^{93}Nb(n,n′γ) 1992De08,1982Av05,1973Va09

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 112, 1163 (2011)	15-Dec-2010

Others: 2007Or01, 2006Or09, 2005Mc13, 1978Ab03, 1970De03, 1970Go46, 1970Ro03.

2010Or01, 2007Or01, 2006Or09, 2005Mc13: E(n)=1.5-3 MeV; BGO Compton-suppressed HPGe detector; measured Eγ, Iγ, γγ coin (At E(n)=3 MeV), γ(θ), lifetimes using Doppler-shift attenuation method, excit (E(n)=1.5-2.6 MeV). Deduced mixed-symmetry states.

1992De08: E=870-2700 (17 steps); HPGe detectors; measured Eγ, branching, γγ coin, excit.

1982Av05: reactor fast neutrons, Ge(Li) detectors; measured Eγ, Iγ, γ(θ) at 90°, 110°, 135°, 145°; Hauser-Feshbach-Moldauer analysis.

1978Ab03: E(n)=1.3, 1.6, 1.8, 2.0, 2.3, 2.5, 2.7 MeV; θ=90°, Ge(Li) detectors; measured Eγ, branching.

1973Va09: E=0.6 MeV to 2.575 MeV, Ge(Li) detectors, measured excit, Eγ, branching at 90°; Hauser-Feshbach analysis with correction for level width fluctuations.

1970Go46: E=2.5-3.1 MeV, Ge(Li) spectrometers in coincidence with NaI detectors (10 ns fast-slow coin time resolution); measured cross sections, Eγ, Iγ, γγ coin; Hauser-Feshbach analysis.

The adopted level scheme is essentially that proposed in 1992De08. Additional levels proposed in 1982Av05 at 1546.3 *5*, 1566.3 *7*, 1709.2 *6*, 1728.4 *3*, 1775.7? 7, 1913.8 *4*, 2118.1 *4* are otherwise unknown and are not adopted; γ rays deexciting them are either absent or placed differently by 1992De08.

^{93}Nb Levels

$T_{1/2}$<14 ns for 687, 743, 808, 810, 950, 979, 1083, 1297, 1335, 1491 levels, based on time spectrum of deexciting γ rays (1970Ro03).

E(level)†	Jπ‡	$T_{1/2}$#	Comments
0	$9/2^+$		Jπ: from Adopted Levels.
30.77 *2*	$1/2^-$		E(level),Jπ: from Adopted Levels.
687.2 *3*	$(3/2^-)$		
743.81 *12*	$7/2^{(+)}$a		
808.34 *18*	$5/2^{(+)}$a		
810.23 *21*	$(5/2^-)$		
949.6 *3*	$13/2^{(+)}$a		
978.64 *18*	$11/2^{(+)}$a	0.50& ps *+24−13*	
1082.45 *17*	$9/2^{(+)}$a	>0.86& ps	
1126.62 *25*	$(5/2^-)$		Jπ: $(5/2^+,7/2^+)$ from excit (1982Av05).
1284.4 *3*	$(1/2^+)$		adopted $J^\pi=(5/2)^-$.
1297.18c *21*	$9/2^{(+)}$a	0.26 ps *+8−5*	Jπ: $(9/2^+,11/2^+)$ from statistical analysis (1992De08).
1315.08 *24*	$(5/2^-,7/2^-)$	0.37& ps *+31−12*	Jπ: statistical analysis gives $7/2^-$ (1992De06), $(5/2^-)$ (1973Va09); $5/2^-$ from γ(θ) assigned by 1982Av05. ADOPTED $J^\pi=5/2^+$.
1334.6 *4*	$17/2^{(+)}$a		π: from 1973Va09; 1992De08 deduce π=− which seems unlikely given that γ feeds $J^\pi=13/2^{(+)}$ 950 level.
1369.6 *4*	$(3/2^+)$		Jπ: 3/2 from (1982Av05), $(1/2^+,3/2^+)$ from (1992De08).
1395.1 *3*	$(5/2^-,7/2)$	>0.55@ ps	Jπ: statistical analysis gives $(7/2^+)$ (1992De08); however, 1982Av05 obtain $(5/2^-)$ from γ(θ); 708γ to $3/2^-$ favors π=− if J=7/2.
1454.2 *5*	$(1/2^+,3/2^+)$		
1482.9c *3*	$(9/2^+)$	45& fs *3*	Jπ: adopted value is $7/2^+$. Other Jπ: $(7/2^+)$ (1982Av05). other $T_{1/2}$: 44 fs *+5−4* from 2007Or01.
1490.9 *4*	$15/2^+$	>0.82& ps	Jπ: from γ(θ) and statistical analysis (1982Av05). However, $(9/2^+)$ from statistical analysis by 1992De08 and $(17/2^+)$ from excit (1972Va09).
1499.83 *20*	$(7/2,9/2^-)$	>0.96 ps	$T_{1/2}$: presumed to supersede 0.81 ps *21* reported by 2006Or09. Jπ: $(9/2^-)$ from excit (1992De08). however, this conflicts with J=7/2 from

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^{93}Nb(n,n′γ) 1992De08,1982Av05,1973Va09 (continued)

^{93}Nb Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	Comments
			1500γ(θ) (1982Av05) and supported by observed level occupancy.
1572.1		0.19[@] ps *+15−7*	$T_{1/2}$: from 2010Or01; presumed to supersede 0.20 ps *+15−7* reported by 2006Or09.
1588.4		>0.87[@] ps	
1603.01 *22*	(7/2⁻,9/2⁻)		
1603.7 *4*	(11/2,13/2)	0.32[&] ps *+17−9*	π=− from 1992De08 but π=+ from 1982Av05.
1665.2 *6*	5/2$^{(+)}$[a]	0.24[&] ps *+7−5*	
1679.09 *21*	(9/2⁺,11/2⁺)	0.22[&] ps *+6−4*	
1682.4?[b] *5*	(5/2⁺)		Jπ: note, however, that 704γ feeds an 11/2⁺ level. Evaluator, therefore, considers existence of this level to be doubtful, and adopts a single level at 1682 keV from which the 704γ also is placed (consistent with 1982Av05).
1682.6[b] *4*	(9/2⁺)	104[&] fs *+17−14*	
1686.0 *4*	13/2	0.17[&] ps *+4−3*	Jπ: statistical analysis yields (13/2⁺) (1982Av05), (9/2⁻,11/2⁻) (1992De08); 13/2 from γ(θ) (1982Av05).
1694?			Level observable in γγ coin only (1992De08).
1703.5		0.15[&] ps *+19−6*	
1772.4 *4*	(5/2⁺)	87[&] fs *+14−10*	
1779.5 *4*	(5/2⁻)	73[@] fs *+30−19*	
1784.2 *3*	(5/2⁺)		
1812.1 *5*	(19/2⁻)	104[&] fs *+35−24*	
1840.6		71[@] fs *+24−17*	$T_{1/2}$: presumed to supersede value of 18.0 fs *28* reported In 2005Mc13.
1908.1 *11*	(5/2)		π=− from statistical analysis in 1992De08; evaluator does not adopt this because it implies mult(1908γ)=M2.
1910.5 *4*	7/2$^{(+)}$	139 fs *+28−21*	Jπ: (7/2⁺,9/2⁺) from statistical analysis (1992De08), 7/2 from γ(θ) (1982Av05). ADOPTED value is 11/2⁺.
1915.8 *5*	(9/2⁻)	62[&] fs *7*	Jπ: adopted value is 7/2.
1947.9 *5*	(3/2⁺,5/2⁺)	0.16[@] ps *+9−5*	Jπ: 3/2 from excit in 1982Av05.
1949.6[b] *3*	(9/2⁺)	0.5[&] ps *+11−2*	Jπ: adopted value is (7/2⁺).
1949.7[b] *4*	(7/2)	0.6[&] ps *+26−3*	Jπ: 5/2⁻,(7/2⁻) from statistical analysis in 1992De08; evaluator rejects 5/2⁻ because it implies mult(1950γ)=M2. adopted π=(+).
1968.4[b] *5*	(11/2⁻,13/2⁻)		
1968.5[b] *3*	(11/2⁻,13/2⁻)	111 fs *+24−21*	Jπ: adopted π=+. $T_{1/2}$: from 2010Or01; presumed to supersede 96 fs *+24−21* from 2007Or01.
1997.6		64[@] fs *+15−12*	
2002.2 *5*	15/2[a]	>0.55 ps	Jπ: statistical analysis yields (9/2⁻) (1992De08), (17/2) (1973Va09).
2019.6 *5*	(7/2⁻,9/2⁻)		
2037.0 *4*	(9/2⁺,11/2⁺)		
2098.8 *5*	(3/2⁺)		
2122.6		80 fs *+21−14*	
2132.3 *6*	(7/2⁺)		Jπ: analysis based on only 2 points gives (5/2⁺,7/2⁺); γ to 11/2$^{(+)}$.
2153.7 *4*	(3/2⁺)		
2162.3 *5*	(9/2⁺)	0.28[&] ps *+21−9*	
2171.2 *4*	(13/2⁺)	0.24[&] ps *+11−6*	
2180.1? *6*	(7/2⁺)		E(level): must differ from the (17/2)⁻ 2180 level In Adopted Levels, Gammas. level not ADOPTED.
2184.0		76[&] fs *+31−21*	E(level): rounded value from Adopted Levels.
2203.2 *4*	(9/2⁺)		
2280.5 *8*	(7/2⁻)		
2329.8 *6*			
2367.3 *10*			

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^{93}Nb(n,n′γ) 1992De08,1982Av05,1973Va09 (continued)

^{93}Nb Levels (continued)

E(level)[†]	$T_{1/2}$[#]
2507.0	66 fs *+21−14*
2583.8 *8*	

† From least-squares fit to Eγ.
‡ From statistical analysis of excit (1992De08), unless indicated otherwise. note that adopted J^{π} values differ In a number of cases.
# From DSAM measurements by 2007Or01, except As noted.
@ From DSAM measurement by 2006Or09.
& From DSAM measurement by 2010Or01.
[a] J from γ(θ) (1982Av05).
[b] 1992De08 propose two levels at essentially the same energy near 1682 keV, 1950 keV and 1968 keV because, in each case, they were unable to fit experimental data for all the attributed γ rays (based on γγ coin) by means of a theoretical excitation function for a single level.
[c] Based on M1 strengths, this level is proposed by 2007Or01 as a member of the quintet of mixed-symmetry states formed from configuration=$\pi 1g_{9/2}\otimes$(first 2^+, mixed-symmetry state in ^{92}Zr).

^{93}Nb(n,n′γ) 1992De08,1982Av05,1973Va09 (continued)

γ(^{93}Nb)

Coin information is from 1992De08.

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#]	Comments
(30.77 2)		30.77	1/2⁻	0	9/2⁺			E_γ: from Adopted Gammas.
x96.52[d] 20	2.1[d] 5							
x100.56[d] 20	2.2[d] 5							
103.94[&] 15	3.6 6	1082.45	9/2(+)	978.64	11/2(+)			
x207.62[d] 15	1.6[d] 4							
270.23[d&] 20	1.0[d] 3	1949.6	(9/2⁺)	1679.09	(9/2⁺,11/2⁺)			
x278.02[d] 20	0.36[d] 10							
282.36[&] 20	0.41 12	1968.5	(11/2⁻,13/2⁻)	1686.0	13/2			
285.52[&] 20	0.49 14	1968.5	(11/2⁻,13/2⁻)	1682.6	(9/2⁺)			
x293.09[d] 20	0.59[d] 16							
318.27[i] 17	≤1.3[if]	1126.62	(5/2⁻)	808.34	5/2(+)			
318.27[i] 17	9.5[if]	1297.18	9/2(+)	978.64	11/2(+)	D(+Q)		A_2=+0.015 22 (1982Av05). δ(D,Q)=−0.04 9 or −10 +5−80 (1982Av05). Branching=53.1 20 (1973Va09). Other: 24 (1992De08).
318.27[h] 17	≤1.3[hf]	1772.4	(5/2⁺)	1454.2	(1/2⁺,3/2⁺)			Branching: 25 (1992De08).
338.67 17	25	1082.45	9/2(+)	743.81	7/2(+)	D(+Q)	0.00 16	Branching=100.0 15 (1973Va09). Others: 100 (1992De08), 100 19 (1970Go46). A_2=+0.02 2 (1982Av05).
364.3 4	2.4	1679.09	(9/2⁺,11/2⁺)	1315.08	(5/2⁻,7/2⁻)			Branching=62 2 (1973Va09). Others: 76 (1992De08), 83 (1982Av05).
x368.78[d] 25	0.25[d] 10							
381.5[a] 3		1679.09	(9/2⁺,11/2⁺)	1297.18	9/2(+)			Branching=36 (1992De08).
385.07 17	17	1334.6	17/2(+)	949.6	13/2(+)	Q		A_2=+0.21 6 consistent with mult=Q (1982Av05).
388.3[d&] 3	0.45[d] 15	1703.5		1315.08	(5/2⁻,7/2⁻)			
400.5[&]	0.83[e] 25	1482.9	(9/2⁺)	1082.45	9/2(+)			
x433.7[d] 3	0.73[d] 25							
477.5[h] 3	5.5[h]	1812.1	(19/2⁻)	1334.6	17/2(+)			
477.5[h] 3	5.5[h]	1968.4	(11/2⁻,13/2⁻)	1490.9	15/2⁺			
x499.9[d] 4	1.6[d] 5							
506.8[@] 4		1315.08	(5/2⁻,7/2⁻)	808.34	5/2(+)			Branching=23.5 12 (1973Va09). Other: 43 (1992De08).
520.5[@] 4		1603.01	(7/2⁻,9/2⁻)	1082.45	9/2(+)			Branching=70 (1992De08). Other: 37 5 (1973Va09).
537.2[a] 3		2037.0	(9/2⁺,11/2⁺)	1499.83	(7/2,9/2⁻)			Branching=100 (1992De08).
541.33 22	16.8	1490.9	15/2⁺	949.6	13/2(+)			A_2=−0.24 3 (1982Av05). Mult.=D+Q, δ=−0.09 3 if J(1491 level)=15/2 (1982Av05).

$^{93}_{41}Nb_{52}$-4

^{93}Nb(n,n′γ) 1992De08,1982Av05,1973Va09 (continued)

γ(^{93}Nb) (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#]	Comments
553.07 *25*	7.2	1297.18	9/2$^{(+)}$	743.81	7/2$^{(+)}$	D(+Q)	−0.3 *+3−7*	Branching=51.0 *20* (1973Va09). Others: 73 (1992De08), 40 (1982Av05), 64 *15* (1970Go46). A_2=+0.04 *3* (1982Av05).
559.4[@] *3*	1.9	1369.6	(3/2$^+$)	810.23	(5/2$^-$)			
571.4 *3*	9.8	1315.08	(5/2$^-$,7/2$^-$)	743.81	7/2$^{(+)}$	D(+Q)		Branching=100.0 *25* (1973Va09). Other: 100 (1992De08). Mult.,δ: A_2=+0.03 *3* (1982Av05); δ=+0.10 *+18−15* if J(1315)=5/2 (1982Av05).
584.97 *22*	8.4	1395.1	(5/2$^-$,7/2)	810.23	(5/2$^-$)	D+Q		Branching=100 (1992De08 and 1982Av05). A_2=+0.02 *2* (1982Av05). δ: −0.55 *+17−25* if 5/2 to 5/2 transition (1982Av05), but adopted J(1395)=(7/2$^-$).
600.4[j] *3*	0.5	2203.2	(9/2$^+$)	1603.01	(7/2$^-$,9/2$^-$)			Placed by 1982Av05 and 1973Va09; absent in 1992De08, so shown as tentative. Eγ from 1973Va09. Branching=24 from I(600γ)/I(2203γ) in 1982Av05 and branching(2203γ) in 1992De08.
613.1[&] *3*	0.7 *4*	1910.5	7/2$^{(+)}$	1297.18	9/2$^{(+)}$			
624.5 *3*	2.2	1603.01	(7/2$^-$,9/2$^-$)	978.64	11/2$^{(+)}$			Branching=100 (1992De08). Other: 100 *5* (1973Va09).
626.1[a] *6*	0.9	1603.7	(11/2,13/2)	978.64	11/2$^{(+)}$			Branching=25 (1992De08). Others: 13 (1982Av05), 33.3 *18* (1973Va09).
639.2[d]	0.6[d]	2122.6		1482.9	(9/2$^+$)			
646.2[a] *8*	1.3	1454.2	(1/2$^+$,3/2$^+$)	808.34	5/2$^{(+)}$			
653.5[a] *6*	7.0	1603.7	(11/2,13/2)	949.6	13/2$^{(+)}$			Branching=100 (1992De08 and 1982Av05). Other: 100 *4* (1973Va09).
656.3 *3*	10.1	687.2	(3/2$^-$)	30.77	1/2$^-$			
671.93[d&] *20*	0.28[d] *8*	2162.3	(9/2$^+$)	1490.9	15/2$^+$			
674.7[@] *4*	2.1	1482.9	(9/2$^+$)	808.34	5/2$^{(+)}$			Branching=23.5 *12* (1973Va09). Others: 32 (1992De08), 29 (1982Av05).
[x]680.2[d] *4*	0.32[d] *15*							
689.1[a] *5*		1499.83	(7/2,9/2$^-$)	810.23	(5/2$^-$)			E_γ: for doubly-placed G. 1992De08 report 689γ-779γ coin. Branching=11 (1992De08; doublet Iγ suitably divided).
689.1[a j] *5*		2180.1?	(7/2$^+$)	1490.9	15/2$^+$			E_γ: γ is doubly-placed γ by 1992De08, but not by 1982Av05. This placement is not ADOPTED.
701.71 *24*	1.3 *4*	1784.2	(5/2$^+$)	1082.45	9/2$^{(+)}$			E_γ: weighted average from 1992De08 and 1982Av05.
703.7[h@] *4*	2.6[h]	1682.4?	(5/2$^+$)	978.64	11/2$^{(+)}$			If the 704γ, instead, deexcited the (9/2$^+$) member of the 1682 doublet proposed in 1992De08, its branching would be 50 *2* (1973Va09) (other value: 72 (1982Av05)).
703.7[h@] *4*	2.6[h]	2098.8	(3/2$^+$)	1395.1	(5/2$^-$,7/2)			
707.5[a] *5*	3.6	1395.1	(5/2$^-$,7/2)	687.2	(3/2$^-$)			Branching=54 (1992De08). Other: 43 (1982Av05).
736.9[@] *4*	4.2	1686.0	13/2	949.6	13/2$^{(+)}$	D(+Q)	+0.4 *6*	A_2=+0.10 *3* (1982Av05). δ from −0.25<δ(D,Q)<+1.0 if J=13/2 (1982Av05). Branching=100 *5* (1973Va09). Other: 100 (1992De08,1982Av05).

$^{93}_{41}Nb_{52}$-5

^{93}Nb(n,n′γ) 1992De08,1982Av05,1973Va09 (continued)

γ(^{93}Nb) (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [#]	δ [#]	Comments
743.82 *17*	100 [b]	743.81	7/2(+)	0	9/2+	D+Q	+0.25 *+13−11*	A_2=+0.07 *2* (1982Av05). δ: +8 *+62−4* also possible (1982Av05), but inconsistent with δ from Coulomb excitation.
756.02 [&] *20*	0.80 *15*	1499.83	(7/2,9/2−)	743.81	7/2(+)			Branching=7 from I(756γ)/I(1500γ) in 1982Av05 and branching(1500γ) in 1992De08).
761.67 [&] *20*	0.59 *15*	1572.1		810.23	(5/2−)			
777.8 [g]		1588.4		810.23	(5/2−)			
779.53 *22*	29.7	810.23	(5/2−)	30.77	1/2−	Q		A_2=−0.06 *2* consistent with mult=Q (1982Av05).
808.3 *4*		2203.2	(9/2+)	1395.1	(5/2−,7/2)			E_γ: for doublet; from 1992De08. Branching=100 (1992De08; doublet Iγ suitably divided).
808.42 *22*	35.6	808.34	5/2(+)	0	9/2+	Q		E_γ,I_γ: for doublet. A_2=−0.005 *14* consistent with mult=Q (1982Av05).
833.3 *4*		1915.8	(9/2−)	1082.45	9/2(+)			
849		2184.0		1334.6	17/2(+)			E_γ: rounded value from Adopted Gammas.
859.1 [@] *3*	0.87	1603.01	(7/2−,9/2−)	743.81	7/2(+)			Branching=63 (1992De08).
[x]882.4 [d] *4*	0.46 [d] *20*							Eγ is out of order in table 2 of 1982Av05; possibly it is 682.4 misprinted.
884.9 [&] *3*	0.75 *25*	1572.1		687.2	(3/2−)			
[x]887.3 [d] *3*	0.48 [d] *20*							
900.90 [&] *25*	1.6 *4*	1588.4		687.2	(3/2−)			
921.4 [c] *5*	2.9	1665.2	5/2(+)	743.81	7/2(+)	D+Q		A_2=−0.22 *2* (1982Av05). δ(D,Q)=−0.40 *5* or −1.60 *15* (1982Av05).
935.5 *3*	2.9	1679.09	(9/2+,11/2+)	743.81	7/2(+)			Branching=100 *4* (1973Va09). Others: 100 (1992De08 and 1982Av05).
939.0 *4*	3.6	1682.6	(9/2+)	743.81	7/2(+)			Branching=100 *4* (1973Va09). Others: 100 (1992De08,1982Av05), 100 *28* (1970Go46).
949.7 *3*	92 [b]	949.6	13/2(+)	0	9/2+	Q		A_2=+0.131 *13* consistent with mult=Q (1982Av05).
950 [j]		1694?		743.81	7/2(+)			E_γ: 744 or 950; order of coincident 744γ and 950γ not established because levels exist at both 744 and 950.
[x]956.8 [d] *4*	0.33 [d] *10*							Eγ is out of order in table 2 of 1982Av05; possibly it is 966.8 misprinted.
964.0 [@] *4*	1.5 *4*	1772.4	(5/2+)	808.34	5/2(+)			Branching: 100 (1992De08).
969.23 *24*	1.3 *7*	1779.5	(5/2−)	810.23	(5/2−)			E_γ: weighted average from 1992De08 and 1982Av05.
978.83 *22*	66	978.64	11/2(+)	0	9/2+	D+Q	−0.40 *+18−47*	A_2=−0.08 *2* (1982Av05). δ=−1.7 *+8−10* also possible (1982Av05) but inconsistent with adopted value.
989.7 [@] *4*	1.1 [e]	1968.5	(11/2−,13/2−)	978.64	11/2(+)			Branching=34 *6* (1973Va09). Others: 127 (1992De08), 48 (1982Av05).
1018.8 [@] *4*	1.0	1968.5	(11/2−,13/2−)	949.6	13/2(+)			Branching=28 *3* (1973Va09). Others: 76 (1992De08), 43 (1982Av05).

$^{93}_{41}Nb_{52}$-6

^{93}Nb(n,n′γ) 1992De08,1982Av05,1973Va09 (continued)

γ(^{93}Nb) (continued)

E_γ †	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	δ#	Comments
1022.6[d&]	0.4[d]	2002.2	15/2	978.64	11/2(+)			placement from 2010Or01. Placed by 1982Av05 from an otherwise unknown 1709 level.
1029.6[g]		1840.6		810.23	(5/2−)			
x1031.9[d]	0.4[d]							Placed by 1982Av05 from an otherwise unknown tentative 1776 level.
1052.6 *4*	3.3	2002.2	15/2	949.6	13/2(+)	D+Q		A_2=+0.18 *2* (1982Av05). δ: +0.40 *+4−8* or +4.5 *5* if J=15/2 (1982Av05).
1082.3 *3*	8.3	1082.45	9/2(+)	0	9/2+	D(+Q)	+0.7 *11*	Branching=51.5 *15* (1973Va09). Others: 37 (1992De08), 33 (1982Av05), 18 *6* (1970Go46). A_2=−0.04 *3* (1982Av05). δ: from −0.38<δ<+1.8 (1982Av05).
1087.4[a] *6*		2037.0	(9/2+,11/2+)	949.6	13/2(+)			Branching=28 (1992De08).
x1097.2[d]	1.0[de] *3*							
x1131.2[d]	0.56[de] *16*							
1137.7[@] *4*	1.3	1947.9	(3/2+,5/2+)	810.23	(5/2−)			
1141.4 *4*	1.4	1949.6	(9/2+)	808.34	5/2(+)			Branching=100 *6* (1973Va09). Others: 100 (1992De08), 100 *35* (1970Go46).
(1143.7[g])		2122.6		978.64	11/2(+)			
1153.4[g]		1840.6		687.2	(3/2−)			
1153.7 *5*	0.44 *20*	2132.3	(7/2+)	978.64	11/2(+)			E_γ: weighted average from 1992De08 and 1982Av05.
x1158.9[d] *3*	0.8[d] *3*							
x1171.4[d] *5*	0.39[d] *15*							
1183.7 *4*	1.3	2162.3	(9/2+)	978.64	11/2(+)			
1186.9[g]		1997.6		810.23	(5/2−)			
x1187.7[d] *4*	0.61[d] *25*							
1192.6 *4*	1.6	2171.2	(13/2+)	978.64	11/2(+)			Branching=100 *4* (1973Va09). Others: 100 (1992De08,1982Av05).
1205.7 *4*		1949.6	(9/2+)	743.81	7/2(+)			Branching=85 *6* (1973Va09). Others: 100 (1992De08), 65 *30* (1970Go46); γ absent in 1982Av05.
1209.4 *4*		2019.6	(7/2−,9/2−)	810.23	(5/2−)			
1213.1[d&] *3*	0.80[d] *25*	2162.3	(9/2+)	949.6	13/2(+)			
1221.6 *3*	1.5	2171.2	(13/2+)	949.6	13/2(+)			Branching=82 *4* (1973Va09). Others: 72 (1992De08), 94 (1982Av05).
1253.6 *3*	1.4	1284.4	(1/2+)	30.77	1/2−			
1288.4[d&] *4*	0.35[d] *12*	2098.8	(3/2+)	810.23	(5/2−)			
1297.2 *4*	18	1297.18	9/2(+)	0	9/2+			Branching=100 *4* (1973Va09). Others: 100 (1992De08,1982Av05), 100 *15* (1970Go46).
1310.2[g]		1997.6		687.2	(3/2−)			
1338.9[d]	0.26[d]	1369.6	(3/2+)	30.77	1/2−			
1351.1 *5*	0.45 *22*	2329.8		978.64	11/2(+)			E_γ: weighted average from 1992De08 and 1982Av05.
1361.2[d]	1.0[d]	2171.2	(13/2+)	810.23	(5/2−)			branching somewhat larger than adopted value.
1380.5[d]	0.6[d]	2122.6		743.81	7/2(+)			

$^{93}_{41}Nb_{52}$-7

^{93}Nb(n,n′γ) 1992De08,1982Av05,1973Va09 (continued)

γ(^{93}Nb) (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#]	Comments
[x]1395.9[d] 7	0.46[d] 23							
[x]1459.3[d] 5	1.1[d] 3							
1482.8[@] 4	7.3	1482.9	(9/2$^+$)	0	9/2$^+$			Branching=100.0 25 (1973Va09). Other: 100 (1992De08,1982Av05).
1499.8 4	12.3	1499.83	(7/2,9/2$^-$)	0	9/2$^+$	D		A_2=+0.02 3 (1982Av05). δ(D,Q)=−0.02 16 if J=7/2 (1982Av05). Branching=100 (1992De08).
1527.9[&] 4	0.38 13	2507.0		978.64	11/2$^{(+)}$			
1536.7[c] 7	0.76	2280.5	(7/2$^-$)	743.81	7/2$^{(+)}$			
1602.9[a] 7	1.6	1603.7	(11/2,13/2)	0	9/2$^+$			Branching=22 (1992De08). Others: 29.8 18 (1973Va09), 23 (1982Av05).
[x]1639.4[d] 6	0.64[d] 25							
1679.1[@] 4	0.7	1679.09	(9/2$^+$,11/2$^+$)	0	9/2$^+$			Branching=38 2 (1973Va09). Others: 26 (1992De08), <24 (1982Av05).
1682.1[@] 6	2.6	1682.6	(9/2$^+$)	0	9/2$^+$			Branching=58.3 21 (1973Va09). Others: 37 (1992De08), 72 (1982Av05), 69 21 (1970Go46).
1685.3 5	3.7	1686.0	13/2	0	9/2$^+$			Branching=63.4 24 (1973Va09). Others: 69 (1992De08), 88 (1982Av05).
1775.4[a] 7		2583.8		808.34	5/2$^{(+)}$			
1908.1[a] 11		1908.1	(5/2)	0	9/2$^+$			
1910.5 4	4.9	1910.5	7/2$^{(+)}$	0	9/2$^+$	D+Q	+3.9 36	A_2=+0.13 6 (1982Av05). δ: from +0.25<δ(D,Q)<+7.5 if J=7/2 (1982Av05).
[x]1946.9[d] 8	0.42[d] 18							
1949.7 4	0.6	1949.7	(7/2)	0	9/2$^+$			If 1950γ deexcited the (9/2$^+$) member of proposed 1950 doublet, its branching would be 109 6 (1973Va09). Others: 43 (1982Av05), 65 20 (1970Go46).
1968.7 4	2.3	1968.5	(11/2$^-$,13/2$^-$)	0	9/2$^+$			Branching=100 6 (1973Va09). Others: 100 (1992De08,1982Av05,1970Go46).
2122.6[d]	<0.9[d]	2122.6		0	9/2$^+$			
2122.9 4	0.9	2153.7	(3/2$^+$)	30.77	1/2$^-$			
2171.4 5		2171.2	(13/2$^+$)	0	9/2$^+$			E_γ,I_γ: From 1973Va09 only; branching=14 2.
2203.2 4	0.7	2203.2	(9/2$^+$)	0	9/2$^+$			Branching=33 (1992De08).
2367.3[a] 10		2367.3		0	9/2$^+$			
2506.9[g]		2507.0		0	9/2$^+$			

[†] Weighted average from 1970Go46, 1973Va09, 1992De08, except as noted. 2006Or09, 2007Or01 and 2010Or01 report a single set of Eγ data from their (n,n′γ) and (p,2nγ) measurements; please see the ^{94}Zr(p,2nγ) dataset for those Eγ data.

[‡] Relative photon intensity from 1982Av05, normalized so I(744γ)=100; uncertainties are given by authors for unplaced lines only. Other Iγ: 1970Go46. 1992De08, 1978Ab03, 1973Va09 report branching only, and uncertainties are given by 1973Va09 alone. Branching, normalized so strongest branch from level is 100, is given under comments. see ^{94}Zr(p,2nγ) dataset for branching obtained by 2010Or01, 2007Or01, 2006Or09 from their joint study of the (p,2nγ) and

$^{93}_{41}Nb_{52}$-8

^{93}Nb(n,n′γ) 1992De08,1982Av05,1973Va09 (continued)

γ(^{93}Nb) (continued)

(n,n′γ) reactions.

[#] From 1982Av05, based on A_2 from γ(θ).

[@] Weighted average from 1973Va09 and 1992De08.

[&] Unplaced γ from 1982Av05, placed by evaluator consistent with level scheme from 2010Or01, 2007Or01 or 2006Or09.

[a] From 1992De08.

[b] May include a small contribution from γ deexciting a tentative 1693 level; see comment on 744γ from 1693 level.

[c] Weighted average from 1970Go46 and 1992De08.

[d] From 1982Av05.

[e] Possibly a multiplet (1982Av05).

[f] Iγ=10.8 for multiplet (1982Av05). Based on I(1297γ)=18 (1982Av05) and branching for 318γ from 1297 level in 1973Va09, I(318γ)=9.5 from 1297 level, leaving Iγ=1.3 for combined intensities of 318 keV transitions from 1127 and 1772 levels.

[g] Rounded value from Adopted Gammas.

[h] Multiply placed with undivided intensity.

[i] Multiply placed with intensity suitably divided.

[j] Placement of transition in the level scheme is uncertain.

[x] γ ray not placed in level scheme.

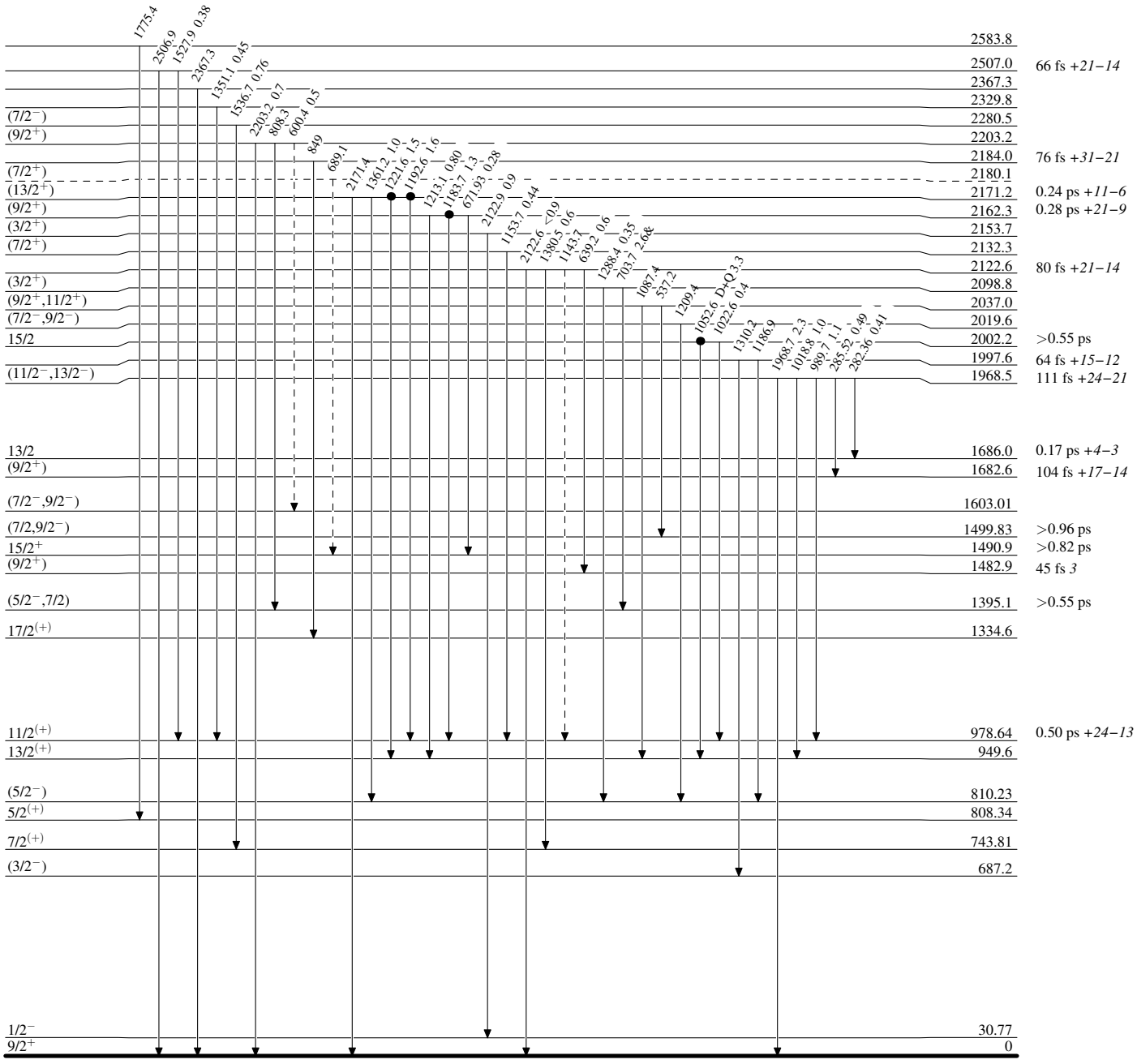
$^{93}_{41}Nb_{52}$-9

^{93}Nb(n,n′γ) 1992De08,1982Av05,1973Va09

Level Scheme

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)
- Coincidence



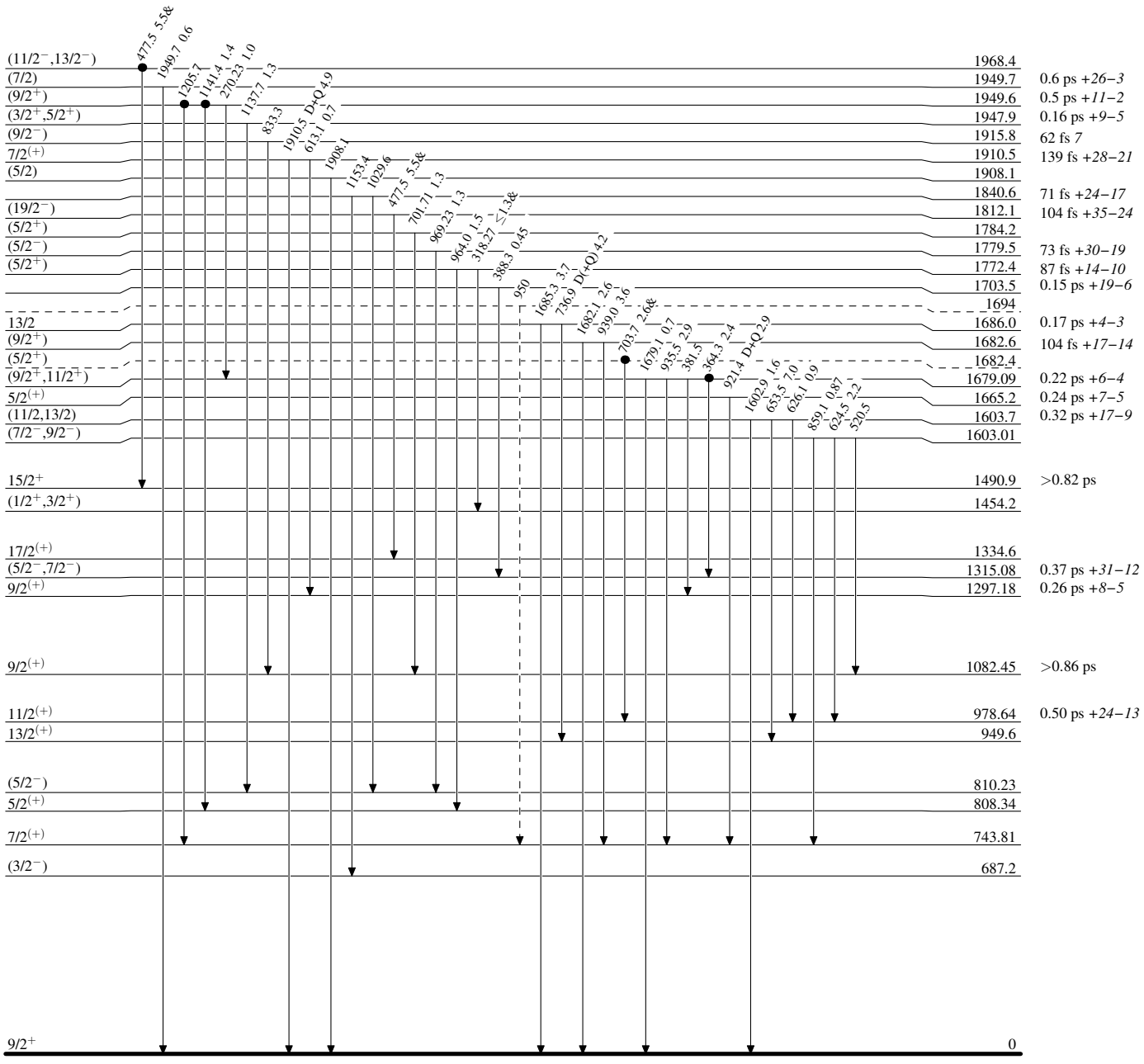
$^{93}_{41}Nb_{52}$

^{93}Nb(n,n′γ) 1992De08,1982Av05,1973Va09

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)
- Coincidence



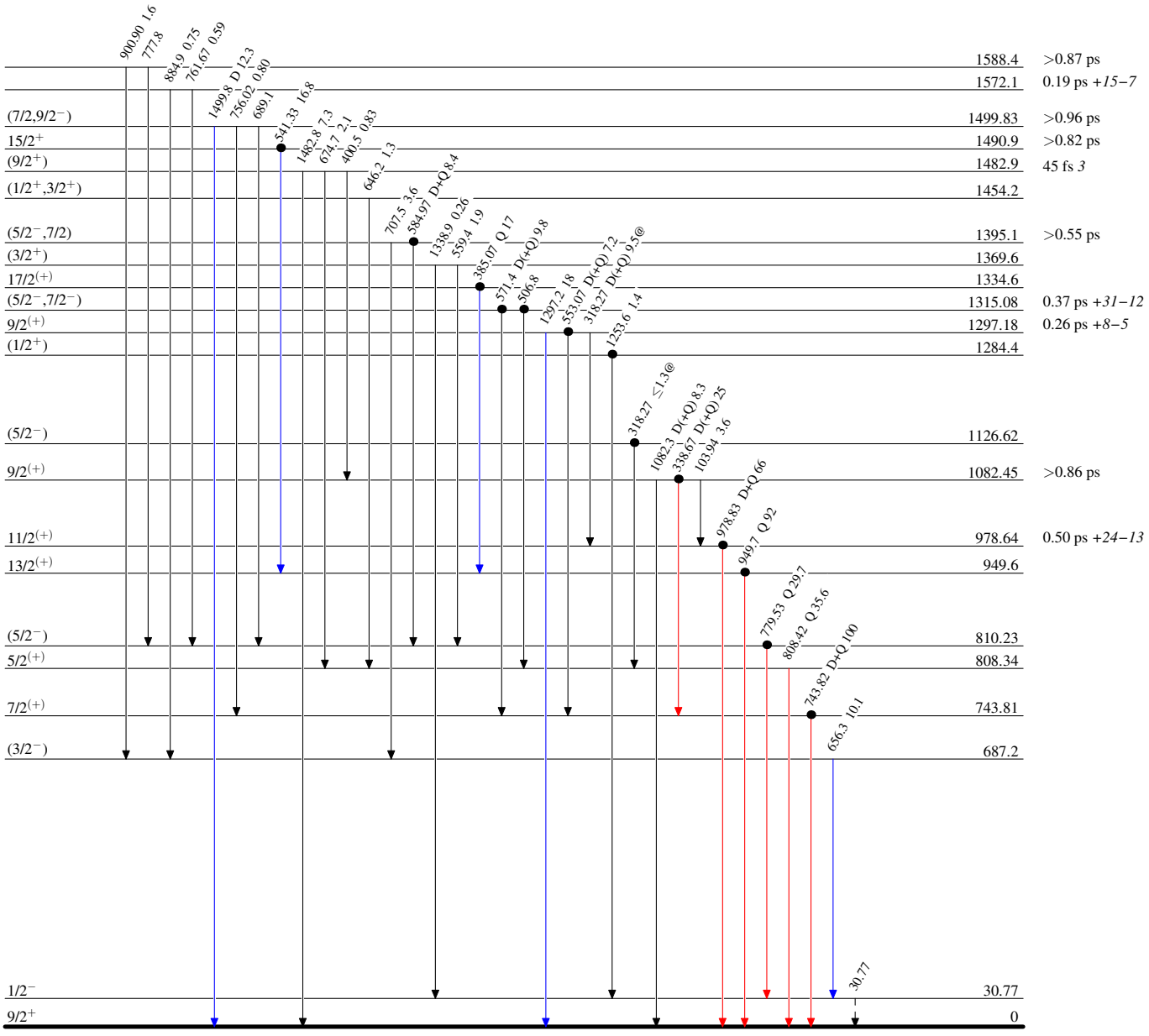
$^{93}_{41}Nb_{52}$

^{93}Nb(n,n′γ) 1992De08,1982Av05,1973Va09

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)
Coincidence



$^{93}_{41}Nb_{52}$