^{58}Ni(^{36}Ar,3pγ) 1994Ru01

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

Other: 1995Ka06.

1994Ru01: E=140, 149 MeV; 99.98% ^{58}Ni target, OSIRIS detector array (12 BGO Compton-suppressed Ge detectors at 65° or 115°, one HP Ge detector at 162°); measured Eγ, Iγ, prompt $\gamma\gamma$ coin (20 ns timing window), DCO ratios (θ=162° and 65°, 115°); results compared with shell-model calculations.

1995Ka06: E=149 MeV; 99.98% ^{58}Ni target, OSIRIS detector array (12 BGO Compton-suppressed Ge detectors), NE213 scin neutron detection; measured Eγ, γ(t), n-γ(t); deduced $T_{1/2}$.

^{91}Tc Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[#]	Comments
0.0	9/2$^+$		
139.3 *3*	(1/2$^-$)		Probable configuration=(π $p_{1/2}$).
394.51 *9*	7/2$^+$		
884.90[d] *17*	(5/2$^-$)		
892.91 *8*	13/2$^+$		
1097.10 *7*	11/2$^+$		
1532.62 *10*	11/2$^+$		
1555.81 *13*	(9/2$^-$)		
1821.34 *10*	17/2$^+$		
1943.10 *9*	13/2$^-$		
2044.84 *9*	15/2$^+$		
2137.17[&] *13*	21/2$^+$	1.85 ns *3*	$T_{1/2}$: weighted average of 1.85 ns *4* (1994Ru01) and 1.87 ns *7* and 1.83 ns *6* (1995Ka06).
2153.01[d] *10*	17/2$^-$	1.07 ns *6*	$T_{1/2}$: weighted average of 1.09 ns *6* (1994Ru01) and 1.04 ns *21*, 0.9 ns *3*, 0.8 ns *6* (1995Ka06).
2767.59[&] *14*	23/2$^+$	<0.7 ps	
2980.58[e] *13*	21/2$^-$	3.3 ps *7*	
3135.91[&] *15*	25/2$^+$	<0.7 ps	
3345.44[&] *15*	25/2$^+$	1.2 ps *9*	
3804.38[e] *15*	25/2$^-$	4.6 ps *5*	
4080.37 *16*	25/2$^-$	3.5 ps *10*	
4119.31[a] *16*	27/2$^+$	<1.4 ps	
4354.53[a] *15*	29/2$^+$	1.5 ps *4*	
4594.90 *16*	27/2$^-$	<0.7 ps	
4703.14[e] *17*	29/2$^-$		
4750.23[a] *18*	29/2$^+$		
4935.75[e] *17*	29/2$^-$	<0.7 ps	
5077.95[e] *18*	31/2$^-$	3.3 ps *3*	
5090.57[a] *17*	31/2$^+$	<1.4 ps	
5268.11[a] *17*	33/2$^+$	6.4 ps *4*	
5382.91 *19*	31/2$^+$		
5567.15[e] *19*	33/2$^-$	<0.7 ps	
5776.13 *19*	33/2$^+$		
5933.68[a] *18*	35/2$^+$	0.49 ps *+35−21*	
6158.75[f] *20*	35/2$^-$	1.46 ps *21*	
6192.17 *18*	33/2$^+$		
6452.35[a] *21*	37/2$^+$	0.8[@] ps *6*	
6615.83[f] *22*	37/2$^-$	0.83[@] ps *14*	$T_{1/2}$: erroneously attributed to 6691 level in table ii of 1994Ru01.
6690.8 *7*			

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$^{58}Ni(^{36}Ar,3p\gamma)$ 1994Ru01 (continued)

^{91}Tc Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	E(level)[†]	Jπ[‡]	$T_{1/2}$[#]
6843.08 *19*	35/2+		8392.3[b] *11*	(41/2+)	0.37 ps *4*
7292.87[a] *20*	37/2+		8559.0 *5*		
7505.06[f] *23*	39/2−		8835.90[b] *22*	41/2+	4.0 ps *4*
7668.00[b] *22*	37/2+		9299.79[b] *24*	43/2+	0.9 ps *4*
7716.20[f] *23*	41/2−	0.83[@] ps *21*	9717.0[f] *21*	(45/2−)	
7992.7 *4*			10166.7[c] *17*	(45/2+)	0.44[@] ps *3*
8141.23[b] *21*	39/2+		10505.4[c] *3*	47/2+	1.8[@] ps *4*
8276.59[b] *23*	(39/2+)		12225.1[c] *24*		

[†] From least-squares fit to Eγ.
[‡] From 1994Ru01, based on measured DCO ratios and observed γγ coin.
[#] From Doppler-shift attenuation, recoil Doppler shift and/or differential decay curve methods (1994Ru01), except as noted.
[@] Effective lifetime (not corrected for feeding) (1994Ru01).
[&] Band(A): π=+, seniority=3 states (1994Ru01). Probable dominant Configuration=$((\pi\ g_{9/2})(\nu\ g_{9/2})^{-2})$.
[a] Band(B): π=+, seniority=5 states (1994Ru01). Probable dominant Configuration=$((\pi\ g_{9/2})^{3}(\nu\ g_{9/2})^{-2})$.
[b] Band(C): π=+, seniority=7 states (1994Ru01).
[c] Band(D): possible π=+, seniority=9 states (1994Ru01).
[d] Band(E): π=−, seniority=3 states (1994Ru01). Probable dominant Configuration=$((\pi\ p_{1/2})(\pi\ g_{9/2})^{2})$.
[e] Band(F): π=−, seniority=5 states (1994Ru01).
[f] Band(G): π=−, seniority=7 states (1994Ru01).

$\gamma(^{91}Tc)$

E_γ[†]	I_γ[†]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	δ[‡]	Comments
108.2 *1*	176 *15*	2153.01	17/2−	2044.84	15/2+	D+Q		DCO=0.27 *5* (1994Ru01).
142.2 *1*	245 *14*	5077.95	31/2−	4935.75	29/2−	D+Q		DCO=0.22 *8* (1994Ru01).
157.6 *1*	9 *2*	5933.68	35/2+	5776.13	33/2+			
177.6 *1*	195 *8*	5268.11	33/2+	5090.57	31/2+	D+Q		DCO=0.22 *7* (1994Ru01).
204.3 *1*	28 *3*	1097.10	11/2+	892.91	13/2+			DCO=0.91 *15* (1994Ru01).
210.0 *1*	225 *9*	2153.01	17/2−	1943.10	13/2−			
210.1 *2*	19 *2*	3345.44	25/2+	3135.91	25/2+			
211.1 *1*	142 *6*	7716.20	41/2−	7505.06	39/2−	D+Q		DCO=0.36 *9* (1994Ru01).
223.6 *1*	76 *4*	2044.84	15/2+	1821.34	17/2+	D+Q		DCO=0.35 *8* (1994Ru01).
232.4 *2*	4 *1*	4935.75	29/2−	4703.14	29/2−			
235.3 *1*	169 *7*	4354.53	29/2+	4119.31	27/2+	D+Q		DCO=0.34 *7* (1994Ru01).
257.8 *3*	6 *2*	6192.17	33/2+	5933.68	35/2+			
276.0 *1*	53 *4*	4080.37	25/2−	3804.38	25/2−			DCO=1.06 *9* (1994Ru01). Transition interpreted by authors as D, ΔJ=0.
315.8 *1*	663 *21*	2137.17	21/2+	1821.34	17/2+			DCO=0.83 *6* (1994Ru01). Transition interpreted by authors as Q, ΔJ=2; RUL disallows M2.
331.6 *1*	87 *5*	2153.01	17/2−	1821.34	17/2+	D(+Q)	+0.2 *6*	DCO=1.00 *8* (1994Ru01). Transition interpreted by authors as D, ΔJ=0.
340.3 *1*	20 *2*	5090.57	31/2+	4750.23	29/2+	D+Q		DCO=0.63 *9* (1994Ru01).
340.9 *1*	267 *13*	4935.75	29/2−	4594.90	27/2−	D(+Q)	−0.05 *7*	DCO=0.52 *7* (1994Ru01).
368.3 *1*	403 *14*	3135.91	25/2+	2767.59	23/2+	D+Q	−0.03 *1*	DCO=0.54 *2* (1994Ru01).
374.8 *1*	210 *9*	5077.95	31/2−	4703.14	29/2−	D(+Q)	−0.01 *6*	DCO=0.56 *7* (1994Ru01).
387.3 *1*	29 *3*	1943.10	13/2−	1555.81	(9/2−)	Q		DCO=1.0 *3* (1994Ru01).
393.1 *2*	8 *2*	5776.13	33/2+	5382.91	31/2+			

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^{58}Ni(^{36}Ar,3pγ) 1994Ru01 (continued)

γ(^{91}Tc) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	δ‡	Comments
394.5 *1*	48 *5*	394.51	7/2+	0.0	9/2+	D+Q	−0.7 *+4−13*	DCO=1.08 *15* (1994Ru01).
395.7 *2*	7 *2*	4750.23	29/2+	4354.53	29/2+			
410.5 *1*	98 *4*	1943.10	13/2−	1532.62	11/2+	D(+Q)	−0.01 *8*	DCO=0.57 *8* (1994Ru01).
435.4 *2*	7 *2*	1532.62	11/2+	1097.10	11/2+			
449.8 *1*	42 *5*	7292.87	37/2+	6843.08	35/2+	D(+Q)		DCO=0.68 *13* (1994Ru01).
457.1 *1*	260 *9*	6615.83	37/2−	6158.75	35/2−	D+Q	−0.08 *4*	DCO=0.47 *3* (1994Ru01).
463.9 *1*	186 *7*	9299.79	43/2+	8835.90	41/2+	D+Q	+0.08 *5*	DCO=0.67 *7* (1994Ru01).
473.2 *1*	33 *2*	8141.23	39/2+	7668.00	37/2+	D(+Q)		DCO=0.60 *10* (1994Ru01).
489.2 *1*	190 *7*	5567.15	33/2−	5077.95	31/2−	D(+Q)	−0.02 *6*	DCO=0.54 *7* (1994Ru01).
514.5 *1*	66 *3*	4594.90	27/2−	4080.37	25/2−	D(+Q)	−0.04 *8*	DCO=0.53 *9* (1994Ru01).
518.7 *1*	237 *9*	6452.35	37/2+	5933.68	35/2+	D(+Q)	0.00 *7*	DCO=0.57 *8* (1994Ru01).
559.3 *1*	23 *2*	8835.90	41/2+	8276.59	(39/2+)	D(+Q)		DCO=0.61 *14* (1994Ru01).
566.3 *2*	40 *6*	8559.0		7992.7				
577.7 *1*	195 *8*	3345.44	25/2+	2767.59	23/2+	D(+Q)	−0.04 *4*	DCO=0.53 *3* (1994Ru01).
591.6 *1*	137 *5*	6158.75	35/2−	5567.15	33/2−	D(+Q)	−0.01 *6*	DCO=0.55 *7* (1994Ru01).
630 *1*	≈15	4750.23	29/2+	4119.31	27/2+			
630.3 *1*	703 *22*	2767.59	23/2+	2137.17	21/2+	D+Q	−0.05 *2*	DCO=0.52 *1* (1994Ru01).
650.9 *1*	63 *4*	6843.08	35/2+	6192.17	33/2+	D(+Q)		DCO=0.54 *13* (1994Ru01).
665.5 *1*	309 *11*	5933.68	35/2+	5268.11	33/2+	D(+Q)	−0.01 *6*	DCO=0.55 *7* (1994Ru01).
670.9 *1*	15 *5*	1555.81	(9/2−)	884.90	(5/2−)	Q		DCO=1.08 *23* (1994Ru01).
685.9 *2*	10 *2*	5776.13	33/2+	5090.57	31/2+	D(+Q)		DCO=0.44 *24* (1994Ru01).
694.7 *1*	148 *6*	8835.90	41/2+	8141.23	39/2+	D(+Q)	−0.01 *7*	DCO=0.54 *8* (1994Ru01).
702.1 *3*	10 *4*	1097.10	11/2+	394.51	7/2+			
736.0 *1*	200 *7*	5090.57	31/2+	4354.53	29/2+	D(+Q)	−0.02 *3*	DCO=0.55 *3* (1994Ru01).
745.6 *2*	20 *1*	884.90	(5/2−)	139.3	(1/2−)	(Q)		DCO=0.90 *23* (1994Ru01).
774.0 *1*	190 *7*	4119.31	27/2+	3345.44	25/2+	D+Q	−0.07 *4*	DCO=0.50 *3* (1994Ru01).
790.6 *1*	209 *9*	4594.90	27/2−	3804.38	25/2−	D(+Q)	−0.04 *7*	DCO=0.53 *7* (1994Ru01).
809.3 *1*	28 *2*	6192.17	33/2+	5382.91	31/2+	D(+Q)		DCO=0.37 *14* (1994Ru01).
823.8 *1*	484 *16*	3804.38	25/2−	2980.58	21/2−	E2		DCO=1.04 *3* (1994Ru01).
827.6 *1*	498 *16*	2980.58	21/2−	2153.01	17/2−	E2		DCO=1.09 *8* (1994Ru01).
843.3 *4*	4 *1*	2980.58	21/2−	2137.17	21/2+			
846.1 *1*	98 *9*	1943.10	13/2−	1097.10	11/2+	D(+Q)	+0.06 *7*	DCO=0.65 *8* (1994Ru01).
848.5 *2*	39 *3*	8141.23	39/2+	7292.87	37/2+	D(+Q)		DCO=0.54 *12* (1994Ru01).
864.0 *3*	6 *2*	5567.15	33/2−	4703.14	29/2−			
889.2 *1*	195 *8*	7505.06	39/2−	6615.83	37/2−	D+Q	−0.07 *5*	DCO=0.47 *4* (1994Ru01).
892.9 *1*	1000 *31*	892.91	13/2+	0.0	9/2+	Q		DCO=0.97 *6* (1994Ru01).
898.7 *1*	224 *9*	4703.14	29/2−	3804.38	25/2−	Q		DCO=0.92 *7* (1994Ru01).
913.6 *1*	223 *8*	5268.11	33/2+	4354.53	29/2+	E2		DCO=0.96 *7* (1994Ru01).
924.2 *1*	30 *3*	6192.17	33/2+	5268.11	33/2+	D(+Q)		DCO=0.36 *13* (1994Ru01).
928.4 *1*	904 *29*	1821.34	17/2+	892.91	13/2+	Q		DCO=0.96 *7* (1994Ru01).
944.2 *2*	13 *3*	4080.37	25/2−	3135.91	25/2+			
947.7 *1*	112 *10*	2044.84	15/2+	1097.10	11/2+	Q		DCO=1.00 *22* (1994Ru01).
972.0 *3*	11 *2*	5090.57	31/2+	4119.31	27/2+			
983.5 *3*	21 *2*	8276.59	(39/2+)	7292.87	37/2+			
998.5 *2*	19 *3*	3135.91	25/2+	2137.17	21/2+			
1009.1 *1*	27 *2*	4354.53	29/2+	3345.44	25/2+	E2		DCO=0.99 *13* (1994Ru01).
1028.4 *2*	20 *2*	5382.91	31/2+	4354.53	29/2+	D(+Q)		DCO=0.55 *18* (1994Ru01).
1036.9 *2*	13 *2*	3804.38	25/2−	2767.59	23/2+			
1048.7 *3*	13 *3*	6615.83	37/2−	5567.15	33/2−			
1050.0 *2*	30 *2*	1943.10	13/2−	892.91	13/2+			
1080.8 *1*	168 *8*	6158.75	35/2−	5077.95	31/2−	E2		DCO=0.92 *9* (1994Ru01).
1097.1 *1*	187 *10*	1097.10	11/2+	0.0	9/2+	D(+Q)	+0.04 *7*	DCO=0.62 *8* (1994Ru01).
1100.0 *3*	13 *6*	4080.37	25/2−	2980.58	21/2−			
1100.4 *3*	15 *4*	7292.87	37/2+	6192.17	33/2+			
1100.4 *1*	41 *3*	7716.20	41/2−	6615.83	37/2−	E2		DCO=0.98 *22* (1994Ru01).
1101.1 *2*	17 *4*	6192.17	33/2+	5090.57	31/2+			

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^{58}Ni(^{36}Ar,3pγ) 1994Ru01 (continued)

γ(^{91}Tc) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	δ‡	Comments
1138.3 *2*	19 *2*	1532.62	11/2+	394.51	7/2+			
1151.9 *1*	152 *11*	2044.84	15/2+	892.91	13/2+	D+Q	−0.25 *6*	DCO=0.39 *3* (1994Ru01).
1158.5 *3*	11 *2*	9299.79	43/2+	8141.23	39/2+			
1205.6 *1*	105 *6*	10505.4	47/2+	9299.79	43/2+	E2		DCO=0.98 *12* (1994Ru01).
1208.4 *1*	60 *5*	3345.44	25/2+	2137.17	21/2+	E2		DCO=0.93 *16* (1994Ru01).
1218.5 *1*	352 *12*	4354.53	29/2+	3135.91	25/2+	E2		DCO=1.07 *8* (1994Ru01).
1297.9 *3*	19 *2*	8141.23	39/2+	6843.08	35/2+	Q		DCO=1.0 *3* (1994Ru01).
1302.2 *10*	10 *5*	7992.7		6690.8				
1345.6 *5*	3 *1*	7505.06	39/2−	6158.75	35/2−			
1351.9 *3*	10 *3*	4119.31	27/2+	2767.59	23/2+			
1359.2 *2*	34 *3*	7292.87	37/2+	5933.68	35/2+			
1441.6 *4*	13 *2*	6192.17	33/2+	4750.23	29/2+			
1459.2 *7*	5 *2*	4594.90	27/2−	3135.91	25/2+			
1475.6 *3*	19 *3*	7668.00	37/2+	6192.17	33/2+			
1532.6 *2*	57 *2*	1532.62	11/2+	0.0	9/2+	D+Q	−1.1 *9*	DCO=0.29 *9* (1994Ru01), −0.2>δ>−2.1.
1542.6 *5*	9 *3*	8835.90	41/2+	7292.87	37/2+			
1555.9 *4*	15 *2*	1555.81	(9/2−)	0.0	9/2+			
1575.1 *6*	5 *2*	6843.08	35/2+	5268.11	33/2+			
1613.0 *8*	19 *3*	6690.8		5077.95	31/2−			
1613.8 *3*	12 *4*	4750.23	29/2+	3135.91	25/2+			
1689.0 *3*	14 *2*	8141.23	39/2+	6452.35	37/2+	D(+Q)		DCO=0.53 *14* (1994Ru01).
1774.4 *13*	51 *5*	10166.7	(45/2+)	8392.3	(41/2+)	E2		DCO=0.99 *18* (1994Ru01).
1824.4 *4*	10 *2*	8276.59	(39/2+)	6452.35	37/2+			
1833.9 *4*	19 *3*	7992.7		6158.75	35/2−			
1837.4 *3*	28 *3*	6192.17	33/2+	4354.53	29/2+	(Q)		DCO=0.90 *21* (1994Ru01).
1939.9 *10*	72 *5*	8392.3	(41/2+)	6452.35	37/2+	E2		DCO=0.91 *15* (1994Ru01).
1943.0 *7*	8 *2*	8559.0		6615.83	37/2−			
2000.8 *20*	70 *8*	9717.0	(45/2−)	7716.20	41/2−	Q		DCO=0.92 *18* (1994Ru01).
2058.4 *17*	10 *3*	12225.1		10166.7	(45/2+)			
2207.7 *3*	30 *3*	8141.23	39/2+	5933.68	35/2+	Q		DCO=0.98 *11* (1994Ru01).
2343.2 *10*	4 *1*	8276.59	(39/2+)	5933.68	35/2+			
2383.6 *5*	8 *2*	8835.90	41/2+	6452.35	37/2+			
2399.8 *5*	14 *2*	7668.00	37/2+	5268.11	33/2+			

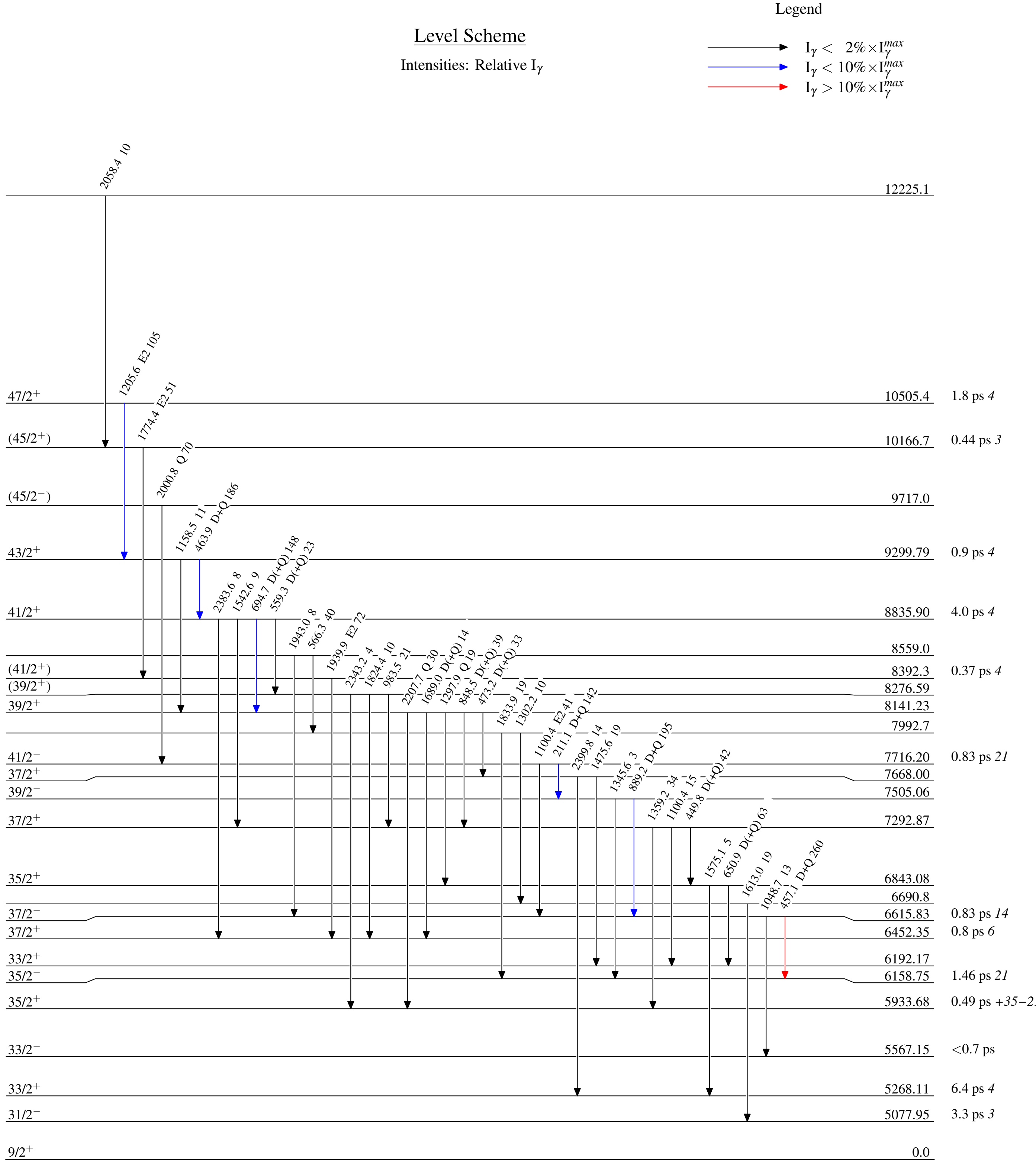
† From 1994Ru01. Iγ is value at 65° relative to I(893γ, 65°)=1000.

‡ Based on measured DCO ratios (1994Ru01). Transitions whose DCO ratio is consistent with Q, ΔJ=2 (or D, ΔJ=0) are assigned as Q unless the authors have assumed otherwise; however, D, ΔJ=0 assignments cannot be ruled out for these. Further, the evaluator has assigned mult=E2 to those Q (ΔJ=2) transitions for which RUL disallows mult=M2.

$^{58}Ni(^{36}Ar,3p\gamma)$ 1994Ru01

Level Scheme

Intensities: Relative I_γ

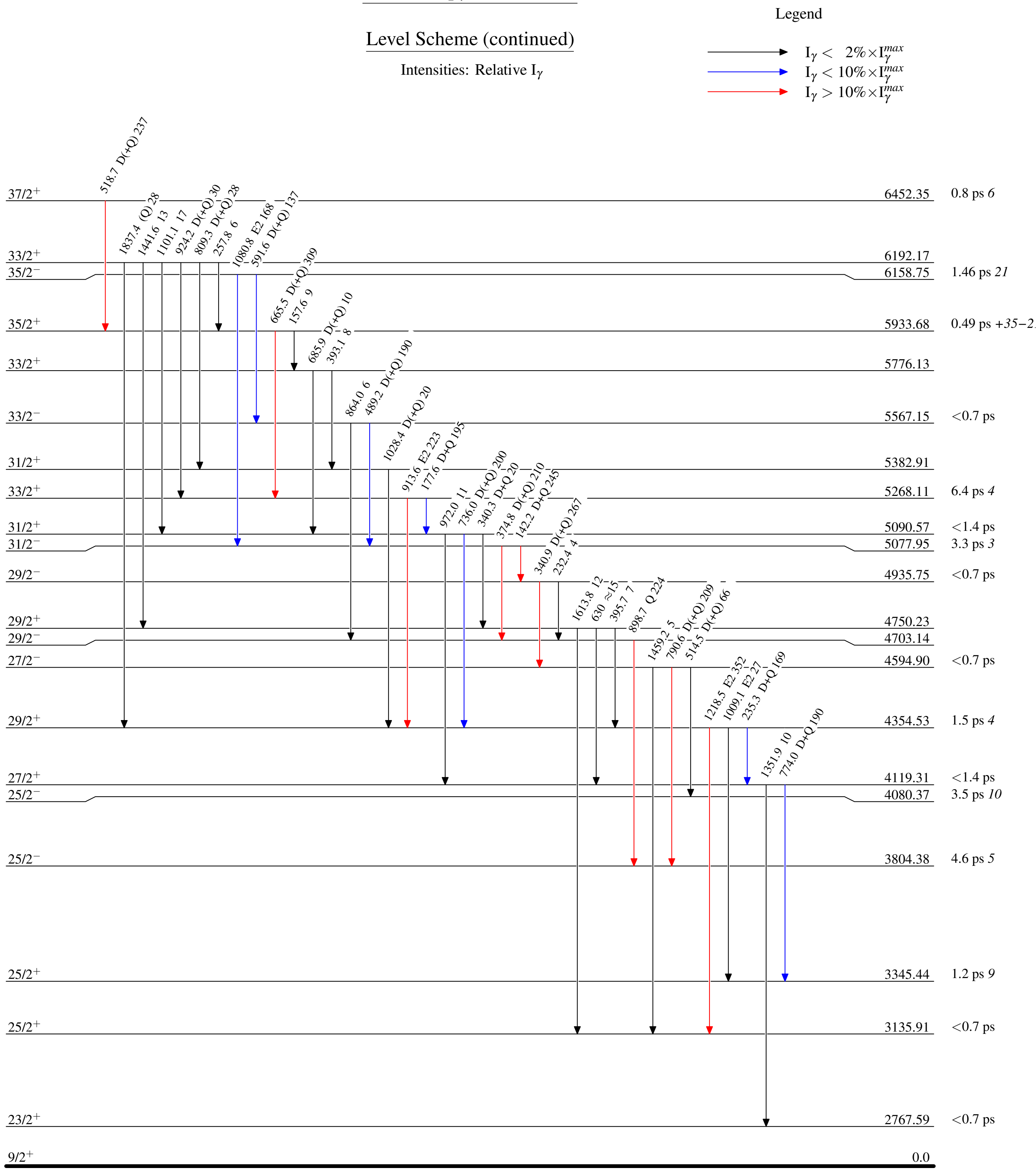


$^{91}_{43}Tc_{48}$

$^{58}Ni(^{36}Ar,3p\gamma)$ 1994Ru01

Level Scheme (continued)

Intensities: Relative I_γ



$^{91}_{43}Tc_{48}$

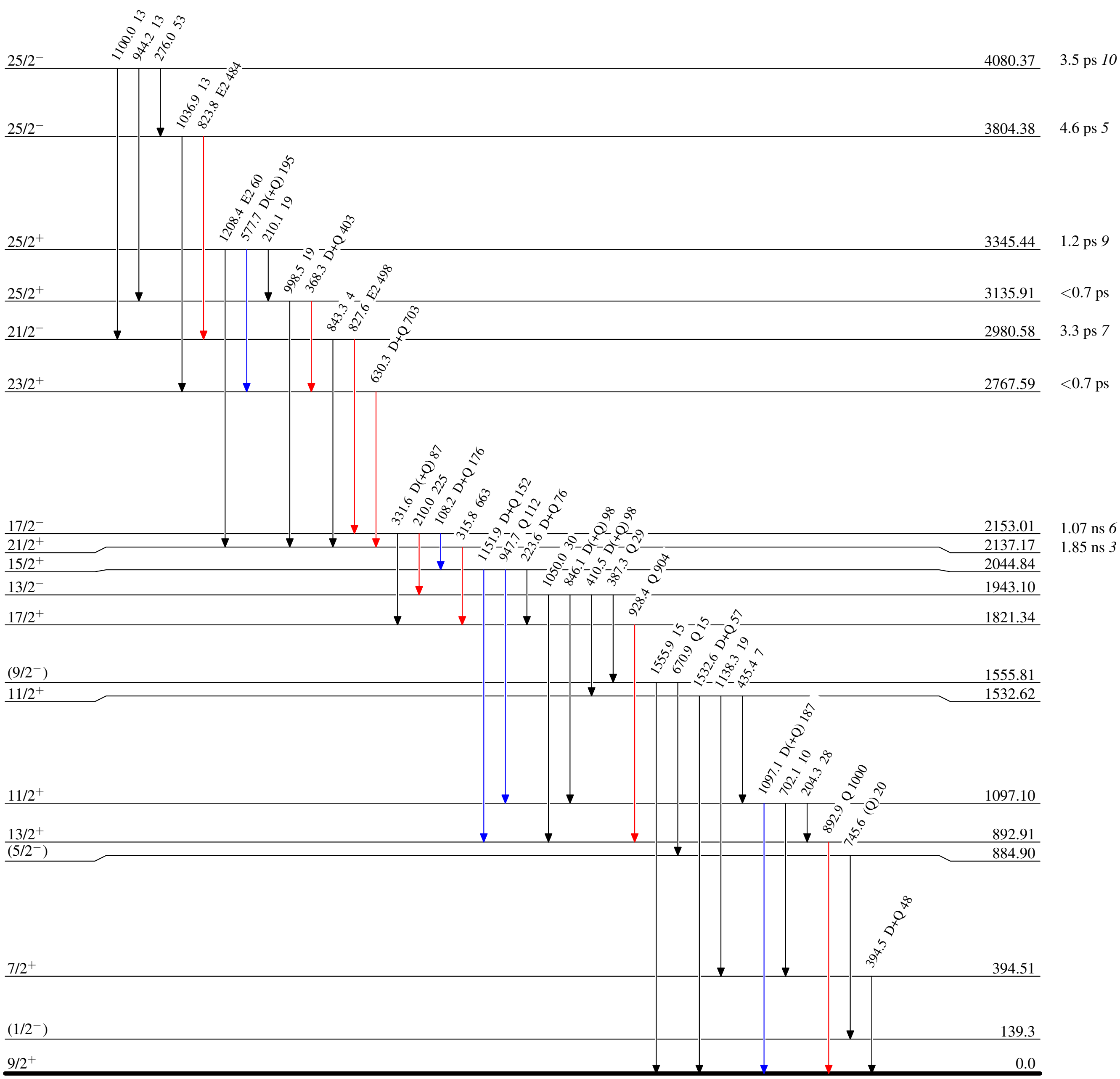
^{58}Ni(^{36}Ar,3pγ) 1994Ru01

Level Scheme (continued)

Intensities: Relative I_γ

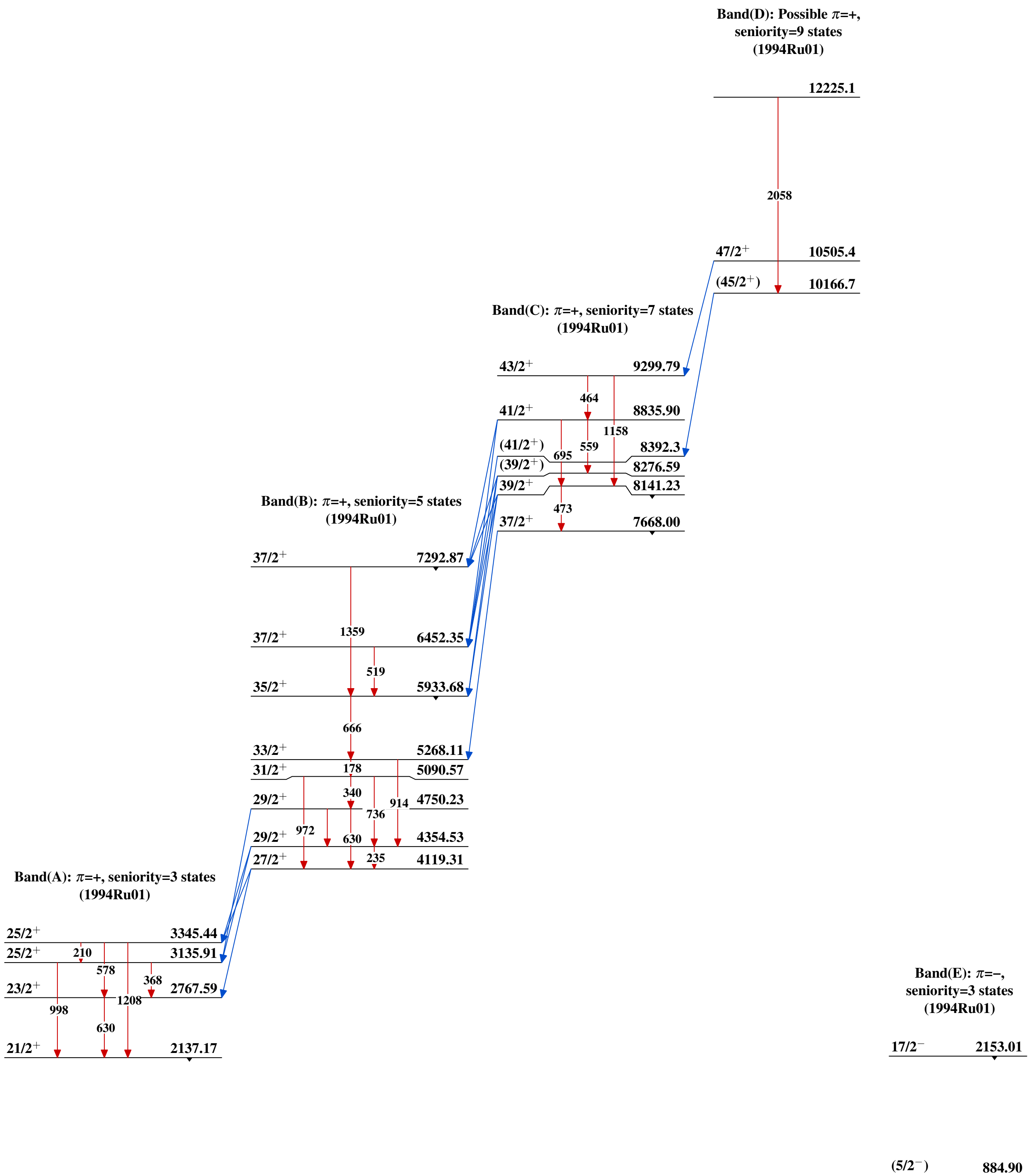
Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$



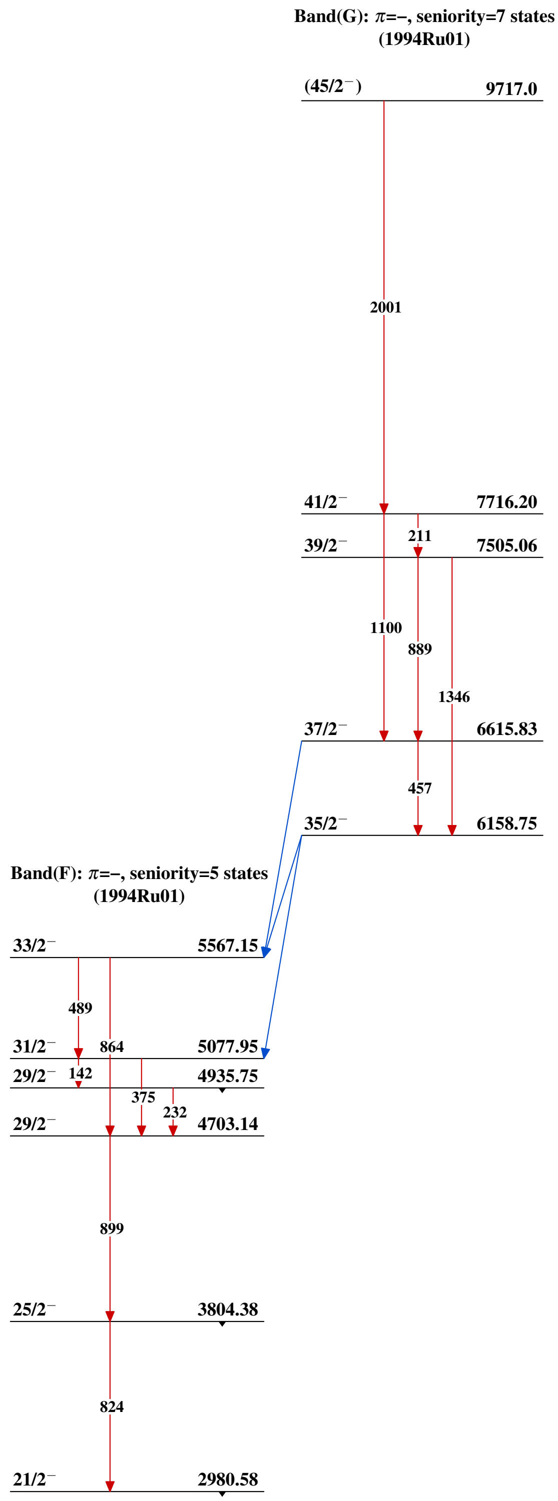
$^{91}_{43}Tc_{48}$

$^{58}Ni(^{36}Ar,3p\gamma)$ 1994Ru01



$^{91}_{43}Tc_{48}$

^{58}Ni(^{36}Ar,3pγ) 1994Ru01 (continued)



$^{91}_{43}Tc_{48}$