Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	S. K. Basu, G. Mukherjee, A. A. Sonzogni	NDS 111,2555 (2010)	30-Jun-2009

Q(β^-)=925.6 *5*; S(n)=8487.2 *19*; S(p)=6803.1 *19*; Q(α)=−2858 *3* 2012Wa38
Note: Current evaluation has used the following Q record 925.6 5 *8488.1 20* 6803.5 *19* −2860 3 2009AuZZ.
S(2n)=15715.7 *20*, S(2p)=17136 *11* (2009AuZZ).
α: Additional information 1.

^{95}Nb Levels

Cross Reference (XREF) Flags

A	^{95}Zr β^- decay	E	^{94}Zr(^{3}He,d) IAR	I	^{16}O(^{82}Se,p2nγ)
B	^{95}Nb IT decay (3.61 d)	F	^{96}Mo(d,^{3}He)	J	^{93}Nb(t,p)
C	^{94}Zr(p,p),(p,p′) IAR	G	^{96}Mo(pol t,α)		
D	^{94}Zr(^{3}He,d),(α,t),(^{16}O,^{15}N)	H	^{97}Mo(d,α)		

E(level)[&]	J$^\pi$[†]	T$_{1/2}$[‡]	XREF	Comments
0.0	9/2$^+$	34.991 d *6*	AB D FGHIJ	%β^-=100 Q<0 (1992Be50); μ=6.141 *5* (1986Ed01) T$_{1/2}$: from Limited Relative Statistical Weight, LRSW, analysis (1985ZiZY, 1992Ra09) of the following 12 values: 35 d *1* (1951EnZZ), 35.0 d *5* (1953Co23), 35.0 d *1* (1961Wy01), 35.6 d *4* (1964WoZZ), 35.8 d *5* (1965Fl02), 35.0 d *5* (1965Si16), 35.10 d *7* (1968La10, published uncertainty of 0.2 divided by 3 to convert from 3σ value), 35.15 d *3* (1968Re04), 34.97 d *1* (1976Ha51, published uncertainty of 0.3 divided by 3 to convert from 3σ value), 34.979 d *9* (1980Ho17), 34.98 d *2* (1982RuZV), and 34.997 d *6* (1997Ma75). In this LRSW analysis the uncertainty for 1997Ma75 value is increased from 0.006 to 0.0062 to reduce its relative weight to 50%. The resulting internal uncertainty is 0.0044 and the reduced-χ^2=1.97. The largest contribution to the reduced-χ^2 value is from the value of 1968Re04. If the RAJEVAL method (1992Ra08) is applied to these data, the uncertainty for this value is increased from 0.03 to 0.09 and the resulting weighted average is 34.985 d *5*, whereas the Normalized Residual method (1992Ja06) increased this uncertainty to 0.06 and gives a weighted average of 34.988 d *6*. These two results are within the range of the adopted value. T$_{1/2}$: Other values: 38.7 d (1945Po01) and the three values 35.045 d *5* (1969MeZV), 35.00 d *3* (1970MeZQ), and 34.98 (1980RuZY), all replaced by 1982RuZV. μ: N/RD. Others: 6.140 *6* (1985Oh08. N/rd), 6.143 *5* (1977Ko31. N/RD; recalculated by 1981Ha55, and 6.004 *12* (1989Ra19). BFNMR/on (Brute force nuclear orientation with radiative detection of nuclear magnetic resonance)(1989Ra19). Q: negative from electric quadrupole alignment (V$_{zz}$) of ^{95}Zr+^{95}Nb in a Zr single crystal.
235.69 *2*	1/2$^-$	3.61 d *3*	AB D FGH J	%IT=94.4 *6*; %β^-=5.6 *6* XREF: J(260). T$_{1/2}$: from 1969Fo01 (ce(K)(236γ)(t); β spect). %β^-,%IT: from Iβ/ce(K)(236γ)=0.10 *1* (1974An22) and ce(K)/(γ=ce)=0.593 for 236 γ.
724.195 *4*	7/2$^+$	≤70 ps	A	J$^\pi$: from $\beta\gamma$ CP.
730 *6*	(5/2)$^+$		D G	E(level): weighted average of 728 *8* (^{3}He,d) and 732 *8* (pol t,α). J$^\pi$: from L(^{3}He,d)=2(1973Me02).
756.728 *12*	7/2$^+$	≤70 ps	A J	XREF: J(767).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{95}Nb Levels (continued)

E(level)[&]	J$^{\pi}$[†]	XREF	Comments
			J$^{\pi}$: from $\beta\gamma$ CP.
			$T_{1/2}$: from 1997De24.
799 *4*	3/2$^-$	D FGH	XREF: F(792)G(807).
			E(level): weighted average of 799 *8* (^{3}He,d), 792 *7* (d,^{3}He) and 807 *8* (pol t,α).
			J$^{\pi}$: from L(^{3}He,d)=1 (1973Me02) and L(d,^{3}He)=1 (1974Bi08).
805 *5*	(5/2 to 13/2)$^+$	J	J$^{\pi}$: from angular momentum transfer in (t,p).
824.70[@] *20*	(13/2$^+$)[#]	I	
877 *7*	(5/2 to 13/2)$^+$	J	J$^{\pi}$: from angular momentum transfer in (t,p).
1010 *5*	(5/2$^-$)	D FGH J	XREF: D(1000)F(1000)G(1021)H(994)J(1009).
			E(level): weighted average of 1000 *20* (^{3}He,d), 1000 *8* (d,^{3}He), 1021 *8* (pol t,α) and 1009 *10* (t,p).
			J$^{\pi}$: L(d,^{3}He)=3. J^{π}=(5/2$^-$) from $\sigma(\theta)$ and a(θ) in (pol t,α).
1088 *11*	9/2$^+$	H J	J$^{\pi}$: L(t,p)=0.
1149 *11*	(5/2 to 13/2)$^+$	J	J$^{\pi}$: from angular momentum transfer in (t,p).
1216 *7*	(7/2 to 11/2)$^-$	J	J$^{\pi}$: from L(t,p)=1.
1219 *5*	3/2$^-$	D FGH	XREF: H(1195).
			E(level): weighted average of 1223 *8* (^{3}He,d), 1221 *12* (d,^{3}He) and 1215 *8* (pol t,α).
			J$^{\pi}$: L(d,^{3}He)=1(1974Bi08). J^{π}=(3/2$^-$) from $\sigma(\theta)$ and a(θ) in (pol t,α)(1983Fl03).
1268 *7*	9/2$^+$	J	J$^{\pi}$: from angular momentum transfer in (t,p).
1274 *6*	5/2$^-$	D GH	XREF: H(1261).
			E(level): weighted average of 1274 *8* (^{3}He,d) and 1273 *8* (pol t,α).
1337 *9*	9/2$^+$	J	J$^{\pi}$: from angular momentum transfer in (t,p).
1364 *8*		G	
1394 *9*		J	
1430 *12*	(3/2$^+$)	D GH	XREF: H(1412).
			E(level): weighted average of 1430 *20* (^{3}He,d) and 1430 *15* (pol t,α).
			J$^{\pi}$: from (pol t,α)(1983Fl03).
1464 *5*		J	
1518 *8*	(5/2 to 13/2)$^+$	H J	XREF: H(1514).
			J$^{\pi}$: L(t,p)=2.
1565 *8*	9/2$^+$	J	J from angular momentum transfer in (t,p).
1590? *8*	3/2$^+$,5/2$^+$	D G	J$^{\pi}$: from angular momentum transfer in (^{3}He,d), in discrepance with (pol.t,α).
1618 *7*	3/2$^+$,5/2$^+$	F J	E(level): weighted average of 1623 *12* (d,^{3}He) and 1616 *8* (t,p).
			J$^{\pi}$: L(d,^{3}He)=1+2 for 1623 doublet.
1645 *8*	1/2$^-$,3/2$^-$	D H	XREF: H(1632).
			J$^{\pi}$: L(^{3}He,d)=(1) suggests that this is the 1/2$^-$,3/2$^-$ member.
1649.4[@] *3*	(17/2$^+$)[#]	I	
1660 *6*	9/2$^+$	G J	E(level): weighted average of 1662 *8* (pol t,α), and 1658 *8* (t,p).
			J$^{\pi}$: from (t,p), J=(5/2$^-$) in (pol t,α).
1704 *7*	(7/2$^+$)	D GH	XREF: D(1720)G(1701)H(1691).
			E(level): weighted average of 1720 *20* from (α,t) and 1701 *8* from (pol t,α).
			J$^{\pi}$: from (pol t,α).
1730 *7*	(5/2 to 13/2)$^+$	J	
1767 *4*	(7/2 to 11/2)$^-$	J	
1813 *6*	5/2$^+$	D GH	XREF: H(1833).
			E(level): weighted average of 1810 *8* (^{3}He,d) and 1816 *8* (pol t,α).
			J$^{\pi}$: from (pol t,α).
1847 *2*	(5/2 to 13/2)$^+$	J	J$^{\pi}$: from angular momentum transfer in (t,p).
1903 *6*	9/2$^+$	D G J	XREF: D(1913)G(1894)J(1903).
			E(level): weighted average of 1913 *8* from (α,t), 1894 *8* from (pol t,α) and 1903 *15* from (t,p).
			J$^{\pi}$: L(t,p)=0.
1958 *9*	9/2$^+$	J	J$^{\pi}$: from angular momentum transfer in (t,p).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{95}Nb Levels (continued)

E(level)[&]	Jπ[†]	XREF	Comments
1972 *8*	3/2⁻,5/2⁻	FGH	XREF: F(1980)G(1972)H(1970). doublet in (d,^{3}He). E(level): from (pol t,α). Jπ: from angular momentum transfer in (d,^{3}He).
2018 *16*	9/2⁺	J	Jπ: from angular momentum transfer in (t,p).
2049 *5*	(3/2 to 15/2)⁻	G J	E(level): weighted average of 2045 *8* (pol. t,α) and 2052 *6* (t,p). Jπ: L(t,p)=3.
2100 *9*		J	
2121 *8*	3/2⁺,5/2⁺	D	Jπ: L(^{3}He,d)=2.
2159 *6*	3/2⁺,5/2⁺	D GH J	XREF: G(2149)H(2143)J(2165). E(level): weighted average of 2165 *8* from (^{3}He,d), 2149 *8* (pol. t,α) and 2165 *11* (t,p). Jπ: from angular momentum transfer in (^{3}He,d); L(t,p)=3 is discrepant.
2194 *9*	(5/2⁺ to 13/2)⁺	G J	XREF: G(2180)J(2200). E(level): weighted average of 2180 *8* (pol. t,α) and 2200 *5* (t,p). Jπ: L(t,p)=2.
2247 *8*	(3/2⁺,5/2⁻)	GH	XREF: H(2260). E(level): from (pol. t,α).
2275 *14*	(1/2 to 17/2)⁺	J	Jπ: from angular momentum transfer in (t,p).
2303 *7*	5/2⁻	G J	E(level): weighted average of 2302 *8* (pol. t,α) and 2305 *14* (t,p).
2328 *12*	1/2⁻,3/2⁻	F H	XREF: H(2333). E(level): from (d,^{3}He). Jπ: L(d,^{3}He)=1+3 for E=2328. Jπ(2302)=5/2⁻ suggests that this is the 1/2⁻,3/2⁻ member.
2328.4[@] *3*	(21/2⁺)[#]	I	
2364? *4*	(1/2⁺)	D J	XREF: D(2373)J(2362). Jπ: L(^{3}He,d)=(0).
2383 *8*	1/2⁻	G	
2390 *7*	(5/2 to 13/2)⁺	J	
2414 *8*	(3/2⁺)	D G	E(level): weighted average of 2406 *8* from (^{3}He,d), 2421 *8* from (t,α).
2430 *4*	(3/2⁺,5/2⁺)	D G J	XREF: D(2421)G(2421). E(level): weighted average of 2431 *8* from (^{3}He,d), 2421 *8* from (pol. t,α) and 2435 *6* (t,p). Jπ: L(^{3}He,d)=2.
2481? *12*	5/2⁻,7/2⁻	F J	Jπ: from angular momentum transfer in (d,^{3}He).
2486 *8*	1/2⁻	G	
2522.0? *4*	(21/2⁺)	I	E(level): level energy is uncertain due to ambiguous ordering of the γ rays involved in the cascade.
2540 *20*	(5/2 to 13/2)⁺	D J	XREF: J(2536).
2599 *8*	5/2⁻	G J	XREF: J(2586).
2632 *8*	(3/2⁺)	D G	
2637 *4*	9/2⁺	J	
2670 *8*	(5/2⁻)	D G	XREF: D(2660).
2706 *2*	(5/2 to 13/2)⁺	J	Jπ: from angular momentum transfer in (t,p).
2724 *8*	5/2⁻	G	
2766 *4*	9/2⁺	GH J	E(level): weighted average of 2768 *8* (pol. t,α) and 2765 *4* (t,p). Jπ: L(t,p)=0.
2787? *12*	5/2⁻,7/2⁻	D F	E(level): weighted average of 2790 *20* (^{3}He,d)) and 2786 *15* (d,^{3}He). Jπ: L(d,^{3}He)=3.
2816 *5*	(3/2 to 15/2)⁻	GH J	XREF: H(2821). E(level): weighted average of 2815 *8* (pol. t,α) and 2817 *6* (t,p). Jπ: L(t,p)=3.
2891 *5*	(5/2 to 13/2)⁺	G J	XREF: G(2896)J(2888).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{95}Nb Levels (continued)

E(level)[&]	J$^{\pi}$[†]	XREF	Comments
			E(level): weighted average of 2896 *8* (pol. t,α) and 2888 *6* (t,p).
			J$^{\pi}$: L(t,p)=2.
2947 *6*	9/2$^+$	J	J$^{\pi}$: from L=0 in (t,p) reaction.
2977 *10*	3/2$^+$,5/2$^+$	D G	XREF: D(2967)G(2987).
			E(level): weighted average of 2967 *8* from (^{3}He,d) and 2987 *8* (t,α).
			J$^{\pi}$: L(^{3}He,d)=2.
2993 *5*	(1/2 to 17/2)$^+$	J	J$^{\pi}$: from angular momentum transfer in (t,p).
3039 *8*		G	
3045 *7*	(3/2 to 15/2)$^-$	J	J$^{\pi}$: from angular momentum transfer in (t,p).
3110 *9*	9/2$^+$	D J	E(level): weighted average of 3110 *20* from (^{3}He,d) and 3111 *10* (t,p).
			J$^{\pi}$: L(t,p)=0.
3149 *3*	9/2$^+$	J	J$^{\pi}$: from angular momentum transfer in (t,p).
3196 *15*	9/2$^+$	J	J$^{\pi}$: from angular momentum transfer in (t,p).
3198.3[@] *4*	(25/2$^+$)[#]	I	
3233 *9*	(1/2 to 17/2)$^+$	J	J$^{\pi}$: from angular momentum transfer in (t,p).
3307 *7*	9/2$^+$	J	J$^{\pi}$: from angular momentum transfer in (t,p).
3358 *6*	9/2$^+$	J	J$^{\pi}$: from angular momentum transfer in (t,p).
3408 *8*	(1/2 to 17/2)$^+$	J	J$^{\pi}$: from angular momentum transfer in (t,p).
3481 *7*	(1/2 to 17/2)$^+$	D J	XREF: D(3510).
3545 *3*	(1/2 to 17/2)$^+$	J	J$^{\pi}$: from angular momentum transfer in (t,p).
3585 *8*	(5/2 to 13/2)$^+$	J	J$^{\pi}$: from angular momentum transfer in (t,p).
3625 *5*	(1/2 to 17/2)$^+$	J	J$^{\pi}$: from angular momentum transfer in (t,p).
3669 *9*	(5/2 to 13/2)$^+$	J	J$^{\pi}$: from angular momentum transfer in (t,p).
3900 *20*		D	
4050 *20*		D	
4070.9?[@] *5*	(29/2$^+$)[#]	I	
4160 *20*		D	
4360 *20*		D	
4520 *20*		D	
4610 *20*		D	
4830 *20*		D	
5140.0[@] *5*	(33/2$^+$)[#]	I	
5200 *20*		D	
5360 *20*		D	
5643.4?[@] *6*		I	
5770 *20*		D	
6487.7[@] *6*		I	
7493.3[@] *7*		I	
8695.2[@] *7*		I	
11990	(5/2)$^+$	E	IAS(^{95}Zr g.s.).
			J$^{\pi}$: from L(^{3}He,d)=2 and parent spin.
12852 *9*	1/2$^+$	C	IAS(^{95}Zr 954).
			J$^{\pi}$: from $\sigma(\theta)$ in (p,p′) and (p,p).
13274 *5*	(5/2$^+$)	C	IAS(^{95}Zr 1324).
			J$^{\pi}$: from $\sigma(\theta)$ in (p,p′) and (p,p).
13601 *6*	3/2$^+$	C E	IAS(^{95}Zr 1618, (3/2)$^+$).
			J$^{\pi}$: from $\sigma(\theta)$ in (p,p′) and (p,p).
13690	7/2$^+$,9/2$^+$	E	IAS(^{95}Zr 1618, 7/2$^+$,9/2$^+$).
			J$^{\pi}$: L(^{3}He,d)=2+4 for 13.69−MeV doublet. J^{π}(13601) suggests that this is the 7/2$^+$,9/2$^+$ doublet.
13721 *6*	5/2$^+$	C	IAS(^{95}Zr 1722).
			J$^{\pi}$: from $\sigma(\theta)$ in (p,p′) and (p,p).
13922 *6*	(5/2$^+$)	C	IAS(^{95}Zr 1940 or 1956).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{95}Nb Levels (continued)

E(level)[&]	J$^{\pi}$[†]	XREF	Comments
			J$^{\pi}$: from $\sigma(\theta)$ in (p,p′) and (p,p).
14070	9/2$^-$,11/2$^-$	E	IAS(^{95}Zr 2025). J$^{\pi}$: L(^{3}He,d)=5.
14262 *10*		C	IAS(^{95}Zr 2285). J$^{\pi}$: J^{π}=1/2$^+$ from $\sigma(\theta)$ in (p,p) and (p,p′) discrepant with ^{95}Zr J^{π}=3/2$^+$,5/2$^+$.
14301 *10*	(3/2$^+$)	C	IAS(^{95}Zr 2317). J$^{\pi}$: from $\sigma(\theta)$ in (p,p′) and (p,p)t.
14365 *7*	(3/2$^+$)	C	IAS(^{95}Zr 2372). J$^{\pi}$: from $\sigma(\theta)$ in (p,p′) and (p,p).
14456 *10*	(7/2$^+$,9/2$^+$)	C	IAS(^{95}Zr 2464). J$^{\pi}$: from ^{95}Zr J^{π}=7/2$^+$,9/2$^+$.
14630 *11*	3/2$^+$	C	IAS(^{95}Zr 2638). J$^{\pi}$: from $\sigma(\theta)$ in (p,p′) and (p,p).
14710	7/2$^+$	E	IAS(^{95}Zr 2732).
14732 *10*	(7/2)$^+$	C E	IAS(^{95}Zr 2732). E(level): from (p,p),(p,p′) IAR. J$^{\pi}$: L(^{3}He,d)=4. (7/2$^+$) from $\sigma(\theta)$ in (p,p),(p,p′).
14832 *12*	(7/2$^+$)	C E	XREF: E(14820). IAS(^{95}Zr 2834). E(level): from (p,p),(p,p′) IAR. J$^{\pi}$: J^{π}=3/2$^+$ from $\sigma(\theta)$ in (p,p),(p,p′) discrepant with L(^{3}He,d)=4.
14978 *6*	(3/2$^+$)	C	IAS(^{95}Zr 2983). J$^{\pi}$: from $\sigma(\theta)$ in (p,p′) and (p,p).
15006 *6*	(3/2$^+$)	C	IAS(^{95}Zr 3012). J$^{\pi}$: from $\sigma(\theta)$ in (p,p′) and (p,p).
15057 *12*	(7/2$^-$)	C	IAS(^{95}Zr 3062). J$^{\pi}$: from $\sigma(\theta)$ in (p,p′) and (p,p); discrepant with ^{95}Zr J^{π}=3/2$^+$,5/2$^+$.

[†] From DWBA analysis of $\sigma(\theta)$ and a(θ) in (pol t,α), except as noted.
[‡] From $\beta\gamma$(t) in β^- decay, except as noted.
[#] From DCO and ADO ratios in ^{16}O(82Se,p2nγ) reaction.
[@] Band(A): Cascade based on g.s..
[&] From least-squares fit to Eγ unless otherwise stated.

Adopted Levels, Gammas (continued)

γ(^{95}Nb)

E_i(level)	J_i^π	E_γ[†]	I_γ	E_f	J_f^π	Mult.[‡]	δ[#]	α	Comments
235.69	1/2$^-$	235.69[@] *2*	100	0.0	9/2$^+$	M4		2.78	α(K)=2.24 *4*; α(L)=0.447 *7*; α(M)=0.0824 *12*; α(N)=0.01160 *17*; α(O)=0.000496 *7* α(N+..)=0.01210 *17* B(M4)(W.u.)=8.35 *21* Mult.: from α(K)exp and K/LMN in IT decay.
724.195	7/2$^+$	724.192[@] *4*	100	0.0	9/2$^+$	M1+E2	−0.11 *2*	0.001496 *21*	α(K)=0.001320 *19*; α(L)=0.0001469 *21*; α(M)=2.59×10^{-5} *4* α(O)=2.22×10^{-7} *4*; α(N+..)=4.02×10^{-6} E_γ: from 2000He14.
756.728	7/2$^+$	756.725[@] *12*	100	0.0	9/2$^+$	M1+E2	+0.14 *5*	0.001356 *19*	α(K)=0.001196 *17*; α(L)=0.0001330 *19*; α(M)=2.34×10^{-5} *4* α(O)=2.01×10^{-7} *3*; α(N+..)=3.64×10^{-6}
824.70	(13/2$^+$)	824.7[&] *2*	100[&]	0.0	9/2$^+$				
1649.4	(17/2$^+$)	824.7[&] *2*	100[&]	824.70	(13/2$^+$)				
2328.4	(21/2$^+$)	679.0 *2*	100	1649.4	(17/2$^+$)				
2522.0?	(21/2$^+$)	872.6[&] *3*	100[&]	1649.4	(17/2$^+$)				
3198.3	(25/2$^+$)	676.2 *3*	17 *7*	2522.0?	(21/2$^+$)				
		869.9 *2*	100 *11*	2328.4	(21/2$^+$)				
4070.9?	(29/2$^+$)	872.6[&] *3*	100[&]	3198.3	(25/2$^+$)				Placement shown as (33/2$^+$) to (29/2$^+$) in table I of 2005Bu08 but (29/2$^+$) to (25/2$^+$) in authors' figure 5. Note that ordering of the 1069.1-872.6 cascade is not established.
5140.0	(33/2$^+$)	1069.1 *2*	100	4070.9?	(29/2$^+$)				Placement shown as (29/2$^+$) to (25/2$^+$) in table I of 2005Bu08 but (33/2$^+$) to (29/2$^+$) in authors' figure 5. Note that ordering of the 1069.1-872.6 cascade is not established. R(ADO)=1.26 *15*.
5643.4?		503.4 *2*	100	5140.0	(33/2$^+$)				
6487.7		844.3 *3*	100	5643.4?					R(ADO)=1.31 *24*.
7493.3		1005.6 *3*	100	6487.7					
8695.2		1201.9 *2*	100	7493.3					

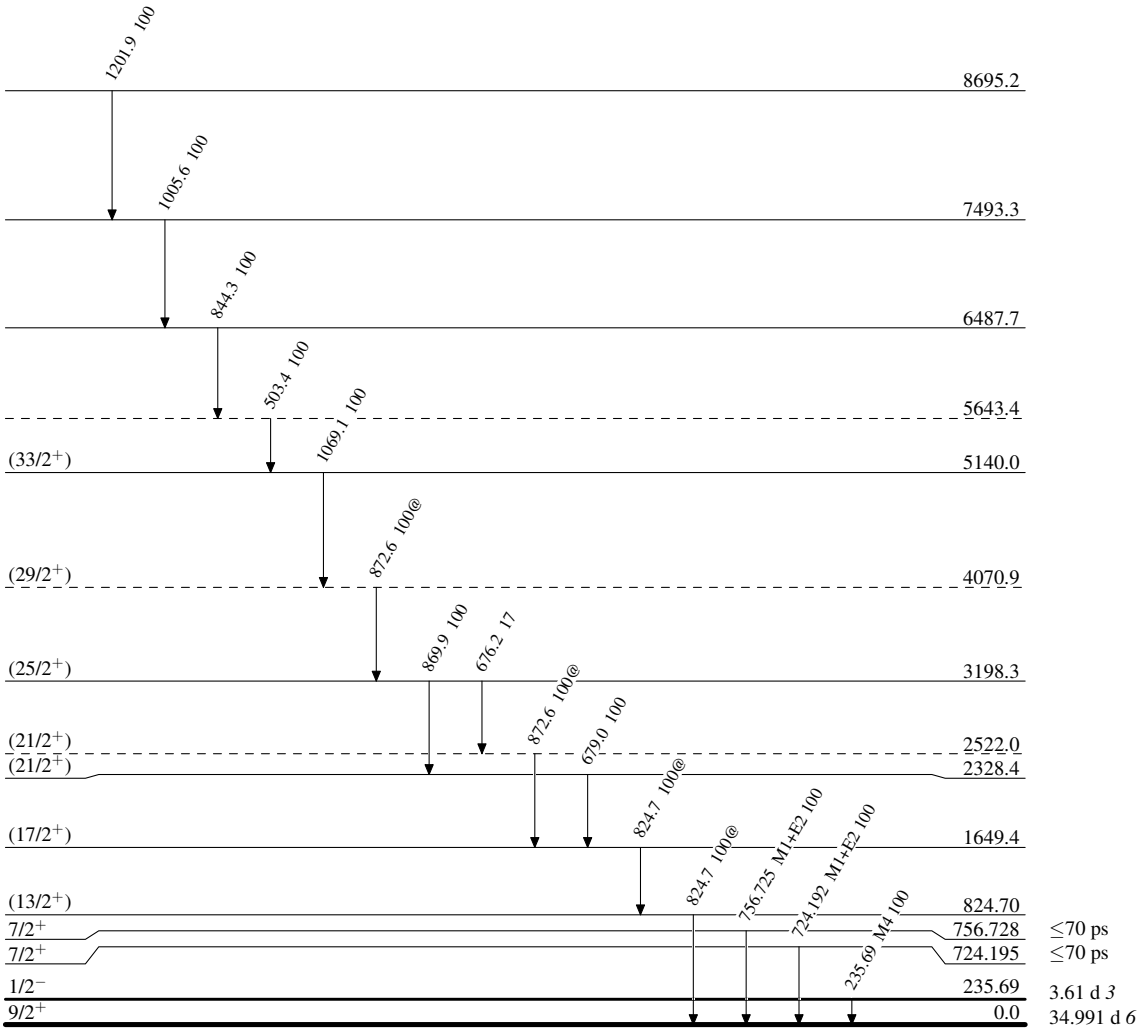
[†] From ^{16}O(^{82}Se,p2nγ), except as noted.
[‡] From α(K)exp, βγ circular polarization, and γ(θ).
[#] From γ(θ).
[@] From β$^-$ decay.
[&] Multiply placed with intensity suitably divided.

$^{95}_{41}Nb_{54}$-6

Adopted Levels, Gammas

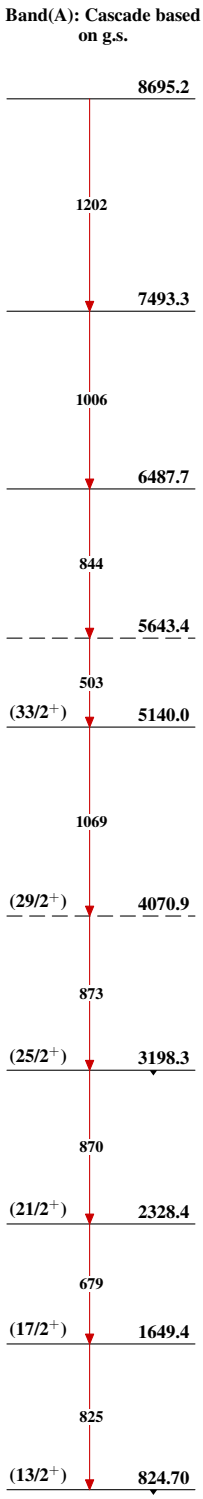
Level Scheme

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



$^{95}_{41}Nb_{54}$

Adopted Levels, Gammas



$^{95}_{41}Nb_{54}$