

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	S. Lalkovski, J. Timar and Z. Elekes		NDS 161, 1 (2019)	1-Apr-2019

Q(β⁻)=1917 3; S(n)=-5910.10 11; S(p)=-10720 25; Q(α)=-4839.5 25 [2017Wa10](#)

¹⁰⁵Ru Levels

Cross Reference (XREF) Flags

A	¹⁰⁵ Tc β ⁻ decay	E	¹⁷³ Yb(²⁴ Mg,Xγ)
B	¹⁰⁴ Ru(n,γ) E=th	F	¹⁶⁸ Er(³⁰ Si,Xγ)
C	¹⁰⁴ Ru(n,γ) E=th:primary	G	¹⁰⁴ Ru(d,pγ)
D	¹⁰⁴ Ru(d,p)		

E(level) [†]	J ^π	T _{1/2}	XREF	Comments
0.0 [‡]	3/2 ⁺	4.439 h 11	ABCDEFGG	%β ⁻ =100 μ=(-)0.32 +8-20 (1981Lu04) J ^π : 5909.9γ from 1/2 ⁺ in ¹⁰⁴ Ru(n,γ) E=th:primary; L(d,p)=2; systematics of the 3/2 ⁺ states in Ru isotopic chain. T _{1/2} : weighted average of: 4.45 h 2 (1955Wi59), 4.44 h 2 (1960Ri03), 4.43 h 2 (1962Br15), 4.39 h 10 (1965Pi01); Others: 1974Ca26 , 1950Si06 , 1950Su07 , 1946Bo28 . μ: From oriented ¹⁰⁵ Ru decay.
20.606 ^{&} 14	5/2 ⁺	340 ns 15	ABCD FG	J ^π : L(d,p)=2; 20.559γ M1+E2 to 3/2 ⁺ ; 5/2 ⁺ is supported by the single-particle spectroscopic strength; configuration: νd _{5/2} . T _{1/2} : from 20.559γ(t) in ¹⁰⁵ Tc β ⁻ decay (1975Su02).
107.942 [‡] 8	5/2 ⁺		AB D FG	J ^π : L(d,p)=2; 107.945γ M1+E2 to 3/2 ⁺ , 87.40γ to 5/2 ⁺ ; band member.
159.519 6	1/2 ⁺		ABCD G	J ^π : L(d,p)=0; 159.528γ to 3/2 ⁺ . configuration: νs _{1/2} .
163.821 16	(5/2 ⁺)	55 ns 7	AB D G	J ^π : L(d,p)=2; 143.26γ M1+E2 to 5/2 ⁺ ; T _{1/2} : from 143.26γ(t) in 1978Ho06 . Not corrected for side feeding. Perhaps associated with T _{1/2} of 208.8-keV level.
185.8 6			G	
208.8 ^a 10	(7/2 ⁻)	<1 μs	DEFG	J ^π : L(d,p)=5; [E1] feeding to (5/2 ⁺); analogy with ¹⁰³ Ru (2016Ki20).
229.50 [@] 4	7/2 ⁺		AB D FG	J ^π : 208.89γ to 5/2 ⁺ , 229.51γ to 3/2 ⁺ ; L(d,p)=4; single-particle spectroscopic strength supports 7/2 ⁺ . configuration: νg _{7/2} .
244.42 5	(5/2 ⁺ ,7/2 ⁺)		B G	J ^π : 244.35γ to 3/2 ⁺ , 223.79γ to 5/2 ⁺ ; no primary transition from 1/2 ⁺ in ¹⁰⁴ Ru(n,γ) E=th:primary.
246.382 10	(3/2 ⁺ ,5/2 ⁺)		AB D G	J ^π : 138.446γ M1+E2 to 5/2 ⁺ , 246.29γ to 3/2 ⁺ ; However, L(d,p)=4,3 suggests 5/2 ⁻ ,7/2 or 9/2 ⁺ assignment.
272.715 16	3/2 ⁺		ABC G	J ^π : 113.34γ to 1/2 ⁺ , 252.07γ M1(+E2) to 5/2 ⁺ , 272.65γ M1+E2 to 3/2 ⁺ ; 5637.1γ from 1/2 ⁺ in ¹⁰⁴ Ru(n,γ) E=th:primary; systematics of the 3/2 ⁺ states in Ru isotopic chain.
301.67 5	7/2 ⁺		B D G	J ^π : L(d,p)=4; 280.99γ to 5/2 ⁺ , 301.61γ to 3/2 ⁺ ;
321.582 18	3/2 ⁻		ABCD G	J ^π : L(d,p)=1; 162.25γ to 1/2 ⁺ , 213.66γ E1 to 5/2 ⁺ ; 5588.4γ from 1/2 ⁺ in ¹⁰⁴ Ru(n,γ) E=th:primary.
441.95 5	3/2 ⁺ ,5/2 ⁺		AB D G	J ^π : L(d,p)=2; 169.18γ M1+E2 to 3/2 ⁺ , 282.67γ to (1/2 ⁺), 333.90γ M1+E2 to 5/2 ⁺ ; no primary γ-ray from 1/2 ⁺ n-capture state supports 5/2 ⁺ .
465.3 ^{&} 6	(9/2 ⁺)		F	J ^π : 235.4γ to 7/2 ⁺ ; 357.3γ to 5/2 ⁺ ; band member.
466.20 5	3/2 ⁺		ABCD G	J ^π : L(d,p)=2; 306.76γ M1+E2 to 1/2 ⁺ , 357.94γ M1+E2 to 5/2 ⁺ , 5444.0γ from 1/2 ⁺ in ¹⁰⁴ Ru(n,γ) E=th:primary.

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Adopted Levels, Gammas (continued)

¹⁰⁵Ru Levels (continued)

E(level) [†]	J ^π	XREF	Comments
490.90 4	(1/2,3/2) ⁻	BCD G	J ^π : 331.64γ to 1/2 ⁺ , 490.78γ to 3/2 ⁺ ; L(d,p)=1 or 3.
574.1 ^a 12	(11/2 ⁻)	EF	J ^π : 365.3γ to (11/2 ⁻); band member.
578.14 14	5/2 ⁻	AB D G	J ^π : L(d,p)=3; 418.6γ to 1/2 ⁺ , 470.3γ to 5/2 ⁺ , 577.9γ to 3/2 ⁺ ;
582.11 6	3/2 ⁺ ,5/2 ⁺	B D G	J ^π : L(d,p)=2; 309.51 γ to 3/2 ⁺ , 352.78γ to 7/2 ⁺ ;
620.6 6		G	
625.84 14	(7/2 ⁺ ,9/2 ⁺)	B D G	J ^π : 396.38γ to 7/2 ⁺ , 605.1γ to 5/2 ⁺ ; L(d,p)=4 or 5.
631.28 7	1/2 ⁺	AB D G	J ^π : L(d,p)=0; 471.62γ to 1/2 ⁺ , 631.3γ to 3/2 ⁺ ;
644.11 11	(1/2 to 7/2)	AB G	J ^π : 535.8γ to 5/2 ⁺ , 644.0γ to 3/2 ⁺ .
669.8 [@] 8	(11/2 ⁺)	F	J ^π : 204.3γ to (9/2 ⁺), 440.4γ to 7/2 ⁺ ; band member.
670.60 4	(1/2 ⁺ ,3/2 ⁺)	BC	J ^π : 397.77γ to 3/2 ⁺ , 562.65γ to 5/2 ⁺ , 5239.1γ from 1/2 ⁺ in ¹⁰⁴ Ru(n,γ) E=th:primary.
725.92 11	(3/2 to 9/2)	B D G	J ^π : 618.0γ to 5/2 ⁺ ; L(d,p)≥3.
756.8 3	(3/2,5/2) ⁺	AB D G	J ^π : L(d,p)=2; 648.7γ to 5/2 ⁺ , 757.0γ to 3/2 ⁺ ;
784.67 9	(1/2,3/2) ⁻	ABC G	J ^π : 462.89γ M1+E2 to 3/2 ⁻ ; 5125.5γ from 1/2 ⁺ in ¹⁰⁴ Ru(n,γ) E=th:primary.
801.5 9		G	
805.77 15	1/2 ⁺	ABCD G	J ^π : L(d,p)=0; 646.25γ to 1/2 ⁺ ;
824.33 7	3/2 ⁺	ABCD G	J ^π : L(d,p)=2; 665.02γ to 1/2 ⁺ , 716.55γ to 5/2 ⁺ ; 5086.0γ from 1/2 ⁺ in ¹⁰⁴ Ru(n,γ) E=th:primary;
836.0 9		G	
841.11 21	(7/2,9/2) ⁺	B D G	J ^π : L(d,p)=4; 539.44γ to 7/2 ⁺ ;
873.62 20	1/2 ⁺	B D G	J ^π : L(d,p)=0; 714.1γ to 1/2 ⁺ ;
886.63 8	3/2 ⁺	ABCD G	J ^π : L(d,p)=2; 565.02γ to 3/2 ⁻ , 640.34γ M1+E2 to (3/2 ⁺ ,5/2 ⁺); 5023.4γ from 1/2 ⁺ in ¹⁰⁴ Ru(n,γ) E=th:primary.
903.19 15	3/2 ⁺ ,5/2 ⁺	AB D G	XREF: D(914). J ^π : L(d,p)=2; 657.0γ to 3/2 ⁺ ,5/2 ⁺ , 739.35γ to 3/2 ⁺ ,5/2 ⁺ to (3/2 ⁺ ,5/2 ⁺);
956.73 10	(1/2 ⁺ ,3/2,5/2 ⁺)	B G	J ^π : 684.00γ to 3/2 ⁺ , 797.4γ to 1/2 ⁺ , 848.65γ to 5/2 ⁺ .
967.15 20	(1/2 ⁺ ,3/2 ⁺)	BC G	J ^π : 4943.7γ from 1/2 ⁺ ¹⁰⁴ Ru(n,γ) E=th:primary.
977.0 ^{&} 12	(13/2 ⁺)	F	J ^π : 511.7γ to (9/2 ⁺); band member.
994 [#] 5	(3/2 ⁺ ,5/2 ⁺)	D	J ^π : L(d,p)=2.
1058.78 14	(3/2 ⁺ ,5/2,7/2 ⁺)	B	J ^π : 757.20γ to 7/2 ⁺ ; 894.9γ to 3/2 ⁺ ,5/2 ⁺ .
1114 [#] 5	(3/2 ⁺ ,5/2 ⁺)	D	J ^π : L(d,p)=2.
1134.66 17	(1/2 ⁺ to 7/2 ⁺)	B D	J ^π : 1135.3γ to 3/2 ⁺ .
1142.9 ^a 14	(15/2 ⁻)	EF	J ^π : 568.8γ to (15/2 ⁻); band member.
1145 [#] 5	(3/2 ⁺ ,5/2 ⁺)	D	J ^π : L(d,p)=(2).
1180.12 16	(3/2 ⁺ ,5/2 ⁺)	B D G	J ^π : L(d,p)=(2); 950.3γ to 7/2 ⁺ , 1159.5γ to 5/2 ⁺ .
1219.9 [@] 13	(15/2 ⁺)	F	J ^π : 550.1γ to (11/2 ⁺); band member.
1325.56 11	(1/2,3/2)	ABC G	J ^π : 439.00γ to 3/2 ⁺ , 1004.1γ to 3/2 ⁻ ; 4584.4γ from 1/2 ⁺ in ¹⁰⁴ Ru(n,γ) E=th:primary.
1329.14 17	(1/2 ⁺ ,3/2 ⁺)	BC G	J ^π : 862.85γ to 3/2 ⁺ ; 4580.1γ from 1/2 ⁺ in ¹⁰⁴ Ru(n,γ) E=th:primary.
1575.2 ^{&} 16	(17/2 ⁺)	F	J ^π : 598.2γ to (13/2 ⁺); band member.
1581 [#] 10	(3/2 ⁺ ,5/2 ⁺)	D	J ^π : L(d,p)=(2).
1693.6 4	(1/2 ⁺ ,3/2 ⁺)	BC	J ^π : 1534.1γ to 1/2 ⁺ ; 4216.6γ from 1/2 ⁺ in ¹⁰⁴ Ru(n,γ) E=th:primary.
1735.30 17	(1/2 ⁺ ,3/2 ⁺)	BC	J ^π : 847.8γ to 3/2 ⁺ , 1575.3γ to 1/2 ⁺ ; 4174.8γ from 1/2 ⁺ in ¹⁰⁴ Ru(n,γ) E=th:primary.
1832.72 11	(1/2,3/2)	ABC	J ^π : 1008.4γ to 3/2 ⁺ , 1201.6γ to 1/2 ⁺ , 1510.6γ to 3/2 ⁻ ; 4076.7γ from 1/2 ⁺ in ¹⁰⁴ Ru(n,γ) E=th:primary.
1843.3 3	(1/2,3/2)	A	J ^π : 1570.5γ to 3/2 ⁺ , 1683.9γ to 1/2 ⁺ ;
1844.8 [@] 16	(19/2 ⁺)	F	J ^π : 624.9γ to (15/2 ⁺); band member.
1845.49 25	(1/2 ⁺ ,3/2 ⁺)	BC G	J ^π : 1823.8γ to 5/2 ⁺ ; 4065.2γ from 1/2 ⁺ in ¹⁰⁴ Ru(n,γ) E=th:primary.
1867.6 ^a 15	(19/2 ⁻)	EF	J ^π : 724.7γ from (19/2 ⁺); band member.
1930 [#] 10	(3/2 ⁺ ,5/2 ⁺)	D	J ^π : L(d,p)=(2).
2148.4 3	(3/2 ⁺)	BC	J ^π : 2127.6 5γ to 5/2 ⁺ ; 3761.7γ from 1/2 ⁺ in ¹⁰⁴ Ru(n,γ) E=th:primary.
2155.43 10		A	
2326.7 4	(1/2 ⁺ to 5/2 ⁺)	A	J ^π : 2053.9γ to 3/2 ⁺ .
2352.8 4	(1/2 ⁺ ,3/2 ⁺)	BC	J ^π : 2332.1γ to 5/2 ⁺ ; 3556.8γ from 1/2 ⁺ in ¹⁰⁴ Ru(n,γ) E=th:primary.
2379.7 4	(1/2 ⁺ ,3/2 ⁺)	BC	J ^π : 3531.7γ from 1/2 ⁺ in ¹⁰⁴ Ru(n,γ) E=th:primary.

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Adopted Levels, Gammas (continued) ^{105}Ru Levels (continued)

<u>E(level)[†]</u>	<u>J^π</u>	<u>XREF</u>	<u>Comments</u>
2403.6 4	(3/2 ⁺ , 5/2, 7/2 ⁻)	A	J ^π : 2174.0γ to 7/2 ⁺ , 2082.0γ to 3/2 ⁻ .
2404.09 20	(1/2 ⁻ , 3/2)	BC	J ^π : 1826.3γ to 5/2 ⁻ ; 3506.1γ from 1/2 ⁺ in $^{104}\text{Ru}(n,\gamma)$ E=th:primary.
2529.0 [@] 19	(23/2 ⁺)	F	J ^π : 684.2γ to (19/2 ⁺); band member.
2710.8 ^a 16	(23/2 ⁻)	EF	J ^π : 843.2γ to (23/2 ⁻); band member.
3285.1 [@] 22	(27/2 ⁺)	F	J ^π : 756.1γ to (23/2 ⁺); band member.
3641.4 ^a 17	(27/2 ⁻)	E	J ^π : 930.6γ to (27/2 ⁻); band member.
(5910.21 7)	1/2 ⁺	C	J ^π : s-wave capture on 0 ⁺ in ^{104}Ru .

[†] From a least-squares fit to Eγ.

[‡] Probable member of the $\nu d_{5/2}^3$ multiplet.

From (d,p).

@ Band(A): Based on $\nu g_{7/2}$.

& Band(B): Based on $\nu d_{5/2}$.

^a Band(C): Probable member of the 11/2⁻ band.

Adopted Levels, Gammas (continued)

$E_i(\text{level})$	J_i^π	$\gamma(^{105}\text{Ru})$				Mult. [‡]	$\gamma(^{105}\text{Ru})$		Comments
		E_γ^{\ddagger}	I_γ^{\ddagger}	E_f	J_f^π		δ	α^\dagger	
20.606	5/2 ⁺	20.56 2	100	0.0	3/2 ⁺	M1+E2	0.065 35	5.7 8	$\alpha(\text{L})=5.2$ 9; $\alpha(\text{M})=0.96$ 16; $\alpha(\text{N}+..)=0.153$ 22 $\alpha(\text{N})=0.148$ 22; $\alpha(\text{O})=0.00498$ 8 $\text{B}(\text{M}1)(\text{W.u.})=0.00111$ 15; $\text{B}(\text{E}2)(\text{W.u.})\leq 20$ α : from $\text{I}(\gamma+\text{ce})$ balance at 20.567-keV level in $^{104}\text{Ru}(\text{n},\gamma)$ $\text{E}=\text{th}$; Others: 6.7 12 (1978Gu14) and $\alpha\approx 24$ (1974Hr01). δ : From α and $\alpha(\text{M}1)=4.02$ 6 and $\alpha(\text{E}2)=409$ 6.
107.942	5/2 ⁺	87.40 [#] 5 107.945 ^{#&} 8	<1.1 [#] 100 [#] 3	20.606 0.0	5/2 ⁺ 3/2 ⁺	M1+E2	-0.094 28	0.256 6	$\alpha(\text{K})=0.223$ 5; $\alpha(\text{L})=0.0275$ 9; $\alpha(\text{M})=0.00507$ 17; $\alpha(\text{N}+..)=0.00086$ 3 $\alpha(\text{N})=0.00082$ 3; $\alpha(\text{O})=4.11\times 10^{-5}$ 8 Mult.: $\text{A}_2=-0.32$ 3 and $\text{A}_4=0.04$ 4 in $^{104}\text{Ru}(\text{n},\gamma)$ $\text{E}=\text{th}$ (1974Hr01). δ : also -2.40 12 in $^{104}\text{Ru}(\text{n},\gamma)$ $\text{E}=\text{th}$ (1978Gu14).
159.519	1/2 ⁺	51.2 [#] 4 159.528 [#] 6	0.8 [#] 3 100 [#]	107.942 0.0	5/2 ⁺ 3/2 ⁺				E_γ : from a curved crystal measurement (1979Bo26).
163.821	(5/2 ⁺)	55.74 [#] 5	5.6 [#] 9	107.942	5/2 ⁺	[M1]		1.641	$\alpha(\text{K})=1.429$ 21; $\alpha(\text{L})=0.1745$ 25; $\alpha(\text{M})=0.0321$ 5; $\alpha(\text{N}+..)=0.00544$ 8 $\alpha(\text{N})=0.00518$ 8; $\alpha(\text{O})=0.000265$ 4 $\text{B}(\text{M}1)(\text{W.u.})=0.000101$ 22 Mult.: $\text{A}_{\text{tot}} = 0.8$ 4 from x- γ coinc. in 1975RaZL.
		143.26 [#] 7	100 [#] 5	20.606	5/2 ⁺	M1+E2	0.25 6	0.129 8	$\alpha(\text{K})=0.112$ 6; $\alpha(\text{L})=0.0143$ 12; $\alpha(\text{M})=0.00263$ 22; $\alpha(\text{N}+..)=0.00044$ 4 $\alpha(\text{N})=0.00042$ 4; $\alpha(\text{O})=2.01\times 10^{-5}$ 9 $\text{B}(\text{M}1)(\text{W.u.})=0.000100$ 15; $\text{B}(\text{E}2)(\text{W.u.})=0.27$ 13 Mult.: $\text{A}_2=-0.12$ 2 and $\text{A}_4=0.00$ 2 in $^{104}\text{Ru}(\text{n},\gamma)$ $\text{E}=\text{th}$ (1974Hr01). δ : Also >12 in $^{104}\text{Ru}(\text{n},\gamma)$ $\text{E}=\text{th}$ (1978Gu14).
185.8 208.8	(7/2 ⁻)	185.8 ^a 6 (45)		0.0 163.821	3/2 ⁺ (5/2 ⁺)	[E1]		1.354	$\alpha(\text{K})=1.174$ 17; $\alpha(\text{L})=0.1489$ 21; $\alpha(\text{M})=0.0270$ 4; $\alpha(\text{N}+..)=0.00436$ 7 $\alpha(\text{N})=0.00419$ 6; $\alpha(\text{O})=0.0001676$ 24 $\text{B}(\text{E}1)(\text{W.u.})>1.3\times 10^{-6}$ E_γ : Not observed, but suggested by the evaluators on the basis of observed 365 γ -143 γ coinc. Mult.: assumed by the evaluators on the basis of 208.6-keV level $\text{T}_{1/2}$ and decay pattern. Parity changing transitions of higher multipolarity would be unreasonably enhanced. Possible small M2 admixture. $\text{B}(\text{E}1)(\text{W.u.})>1.3\times 10^{-6}$ is consistent with $\text{B}(\text{E}1)(\text{W.u.})$ (7/2 ⁻ to 5/2 ⁻) 7.0×10^{-6} in ^{103}Ru (2016Ki20).
229.50	7/2 ⁺	121.61 8	21 5	107.942	5/2 ⁺				

Adopted Levels, Gammas (continued)

$\gamma(^{105}\text{Ru})$ (continued)									
$E_i(\text{level})$	J_i^π	E_γ^\ddagger	I_γ^\ddagger	E_f	J_f^π	Mult. [‡]	δ	α^\dagger	Comments
229.50	7/2 ⁺	208.89 4	100 25	20.606	5/2 ⁺				
		229.51 8	24 11	0.0	3/2 ⁺				
244.42	(5/2 ⁺ , 7/2 ⁺)	80.61 7	94 47	163.821	(5/2 ⁺)				
		136.53 12	71 35	107.942	5/2 ⁺				
		223.79 8	100 53	20.606	5/2 ⁺				
		244.35 12	100 41	0.0	3/2 ⁺				
246.382	(3/2 ⁺ , 5/2 ⁺)	82.546 [#] 14	100 [#] 19	163.821	(5/2 ⁺)	M1+E2	0.07 2	0.542 10	$\alpha(\text{K})=0.471$ 9; $\alpha(\text{L})=0.0584$ 17; $\alpha(\text{M})=0.0108$ 3; $\alpha(\text{N}+..)=0.00182$ 5 $\alpha(\text{N})=0.00173$ 5; $\alpha(\text{O})=8.70\times 10^{-5}$ 14 E_γ : from curved crystal measurements (1979Bo26). Mult.: $A_{22}=-0.112$ 9 and $A_{44}=-0.005$ 15 in $^{104}\text{Ru}(\text{n},\gamma)$ E=th (1978Gu14) and $A_{22}=-0.112$ 8 and $A_{44}=0$ in $^{104}\text{Ru}(\text{n},\gamma)$ E=th (1978Gu14); Atot=0.6 3 from x- γ coinc. in 1975RaZL. δ : Also 0.45 4 in $^{104}\text{Ru}(\text{n},\gamma)$ E=th (1978Gu14).
		138.446 [#] 7	100 [#] 11	107.942	5/2 ⁺	M1+E2	-0.55 3	0.190 6	$\alpha(\text{K})=0.162$ 5; $\alpha(\text{L})=0.0236$ 10; $\alpha(\text{M})=0.00438$ 18; $\alpha(\text{N}+..)=0.00071$ 3 $\alpha(\text{N})=0.00069$ 3; $\alpha(\text{O})=2.75\times 10^{-5}$ 8 E_γ : from curved crystal measurements (1979Bo26). Mult.: $A_{22}=-0.311$ 18 and $A_{44}=0.015$ 9 in $^{104}\text{Ru}(\text{n},\gamma)$ E=th (1978Gu14) or $A_{22}=-0.305$ 15 and 0 in $^{104}\text{Ru}(\text{n},\gamma)$ E=th (1978Gu14). δ : also -0.13 4 in $^{104}\text{Ru}(\text{n},\gamma)$ E=th (1978Gu14).
		225.6 [#] 1	69 [#] 7	20.606	5/2 ⁺	M1(+E2)	0.04 32	0.034 5	$\alpha(\text{K})=0.030$ 4; $\alpha(\text{L})=0.0035$ 6; $\alpha(\text{M})=0.00065$ 11; $\alpha(\text{N}+..)=0.000111$ 18 $\alpha(\text{N})=0.000105$ 17; $\alpha(\text{O})=5.5\times 10^{-6}$ 5 Mult.: $A_2=0.00$ 4 and $A_4=0.07$ 6 in $^{104}\text{Ru}(\text{n},\gamma)$ E=th (1974Hr01).
272.715	3/2 ⁺	246.2 [#] 5	14 [#] 3	0.0	3/2 ⁺				
		85.4 ^a 6		185.8					
		108.1 ^a 6		163.821	(5/2 ⁺)				
		113.34 3	20.8 15	159.519	1/2 ⁺				
		164.67 12	1.3 6	107.942	5/2 ⁺				
272.65 3	3/2 ⁺	252.07 2	100 4	20.606	5/2 ⁺	M1(+E2)	11 +14-4	0.0483 8	$\alpha(\text{K})=0.0413$ 7; $\alpha(\text{L})=0.00576$ 9; $\alpha(\text{M})=0.001064$ 17; $\alpha(\text{N}+..)=0.000174$ 3 $\alpha(\text{N})=0.000167$ 3; $\alpha(\text{O})=6.82\times 10^{-6}$ 10
		272.65 3	60 4	0.0	3/2 ⁺	M1+E2	0.29 +11-7	0.0221 11	$\alpha(\text{K})=0.0193$ 9; $\alpha(\text{L})=0.00232$ 14; $\alpha(\text{M})=0.00043$ 3; $\alpha(\text{N}+..)=7.2\times 10^{-5}$ 4 $\alpha(\text{N})=6.9\times 10^{-5}$ 4; $\alpha(\text{O})=3.51\times 10^{-6}$ 13
301.67	7/2 ⁺	280.99 10	40 20	20.606	5/2 ⁺				
		301.61 6	100 34	0.0	3/2 ⁺				

Adopted Levels, Gammas (continued)

<u>$\gamma(^{105}\text{Ru})$ (continued)</u>									
$E_i(\text{level})$	J_i^π	E_γ^\ddagger	I_γ^\ddagger	E_f	J_f^π	Mult. [‡]	δ	α^\dagger	Comments
321.582	3/2 ⁻	48.94 15	0.46 23	272.715	3/2 ⁺	E1		0.01578	$\alpha(\text{K})=0.01384$ 20; $\alpha(\text{L})=0.001599$ 23; $\alpha(\text{M})=0.000292$ 4; $\alpha(\text{N}+..)=4.91\times 10^{-5}$ 7 $\alpha(\text{N})=4.68\times 10^{-5}$ 7; $\alpha(\text{O})=2.33\times 10^{-6}$ 4
		75.25 4	25 3	246.382	(3/2 ⁺ ,5/2 ⁺)				
		157.81 5	33 3	163.821	(5/2 ⁺)				
		162.25 8	8.1 23	159.519	1/2 ⁺				
441.95	3/2 ⁺ ,5/2 ⁺	213.66 4	17.1 17	107.942	5/2 ⁺	M1+E2	1.0 +8-4	0.14 4	$\alpha(\text{K})=0.11$ 3; $\alpha(\text{L})=0.017$ 5; $\alpha(\text{M})=0.0031$ 10; $\alpha(\text{N}+..)=0.00051$ 15 $\alpha(\text{N})=0.00049$ 14; $\alpha(\text{O})=1.9\times 10^{-5}$ 4 Mult.: $A_{22}=0.10$ 5 and $A_{44}=-0.12$ 6 in ¹⁰⁴ Ru(n, γ) E=th (1978Gu14) or $A_{22}=0.07$ 4 and $A_{44}=0$ in ¹⁰⁴ Ru(n, γ) E=th (1978Gu14).
		300.92 5	10.2 14	20.606	5/2 ⁺				
		321.50 3	100 14	0.0	3/2 ⁺				
465.3	(9/2 ⁺)	169.18 5	39 3	272.715	3/2 ⁺	M1+E2	-0.62 +4-7	0.0143 4	$\alpha(\text{K})=0.0124$ 3; $\alpha(\text{L})=0.00152$ 5; $\alpha(\text{M})=0.000278$ 8; $\alpha(\text{N}+..)=4.69\times 10^{-5}$ 13 $\alpha(\text{N})=4.47\times 10^{-5}$ 13; $\alpha(\text{O})=2.21\times 10^{-6}$ 5 Mult.: $A_{22}=-0.352$ 29 and $A_{44}=0.038$ 48 in ¹⁰⁴ Ru(n, γ) E=th (1978Gu14) or $A_{22}=-0.340$ 25 and $A_{44}=0$ in ¹⁰⁴ Ru(n, γ) E=th (1978Gu14). δ : Also -3.7 +5-6 in ¹⁰⁴ Ru(n, γ) E=th (1978Gu14).
		282.67 10	11 3	159.519	1/2 ⁺				
		333.90 20	44 13	107.942	5/2 ⁺				
466.20	3/2 ⁺	420.9 6		20.606	5/2 ⁺	M1+E2		0.020 5	$\alpha(\text{K})=0.017$ 4; $\alpha(\text{L})=0.0022$ 7; $\alpha(\text{M})=0.00041$ 12; $\alpha(\text{N}+..)=6.8\times 10^{-5}$ 19 $\alpha(\text{N})=6.5\times 10^{-5}$ 18; $\alpha(\text{O})=3.0\times 10^{-6}$ 6 I_γ : 41 11 in ¹⁰⁵ Tc β^- decay. Mult.: $A_{22}=-0.019$ 41 and $A_{44}=0.41$ 17 in ¹⁰⁴ Ru(n, γ) E=th (1978Gu14) or $A_{22}=-0.015$ 37 and $A_{44}=0$ in ¹⁰⁴ Ru(n, γ) E=th (1978Gu14).
		442.00 15	100 13	0.0	3/2 ⁺				
		235.4 & 10	89 8	229.50	7/2 ⁺				
466.20	3/2 ⁺	357.3 & 10	100 11	107.942	5/2 ⁺	M1+E2		0.0128 23	$\alpha(\text{K})=0.0111$ 19; $\alpha(\text{L})=0.0014$ 3; $\alpha(\text{M})=0.00025$ 6; $\alpha(\text{N}+..)=4.2\times 10^{-5}$ 9 $\alpha(\text{N})=4.0\times 10^{-5}$ 9; $\alpha(\text{O})=1.9\times 10^{-6}$ 3 I_γ : 100 19 in ¹⁰⁵ Tc β^- decay. Mult.: $A_{22}=0.150$ 15 and $A_{44}=0.013$ 25 in ¹⁰⁴ Ru(n, γ) E=th (1978Gu14) or $A_{22}=0.158$ 13 and $A_{44}=0$ in ¹⁰⁴ Ru(n, γ) E=th (1978Gu14).
		445.1 & 10	<16	20.606	5/2 ⁺				
		306.76 6	100 27	159.519	1/2 ⁺				
466.20	3/2 ⁺	357.94 12	93 20	107.942	5/2 ⁺	M1+E2			

Adopted Levels, Gammas (continued)

γ(¹⁰⁵Ru) (continued)

E _i (level)	J ^π _i	E _γ [‡]	I _γ [‡]	E _f	J ^π _f	Mult. [‡]	δ	α [†]	Comments
466.20	3/2 ⁺	445.60 15	73 10	20.606	5/2 ⁺				I _γ : 64 13 in ¹⁰⁵ Tc β ⁻ decay.
		466.2 3	67 20	0.0	3/2 ⁺				I _γ : 59 6 in ¹⁰⁵ Tc β ⁻ decay.
490.90	(1/2,3/2) ⁻	169.9 ^a 6		321.582	3/2 ⁻				
		218.18 3	10.4 20	272.715	3/2 ⁺				
		326.1 ^a 6		163.821	(5/2 ⁺)				
		331.64 16	20 8	159.519	1/2 ⁺				
		490.78 10	100 12	0.0	3/2 ⁺				
574.1	(11/2 ⁻)	365.3 [@] 6		208.8	(7/2 ⁻)				
578.14	5/2 ⁻	418.6 2	11 4	159.519	1/2 ⁺				
		470.3 2	13 4	107.942	5/2 ⁺				
		577.9 [#] 5	100 [#] 12	0.0	3/2 ⁺				
582.11	3/2 ⁺ ,5/2 ⁺	280.26 8	100 9	301.67	7/2 ⁺				
		309.51 8	40 5	272.715	3/2 ⁺				
		352.78 12	49 14	229.50	7/2 ⁺				
620.6		178.6 ^a 6		441.95	3/2 ⁺ ,5/2 ⁺				
625.84	(7/2 ⁺ ,9/2 ⁺)	396.38 15	18 9	229.50	7/2 ⁺				
		516.7 ^a 6		107.942	5/2 ⁺				
		605.1 3	100 45	20.606	5/2 ⁺				
631.28	1/2 ⁺	358.51 12	36 22	272.715	3/2 ⁺				I _γ : 100 41 in ¹⁰⁵ Tc β ⁻ decay.
		467.0 ^a 6		163.821	(5/2 ⁺)				
		471.62 20	15 4	159.519	1/2 ⁺				I _γ : 54 27 in ¹⁰⁵ Tc β ⁻ decay.
		631.3 2	100 11	0.0	3/2 ⁺				I _γ : 40 13 in ¹⁰⁵ Tc β ⁻ decay.
644.11	(1/2 to 7/2)	203.2 ^a 6		441.95	3/2 ⁺ ,5/2 ⁺				
		322.3 [#] 5	100 [#] 30	321.582	3/2 ⁻				
		397.6 [#] 5	18 [#] 9	246.382	(3/2 ⁺ ,5/2 ⁺)				
		480.1 [#] 5	95 [#] 10	163.821	(5/2 ⁺)				
		535.8 [#] 5	<10 [#]	107.942	5/2 ⁺				
		644.0 [#] 5	47 [#] 9	0.0	3/2 ⁺				
669.8	(11/2 ⁺)	204.3 ^{&} 10	27 3	465.3	(9/2 ⁺)				
		440.4 ^{&} 10	100 9	229.50	7/2 ⁺				
670.60	(1/2 ⁺ ,3/2 ⁺)	397.77	8 4	272.715	3/2 ⁺				
		562.65 4	100 29	107.942	5/2 ⁺				
725.92	(3/2 to 9/2)	481.50 12	7 4	244.42	(5/2 ⁺ ,7/2 ⁺)				
		618.0 2	100 25	107.942	5/2 ⁺				
756.8	(3/2,5/2) ⁺	314.7 [#] 5	63 [#] 27	441.95	3/2 ⁺ ,5/2 ⁺				I _γ : 100 in ¹⁰⁴ Ru(n,γ) E=th; Only this decay branch is observed in ¹⁰⁴ Ru(n,γ) E=th.
		484.0 [#] 5	37 [#] 7	272.715	3/2 ⁺				
		648.7 [#] 5	63 [#] 12	107.942	5/2 ⁺				
		757.0 [#] 5	100 [#] 13	0.0	3/2 ⁺				
784.67	(1/2,3/2) ⁻	462.89 12	100 6	321.582	3/2 ⁻	M1+E2	0.33 +12-7	0.00571 12	α=0.00571 12; α(K)=0.00500 10; α(L)=0.000584

Adopted Levels, Gammas (continued)

γ(¹⁰⁵Ru) (continued)

E _i (level)	J ^π _i	E _γ [‡]	I _γ [‡]	E _f	J ^π _f	Mult. [‡]	δ	α [†]	Comments
									14; α(M)=0.000107 3; α(N+..)=1.82×10 ⁻⁵ 4 α(N)=1.73×10 ⁻⁵ 4; α(O)=9.08×10 ⁻⁷ 15 Mult.: A ₂₂ =0.349 40 and A ₄₄ =0.019 59 in ¹⁰⁴ Ru(n,γ) E=th (1978Gu14) or A ₂₂ =0.353 38 and A ₄₄ =0 in ¹⁰⁴ Ru(n,γ) E=th (1978Gu14). δ: Also 0.88 +15-18 in ¹⁰⁴ Ru(n,γ) E=th (1978Gu14).
784.67	(1/2,3/2) ⁻	538.3 4 621.4 3	5.0 21 1.1 7	246.382 (3/2 ⁺ ,5/2 ⁺) 163.821 (5/2 ⁺)					
801.5		180.9 ^a 6		620.6					
805.77	1/2 ⁺	646.25 15	100	159.519 1/2 ⁺					
824.33	3/2 ⁺	193.00 8 333.28 20 578.00 665.0 2 716.55 15 803.8 4 824.45 15	40 9 50 22 44 29 18 10 37 15 22 15 100 15	631.28 1/2 ⁺ 490.90 (1/2,3/2) ⁻ 246.382 (3/2 ⁺ ,5/2 ⁺) 159.519 1/2 ⁺ 107.942 5/2 ⁺ 20.606 5/2 ⁺ 0.0 3/2 ⁺					
836.0		215.4 ^a 6		620.6					
841.11	(7/2,9/2) ⁺	539.44 20	100	301.67 7/2 ⁺					
873.62	1/2 ⁺	600.5 ^a 6 714.1 2		272.715 3/2 ⁺ 159.519 1/2 ⁺					
886.63	3/2 ⁺	242.45 10 565.02 15 640.34 15	100 29 3.5 7 35 4 100 5	644.11 (1/2 to 7/2) 321.582 3/2 ⁻ 246.382 (3/2 ⁺ ,5/2 ⁺)		M1+E2	0.20 2	0.00260 4	α=0.00260 4; α(K)=0.00228 4; α(L)=0.000262 4; α(M)=4.80×10 ⁻⁵ 7; α(N+..)=8.20×10 ⁻⁶ 12 α(N)=7.79×10 ⁻⁶ 11; α(O)=4.15×10 ⁻⁷ 6 Mult.: A ₂₂ =-0.013 48 and A ₄₄ =-0.012 76 in ¹⁰⁴ Ru(n,γ) E=th (1978Gu14) or A ₂₂ =-0.017 43 in ¹⁰⁴ Ru(n,γ) E=th (1978Gu14).
		722.8 [#] 5	<6 [#]	163.821 (5/2 ⁺)					
903.19	3/2 ⁺ ,5/2 ⁺	657.0 [#] 5 739.35 15	<10 [#] 100 11	246.382 (3/2 ⁺ ,5/2 ⁺) 163.821 (5/2 ⁺)					
956.73	(1/2 ⁺ ,3/2,5/2 ⁺)	684.00 15 710.2 4 797.4 2 848.65 20	92 22 76 32 100 16 86 27	272.715 3/2 ⁺ 246.382 (3/2 ⁺ ,5/2 ⁺) 159.519 1/2 ⁺ 107.942 5/2 ⁺					
967.15	(1/2 ⁺ ,3/2 ⁺)	323.27 20	100	644.11 (1/2 to 7/2)					
977.0	(13/2 ⁺)	511.7 ^{&} 10	100	465.3 (9/2 ⁺)					
1058.78	(3/2 ⁺ ,5/2,7/2 ⁺)	757.20 15 829.2 4 894.9 4	100 10 5 4 30 14	301.67 7/2 ⁺ 229.50 7/2 ⁺ 163.821 (5/2 ⁺)					
1134.66	(1/2 ⁺ to 7/2 ⁺)	971.7 4	17 10	163.821 (5/2 ⁺)					

∞

Adopted Levels, Gammas (continued)

γ(¹⁰⁵Ru) (continued)

E _i (level)	J _i ^π	E _γ [‡]	I _γ [‡]	E _f	J _f ^π	Comments
1134.66	(1/2 ⁺ to 7/2 ⁺)	1135.3 4	100 38	0.0	3/2 ⁺	
1142.9	(15/2 ⁻)	568.8 @ 6		574.1	(11/2 ⁻)	
1180.12	(3/2 ⁺ , 5/2 ⁺)	738.3 4	41 20	441.95	3/2 ⁺ , 5/2 ⁺	
		878.5 2	95 24	301.67	7/2 ⁺	
		950.3 4	51 20	229.50	7/2 ⁺	
		1159.5 5	100 41	20.606	5/2 ⁺	
1219.9	(15/2 ⁺)	550.1 & 10	100	669.8	(11/2 ⁺)	
1325.56	(1/2, 3/2)	439.00 15	87 9	886.63	3/2 ⁺	
		540.6 2	100 14	784.67	(1/2, 3/2) ⁻	
		883.5 5		441.95	3/2 ⁺ , 5/2 ⁺	E _γ : from ¹⁰⁵ Tc β ⁻ decay.
		1004.1 4	81 21	321.582	3/2 ⁻	
1329.14	(1/2 ⁺ , 3/2 ⁺)	862.85 20	100 25	466.20	3/2 ⁺	
		887.3 3	38 13	441.95	3/2 ⁺ , 5/2 ⁺	
1575.2	(17/2 ⁺)	598.2 & 10	100	977.0	(13/2 ⁺)	
1693.6	(1/2 ⁺ , 3/2 ⁺)	1534.1 5	100	159.519	1/2 ⁺	
1735.30	(1/2 ⁺ , 3/2 ⁺)	600.65 3	18 8	1134.66	(1/2 ⁺ to 7/2 ⁺)	
		847.8 4	29 13	886.63	3/2 ⁺	
		1090.7 4	100 25	644.11	(1/2 to 7/2)	
		1575.3 6	47 20	159.519	1/2 ⁺	
1832.72	(1/2, 3/2)	1008.4 # 1	54 # 5	824.33	3/2 ⁺	
		1047.9 # 5	18 # 9	784.67	(1/2, 3/2) ⁻	
		1201.6 # 5	36 # 4	631.28	1/2 ⁺	
		1366.3 # 5	100 # 10	466.20	3/2 ⁺	
		1510.6 # 5	73 # 7	321.582	3/2 ⁻	
		1560.1 # 5	63 # 7	272.715	3/2 ⁺	
		1673.3 # 5	<5 #	159.519	1/2 ⁺	
1843.3	(1/2, 3/2)	1058.5 # 5	100 # 36	784.67	(1/2, 3/2) ⁻	
		1570.5 # 5	<18 #	272.715	3/2 ⁺	
		1683.9 # 5	<18 #	159.519	1/2 ⁺	
1844.8	(19/2 ⁺)	624.9 & 10	100	1219.9	(15/2 ⁺)	
1845.49	(1/2 ⁺ , 3/2 ⁺)	878.5 2	100 26	967.15	(1/2 ⁺ , 3/2 ⁺)	
		1823.8 6	28 13	20.606	5/2 ⁺	
1867.6	(19/2 ⁻)	724.7 @ 6		1142.9	(15/2 ⁻)	
2148.4	(3/2 ⁺)	2127.6 5	100	20.606	5/2 ⁺	
2155.43		1370.8 # 5	32 # 7	784.67	(1/2, 3/2) ⁻	
		1882.7 # 5	7.1 # 14	272.715	3/2 ⁺	
		2155.4 # 1	100 # 11	0.0	3/2 ⁺	
2326.7	(1/2 ⁺ to 5/2 ⁺)	2053.9 # 5	100 # 21	272.715	3/2 ⁺	

Adopted Levels, Gammas (continued)

γ(¹⁰⁵Ru) (continued)

E _i (level)	J ^π _i	E _γ [‡]	I _γ [‡]	E _f	J ^π _f	Mult. [‡]	Comments
2326.7	(1/2 ⁺ to 5/2 ⁺)	2167.2 [#] 5	21 [#] 4	159.519	1/2 ⁺		
2352.8	(1/2 ⁺ ,3/2 ⁺)	1910.5 5	100 26	441.95	3/2 ⁺ ,5/2 ⁺		
		2332.1 6	55 21	20.606	5/2 ⁺		
2379.7	(1/2 ⁺ ,3/2 ⁺)	1321.8 5	100	1058.78	(3/2 ⁺ ,5/2,7/2 ⁺)		
2403.6	(3/2 ⁺ ,5/2,7/2 ⁻)	2082.0 [#] 5	100 [#] 21	321.582	3/2 ⁻		
		2174.0 [#] 5	29 [#] 4	229.50	7/2 ⁺		
2404.09	(1/2 ⁻ ,3/2)	1826.3 6	100 10	578.14	5/2 ⁻		
2529.0	(23/2 ⁺)	684.2 ^{&} 10	100	1844.8	(19/2 ⁺)		
2710.8	(23/2 ⁻)	843.2 [@] 6		1867.6	(19/2 ⁻)		
3285.1	(27/2 ⁺)	756.1 ^{&} 10	100	2529.0	(23/2 ⁺)		
3641.4	(27/2 ⁻)	930.6 [@] 6		2710.8	(23/2 ⁻)		
(5910.21)	1/2 ⁺	3506.1 2	10.2 12	2404.09	(1/2 ⁻ ,3/2)		
		3531.7 6	3.4 9	2379.7	(1/2 ⁺ ,3/2 ⁺)		
		3556.8 6	1.8 7	2352.8	(1/2 ⁺ ,3/2 ⁺)		
		3761.7 3	9.2 8	2148.4	(3/2 ⁺)		
		4065.2 7	1.8 6	1845.49	(1/2 ⁺ ,3/2 ⁺)		
		4076.7 9	2.5 6	1832.72	(1/2,3/2)		
		4174.8 3	20.9 12	1735.30	(1/2 ⁺ ,3/2 ⁺)		
		4216.6 6	11.7 16	1693.6	(1/2 ⁺ ,3/2 ⁺)		
		4580.1 10	3.5 4	1329.14	(1/2 ⁺ ,3/2 ⁺)		
		4584.4 2	13.6 10	1325.56	(1/2,3/2)		
		4943.7 7	5 3	967.15	(1/2 ⁺ ,3/2 ⁺)		
		5023.4 2	100 19	886.63	3/2 ⁺	D	Mult.: A ₂₂ =-0.072 30 and A ₄₄ =-0.025 47 in ¹⁰⁴ Ru(n,γ) E=th (1978Gu14) or A ₂₂ =-0.081 27 and A ₄₄ =0 in ¹⁰⁴ Ru(n,γ) E=th (1978Gu14).
		5086.0 2	25 8	824.33	3/2 ⁺		
		5125.5 3	27.0 16	784.67	(1/2,3/2) ⁻		
		5239.1 4	1.6 8	670.60	(1/2 ⁺ ,3/2 ⁺)		
		5444.0 2	12.6 12	466.20	3/2 ⁺		
		5588.4 2	30.4 20	321.582	3/2 ⁻		
		5637.1 2	6.4 16	272.715	3/2 ⁺		
		5750.7 2	13 3	159.519	1/2 ⁺		
		5909.9 2	28.8 24	0.0	3/2 ⁺		

† Additional information 1.

‡ From ¹⁰⁴Ru(n,γ) E=th, unless otherwise noted.

From ¹⁰⁵Tc β⁻ decay.

@ From ¹⁷³Yb(²⁴Mg,Xγ).

Adopted Levels, Gammas (continued)

$\gamma(^{105}\text{Ru})$ (continued)

& From $^{168}\text{Er}(^{30}\text{Si}, X\gamma)$.

^a From $^{104}\text{Ru}(d, p\gamma)$.

$^{105}\text{Ru}_{61}-11$

From ENSDF

$^{105}\text{Ru}_{61}-11$

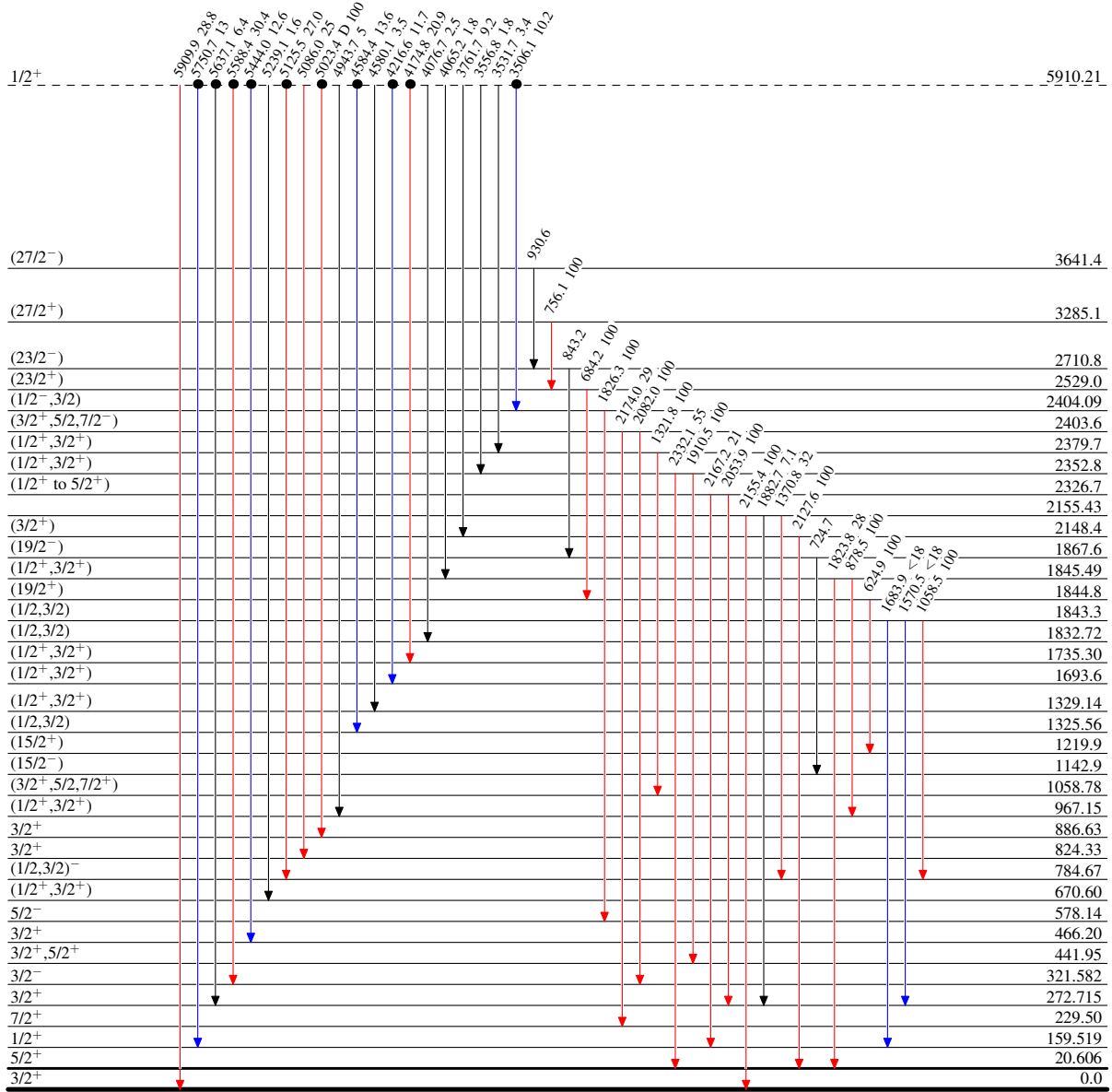
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Type not specified

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



340 ns 15
4.439 h 11

¹⁰⁵Ru₆₁

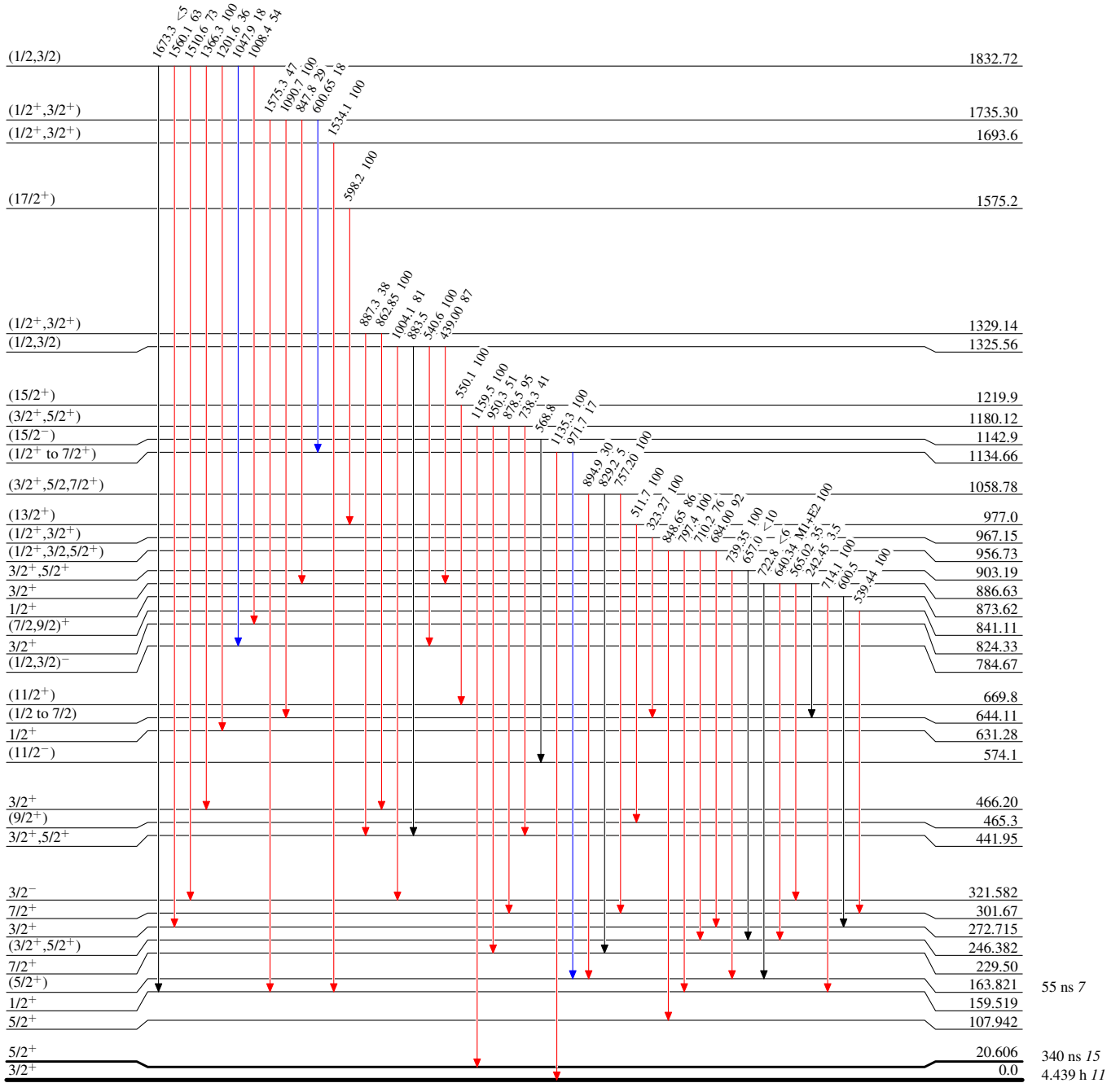
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified

Legend

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



¹⁰⁵Ru₆₁

55 ns 7

340 ns 15
4.439 h 11

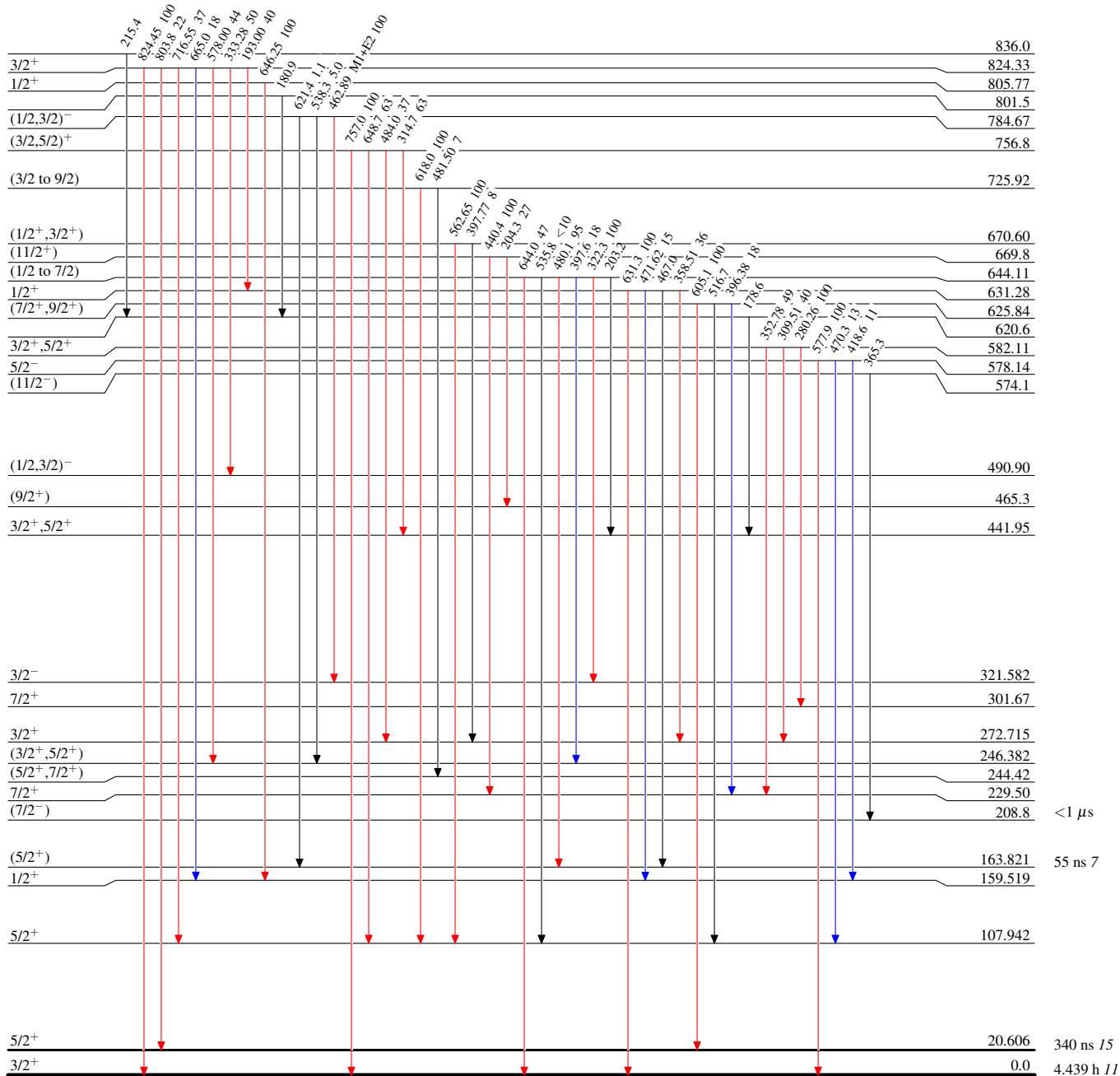
Adopted Levels, Gammas

Level Scheme (continued)

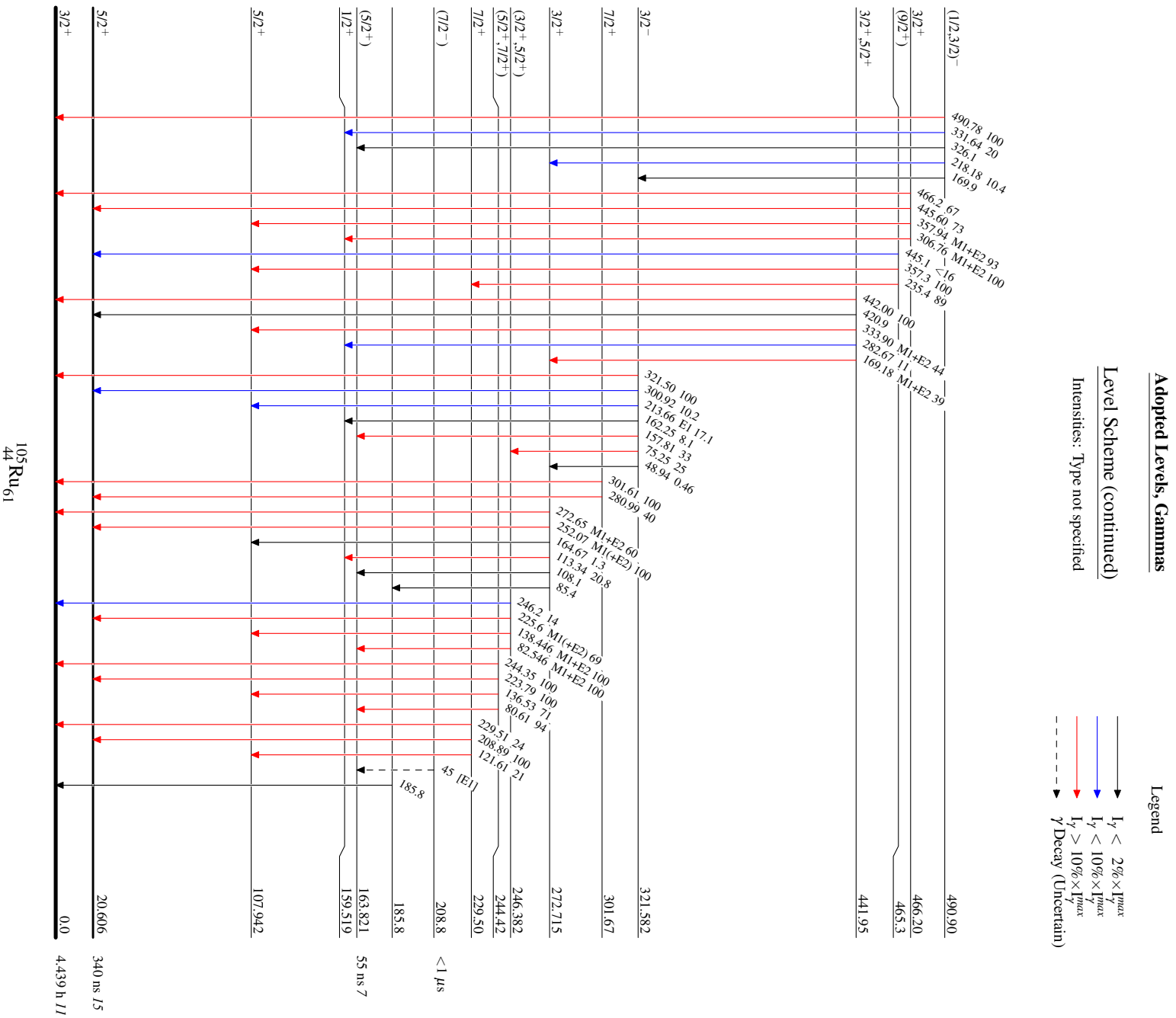
Intensities: Type not specified

Legend

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



$^{105}_{44}\text{Ru}_{61}$

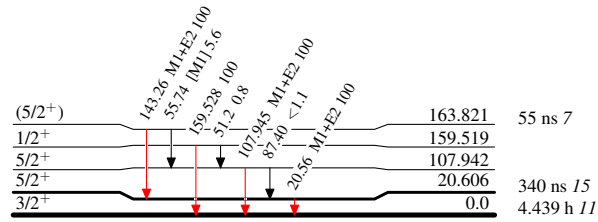


Adopted Levels, Gammas**Level Scheme (continued)**

Intensities: Type not specified

Legend

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

 $^{105}_{44}\text{Ru}_{61}$

Adopted Levels, Gammas