

Adopted Levels, Gammas

Type	History		Literature Cutoff Date
	Author	Citation	
Full Evaluation	Jean Blachot	ENSDF	1-Jul-2008

$Q(\beta^-)=1373$ 17; $S(n)=7870$ 12; $S(p)=12200$ 12; $Q(\alpha)=-5728$ 13 [2012Wa38](#)

Note: Current evaluation has used the following Q record $1.35\text{E}+3$ 5 7.82×10^3 171.186e+419-5.77e+313 [2003Au03](#).

$Q(\beta^-)$: $Q(\beta^-)$ to 16.8-s $^{108}\text{Rh}=1320$ 100 from $\beta\gamma$ -coin [1962Pi02](#); however, it is not known whether the 16.8-s or the 6-min ^{108}Rh level is the ground state. From $Q(\beta^-)(^{108}\text{Rh})$ for these two activities, $E(\text{level})(6\text{-min})=-60$ 110 ([2003Au03](#)); thus, $Q(\beta^-)(^{108}\text{Ru})$ could be 170 keV larger than the value given in [2003Au03](#) if the 6-min state in ^{108}Rh were the g.s.

 ^{108}Ru Levels

For collective-model predictions on E(levels), B(E2), and Q, see [1978Se05](#), [1980Su01](#).

Cross Reference (XREF) Flags

A ^{108}Tc β^- decay
B ^{252}Cf SF decay
C $^{176}\text{Yb}(^{28}\text{Si}, X\gamma)$

E(level)	J^π	$T_{1/2}$	XREF	Comments
0.0 [‡]	0 ⁺	4.55 min 5	ABC	$\% \beta^- = 100$ $T_{1/2}$: from 1978Fr16 (165 γ decay curve). Others: 4.5 min 2 (1962Pi02), 4.4 min 2 (1969WiZX), 4.6 min 1 (1976KaYO).
242.23 [‡] 4	2 ⁺	0.36 ns 3	ABC	$T_{1/2}$: weighted average of 0.345 ns 30 in SF decay and 0.41 ns 7 in β^- decay. Other: 0.41 7 (1995Sc24) $\beta\gamma(t)$.
665.10 [‡] 7	4 ⁺	13.4 ps 10	ABC	$T_{1/2}$: from 1986Ma22 . Recoil-distance Doppler shift measurements. The value is an average for the 4 ⁺ states in ^{108}Ru and ^{110}Ru since $E\gamma(4^+ \rightarrow 2^+) = 423$ in both nuclides, and these transitions were not resolved. Other: <0.08 ns (1995Sc24) $\beta\gamma(t)$.
707.83 [#] 4	2 ⁽⁺⁾	0.10 ns 7	ABC	J^π : γ to 2 ⁺ . Probable member of g.s. rotational band. $T_{1/2}$: from 1995Sc24 , $\beta\gamma(t)$.
974.84 [#] 7	(3 ⁺)		ABC	J^π : γ' s to 0 ⁺ , 2 ⁺ . $\gamma\gamma(\theta)$ gives J=2. Possible γ -vibrational bandhead.
975.95 15	(0 ⁺)		A	J^π : $\gamma\gamma(\theta)$ in ^{108}Tc β^- decay on the 732.6 and 733.9 doublet consistent only with J(975)=0 if J(974)=3.
1182.97 [#] 11	(4 ⁺)		ABC	
1218.81 21			A	
1240.59 [‡] 17	6 ⁺		BC	
1249.17 8	(2 ⁺)	0.41 ns 27	A	$T_{1/2}$: from 1995Sc24 , $\beta\gamma(t)$. J^π : $\gamma\gamma(\theta)$ and γ' s to 0 ⁺ and (4 ⁺).
1486.14 13			A	
1496.14 [#] 15	(5 ⁺)		BC	
1643.87 ^a 8	(4 ⁺)		AB	
1741.28 21			A	
1761.90 [#] 16	(6 ⁺)		BC	
1825.75 ^a 7	(5 ⁺)		AB	J^π : From ^{252}Cf SF Decay, not the same level given in β^- decay feeding The 242 Level (2 ⁺) by D+Q.
1942.2 [‡] 3	8 ⁺		BC	
1973.27 16			A	
2002.57 9			A	
2110.6 ^{&} 6	(5 ⁻)		BC	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{108}Ru Levels (continued)

E(level)	$J^\pi^\dagger$	XREF	Comments
2124.95 9	1,2,3	A	J^π : $\gamma\gamma(\theta)$ gives 1,2,3.
2132.68 [#] 25	(7 ⁺)	BC	
2273.0 [@] 6	(6 ⁻)	BC	
2352.26 17		A	
2419.7 [#] 3	(8 ⁺)	B	
2472.6 [@] 7	(7 ⁻)	BC	
2716.1 [@] 8	(8 ⁻)	B	
2730.99 13		A	
2740.5 [‡] 3	10 ⁺	BC	
2843.9 [#] 7	(9 ⁺)	B	
2862.56 18		A	
2925.11 22		A	
2984.7 ^{&} 7	(9 ⁻)	B	
3097.63 14		A	
3149.7 [#] 4	(10 ⁺)	B	
3294.2 [@] 9	(10 ⁻)	B	
3528.6 [‡] 4	12 ⁺	BC	
3556.2 ^{&} 10	(11 ⁻)	B	
3569.4 [#] 8	(11 ⁺)	B	
3981.7 [@] 10	(12 ⁻)	B	
4193.6 ^{&} 11	(13 ⁻)	B	
4290.8 [‡] 5	14 ⁺	B	
4309.8 [#] 9	(13 ⁺)	B	
4774.4 [@] 10	(14 ⁻)	B	
4947.3 ^{&} 11	(15 ⁻)	B	
5154.4 [‡] 6	16 ⁺	B	

[†] From syst and band assignment, unless otherwise noted.

[‡] Band(A): g.s. band. $E(\text{level})(4^+)/E(\text{level})(2^+)=2.76$ (^{110}Ru), 2.75 (^{108}Ru), 2.64 (^{106}Ru), 2.48 (^{104}Ru).

[#] Band(B): Possible γ -vibrational band. Ratio of inertial parameters for γ -vibration/g.s. bands=1.10 (^{108}Ru), 1.11 (^{106}Ru).

[@] Band(C): $\nu 5/2[402]\#\nu 5/2[532]$, $\alpha=0$.

[&] Band(c): $\nu 5/2[402]\#\nu 5/2[532]$, $\alpha=1$.

^a Band(D): two-phonon γ -vibrational band.

 $\gamma(^{108}\text{Ru})$

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\dagger$	E_f	J_f^π	Mult.	δ	$\alpha^\#$	Comments
242.23	2 ⁺	242.25 5	100	0.0	0 ⁺	[E2]		0.056	B(E2)(W.u.)=62 6
665.10	4 ⁺	422.9 1	100	242.23	2 ⁺	[E2]			B(E2)(W.u.)=102 8
707.83	2 ⁽⁺⁾	465.6 1	100 9	242.23	2 ⁺				
		707.81 5	80 6	0.0	0 ⁺	[E2]			B(E2)(W.u.)=0.5 4
974.84	(3 ⁺)	267.1 2	10.8 17	707.83	2 ⁽⁺⁾				
		309.7 2	6.3 8	665.10	4 ⁺				
		732.6 1	100 8	242.23	2 ⁺	D+Q	-3.0 +7-14		
975.95	(0 ⁺)	733.9 2	100	242.23	2 ⁺				
1182.97	(4 ⁺)	475.4 2	100 24	707.83	2 ⁽⁺⁾				
		518.0 2	63 16	665.10	4 ⁺				

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

$\gamma(^{108}\text{Ru})$ (continued)								
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult.	δ	Comments
1182.97	(4 ⁺)	940.5 2	23 10	242.23	2 ⁺			I_γ : reported only in SF decay.
1218.81		553.7 2	100	665.10	4 ⁺			E_γ : this transition is not seen in (SF), So the 6 ⁺ assigned to the 1218 level in ^{108}Tc decay is questionable.
1240.59	6 ⁺	575.5 2	100	665.10	4 ⁺			
1249.17	(2 ⁺)	273.4 2	11 3	975.95	(0 ⁺)			
		541.3 2	14.8 19	707.83	2 ⁽⁺⁾			
		584.0 1	28 9	665.10	4 ⁺	[E2]		B(E2)(W.u.)=0.08 7
		1007.1 2	100 15	242.23	2 ⁺	D+Q	0.9 +7-5	
		1249.0 5	67 11	0.0	0 ⁺	[E2]		B(E2)(W.u.)=0.005 3
1486.14		511.0 2	100 20	974.84	(3 ⁺)			
		821.0 2	77 18	665.10	4 ⁺			
1496.14	(5 ⁺)	521.1 2	100	974.84	(3 ⁺)			
		831.2 2	50	665.10	4 ⁺			
1643.87	(4 ⁺)	394.6 2	36 10	1249.17	(2 ⁺)			
		669.1 1	100 13	974.84	(3 ⁺)			
		935.9 2	41 10	707.83	2 ⁽⁺⁾			
		1401.6 2	73 13	242.23	2 ⁺			
1741.28		492.1 2	100	1249.17	(2 ⁺)			
1761.90	(6 ⁺)	521.3 2	17	1240.59	6 ⁺			
		578.8 2	100	1182.97	(4 ⁺)			
		1097.1 3	14	665.10	4 ⁺			
1825.75	(5 ⁺)	181.9 2	9.2 17	1643.87	(4 ⁺)			
		576.6 1	18 4	1249.17	(2 ⁺)			
		851.0 2	33 3	974.84	(3 ⁺)			
		1118.0 2	48 6	707.83	2 ⁽⁺⁾			
		1583.5 1	100 8	242.23	2 ⁺			Mult.: Could be different transition in β -decay and ^{252}Cf SF.
1942.2	8 ⁺	701.6 2	100	1240.59	6 ⁺			
1973.27		790.6 2	39 11	1182.97	(4 ⁺)			
		1308.0 3	61 17	665.10	4 ⁺			
		1730.5 3	100 28	242.23	2 ⁺			
2002.57		358.7 2	11 3	1643.87	(4 ⁺)			
		1027.4 2	24 5	974.84	(3 ⁺)			
		1760.4 1	100 7	242.23	2 ⁺			
2110.6	(5 ⁻)	870.0	<1.96	1240.59	6 ⁺			
		1445.5	100 10	665.10	4 ⁺			
2124.95	1,2,3	1150.4 2	14 3	974.84	(3 ⁺)			
		1417.0 1	100 8	707.83	2 ⁽⁺⁾	D+Q		δ : $\delta=-1.6$ to $+3.6$.
		1882.8 2	18 3	242.23	2 ⁺	D+Q	-0.7 +6-11	
2132.68	(7 ⁺)	636.5 2	100	1496.14	(5 ⁺)			
2273.0	(6 ⁻)	162.5	100 11	2110.6	(5 ⁻)			
		1032.0	63 7	1240.59	6 ⁺			
		1608.0	30 7	665.10	4 ⁺			
2352.26		1687.2 2	22 5	665.10	4 ⁺			
		2352.1 3	100 36	0.0	0 ⁺			
2419.7	(8 ⁺)	657.8 2	100	1761.90	(6 ⁺)			
2472.6	(7 ⁻)	199.5	100 12	2273.0	(6 ⁻)			
		362.0	31 8	2110.6	(5 ⁻)			
2716.1	(8 ⁻)	243.50	100 10	2472.6	(7 ⁻)			
		443.0	55 15	2273.0	(6 ⁻)			
2730.99		1244.5 2	90 21	1486.14				
		1756.2 2	46 11	974.84	(3 ⁺)			
		2023.4 2	100 25	707.83	2 ⁽⁺⁾			
2740.5	10 ⁺	798.3 2	100	1942.2	8 ⁺			

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) $\gamma(^{108}\text{Ru})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π
2843.9	(9 ⁺)	710.4	100 15	2132.68	(7 ⁺)	3294.2	(10 ⁻)	578.1	70 20	2716.1	(8 ⁻)
		902.5	4 4	1942.2	8 ⁺	3528.6	12 ⁺	788.1 3	100	2740.5	10 ⁺
2862.56		1887.7 2	60 16	974.84	(3 ⁺)	3556.2	(11 ⁻)	262.0	20 10	3294.2	(10 ⁻)
		2620.3 3	100 27	242.23	2 ⁺			571.5	100 20	2984.7	(9 ⁻)
2925.11		1950.4 3	34 9	974.84	(3 ⁺)	3569.4	(11 ⁺)	725.5	67 22	2843.9	(9 ⁺)
		2217.1 3	100 28	707.83	2 ⁽⁺⁾			828.9	100 22	2740.5	10 ⁺
2984.7	(9 ⁻)	268.6	100 18	2716.1	(8 ⁻)	3981.7	(12 ⁻)	687.5 3	100	3294.2	(10 ⁻)
		512.1	45 9	2472.6	(7 ⁻)	4193.6	(13 ⁻)	637.4 3	100	3556.2	(11 ⁻)
		1042.7	55 9	1942.2	8 ⁺	4290.8	14 ⁺	762.2 3	100	3528.6	12 ⁺
3097.63		972.6 2	38 10	2124.95	1,2,3	4309.8	(13 ⁺)	740.4 3	100	3569.4	(11 ⁺)
		1272.1 2	100 25	1825.75	(5 ⁺)	4774.4	(14 ⁻)	792.7 3	100	3981.7	(12 ⁻)
		2389.4 3	90 25	707.83	2 ⁽⁺⁾	4947.3	(15 ⁻)	753.7 3	100	4193.6	(13 ⁻)
3149.7	(10 ⁺)	730.0 3	100	2419.7	(8 ⁺)	5154.4	16 ⁺	863.6 3	100	4290.8	14 ⁺
3294.2	(10 ⁻)	309.5	100 20	2984.7	(9 ⁻)						

[†] From ^{108}Tc β^- decay when available.

[‡] Photon branching ratio from each level. Data with uncertainties are from ^{108}Tc β^- decay. Other data are from SF decay where uncertainties range from 5% to 50%.

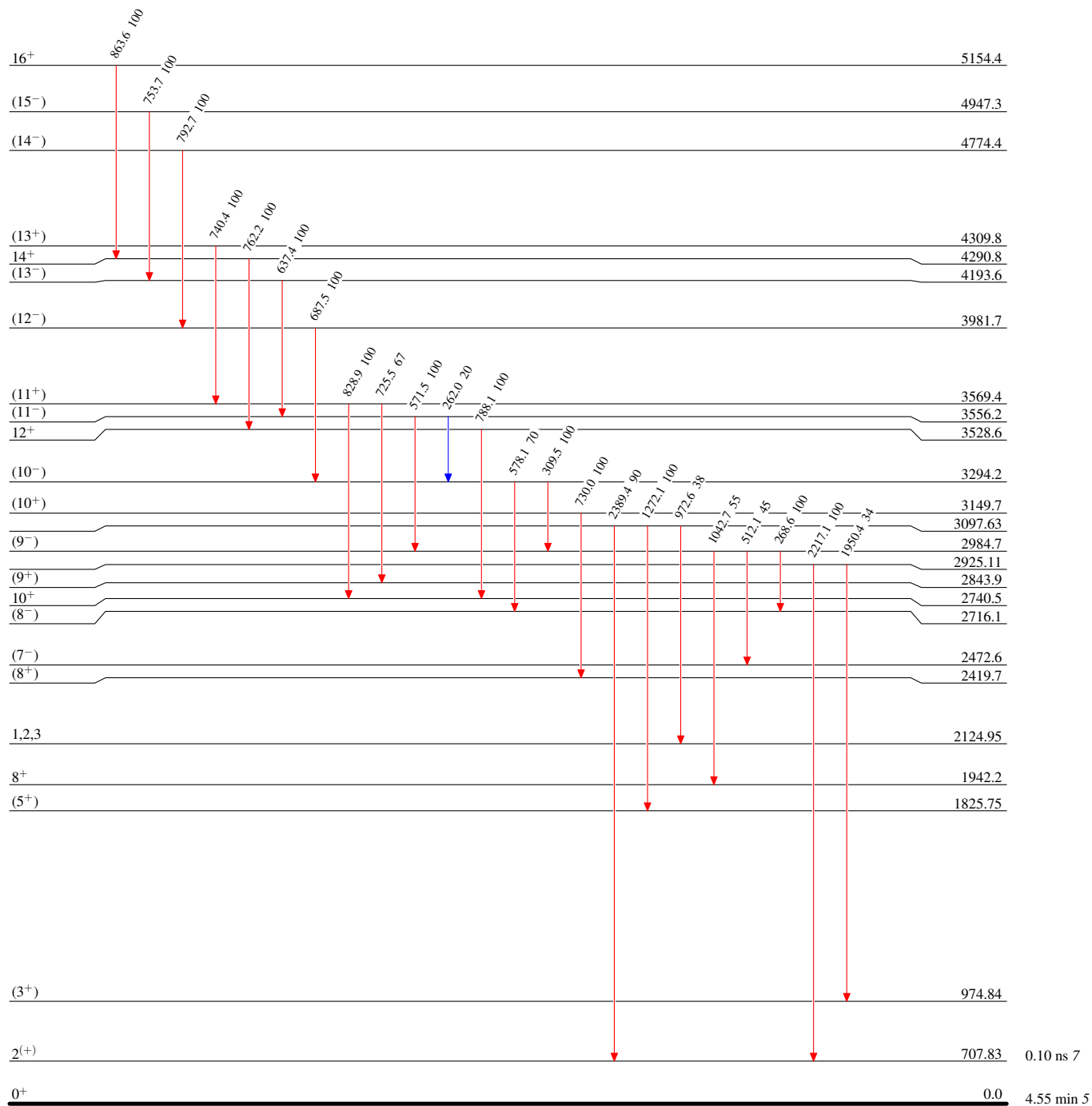
[#] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ -ray energies, assigned multiplicities, and mixing ratios, unless otherwise specified.

Adopted Levels, GammasLevel Scheme

Intensities: Type not specified

Legend

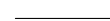
- $I_\gamma < 2\% \times I_\gamma^{\max}$
—→ $I_\gamma < 10\% \times I_\gamma^{\max}$
—→ $I_\gamma > 10\% \times I_\gamma^{\max}$

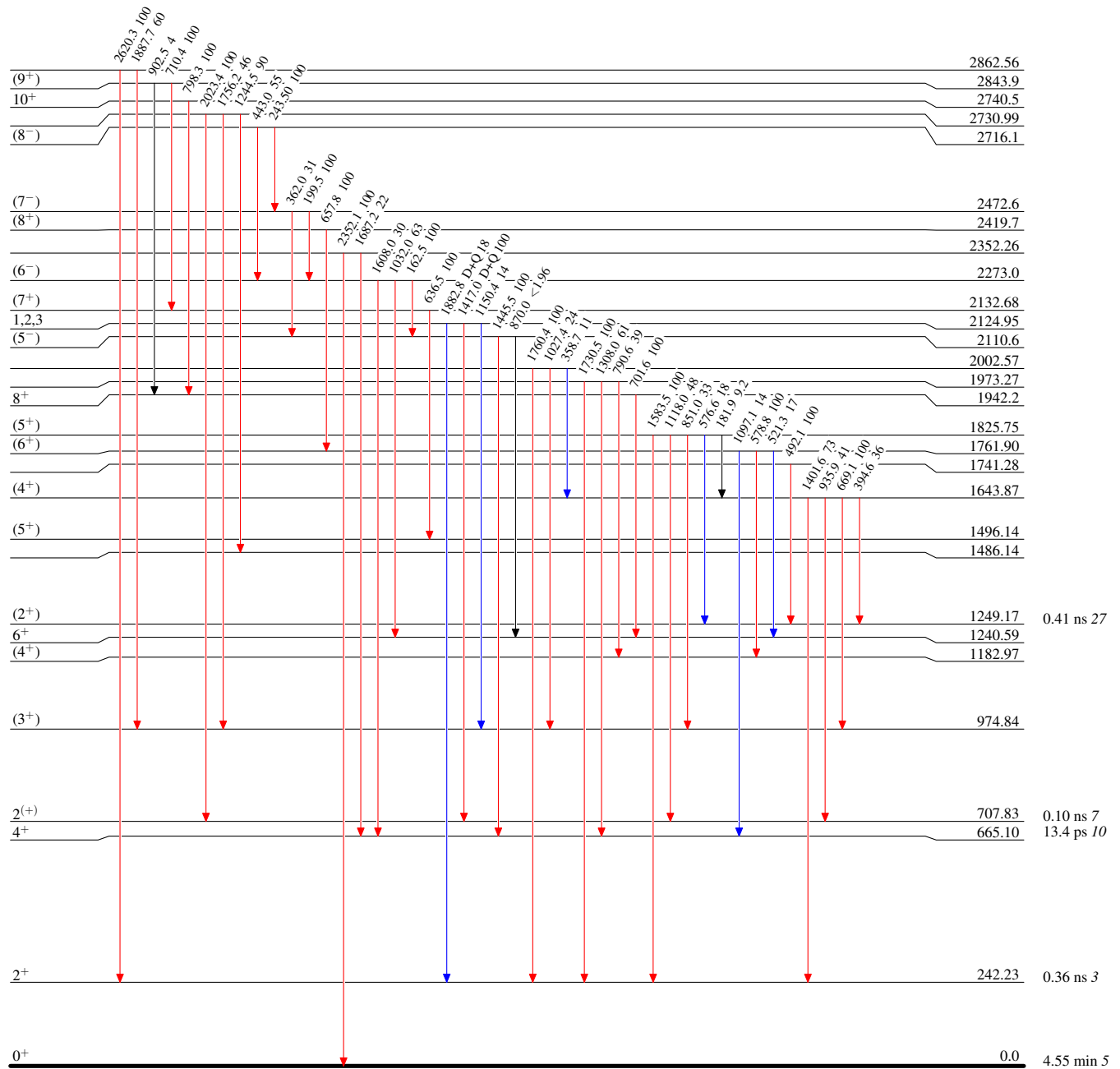


Adopted Levels, GammasLevel Scheme (continued)

Intensities: Type not specified

Legend

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

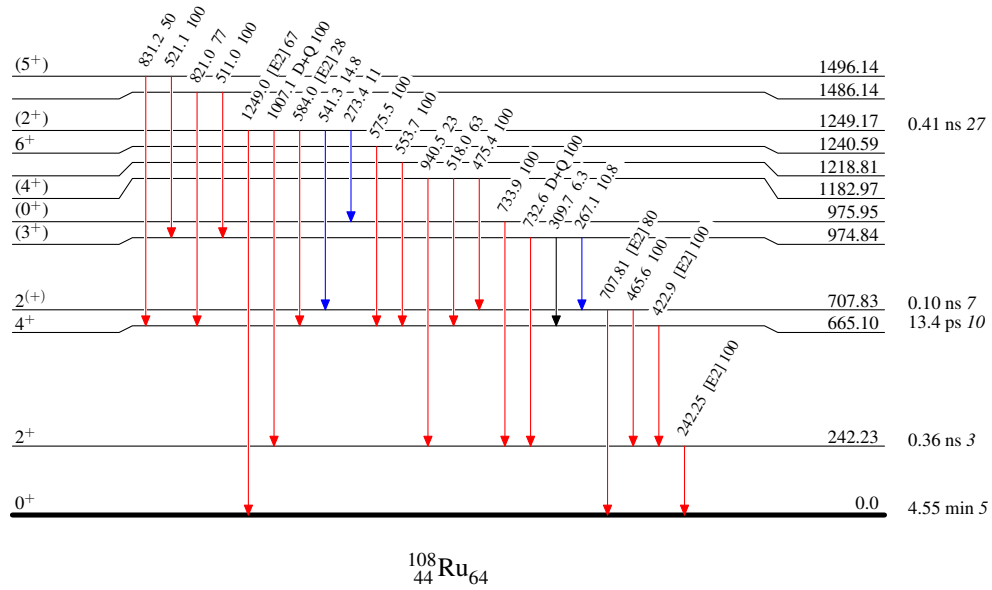


Adopted Levels, Gammas**Level Scheme (continued)**

Intensities: Type not specified

Legend

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



Adopted Levels, Gammas