Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 114, 1293 (2013)	1-Sep-2013

Q(β^-)=−4430 *7*; S(n)=12048 *4*; S(p)=5154 *3*; Q(α)=−6045 *4* 2012Wa38

Theory (partial list):
Level structure: 1996Ru02, 1992Si14, 1988Xi01, 1985Bl04, 1984Mu03, 1978Fu11, 1977Ba54, 1974Gl01, 1966Ve02, 1965Au04 (shell-model calculations).
1980Ha39 (pairing correlations with intrinsic degrees of freedom).
1979Ho20, 1977Ak01 (BCS model).
1978Li26 (nuclear field theory).
Electromagnetic transition probabilities: 1988Ji04, 1978Fu11 (shell model).
Analog resonances: 1970Bu20, 1971Bi18, 1972Sp02, 1974Ho22.

Other Reactions:

^{90}Zr(p,n) IAR:
Unpublished $\sigma(\theta)$ data of W. H. Dunlop for population of the analog of the ^{91}Zr g.s. are shown in 1974Ho22.

^{91}Nb Levels

Cross Reference (XREF) Flags

A	^{88}Sr(^{6}Li,3nγ),^{78}Se(^{16}O,2npγ)	I	^{90}Zr(α,t),^{90}Zr(α,tp)	Q	^{90}Zr(^{7}Li,^{6}He), (^{7}Li,^{6}Hep)
B	^{89}Y(α,2nγ), ^{93}Nb(α,α'2nγ)	J	^{90}Zr(d,n)	R	^{90}Zr(p,p),(p,p$'$),(p,p$'\gamma$) IAR
C	^{90}Zr(α,2npγ)	K	^{90}Zr(^{12}C,^{11}B), (^{16}O,^{15}N),	S	^{90}Zr(^{3}He,d) IAS
D	^{91}Mo ε decay (15.49 min)	L	^{90}Zr(^{3}He,d)	T	^{76}Ge(^{19}F,4nγ)
E	^{91}Mo ε decay (64.6 s)	M	^{92}Mo(t,α)	U	^{93}Nb(p,p2n):moment
F	^{90}Zr(p,γ)	N	^{92}Mo(d,^{3}He)	V	^{90}Zr(^{13}C,^{12}B)
G	^{91}Zr(p,n)	O	^{91}Nb IT decay (60.86 d)		
H	^{91}Zr(p,nγ)	P	^{91}Nb IT decay (3.76 μs)		

E(level)[†]	J^π	$T_{1/2}$[‡]	XREF	Comments
0.0[#]	9/2$^+$	6.8×10^2 y *13*	ABCDEFGHIJKLMNOPQ TUV	%ε+%β^+=100 μ=+6.521 *2* (2009Ch25) Q=−0.25 *3* (2009Ch25) J^π: L(^{3}He,d)=4 on 0$^+$ target; L(^{16}O,^{15}N)=5 on 0$^+$ target with 1/2$^-$ ejectile. $T_{1/2}$: from activity of mass-separated source (1982Na17) assuming $T_{1/2}$(^{94}Nb)=2.03×10^4 y *16*. μ,Q: from collinear LASER spectroscopy (2011StZZ from 2009Ch25).
104.60 *5*	1/2$^-$	60.86 d *22*	AB DEFGHI LMNOPQ U	%ε+%β^+=3.4 *5*; %IT=96.6 *5* μ=−0.101 *2* (2009Ch25) Δ<r^2>(^{91g}Nb,^{91m}Nb)=+0.040 fm^2 *3* (2009Ch25). %ε+%β^+: from ^{91}Nb IT decay (60.86 d). J^π: L(^{3}He,d)=1 on 0$^+$ target; M4 105γ to 9/2$^+$. $T_{1/2}$: from ^{91}Nb IT decay (60.86 d). μ: from collinear LASER spectroscopy (2011StZZ; from 2009Ch25).
1040 *25*			M	
1186.88 *7*	5/2$^-$	2.6 ps *11*	AB DEFGH M P	J^π: L(t,α)=3 on 0$^+$ target; E2 1082γ to 1/2$^-$ 105.
1312.72 *9*	3/2$^-$	0.166 ps *17*	AB EFGHI KLMN Q	XREF: K(1270). J^π: L(^{3}He,d)=1 on 0$^+$ target; L(^{16}O,^{15}N)=2 on 0$^+$ target

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{91}Nb Levels (continued)

E(level)[†]	J^{π}	$T_{1/2}$[‡]	XREF	Comments
				with 1/2$^-$ ejectile.
1581.02 *14*	(7/2)$^+$	0.33 ps *3*	AB D FGHI	J^{π}: M1+E2 1581γ to 9/2$^+$ g.s.; log *ft*=7.2 (log $f^{1u}t$=8.4) from 9/2$^+$ parent; Hauser-Feshbach analysis in (p,n).
1612.66 *9*	3/2$^-$	0.054 ps *12*	B EFGH JKLMN Q	XREF: K(1580)L(1595). J^{π}: L(^{3}He,d)=1 on 0$^+$ target; L(^{16}O,^{15}N)=2 on 0$^+$ target with 1/2$^-$ ejectile.
1637.01 *15*	(9/2$^+$)	1.8 ps *+11−4*	AB D FGH	J^{π}: log *ft*=7.0 (log $f^{1u}t$=8.2) from 9/2$^+$ parent; (M1+E2) 1637γ to 9/2$^+$ g.s.; Hauser-Feshbach analysis in (p,n).
1790.63 *9*	(9/2$^-$)	>1.6 ps	ABCD FGHi P	XREF: i(1820). J^{π}: E2 194γ from (13/2$^-$) 1984; D(+Q) 1790γ to 9/2$^+$ g.s.; 604γ to 5/2$^-$ 1187.
1844.93 *13*	(5/2)$^-$	>1.5 ps	D FGHi KLMN	XREF: i(1820)K(1880). J^{π}: L(t,α)=3 on 0$^+$ target; 1740γ to 1/2$^-$ 105; Hauser-Feshbach analysis in (p,nγ).
1885 *8*	(≥7/2)[a]		F	
1963.11 *21*	(5/2$^+$)	0.18 ps *3*	B FGHI LM	J^{π}: 5/2 from Hauser-Feshbach analysis in (p,nγ); 1963γ to 9/2$^+$ g.s.; L(^{3}He,d)=1,(2) on 0$^+$ target.
1984.26 *11*	(13/2$^-$)	10.0 ns *4*	ABC FGH P	μ=+8.14 *13* J^{π}: Q+O 1984γ to 9/2$^+$ g.s.; configuration=((π $p_{1/2}$)($g_{9/2}$)^{2}13/2$^-$) (1975Br01) (supported by measured g factor). $T_{1/2}$: from (α,2nγ). μ: From TDPAD (1989Ra17, from +8.19 *26* based on g-factor=1.26 *4* (1976Ba02) and other unpublished data). differs from +9.14 *13* (2011StZZ and 2005St24, from 1977ZaZW).
2034.42 *20*	(17/2$^-$)	3.76 μs *12*	AB P T	%IT=100 μ=+10.82 *14* J^{π}: (E2) 50γ to (13/2$^-$); isomeric state expected with configuration=((π $p_{1/2}$)($g_{9/2}$)^{2}17/2$^-$) (1975Br01). $T_{1/2}$: from γ(t) in (^{6}Li,3nγ) (1976Br14,1975Br01). Others: 3.4 μs *1* from time-dependent perturbed angular distribution in (^{6}Li,3nγ) (1977Ha49), 3.8 μs *2* from γ(t) in (α,2nγ) (1974Be36). μ: from DPAD in (^{6}Li,3nγ) (1977Ha49). other μ: +10.81 *15* from DPAD in (α,2nγ) (1979Pl05) (both values are listed in 1989Ra17 and 2011StZZ).
2065 *8*	(≥7/2)[a]		F M	
2120.87 *15*	(7/2$^-$)	>1.0 ps	B FGH	J^{π}: 808γ to 3/2$^-$ 1313; ΔJ=0,1 330γ to (9/2$^-$) 1791; 2120γ to 9/2$^+$.
2170	(7/2,9/2,11/2)		B F K	J^{π}: D 2170γ to 9/2$^+$ g.s.
2275 *10*	(≥7/2)[a]		F i	XREF: i(2300).
2290.76[#] *15*	(13/2)$^+$	0.250 ps *21*	ABC FGH T	J^{π}: stretched E2 2291γ to 9/2$^+$. E consistent with that expected for (($g_{9/2}$)^3)13/2$^+$ state (1975Br01). $T_{1/2}$: from DSA in (α,2nγ). 0.12 ps *+4−3* from (p,nγ).
2324.55 *20*	(5/2$^-$)	0.111 ps *14*	B F Hi M	XREF: i(2300). J^{π}: IAR analysis in (p,nγ); 1012γ to 3/2$^-$ 1313; 744γ to (7/2)$^+$ 1581.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{91}Nb Levels (continued)

E(level)[†]	J^π	$T_{1/2}$[‡]	XREF	Comments
2330.03 *24*	$(11/2)^+$	0.104 ps *+28−21*	B FGH	J^π: M1+E2 2330γ to $9/2^+$ g.s.; Hauser-Feshbach and IAR analysis in (p,nγ).
2345.36 *11*	$(3/2)^-$	0.104 ps *+21−14*	EFGH L	J^π: L(^{3}He,d)=1 on 0^+ target; Hauser-Feshbach analysis in (p,nγ).
2390.01 *22*	$(3/2^+)$	1.0 ps *+24−5*	FGHI M	XREF: M(2408). J^π: γ's to $1/2^-$ and $5/2^-$; $3/2^+$,$5/2^+$ from IAR analysis in (p,nγ).
2413.49 *19*	$(11/2^-)$	0.65 ps *25*	AB FGH	J^π: M1+E2 429γ to $(13/2^-)$ 1984; D(+Q) 2413γ to $9/2^+$ g.s.
2531.2 *3*	$(11/2^-)$	0.9 ps *+5−3*	B D FGHI M	J^π: D+Q 2531γ to $9/2^+$ g.s.; Hauser-Feshbach and IAR analysis in (p,nγ).
2579.54 *23*	$(5/2^+)$	0.55 ps *+35−14*	B FGH	J^π: γ's to $3/2^-$ and $9/2^+$; Hauser-Feshbach and IAR analysis in (p,nγ).
2612.6 *3*	$(7/2^-)$	0.090 ps *+21−14*	FGHI m	XREF: m(2624). J^π: 2613γ to $9/2^+$ g.s.; Hauser-Feshbach and IAR analysis in (p,n).
2631.98 *18*	(9/2)	0.125 ps *+35−21*	D FGH Lm	XREF: m(2624). J^π: log *ft*=6.6 (log $f^{1u}t$=7.6) from $9/2^+$ parent; Hauser-Feshbach analysis of (p,nγ).
2660.25 *21*	$(15/2^-)$	≤14 ps	AB	J^π: D(+Q) 626γ to $(17/2^-)$ 2034; configuration=$((\pi\ p_{1/2})(g_{9/2})^2 15/2^-)$ state expected at comparable energy (1974Gl01). $T_{1/2}$: from Doppler shift in (^{6}Li,3nγ).
2792.55 *15*	$(7/2^+)$		D FGHI K M	XREF: K(2750). J^π: log *ft*=7.2 (log $f^{1u}t$=8.2) from $9/2^+$ parent; Hauser-Feshbach and IAR analysis in (p,nγ); 1606γ to $5/2^-$ 1187.
2881.9 *4*	(≤7/2)[a]		F Hi k M	XREF: i(2900)k(2900). J^π: γ to $3/2^-$.
2911.8 *3*			Hi k	XREF: i(2900)k(2900). J^π: 2912γ to $9/2^+$ g.s., so J=(5/2 to 13/2).
2969.9 *3*			H L	J^π: 2970γ to $9/2^+$ g.s. so J=(5/2 to 13/2).
2991.3 *3*			Hi m	XREF: i(3010)m(3000). J^π: 1804γ to $5/2^-$ 1187 favors J≤(9/2).
3028.26 *18*	7/2,9/2,11/2$^{(+)}$		D F Hi m	XREF: i(3010)m(3000). J^π: log *ft*=6.4 (log $f^{1u}t$=7.3) from $9/2^+$ parent; 1447γ to $(7/2)^+$ 1581.
3065.3 *8*	$(5/2^-)$		F H	J^π: γ's to $1/2^-$ and $(9/2^-)$.
3080 *10*	(≤7/2)[a]		F m	XREF: m(3096).
3110.13[#] *19*	$(17/2)^+$	<0.2 ns	ABC T	J^π: E2 819γ to $(13/2)^+$ 2291; D 450γ to J≥15/2, 2661; E consistent with that calculated for $((g_{9/2})^3)17/2^+$ state (1974Gl01). $T_{1/2}$: from (^{6}Li,3nγ).
3126.04 *23*	(≥7/2)[a]		F HI m	XREF: m(3096). J^π: γ's to $9/2^+$ and $(7/2)^+$.
3149.17 *24*	7/2,9/2,11/2		D F H	J^π: log *ft*=6.5 (log $f^{1u}t$=7.3) from $9/2^+$ parent.
3179.65 *22*	$(3/2)^+$		F H L Q	XREF: L(3162). J^π: L(^{3}He,d)=2 on 0^+ target; 3074γ to $1/2^-$ 105.
3187.4 *3*	7/2,9/2,11/2		D F H	J^π: log *ft*=7.5 (log $f^{1u}t$=8.3) from $9/2^+$ parent.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{91}Nb Levels (continued)

E(level)[†]	Jπ	$T_{1/2}$[‡]	XREF	Comments
3273.5 *3*	(≤7/2)[a]		F H M	XREF: M(3259). Jπ: 3273γ to 9/2+ g.s.
3300 *10*	(≥7/2)[a]		F M	
3328.6 *3*			H	Jπ: 3329γ to 9/2+ g.s.
3370.1 *15*	5/2+,7/2+		F IjK M q V	XREF: j(3390)q(3410). Jπ: L(^{16}O,^{15}N)=3 on 0+ target with 1/2− ejectile; consistent with possible 3370γ to 9/2+ g.s.
3434.4	(5/2)+		H j LM q	XREF: j(3390)L(3410)q(3410). Jπ: L(^{3}He,d)=2 on 0+ target; possible 3434γ to 9/2+ g.s.
3461.6	(≤7/2)[a]		F H	Jπ: possible 3462γ to 9/2+ g.s., so J=1/2,3/2,5/2− unlikely.
3466.77[#] *21*	(21/2)+	0.92 ns *10*	ABC T	μ=+12.4 *19* Jπ: stretched E2 357γ to (17/2)+ 3110. E consistent with that calculated for $((g_{9/2})^3)$21/2+ state (1974Gl01). $T_{1/2}$: from α-357ce(t) in (α,α′2nγ). μ: from integral perturbed angular distribution (1989Ra17, from 1977Ba34). value rounded to +12 *2* In 2011StZZ.
3562.1 *15*	(≤7/2)		F H LM	XREF: M(3529). Jπ: 3562γ to 9/2+ g.s.; primary γ intensity in (p,γ).
3591? *25*			M	Possibly identical to 3562 or 3635 level.
3634.6	(5/2+,7/2−)		HI	XREF: I(3650). Jπ: 3636γ to 9/2+ g.s.; 2321γ to 3/2− 1313.
3697.2	(5/2)+		F H L	XREF: F(3670). Jπ: L(^{3}He,d)=2 on 0+ target; possible γ to 9/2+ g.s.
3780 *10*	(≤7/2)[a]		F M	
3836.6 *5*	(7/2,9/2−)		D H	Jπ: log *ft*=7.1 (log $f^{1u}t$=7.3) from 9/2+ parent; 1991γ to (5/2)− 1845.
3886.6 *5*	7/2,9/2,11/2$^{(-)}$		D H M	Jπ: log *ft*=7.2 (log $f^{1u}t$=7.2) from 9/2+ parent; 1764γ to (7/2)− 2121.
3916.8 *6*	7/2,9/2,11/2		D H L	Jπ: log *ft*=7.3 (log $f^{1u}t$=7.3) from 9/2+ parent.
4023.5			H LM	XREF: M(3986). Jπ: 4023γ to 9/2+ g.s.
4096.9 *3*	(19/2)		AB T	Jπ: D(+Q) 2063γ to (17/2−) 2034 In (^{19}F,4nγ).
4112 *25*			M	
4164 *10*	1/2+		J L	Jπ: L(^{3}He,d)=0 on 0+ target.
4180.7 *11*	7/2,9/2,11/2		D HI M	Jπ: log *ft*=6.5 (log $f^{1u}t$<8.5) from 9/2+ parent.
4237.1	(5/2)+		H KLM Q	XREF: M(4257). Jπ: L(^{3}He,d)=2 on 0+ target; 4237γ to 9/2+ g.s.
4351.28[#] *24*	(21/2)		AB T	Jπ: ΔJ=1, D(+Q) 254γ to (19/2−) 4097; (D+Q) 885γ to (21/2)+ 3467. 2316γ to (17/2−) 2034 favors π=− but level included In π=+ sequence In (^{19}F,4nγ).
4358 *10*	3/2+,5/2+		LM	Jπ: L(^{3}He,d)=2 on 0+ target.
4404 *25*			M	
4441 *10*	1/2+		J LM Q	Jπ: L(^{3}He,d)=0 on 0+ target.
4546 *10*	3/2+,5/2+		J LM	XREF: M(4569). Jπ: L(^{3}He,d)=2 on 0+ target.
4650 *10*	3/2+,5/2+		j LM	XREF: j(4690). Jπ: L(^{3}He,d)=2 on 0+ target.
4738 *10*	3/2+,5/2+		ijkL	XREF: i(4770)j(4690)k(4750). Jπ: L(^{3}He,d)=2 on 0+ target.
4817 *10*	7/2+,9/2+		i kL Q V	XREF: i(4770)k(4750)V(4770).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{91}Nb Levels (continued)

E(level)†	J^{π}	$T_{1/2}$‡	XREF	Comments
				J^{π}: L(^{3}He,d)=4 on 0^+ target.
4848.8# *4*	$(23/2^+)$		AB T	XREF: A(4773)B(4773). J^{π}: (D) 497γ to $(21/2^-)$ 4351 In (^{19}F,4nγ).
4852.5 *3*	(21/2)		B	J^{π}: ΔJ=(1), (M1+E2) 756γ to (19/2) 4097 In (α,2nγ) favors J≥19/2.
4912 *10*	$3/2^+,5/2^+$		I L Q	J^{π}: L=2 for (^{3}He,d) on 0^+ target.
5010 *10*	$3/2^+,5/2^+$		I L	J^{π}: L=2 for (^{3}He,d) on 0^+ target.
5034.5# *5*	$(25/2^+)$	1.2 ns *3*	AB T	XREF: A(5271)B(5270). J^{π}: intraband ΔJ=1, D(+Q) 185γ to $(23/2^+)$ 4848. $T_{1/2}$: from 185γ(t) in (^{16}O,2npγ) (1985An23); attributed to 5455 level there, but 185γ is now placed from the 5034 level instead, so measured $T_{1/2}$IS presumed to arise from the 5034 level.
5068 *10*	$3/2^+,5/2^+$		LM	J^{π}: L=2 for (^{3}He,d) on 0^+ target.
5135 *20*			I M	
5184.2@ *4*	$(23/2^+)$		A T	J^{π}: 1717γ to $(21/2)^+$ 3467.
5226 *10*	$(1/2^+)$		J L Q	XREF: Q(5250). J^{π}: L(d,n)=0; L(^{3}He,d)=0+2 on 0^+ target.
5307 *10*	$3/2^+,5/2^+$		IJKLM	XREF: I(5340)K(5330)M(5287). J^{π}: L=2 for (^{3}He,d) on 0^+ target.
5349.5 *11*	(19/2,21/2,23/2)		B	J^{π}: ΔJ=0,1 497γ to (21/2) 4853.
5392 *10*	$3/2^+,5/2^+$		J LM	XREF: M(5350). J^{π}: L(^{3}He,d)=2 on 0^+ target.
5455.6# *5*	$(27/2^+)$		AB T	J^{π}: D(+Q) 421γ to $(25/2^+)$ 5034; 608γ to $(23/2^+)$ 4848. J=25/2 proposed In (α,2nγ) based on a placement of the 186γ which is not confirmed In (^{19}F,4nγ) and, consequently, not adopted here. $T_{1/2}$: see comment on 5034 level $T_{1/2}$.
5502 *10*	$3/2^+,5/2^+$		J LM Q	XREF: M(5536). J^{π}: L(^{3}He,d)=2 on 0^+ target.
5543.3& *4*	$(21/2^-)$		T	J^{π}: D 2077γ to $(21/2^+)$ 3467. however, DCO(2077γ) from (^{19}F,4nγ) is unexpectedly low for a D, ΔJ=0 transition.
5622 *15*	$1/2^+$		L	J^{π}: L(^{3}He,d)=0 on 0^+ target.
5685 *15*	$1/2^+$		J L	J^{π}: L(^{3}He,d)=0 on 0^+ target.
5788 *15*	$1/2^+$		L	J^{π}: L(^{3}He,d)=0 on 0^+ target.
5792.1 *15*			B	J^{π}: γ to (19/2 to 23/2) 5350.
5840 *15*	$1/2^+$		J L	XREF: J(5880). J^{π}: L(^{3}He,d)=0 on 0^+ target.
5994 *15*			I L	XREF: I(5950).
6009.3 *15*			B	J^{π}: 660γ to (19/2 to 23/2) 5350.
6040 *15*	$7/2^+,9/2^+$		i L	XREF: i(6090). J^{π}: L(^{3}He,d)=4 on 0^+ target.
6088.2@ *5*	$(25/2^+)$		T	J^{π}: (D+Q) 904γ to $(23/2^+)$ 5184 In (^{19}F,4nγ).
6121 *15*	$3/2^+,5/2^+$		i L	XREF: i(6090). J^{π}: L(^{3}He,d)=2 on 0^+ target.
6180 *15*	$3/2^+,5/2^+$		L	J^{π}: L(^{3}He,d)=2 on 0^+ target.
6215 *15*	$(7/2^+,9/2^+)$		L	J^{π}: L(^{3}He,d)=(4) on 0^+ target.
6273.6& *5*	(≤25/2)		T	J^{π}: 730γ to $(21/2^-)$ 5543. $(25/2^-)$ proposed In (^{19}F,4nγ).
6286 *15*			L	
6345 *15*			L	
6406 *15*			L	
6518.7# *5*	$(29/2^+)$		T	J^{π}: D 1063γ to $(27/2^+)$ 5455 In (^{19}F,4nγ).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{91}Nb Levels (continued)

E(level)[†]	J$^{\pi}$	T$_{1/2}$[‡]	XREF	Comments
6529 *15*	+		L	J$^{\pi}$: L(^{3}He,d)=0+2 on 0^{+} target.
6703 *15*	+		L	J$^{\pi}$: L(^{3}He,d)=0+2 on 0^{+} target.
6850 *15*	+		L	J$^{\pi}$: L(^{3}He,d)=0+2 on 0^{+} target.
6919.1[&] *6*	(27/2)		T	J$^{\pi}$: D 646γ to ($\leq$25/2) 6273 In (^{19}F,4nγ).
6923 *15*			L	
7007 *15*	1/2^{+}		L	J$^{\pi}$: L(^{3}He,d)=0 on 0^{+} target.
7060 *15*			L	
7112 *15*			L	
7218 *15*			L	
7437.7[#] *5*	(31/2^{+})		B T	XREF: B(?). J$^{\pi}$: D+Q 919γ to (29/2^{+}) 6518; 1982γ to (27/2^{+}) 5455.
8099.3[#] *6*	(33/2^{+})		T	J$^{\pi}$: 662γ to (31/2^{+}) 7438 In (^{19}F,4nγ).
8630.3 *12*			T	J$^{\pi}$: 531γ to (33/2^{+}) 8099 In (^{19}F,4nγ).
8846.3[#] *12*	(37/2^{+})		T	J$^{\pi}$: 747γ to (33/2^{+}) 8099 In (^{19}F,4nγ).
9437.3 *16*			T	
9823 *6*	(5/2)$^{+}$	24 keV *2*	I RS	J$^{\pi}$: L(^{3}He,d)=2. Analysis of (p,p) IAR (1969Sc22). E(level): unweighted average of data (uncertainty unstated) in (p,p),(p,p′),(p,p′γ) IAR. Analog of ^{91}Zr g.s.
10137.3 *19*			T	
11009 *4*	(1/2^{+})	83 keV *4*	R	Analog of ^{91}Zr 1/2^{+} 1205 level.
11309 *5*	5/2^{+}	5.6 keV *10*	R	J$^{\pi}$: from $\sigma(\theta)$ in (p,p′) IAR (1968Li11). Analog of ^{91}Zr 5/2^{+} 1466 level.
11548 *10*			R	
11735 *5*	(7/2)$^{+}$		RS	J$^{\pi}$: L(^{3}He,d)=4; analog of ^{91}Zr 7/2^{+} 1882 level.
11873 *3*	3/2^{+}	42 keV *3*	RS	J$^{\pi}$: L(^{3}He,d)=2; (pol p,p). Analog of ^{91}Zr 3/2^{+} 2042 level.
11958 *7*			R	Analog of ^{91}Zr (9/2)$^{+}$ 2131 level.
12036 *5*		28 keV *2*	Rs	XREF: s(12150). Analog of ^{91}Zr (7/2)$^{+}$ 2201 level.
12070 *40*	(11/2^{-})		I S	Analog of ^{91}Zr (11/2)$^{-}$ 2170 level.
12084 *5*			Rs	XREF: s(12150). Analog of ^{91}Zr (13/2)$^{-}$ 2260 level.
12209 *5*			R	Analog of ^{91}Zr 2367 level.
12366 *3*	1/2^{+}	63 keV *5*	R	Analog of ^{91}Zr 2558 level.
12438 *7*			R	Analog of ^{91}Zr 2580 level.
12489 *10*			R	Possible analog of ^{91}Zr 2640 level.
12599 *5*			R	Analog of ^{91}Zr 2775 level.
12662 *5*			R	Analog of ^{91}Zr 2826 level.
12716 *4*		40 keV *5*	R	Analog of ^{91}Zr 2871 level.
12804 *5*			R	
12839 *10*			R	
12907 *4*	3/2^{+}	47 keV *2*	R	J$^{\pi}$: from (pol p,p) IAR. Analog of ^{91}Zr 3083 level.
13126 *6*	3/2^{+}	30 keV	R	J$^{\pi}$: from (pol p,p) IAR. Analog of ^{91}Zr 3290 level.
13275 *5*			R	
13310 *5*		28 keV *2*	R	
13380 *40*	7/2^{+},9/2^{+}		S	J$^{\pi}$: L(^{3}He,d)=4 for 0^{+} target. J=9/2 is eliminated if analog state assignment is correct. Probable analog of ^{91}Zr 7/2^{+} 3469 level.
13507 *4*	3/2^{+}	48 keV *5*	R	J$^{\pi}$: from (pol p,p) IAR. Analog of ^{91}Zr 3681 level.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{91}Nb Levels (continued)

E(level)†	XREF
13635 *10*	R
13846 *7*	R
13957 *7*	R
14131 *4*	R
14311 *7*	R
14374 *10*	R

† Levels with ΔE<3 keV are deduced from the Adopted Gammas by means of least-squares techniques. Others are from primary γ energy in (p,γ), from (^{3}He,d), (t,α), or (α,t), and resonances are from (p,p),(p,p′) IAR or (^{3}He,d) IAS.

‡ If not indicated otherwise, $T_{1/2}$ is from Doppler-shift attenuation observed in (p,nγ) or (α,2nγ), or the weighted average of both. For IAR′s, the resonance widths are given.

Band(A): sequence based on g.s..

@ Band(B): sequence based on (23/2$^+$).

& Band(C): sequence based on (21/2$^-$).

[a] From (p,γ), based on relative Iγ for primary γ feeding level and on bombarding energy dependence of Iγ.

$\gamma(^{91}Nb)$

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡	δ‡	α[e]	Comments
104.60	1/2⁻	104.62 *5*	100	0.0	9/2⁺	M4		167.3	B(M4)(W.u.)=18.6 *3* E_γ,Mult.: from IT decay (60.86 d). calculated hindrance =4.07 *18* (2012Se10).
1186.88	5/2⁻	1082.29# *7*	100	104.60	1/2⁻	E2			B(E2)(W.u.)=6 *3* Mult.: Q from $\gamma(\theta)$ in (α,2nγ); not M2 from RUL.
1312.72	3/2⁻	1208.10# *8*	100	104.60	1/2⁻	(M1(+E2))			Mult.: D(+Q), $-2.5\leq\delta\leq+0.15$ from $\gamma(\theta)$ in (p,nγ); $\Delta\pi$=no from level scheme.
1581.02	(7/2)⁺	1581.04# *22*	100	0.0	9/2⁺	M1+E2	+0.24 *+10−9*		B(M1)(W.u.)=0.0160 *17*; B(E2)(W.u.)=0.4 *3* Mult.: D+Q from $\gamma(\theta)$ in (α,2nγ); not E1+M2 from RUL.
1612.66	3/2⁻	425.9 *2*	0.75& *7*	1186.88	5/2⁻				E_γ: from ^{91}Mo ε decay (64.6 s).
		1508.00 *9*	100.00& *10*	104.60	1/2⁻				E_γ: from ^{91}Mo ε decay (64.6 s).
1637.01	(9/2⁺)	1636.99# *15*	100	0.0	9/2⁺	(M1+E2)	−0.53 *+12−16*		B(M1)(W.u.)=0.0022 *+6−14*; B(E2)(W.u.)=0.24 *+10−17* Mult.: (D+Q) in (α,2nγ); not E1+M2 from RUL.
1790.63	(9/2⁻)	603.71 *15*	3.4 *5*	1186.88	5/2⁻				E_γ: weighted average from (^{6}Li,3nγ), (α,2nγ) and (p,nγ).
		1790.53# *13*	100.0 *5*	0.0	9/2⁺	(E1+M2)	−0.15 *15*		B(E1)(W.u.)<3.6×10^{-5}; B(M2)(W.u.)<3.3 Mult.: D(+Q) from (p,nγ). Other δ: <0.25 in (α,2nγ); +1.10 *4* also possible in (p,nγ).
1844.93	(5/2)⁻	657.95 *21*	54 *4*	1186.88	5/2⁻				E_γ: weighted average from (p,γ) and (p,nγ).
		1740.35 *15*	100 *4*	104.60	1/2⁻				E_γ: weighted average from ^{91}Mo ε decay (15.49 min), (p,γ), (p,nγ).
1963.11	(5/2⁺)	1963.09 *21*	100	0.0	9/2⁺	[E2]			B(E2)(W.u.)=4.4 *8* E_γ: weighted average from (α,2nγ), (p,γ) and (p,nγ).
1984.26	(13/2⁻)	193.63# *13*	39.9 *9*	1790.63	(9/2⁻)	E2		0.1060	B(E2)(W.u.)=2.37 *12* I_γ: from (α,2nγ). Other Iγ: 52 *5* in (^{6}Li,3nγ), 67 in (α,2npγ), 96 *6* in (p,nγ) based on 55° γ intensity. Mult.: Q from $\gamma(\theta)$ in (^{6}Li,3nγ). Other: Q+O, δ=−0.15 *5* in (p,nγ).
		1984.15# *15*	100.0 *11*	0.0	9/2⁺	(M2+E3)	−0.13 *4*		B(M2)(W.u.)=0.00340 *15*; B(E3)(W.u.)=0.024 *15* Mult.: Q+O from $\gamma(\theta)$ in (^{6}Li,3nγ) and (p,nγ); $\Delta\pi$=yes from level scheme. δ: weighted average of −0.11 *6* in (^{6}Li,3nγ) and −0.15 *5* in (p,nγ). Other Eγ: 1982.5 *6* in (p,γ).
2034.42	(17/2⁻)	50.1 *2*	100	1984.26	(13/2⁻)	(E2)		13.9 *3*	B(E2)(W.u.)=1.32 *6* E_γ: from (^{6}Li,3nγ).

γ(^{91}Nb) (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡	δ‡	Comments
								Mult.: from α(K)exp (deduced from the delayed components) and α(exp) in (α,2nγ). Not M2 from RUL.
2120.87	(7/2⁻)	329.89 *24*	100 *4*	1790.63	(9/2⁻)			Eγ: weighted average from (p,γ) and (p,nγ). Other Eγ: 328.6 in (α,2nγ). δ(D,Q)=−0.25≤δ≤+0.2 or <−3 or >+10 in (p,nγ).
		808.4 *3*	21 *4*	1312.72	3/2⁻			
		934.1 *3*	91 *4*	1186.88	5/2⁻			δ(D,Q)=−0.04≤δ≤+0.3 or <−6 or >+33 in (p,nγ).
		2120.9 *3*	24 *4*	0.0	9/2⁺			Eγ: weighted average from (p,γ) and (p,nγ).
2170	(7/2,9/2,11/2)	2170		0.0	9/2⁺	D		Eγ: from (α,2nγ). Mult.: from γ(θ) in (α,2nγ).
2290.76	(13/2)⁺	2290.77# *16*	100	0.0	9/2⁺	E2		B(E2)(W.u.)=1.48 *13* Mult.: Q from γ(θ) in (^{6}Li,3nγ) and (α,2nγ); not M2 from RUL. δ(Q,O)=−0.03 *7* from (p,nγ); δ(E2,M3)<0.0023 from RUL. Other Eγ: 2292.0 *3* in (α,2nγ).
2324.55	(5/2⁻)	743.5 *3*	8 *3*	1581.02	(7/2)⁺	[E1]		B(E1)(W.u.)=3.0×10^{-4} *12*
		1012.0 *3*	88 *3*	1312.72	3/2⁻			Other Eγ: 1014.0 *7* in (α,2nγ).
		1137.4 *4*	100 *3*	1186.88	5/2⁻			Eγ: weighted average from (p,γ) and (p,nγ).
2330.03	(11/2)⁺	2330.00 *24*	100	0.0	9/2⁺	M1+E2	−10 *+3−27*	B(M1)(W.u.)≈0.00017 *11*; B(E2)(W.u.)=3.2 *+7−9* Eγ: weighted average from (α,2nγ), (p,γ) and (p,nγ). Mult.,δ: from γ(θ) in (p,nγ); mult=E1+M2 disallowed by RUL.
2345.36	(3/2)⁻	732.62 *19*	23.7& *24*	1612.66	3/2⁻			Eγ: weighted average from ^{91}Mo ε decay (64.6 s), (p,nγ).
		1032.59 *19*	81& *11*	1312.72	3/2⁻			Eγ: weighted average from ^{91}Mo ε decay (64.6 s), (p,γ), (p,nγ). Iγ: 73 *3* in Mo ε decay (64.6 s), 96 *4* in (p,nγ).
		1158.48 *15*	41& *4*	1186.88	5/2⁻			Eγ: weighted average from ^{91}Mo ε decay (64.6 s), (p,nγ).
		2240.87 *20*	100& *3*	104.60	1/2⁻			Eγ: weighted average from ^{91}Mo ε decay (64.6 s), (p,γ), (p,nγ).
2390.01	(3/2⁺)	1203.1 *3*	49 *3*	1186.88	5/2⁻	[E1]		B(E1)(W.u.)=6×10^{-5} *+4−6*
		2285.4 *3*	100 *3*	104.60	1/2⁻	[E1]		B(E1)(W.u.)=1.9×10^{-5} *+10−19* Eγ: weighted average from (p,γ) and (p,nγ).
2413.49	(11/2⁻)	429.11 *24*	49 *3*	1984.26	(13/2⁻)	M1+E2	−0.45 *4*	B(M1)(W.u.)=0.12 *5*; B(E2)(W.u.)=140 *60* Eγ: weighted average from (^{6}Li,3nγ), (α,2nγ) and (p,nγ). Iγ: from (p,nγ). Other Iγ: 57 from (α,2nγ), 90 *9* from (^{6}Li,3nγ). Mult.: from γ(θ) in (p,nγ) and RUL. δ: weighted average of −0.42 *5* from (^{6}Li,3nγ) and −0.49 *+5−6* in (α,2nγ). Other: −0.27 to −0.14, −4.8 to −3 in (p,nγ).
		2413.58# *25*	100 *3*	0.0	9/2⁺	(E1+M2)	0.00 *4*	B(E1)(W.u.)=2.5×10^{-5} *10* Iγ: weighted average from (α,2nγ) and (p,nγ). Mult.,δ: D(+Q) from γ(θ) in (p,nγ); Δπ=yes from level scheme.

$^{91}_{41}Nb_{50}$-9

$\gamma(^{91}Nb)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	δ[‡]	Comments
2531.2	(11/2−)	410.4[f]	14.3 *23*	2120.87	(7/2−)	[E2]		B(E2)(W.u.)=2.8×10^2 *+11−16* Placed on the basis of excitation function in (p,nγ) (1977Sc28) but B(E2)(W.u.) is unexpectedly large compared with other B(E2)(W.u.) values.
		2531.2[#] *3*	100.0 *23*	0.0	9/2+	(E1+M2)	+0.22 *3*	B(E1)(W.u.)=1.9×10^−5 *+7−11*; B(M2)(W.u.)=0.7 *+3−4* Mult.: D+Q from (p,nγ); Δπ from level scheme. δ: from (p,nγ).
2579.54	(5/2+)	998.6 *3*	46.6 *26*	1581.02	(7/2)+			
		1266.8 *3*	100.0 *26*	1312.72	3/2−	[E1]		B(E1)(W.u.)=1.8×10^−4 *+5−12* Eγ: weighted average from (p,γ) and (p,nγ). Other Eγ: 1267.9 *7* in (α,2nγ).
		2578.8	18	0.0	9/2+			
2612.6	(7/2−)	2612.6 *3*	100	0.0	9/2+	[E1]		B(E1)(W.u.)=2.1×10^−4 *+4−5* Eγ: weighted average from (p,γ) and (p,nγ).
2631.98	(9/2)	1050.9 *3*	4.5[a] *6*	1581.02	(7/2)+			Eγ: from ⁹¹Mo ε decay (15.49 min).
		2631.97 *20*	100.0[a] *17*	0.0	9/2+			Eγ: weighted average from ⁹¹Mo ε decay (15.49 min), (p,γ), (p,nγ).
2660.25	(15/2−)	625.82 *10*	100	2034.42	(17/2−)	(M1+E2)	−0.03 *5*	B(M1)(W.u.)>0.0064 Eγ: weighted average from (⁶Li,3nγ) and (α,2nγ). Mult.: D(+Q) from (⁶Li,3nγ). δ: average of −0.02 *5* from (⁶Li,3nγ), −0.04 *5* from (α,2nγ).
2792.55	(7/2+)	1156.3[f] *4*	35[@] *10*	1637.01	(9/2+)			Eγ: from ⁹¹Mo ε decay (15.49 min).
		1605.80 *17*	100[@] *10*	1186.88	5/2−			Eγ: weighted average from ⁹¹Mo ε decay (15.49 min) and (p,nγ). other Iγ: 82 from (p,nγ).
		2792.18 *25*	97[@] *10*	0.0	9/2+			Eγ: weighted average from ⁹¹Mo ε decay (15.49 min), (α,2nγ), (p,nγ). Other Iγ: 122 in (p,nγ).
2881.9	(≤7/2)	1569.2 *3*	100	1312.72	3/2−			
2911.8		2911.7 *3*	100	0.0	9/2+			
2969.9		2969.8 *3*	100	0.0	9/2+			
2991.3		1804.4 *3*	100	1186.88	5/2−			
3028.26	7/2,9/2,11/2(+)	1447.2 *2*	14.7[@] *12*	1581.02	(7/2)+			Eγ: from ⁹¹Mo ε decay (15.49 min).
		3028.25 *25*	100[@] *4*	0.0	9/2+			Eγ: weighted average from ⁹¹Mo ε decay (15.49 min) and (p,nγ).
3065.3	(5/2−)	1273.7	49	1790.63	(9/2−)			
		2961.9 *11*	100	104.60	1/2−			Eγ: unweighted average of 2963.0 *15* from (p,γ) and 2960.8 *3* from (p,nγ).
3110.13	(17/2)+	449.7 *4*	10.1[b] *7*	2660.25	(15/2−)	(E1)		B(E1)(W.u.)>1.7×10^−6 Eγ: weighted average from (⁶Li,3nγ) and (α,2nγ). other Iγ: 16 from (α,2nγ). Mult.: D from (α,2nγ); Δπ=yes from level scheme.
		819.40 *15*	100.0 *9*	2290.76	(13/2)+	E2		B(E2)(W.u.)>0.29

$^{91}_{41}Nb_{50}$-10

$\gamma(^{91}Nb)$ (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡	δ‡	α[e]	Comments
									E_γ: weighted average from (^{6}Li,3nγ), (α,2nγ) and (α,2npγ). I_γ: from (α,2nγ). Mult.: Q from $\gamma(\theta)$ in (^{6}Li,3nγ); not M2 from RUL.
3126.04	(≥7/2)	1545.4 3	52	1581.02	(7/2)$^+$				
		3125.6 3	100	0.0	9/2$^+$				
3149.17	7/2,9/2,11/2	3149.11 24	100	0.0	9/2$^+$				E_γ: weighted average from ^{91}Mo ε decay (15.49 min), (p,γ), (p,nγ).
3179.65	(3/2)$^+$	1866.6 3	64	1312.72	3/2$^-$				
		3075.3 3	100	104.60	1/2$^-$				
3187.4	7/2,9/2,11/2	3187.3 3	100	0.0	9/2$^+$				Other Eγ: 3185.2 12 in (p,γ), 3187.8 5 In ε decay (15.49 min).
3273.5	(≤7/2)	3273.4 3	100	0.0	9/2$^+$				
3328.6		3328.6 3	100	0.0	9/2$^+$				
3370.1	5/2$^+$,7/2$^+$	3370.0[f] 15		0.0	9/2$^+$				
3434.4	(5/2)$^+$	3434.3[f]	100	0.0	9/2$^+$				
3461.6	(≤7/2)	3461.5[f]	100	0.0	9/2$^+$				
3466.77	(21/2)$^+$	356.64 9	100	3110.13	(17/2)$^+$	E2		0.01286	B(E2)(W.u.)=4.3 5 E_γ: weighted average from (^{6}Li,3nγ), (α,2nγ) and (α,2npγ). Mult.: Q from $\gamma(\theta)$ in (^{6}Li,3nγ); not M2 from RUL.
3562.1	(≤7/2)	3562.0 15	100	0.0	9/2$^+$				E_γ: from (p,γ). Other Eγ: 3559.8 in (p,nγ).
3634.6	(5/2$^+$,7/2$^-$)	1309.9	100	2324.55	(5/2$^-$)				
		2320.5		1312.72	3/2$^-$				
		3636.0	83	0.0	9/2$^+$				
3697.2	(5/2)$^+$	3697.1[f]	100	0.0	9/2$^+$				
3836.6	(7/2,9/2$^-$)	1991.3		1844.93	(5/2)$^-$				
		2253.1	100	1581.02	(7/2)$^+$				
		3837.6 6	87	0.0	9/2$^+$				E_γ: from ^{91}Mo ε decay (15.49 min).
3886.6	7/2,9/2,11/2$^{(-)}$	558.7		3328.6					
		1764.4	21	2120.87	(7/2$^-$)				
		3886.7 6	100	0.0	9/2$^+$				E_γ: from ^{91}Mo ε decay (15.49 min).
3916.8	7/2,9/2,11/2	3916.7 6	100	0.0	9/2$^+$				E_γ: from ^{91}Mo ε decay (15.49 min).
4023.5		4023.4	100	0.0	9/2$^+$				
4096.9	(19/2)	2062.5 3	100	2034.42	(17/2$^-$)	D(+Q)	<0.9		E_γ: unweighted average of 2062.1 5 from (^{6}Li,3nγ), 2063.0 2 from (α,2nγ) and 2062.5 3 from (^{19}F,4nγ).
4180.7	7/2,9/2,11/2	1189.8		2991.3					
		4180.9 8		0.0	9/2$^+$				E_γ: from ^{91}Mo ε decay (15.49 min).
4237.1	(5/2)$^+$	4237.0	100	0.0	9/2$^+$				
4351.28	(21/2)	254.41 23	93 4	4096.9	(19/2)	D(+Q)	−0.07 5		Additional information 1. E_γ: weighted average of 254.5 5 from (^{6}Li,3nγ), 254.3 1 from (α,2nγ), 254.4 3 from (^{19}F,4nγ). I_γ: from (α,2nγ). Other Iγ: 163 16 from (^{6}Li,3nγ), 70 15 from (^{19}F,4nγ).

$^{91}_{41}Nb_{50}$-11

Adopted Levels, Gammas (continued)

$\gamma(^{91}Nb)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	δ[‡]	α[e]	Comments
4351.28	(21/2)	884.51 16	100 5	3466.77	$(21/2)^+$	D+Q	−0.22 18		E_γ: weighted average of 884.5 3 from (^{19}F,4nγ), 884.6 5 from (^{6}Li,3nγ), 884.5 2 from (α,2nγ). I_γ: uncertainty from (α,2nγ) (0.5) seems unrealistically low; evaluator suspects a typographical error and adopts an order of magnitude higher uncertainty. Mult.: D from (^{19}F,4nγ), (D+Q) from (α,2nγ).
		2316[c]	31	2034.42	$(17/2^-)$				
4848.8	$(23/2^+)$	497.1[d] 3	100[d]	4351.28	(21/2)	(D)			other Eγ: 497.9 from (^{6}Li,3nγ). Mult.: from (^{19}F,4nγ); not stretched Q, from $\gamma(\theta)$ for 497γ doublet in (α,2nγ).
4852.5	(21/2)	755.6[c] 1	100	4096.9	(19/2)	(M1+E2)	+1.1 2		Mult.: D+Q from (α,2nγ); δ atypically large for E1+M2.
5034.5	$(25/2^+)$	185.8[d] 3	100[d]	4848.8	$(23/2^+)$	(M1(+E2))	−0.05 5	0.0434 7	B(M1)(W.u.)=0.0027 7; B(E2)(W.u.)=0.21 +42−21 presumably the Eγ=185.0 5, d(+Q), δ=−0.05 5 transition placed from a 5455 level In (α,2nγ) and (^{6}Li,3nγ) based on a different order for the 421γ-186γ-497γ cascade. Mult.: D(+Q) intraband G.
5184.2	$(23/2^+)$	1717.4[d] 3	100[d]	3466.77	$(21/2)^+$	D			other Eγ: 1715 2 for doublet from (^{6}Li,3nγ).
5349.5	(19/2,21/2,23/2)	497[c]	100	4852.5	(21/2)				E_γ: for doublet. Mult.: not stretched Q, from $\gamma(\theta)$ for 497γ doublet in (α,2nγ).
5455.6	$(27/2^+)$	421.1 1	100 22	5034.5	$(25/2^+)$	D(+Q)	−0.04 4		E_γ,Mult.,δ: from (α,2nγ). I_γ: from (19γ,4nγ).
		607.5 3	42 25	4848.8	$(23/2^+)$				Mult.: possibly Q from (^{19}F,4nγ).
5543.3	$(21/2^-)$	2076.5[d] 3	100[d]	3466.77	$(21/2)^+$	D			
5792.1		442.6[c]	100	5349.5	(19/2,21/2,23/2)				
6009.3		659.8[c]	100	5349.5	(19/2,21/2,23/2)				
6088.2	$(25/2^+)$	904.0[d] 3	100[d]	5184.2	$(23/2^+)$	(D+Q)			
6273.6	($\leq$25/2)	730.3 3	100	5543.3	$(21/2^-)$				Mult.: D from DCO In ^{76}Ge(^{19}F,4nγ) but level scheme from that reaction requires a ΔJ=2 transition.
6518.7	$(29/2^+)$	1063.0[d] 3	100[d]	5455.6	$(27/2^+)$	D			Mult.: from ^{76}Ge(^{19}F,4nγ).
6919.1	(27/2)	645.5[d] 3	100[d]	6273.6	($\leq$25/2)	D			Mult.: from ^{76}Ge(^{19}F,4nγ).
7437.7	$(31/2^+)$	919.0 2	40 7	6518.7	$(29/2^+)$	D+Q	−0.22 8		E_γ,Mult.,δ: from (α,2nγ); however, γ was placed In that study from a 5270 level established assuming a different order for

γ(^{91}Nb) (continued)

E_i(level)	J^π_i	E_γ †	I_γ †	E_f	J^π_f	Comments
						422γ-186γ-497γ cascade.
						I_γ: from (^{19}F,4nγ).
7437.7	(31/2$^+$)	1982.1[d] 3	100[d] 12	5455.6	(27/2$^+$)	Mult.: D from DCO In ^{76}Ge(^{19}F,4nγ) but level scheme from that reaction requires a ΔJ=2 transition.
8099.3	(33/2$^+$)	661.6[d] 3	100[d]	7437.7	(31/2$^+$)	
8630.3		531[d]	100[d]	8099.3	(33/2$^+$)	
8846.3	(37/2$^+$)	747[d]	100[d]	8099.3	(33/2$^+$)	
9437.3		807[d]	100[d]	8630.3		
10137.3		700[d]	100[d]	9437.3		

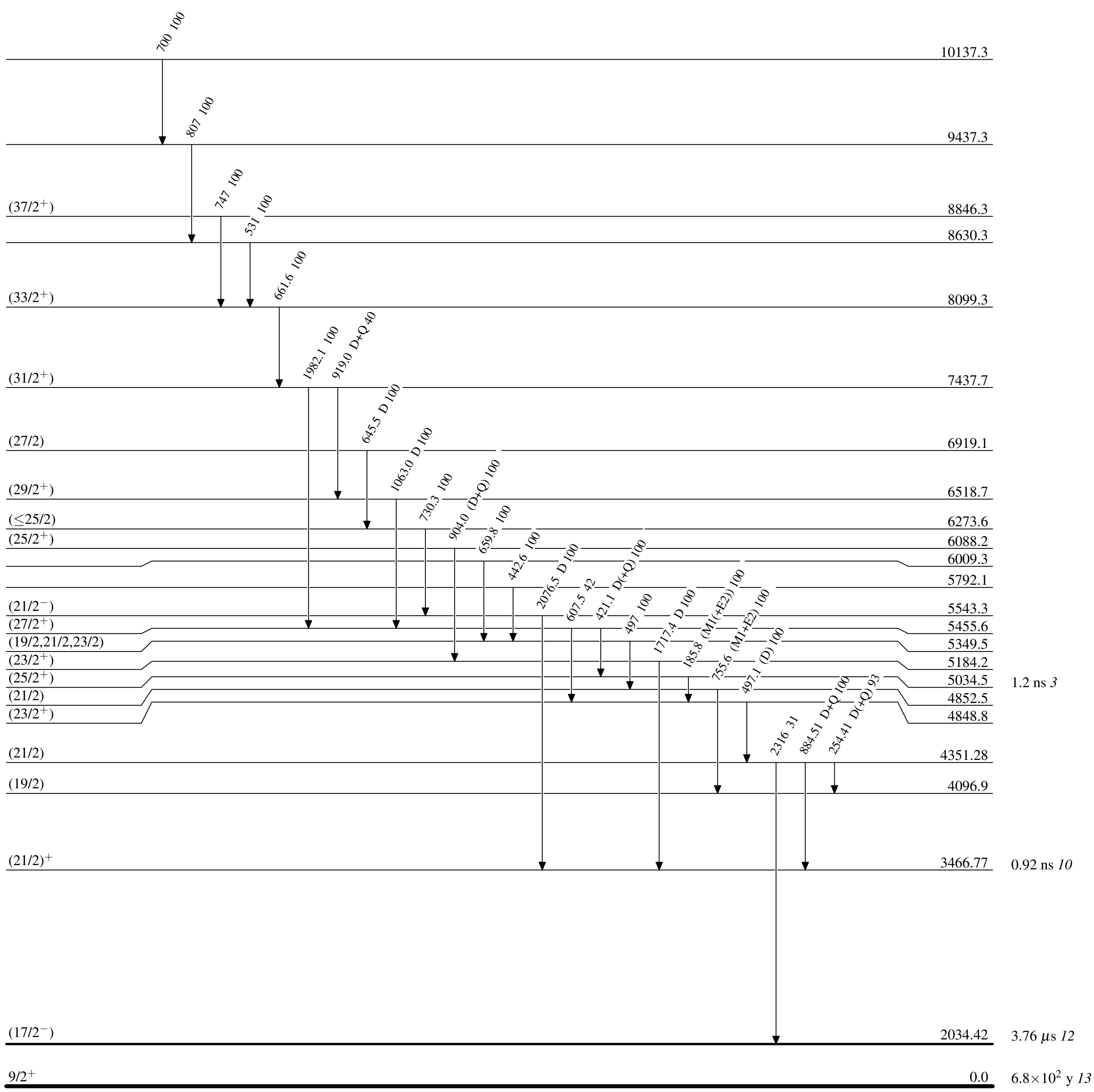
† From (p,nγ), except as noted.
‡ From $\gamma(\theta)$ in (α,2nγ), if not indicated otherwise.
# Weighted average of all available data.
@ From ^{91}Mo ε decay (15.49 min).
& Weighted average from ^{91}Mo ε decay (64.6 s) and (p,nγ).
[a] Weighted average from ^{91}Mo ε decay (15.49 min) and (p,nγ).
[b] Weighted average from (^{6}Li,3nγ) and (α,2nγ).
[c] From (α,2nγ).
[d] From ^{76}Ge(^{19}F,4nγ).
[e] 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.
[f] Placement of transition in the level scheme is uncertain.

$^{91}_{41}$Nb$_{50}$-13

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{91}_{41}Nb_{50}$

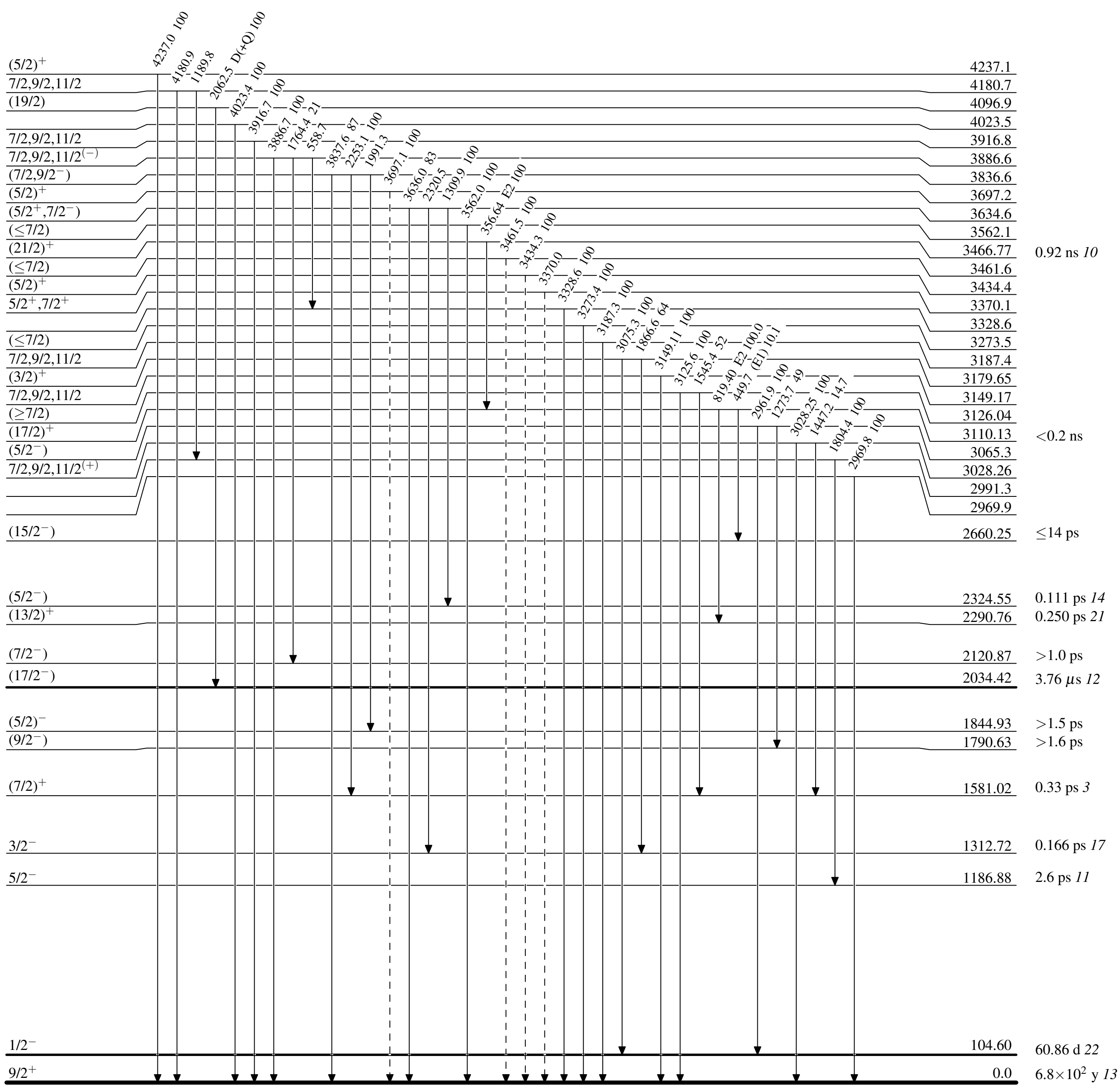
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

Legend

γ Decay (Uncertain)



$^{91}_{41}Nb_{50}$

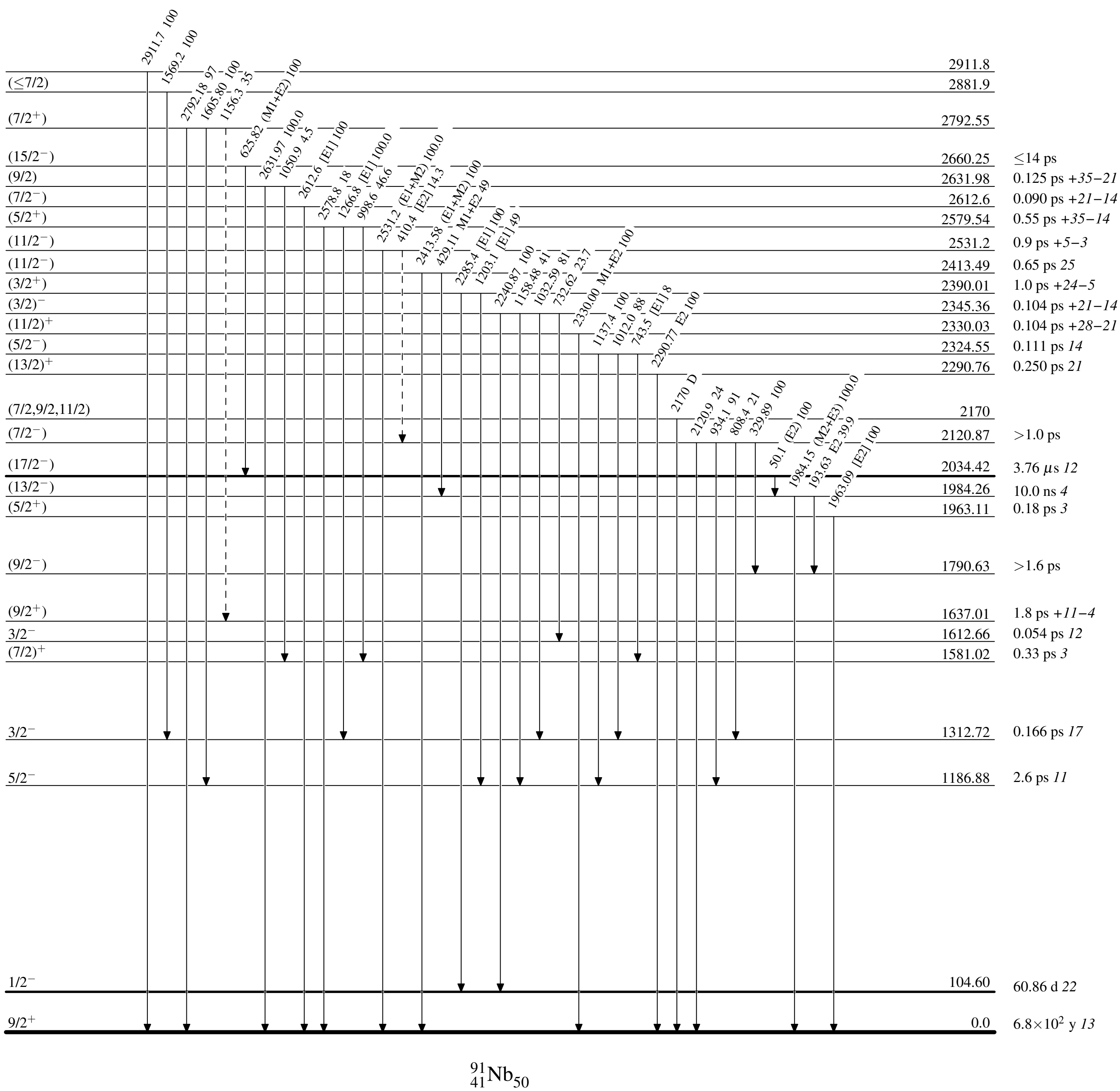
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

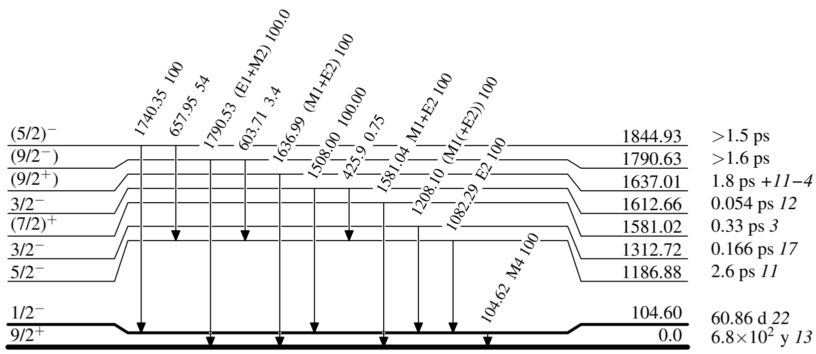
γ Decay (Uncertain)



Adopted Levels, Gammas

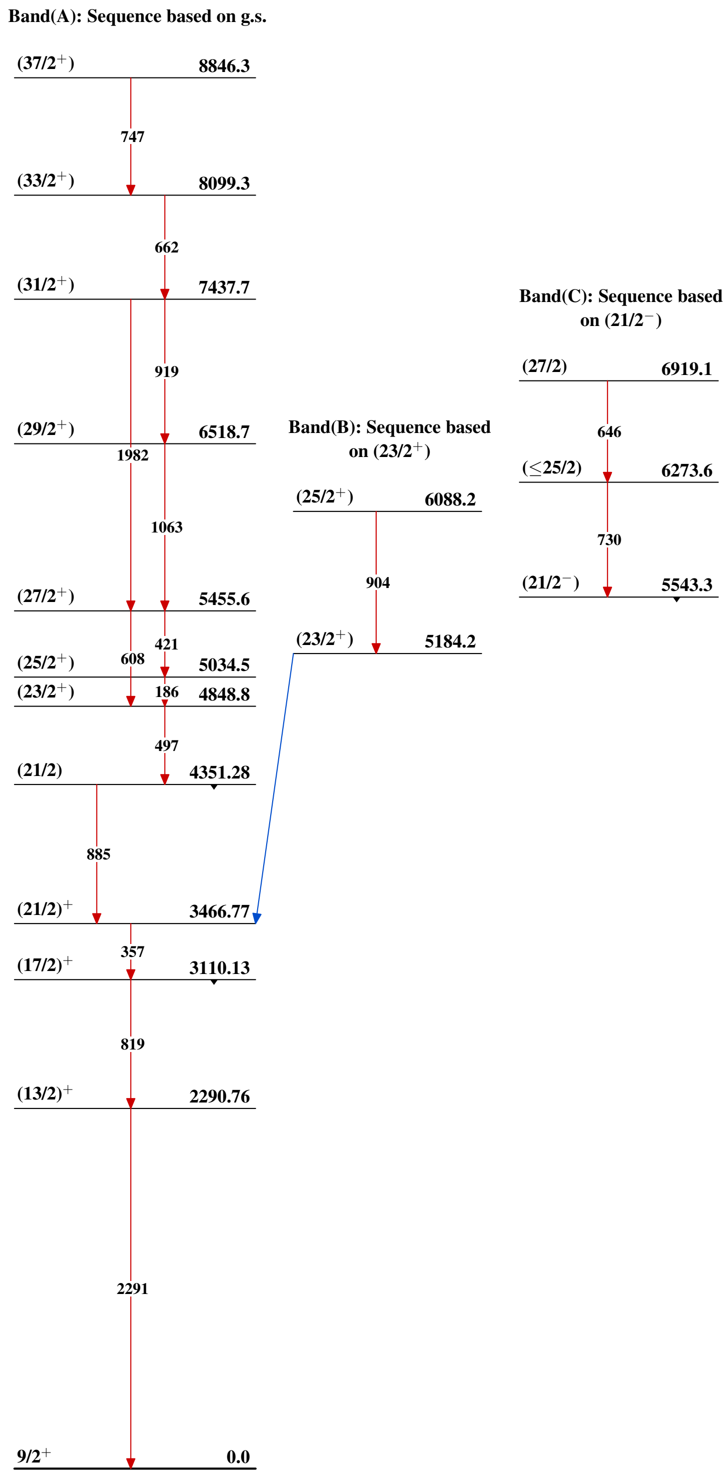
Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{91}_{41}Nb_{50}$

Adopted Levels, Gammas



$^{91}_{41}Nb_{50}$