9*) α(K)=0.00281 *7*; α(L)=0.000311 *8*; α(M)=5.31×10^{-5} *14* α(N)=7.15×10^{-6} *18*; α(O)=4.99×10^{-7} *11*

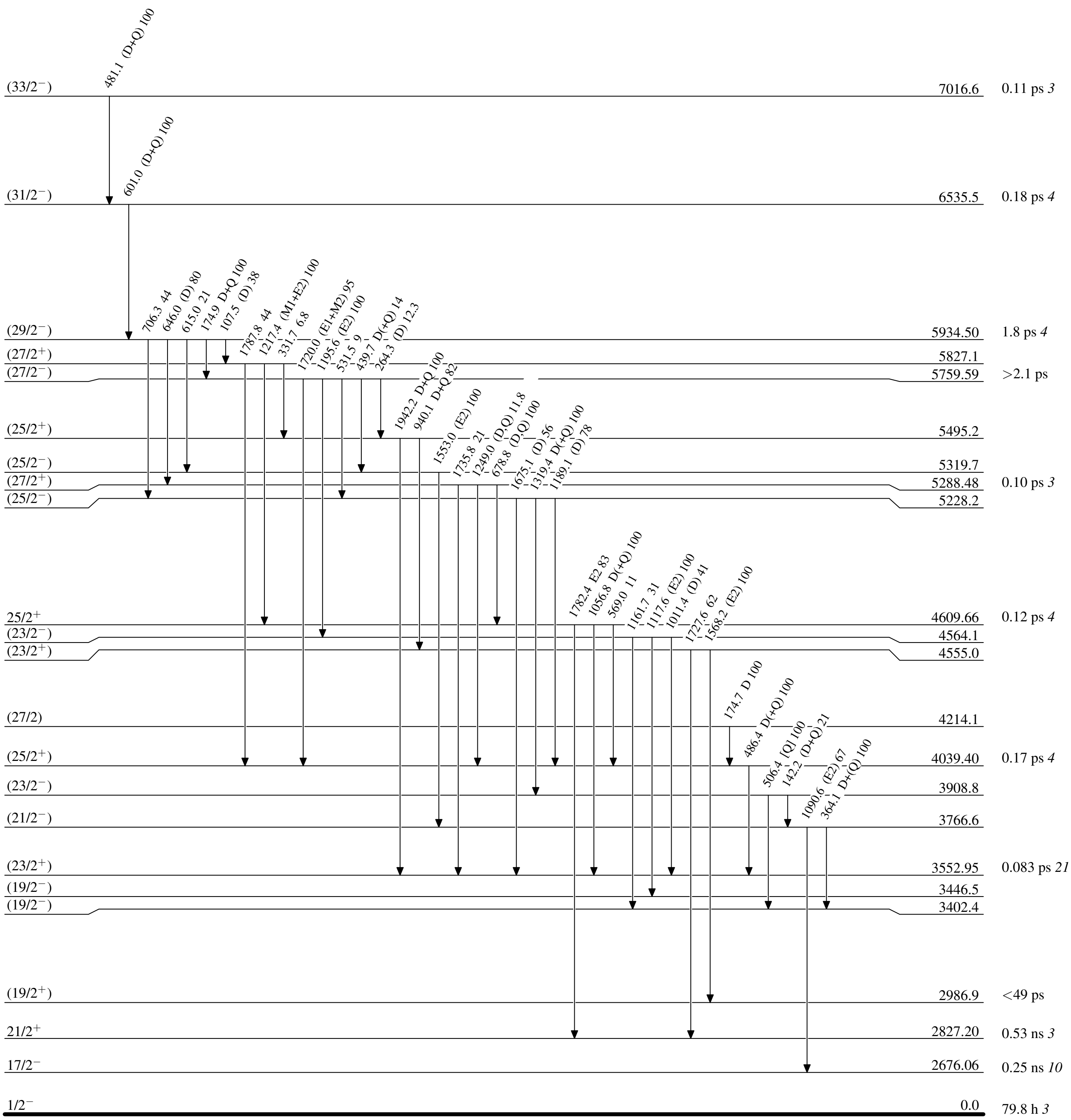
[†] Weighted average of values from $\varepsilon+\beta^+$ decay, (p,nγ), and (p,2nγ) or (α,2nγ), or one of these measurements, unless indicated otherwise.
[‡] For calculation of reduced transition probabilities and the related α, the assignments of stretched Q are taken to be E2.
[#] From (α,2nγ), unless indicated otherwise.
[@] From (p,γ); these values do not have uncertainties and the energies are quoted here to the nearest 0.1 keV.
[&] From ^{80}Se(^{11}B,4nγ).
[a] Additional information 1.
[b] Multiply placed with undivided intensity.

$^{87}_{39}Y_{48}$-14

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

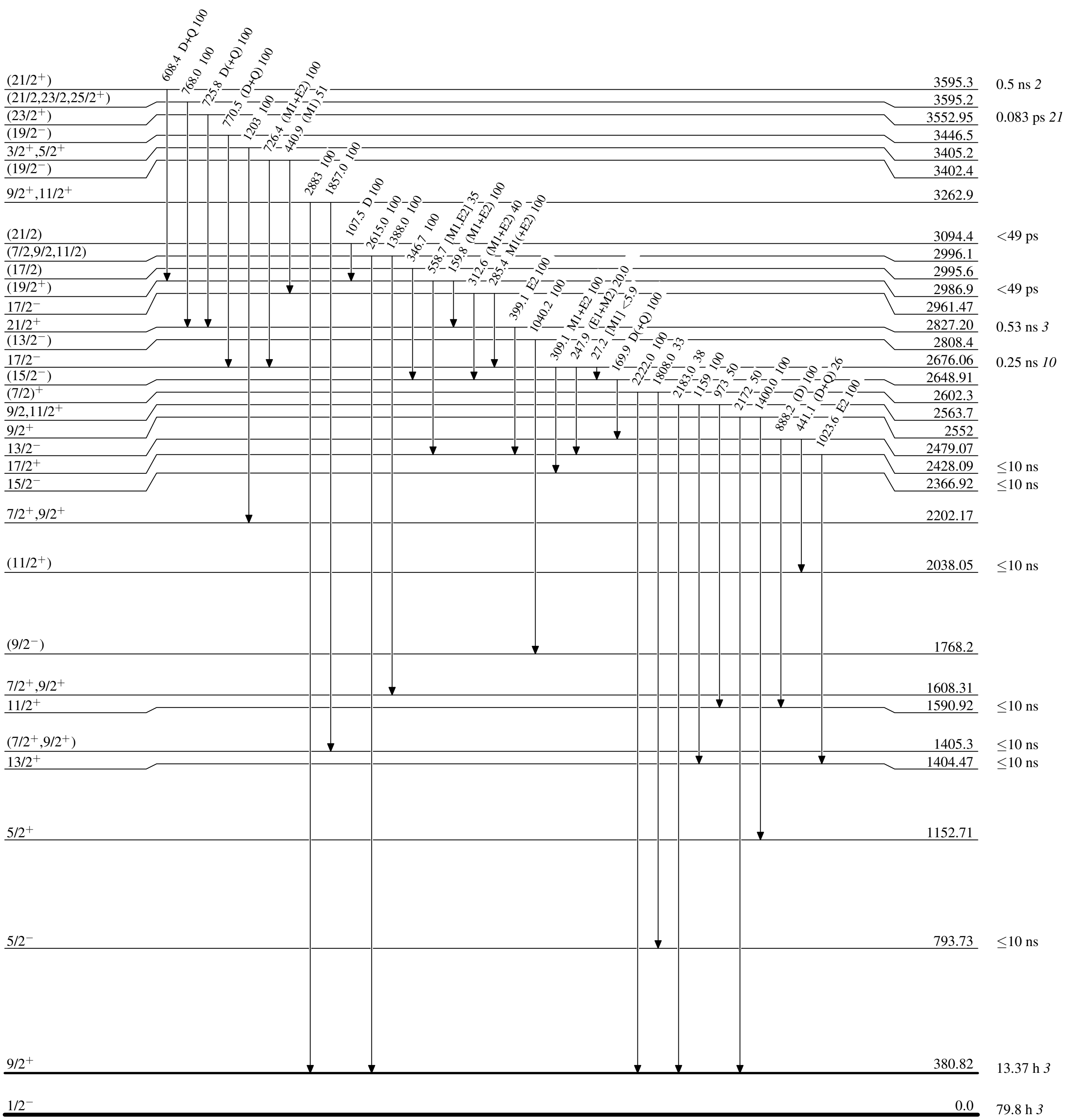


$^{87}_{39}Y_{48}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

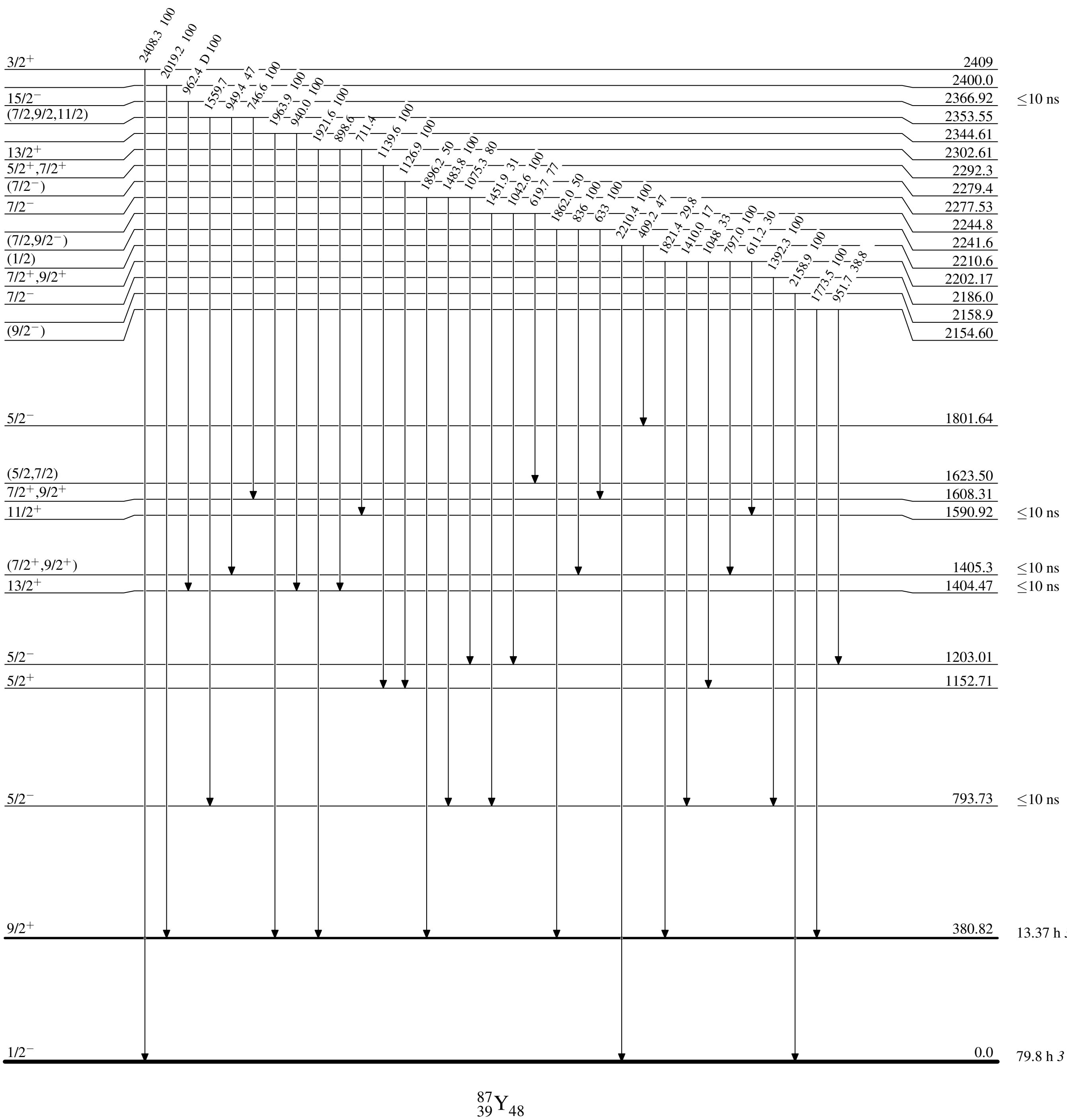


$^{87}_{39}Y_{48}$

Adopted Levels, Gammas

Level Scheme (continued)

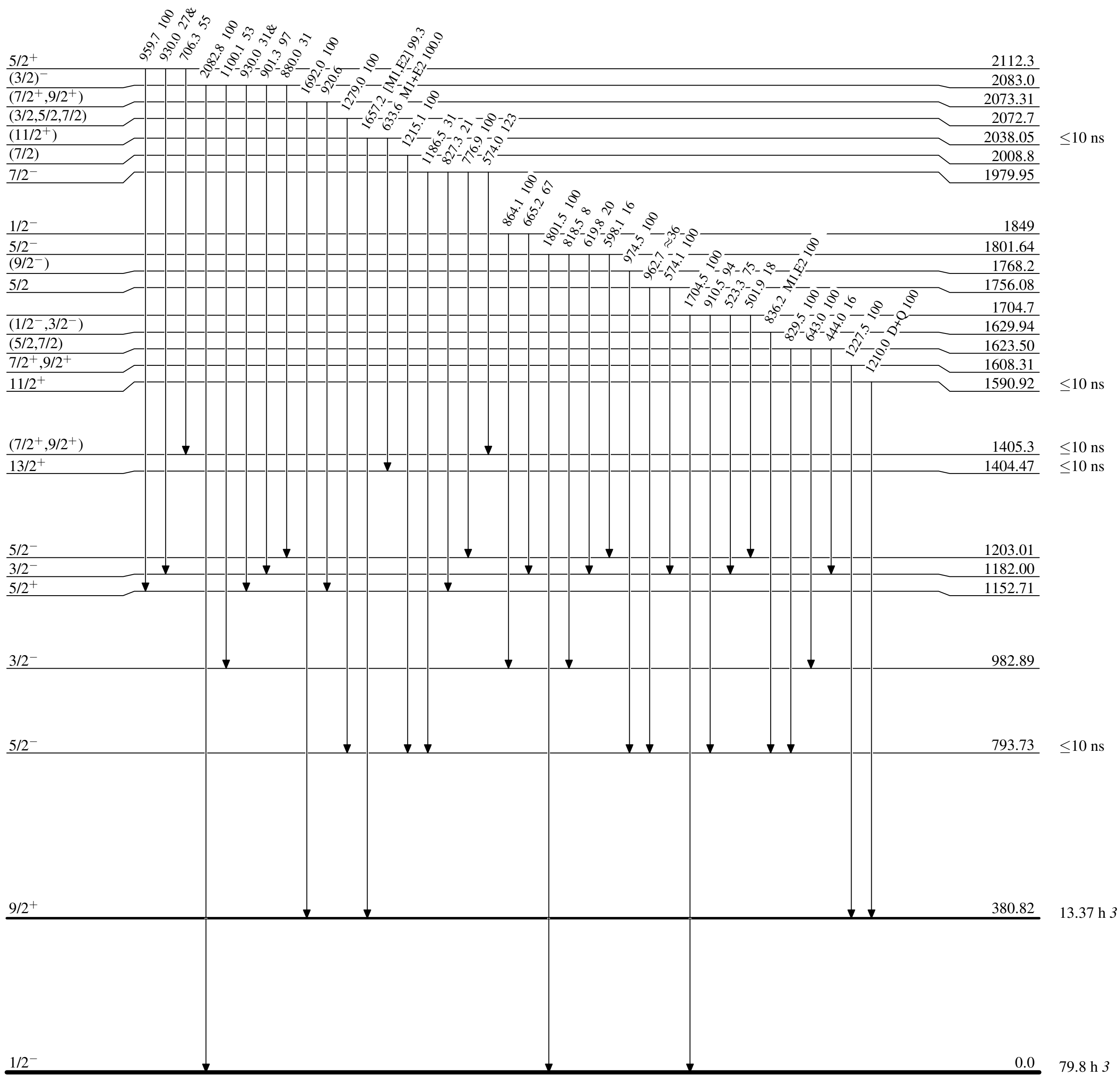
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

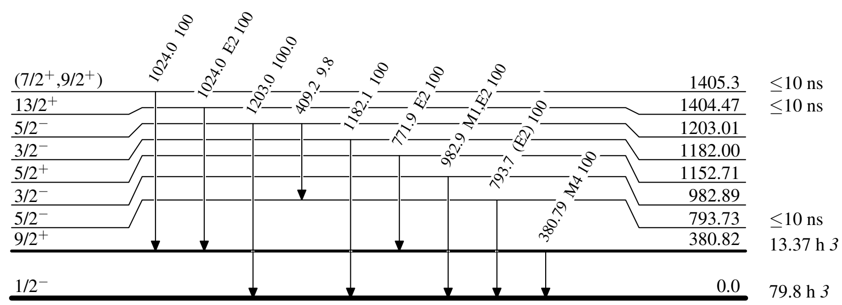


$^{87}_{39}Y_{48}$

Adopted Levels, Gammas

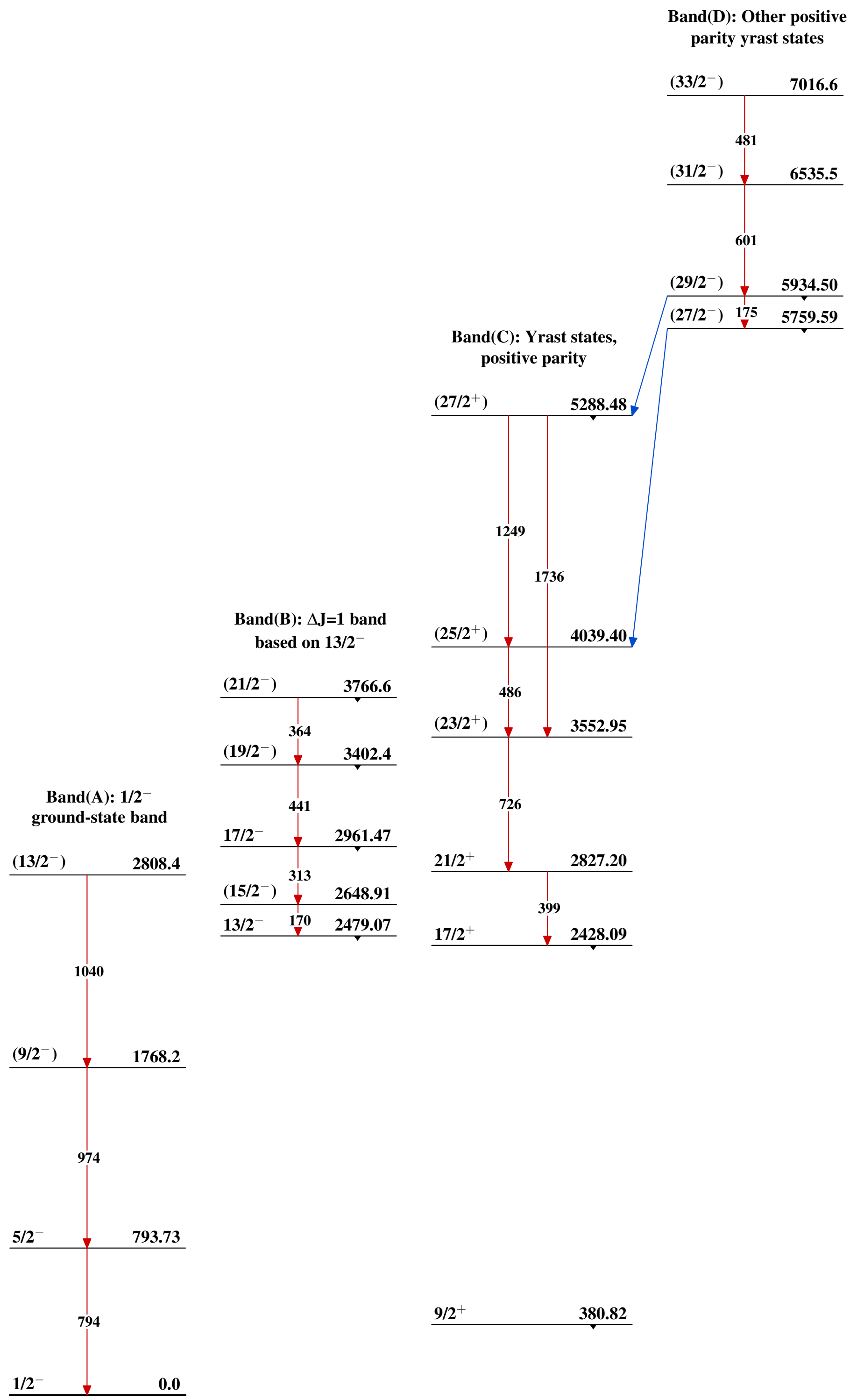
Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



$^{87}_{39}Y_{48}$

Adopted Levels, Gammas



$^{87}_{39}Y_{48}$