Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	D. De Frenne	NDS 110,2081 (2009)	1-Mar-2009

Q(β^-)=764.4 *22*; S(n)=6232.05 *15*; S(p)=9982 *10*; Q(α)=−3719.6 *12* 2012Wa38
Note: Current evaluation has used the following Q record 763.4 216232.05 *159982* 9 −3717.9 *16* 2003Au03.

^{103}Ru Levels

Cross Reference (XREF) Flags

A	^{103}Tc β^- decay	E	^{102}Ru(d,p)
B	^{103}Ru IT decay (1.69 ms)	F	^{104}Ru(p,d), (d,t)
C	^{100}Mo(α,nγ)	G	(HI,xnγ)
D	^{102}Ru(n,γ) E=th		

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	XREF	Comments
0.0	3/2$^+$	39.247 d *13*	ABCDEFG	%β^-=100 μ=0.200 *7* (1989Ra17); Q=+0.62 *2* (1989Ra17,1986Gr26) $T_{1/2}$: From the review of (2004Wo02). Others: 39.260 d *20* (1981Va11), 39.214 d *13* (1981Mi10); 39.254 d *8* (1980Ho17), 39.296 d *9* (1976WaZH). 39.35 d *5* (1971De11), 39.5 d *5* (1965Fl02), 39.4 d *4* (1959Ca12), 1957Wr37, 1952Ko27, 1951Su90, 1948Mo33. J$^\pi$: L=2 in (d,p). μ agrees with values for other J=3/2 states in this region. μ: others: 0.225 *60* (1981Ha11), 0.18 *2* (1981Mu18) all using the low temperature nuclear orientation technique. 0.2071 *31* (1990Hi02) NMR on oriented ^{103}Ru in Fe. Other references: 1979KrZV, 1976Ba39.
2.81 *5*	5/2$^+$		ABCDEF	E(level): implied from several γ-ray doublets of ΔE=2.8 keV including a g.s. transition in ^{103}Tc β^- decay, (n,γ) and (α,nγ). J$^\pi$: L=2 in (p,d),(d,t). 210.8γ from 213 is ΔJ=1.
136.079 *3*	5/2$^+$		A CDEF	J$^\pi$: L=2 in (d,p),(p,d),(d,t). J=5/2 favored by 136$\gamma(\theta)$ in (α,nγ).
174.26 *4*	1/2$^+$		A CDEF	J$^\pi$: L=0 in (d,p),(p,d),(d,t).
213.56[#] *7*	7/2$^+$	<15 ns	ABCDEFG	J$^\pi$: L=4 (d,p),(d,t). log *ft*=6.2 from 5/2$^+$ excludes 9/2$^+$. $T_{1/2}$: from prompt component (210.7γ)(t) (1975Kl04).
238.2[@] *7*	11/2$^-$	1.69 ms *7*	BC EFG	$T_{1/2}$: from γ(t): unweighted av of 1.56 ms *5* (1970Uy01), 1.67 ms *10* (1975Kl04), 1.85 ms *6* (1975Ba60). Others: 1964Br27, 1967Iv03, 1968Io01. J$^\pi$: from L=5 (d,p),(p,d),(d,t), B(M2)(W.u.)(24.6γ,M2) syst and E(11/2$^-$) regional trend. If J^π were 9/2$^-$,the transition to 213 level could be an E1 and B(E1)(W.u.)$\leq 1.5\times10^{-9}$. This would be too slow (1981En06).
297.48 *10*	(7/2)$^-$		A CDEF	J$^\pi$: L=3 in (d,p),(p,d), D(+Q) γ to (5/2)$^+$.
346.38 *1*	3/2$^+$		A CDEF	J$^\pi$: from L=2 (d,t),(p,d), excit (346γ) favors 3/2.
404.15 *10*	(7/2)$^+$		A CD	J$^\pi$: D+Q γ to (5/2)$^+$, 7/2 from $\gamma(\theta)$ (1986Ka37).
406.08 *7*	3/2$^+$,5/2$^+$		A DEF	J$^\pi$: L=2 (d,p),(p,d),(d,t).
432.06 *9*	1/2$^+$		A CDEF	J$^\pi$: from L=0 (d,p),(d,t).
475.9? *9*			C	
501.15 *7*	(5/2)$^+$		A CDEF	J$^\pi$: L=2 in (d,p),(p,d),(d,t). 5/2$^+$ suggested by 1982Be19 from (d,p)/(p,d) spectroscopic strength and $\gamma(\theta)$ in (α,nγ).
535.4 *16*	(3/2$^+$,5/2$^+$)		E	J$^\pi$: L=(2) in (d,p).
548.21 *12*	(1/2$^+$)		CDEF	J$^\pi$: probable member of complex unresolved multiplet observed in (d,p),(p,d) and (d,t). No unambiguous L assignment. γ to 5/2$^+$, $\gamma(\theta)$ in (α,nγ) suggest 1/2.
554.58 *16*	(1/2$^+$)		A D	J$^\pi$: probable member of complex unresolved multiplet observed in (d,p),(p,d) and (d,t). No unambiguous L assignment. Preferential γ decay of the 554-keV level to g.s. and the presence of a L=0 component

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Adopted Levels, Gammas (continued)

^{103}Ru Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
			in the unresolved multiplet in (p,d) suggest (1/2$^+$).
557.7 *4*	(9/2$^+$)	C	Jπ: probable member of complex unresolved multiplet observed in (d,p),(p,d) and (d,t). No unambiguous L assignment. Excit of 344γ suggest 7/2,9/2 in (α,nγ). 344$\gamma(\theta)$ favors 9/2.
562.87 *7*	(3/2$^+$,5/2$^+$)	A CD	Jπ: probable member of complex unresolved multiplet observed in (d,p),(p,d) and (d,t). No unambiguous L assignment. Population and depopulation of 562-keV level suggest 1/2$^+$,3/2,5/2$^+$; log *ft*=5.32 in ^{103}Tc β^- decay excludes 1/2$^+$,3/2$^-$.
568.17 *15*		CD	Jπ: from $\gamma(\theta)$ in (α,nγ) J^π=(1/2$^+$) and from (n,γ) J^π=(3/2$^-$).
591.97 *6*	(5/2)$^+$	A CDEF	Jπ: L=2 in (d,p),(p,d),(d,t). 5/2$^+$ suggested from (d,p)/(p,d) spectroscopic strength (1982Be19).
622.0 *5*	(5/2$^+$)	CDEF	Jπ: L=(2) in (d,p),(p,d). 5/2$^+$ suggested from (d,p)/(p,d) spectroscopic strength (1982Be19). Excit, n$\gamma(\theta)$ for 324.7γ in (α,nγ) suggest 3/2, although 5/2 cannot be ruled out. In disagreement with J≥9/2 from ^{102}Ru(n,γ).
653.7[@] *8*	15/2$^-$	C G	Jπ: based on 415γ excit and angular distribution in (α,nγ). Stretched intraband E2 to 11/2$^-$.
661.55 *5*	(3/2)$^+$	A CDEF	Jπ: L=2 (d,p),(p,d),(d,t). 3/2$^+$ suggested from (d,p)/(p,d) spectroscopic strength (1982Be19).
697.2 *3*	7/2$^+$,9/2$^+$	CDEF	Jπ: L=4 (d,p),(p,d),(d,t).
735.2 *4*	(5/2$^+$)	C	E(level): 735.2 and 736.89 keV levels separately observed in (α,nγ). Jπ: D+Q γ to (7/2)$^+$, $\gamma(\theta)$ suggest J=5/2.
736.89 *13*	1/2$^+$	DEF	Jπ: L=0 (d,p),(p,d),(d,t). J^π assignment consistent with strong level population in (n,γ) and preferential γ decay to 1/2$^+$ states.
748.8 *5*	(5/2$^+$)	C	Jπ: E2 γ to (9/2$^+$), $\gamma(\theta)$ suggest J=5/2.
774.1[#] *3*	11/2$^+$	C G	Jπ: stretched Q from excit and angular distribution in (α,nγ). Member of ΔJ=2 band based on 7/2$^+$ at 213 keV.
774.77 *8*	(3/2$^+$,5/2$^+$)	A DEF	Jπ: suggested from population in (n,γ) and γ decay pattern. Consistent with observation of unresolved multiplet at 773.8 keV in (d,p) with L=0 and L=2 components and a possible multiplet at 777.0 keV in (p,d) with a predominant L=2 component. 1/2$^+$ ruled out from log *ft*.
855 *2*		F	
873.71 *22*	(3/2$^+$,5/2$^+$)	CD	Jπ: from excit and $\gamma(\theta)$.
903.05 *19*	(≤5/2$^+$)	D F	Jπ: may be a member of a possible unresolved multiplet observed in (d,p),(p,d),(d,t) with L=2. γ decay pattern suggest J≤5/2.
905.36 *13*	3/2$^+$,5/2$^+$	A DE	Probably member of a possible unresolved multiplet observed in (d,p),(p,d),(d,t) with L=2 as main component. Jπ: from allowed β-transition with log *ft*=5.8 from 5/2$^+$. J^π=3/2$^+$,5/2$^+$,7/2$^+$ possible; 7/2$^+$ ruled out from L=2.
907.64 *19*	(≤5/2$^+$)	D	May be member of a possible unresolved multiplet observed in (d,p),(p,d),(d,t) with L=2. γ decay pattern suggest J≤5/2.
911.6 *9*	(7/2$^+$)	C	Jπ: From γ excitation function of 614 keV γ in (α,nγ).
927.24 *18*	1/2$^+$	CDEF	Jπ: L(d,p)=0. In disagreement with J^π=(3/2$^-$,5/2$^+$) from (n,γ) data.
931.3 *5*	(3/2,5/2)	C	Jπ: γ to (1/2$^+$). γ excitation function of 383 keV γ in (α,nγ) suggests 5/2 or 3/2 while its isotropic angular distribution favors 3/2.
940.50 *13*		A D F	
954.4 *9*	(3/2)	C	Jπ: From γ excitation function of 818 keV γ in (α,nγ).
988.8		C	
991.6 *5*		D	
1004.0 *15*	3/2$^+$,5/2$^+$	EF	Jπ: L(d,p)=2.
1018.1 *8*	(5/2,7/2)	C	Jπ: Suggested from excitation function of 720γ in (α,nγ).
1020.4 *11*	(11/2$^-$,13/2$^-$)	C	Jπ: based on 366γ excit, angular distribution in (α,nγ) favors 13/2.
1057 *5*	(7/2$^+$,9/2$^+$)	E	Jπ: L(d,p)=(4).
1065.14 *10*	3/2$^+$,5/2$^+$,7/2$^+$	A CD F	Jπ: allowed β-transition with log *ft*=5.8 from 5/2$^+$.
1079.6 *9*	(7/2$^+$,9/2$^+$)	C EF	Jπ: L(d,p),(p,d), (d,p)=(4).
1106.7 *7*	1/2$^+$	DE	Jπ: L(d,p)=0.
1110.1 *3*	(3/2$^+$,5/2$^+$)	D F	Jπ: from L(d,t)=(2) and γ decay pattern in (n,γ).

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Adopted Levels, Gammas (continued)

^{103}Ru Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
1110.6 *3*	(11/2$^+$)	C	Jπ: Q γ to 7/2$^+$, γ(θ) favors 11/2$^+$.
1133.7 *7*		C E	
1140.6 *9*	(3/2,5/2)	C	Jπ: excit and γ(θ) in (α,nγ).
1171.3 *7*	(1/2,3/2)	C	Jπ: Deexcitation pattern and γ(θ) in (α,nγ).
1174.08 *23*	(3/2)	D	E(level): might be identical with 1171.3 level seen in (α,nγ). Jπ: population and depopulation in (n,γ) permits J=1/2,3/2,5/2. (625.8γ-250.5γ)(θ) and (625.8γ-(250.5γ)−294.4γ)(θ) suggests 3/2.
1182 *5*	3/2$^+$,5/2$^+$	E	Jπ: L(d,p)=2.
1199.9 *5*	(13/2$^+$)	C	Jπ: Q γ to (9/2)$^+$, D+Q γ to 11/2$^+$.
1238 *2*	3/2$^+$,5/2$^+$	F	Jπ: L(p,d)=2.
1250.6 *19*	3/2$^+$,5/2$^+$	EF	Jπ: L(d,p)=2.
1269.8 *9*		C E	
1288.2 *9*		C	
1301.5[@] *11*	19/2$^-$	C G	Jπ: stretched E2 to 15/2$^-$.
1313.6 *7*	(11/2)$^+$	C	Jπ: M1+E2 γ to 11/2$^+$. Jπ=(9/2$^+$) and (13/2$^+$) cannot be ruled out.
1322 *5*	9/2$^-$,11/2$^-$	E	Jπ: L(d,p)=5.
1324.2 *4*		D F	
1338 *2*		F	
1347.12 *19*		DE	
1370 *5*		E	
1378.4 *9*		C	
1400.98 *12*		D F	
1431.12 *17*		DE	
1443.7[#] *9*	15/2$^+$	C G	Jπ: stretched E2 to 11/2$^+$ in (α,nγ).
1461 *5*		E	
1473.8 *9*		C	
1490.3 *19*		EF	
1558.3 *19*	3/2$^+$,5/2$^+$	EF	Jπ: L(d,p)=(2); L(p,d)(d,t)=2.
1604.47 *15*		DE	
1642 *5*		E	
1662 *5*	(5/2$^+$,3/2$^+$)	E	Jπ: From L(d,p)=(2).
1699 *5*		E	
1717.0 *4*		DE	
1730.4 *3*		D	
1755.3 *19*	1/2$^-$,3/2$^-$	EF	Jπ: L(p,d)=1.
1780 *5*		E	
1809 *5*	1/2$^+$	E	Jπ: L(d,p)=0.
1817 *2*		F	
1835.88 *23*		DE	
1880.54 *20*		DE	
1892 *2*		F	
1906.06 *23*	(3/2$^-$,1/2$^-$)	DEF	Jπ: From L(d,p)=(1).
1961.94 *18*	3/2$^+$,5/2$^+$	DE	Jπ: L(d,p)=2.
2003.6 *8*		DE	
2022 *2*		F	
2058 *6*	(3/2$^+$,5/2$^+$)	E	Jπ: L(d,p)=(2).
2082 *6*	3/2$^+$,5/2$^+$	E	Jπ: L(d,p)=2.
2118 *6*	(5/2$^+$,3/2$^+$)	E	Jπ: From L(d,p)=(2).
2129.7[@] *9*	23/2$^-$	G	Jπ: stretched E2 to 19/2$^-$.
2131.8[#] *10*	19/2$^+$	C G	Jπ: stretched E2 to 15/2$^+$.
2137 *6*	(3/2$^+$,5/2$^+$)	E	Jπ: L(d,p)=(2).
2167	7/2$^+$,9/2$^+$	EF	Jπ: L(d,p)=4.
2206.04 *19*		DE	
2217 *2*		F	
2223.6 *4*		DE	

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Adopted Levels, Gammas (continued)

^{103}Ru Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
2232 *2*		F	
2248 *6*		E	
2280 *6*		E	
2299 *2*	1/2⁻,3/2⁻	F	Jπ: L(p,d)=1; L(d,t)=1.
2384 *2*	1/2⁻,3/2⁻	F	Jπ: L(p,d)=1; L(d,t)=1.
2405 *6*		E	
2443.2 *24*		EF	
2489 *6*		E	
2507 *2*	1/2⁻,3/2⁻	F	Jπ: L(p,d)=1; L(d,t)=1.
2515 *6*	1/2⁺	E	Jπ: L(d,p)=0.
2520 *2*		F	
2548 *6*	1/2⁻,3/2⁻	E	Jπ: L(d,p)=1.
2576.20 *24*		DE	
2627 *6*	5/2⁺,3/2⁺	E	Jπ: L(d,p)=2.
2657 *6*		E	
2679.6[#] *20*	23/2⁺	G	Jπ: stretched E2 to 19/2⁺.
2694 *6*		E	
2723 *6*		E	
2960 *6*		E	
3015 *6*		E	
3062 *6*		E	
3078.7[@] *18*	27/2⁻	G	Jπ: stretched E2 to 23/2⁻.
3204 *6*		E	
3275.6[#] *23*	(27/2⁺)	G	Jπ: (E2) to 23/2⁺.
3325 *6*		E	
3512 *6*		E	
4058.6[#] *25*	(31/2⁺)	G	Jπ: (E2) to (27/2⁺).
4083.0[@] *19*	(31/2⁻)	G	Jπ: (E2) to 27/2⁻.
5028[#] *3*	(35/2⁺)	G	Jπ: E2 to (31/2⁺).
5127 *2*	(35/2⁻)	G	Calculated by evaluator from measured Eγ observed only by 2005Re11.

[†] Unless noted otherwise, calculated with a least-squares procedure based on adopted gammas.
[‡] J values suggested from (HI,xnγ) based on observed band structure.
[#] Band(A): possible ΔJ=2, 7/2⁺ band (1998Fo08).
[@] Band(B): possible ΔJ=2, 11/2⁻ band (1998Fo08).

Adopted Levels, Gammas (continued)

γ(^{103}Ru)

E_i(level)	J_i^π	E_γ[@]	I_γ[@]	E_f	J_f^π	Mult.[†‡]	δ[#]	α[c]	Comments
2.81	5/2$^+$	(2.70 *10*)	100	0.0	3/2$^+$				E_γ: deduced from observed γ-ray pairs with ΔE=2.70 keV.
136.079	5/2$^+$	133.3 *3*	2.3 *3*	2.81	5/2$^+$				
		136.079 *3*	100 *4*	0.0	3/2$^+$	M1+E2	−0.34 *9*	0.168 *15*	δ: weighted average of −0.36 *+9−13* from ^{100}Mo(α,nγ) and −0.27 *+9−16* from ^{102}Ru(n,γ).
174.26	1/2$^+$	171.3 *4*	3.5[&] *16*	2.81	5/2$^+$				
		174.29 *5*	100[&] *4*	0.0	3/2$^+$	M1			
213.56	7/2$^+$	77.5 *8*	1.8 *4*	136.079	5/2$^+$				
		210.64 *5*	100 *4*	2.81	5/2$^+$	M1+E2			0.4<δ<9 if δ(287γ)<0 or −7<δ<−0.2 if δ(287)>0.
		213.17 *16*	5.05 *8*	0.0	3/2$^+$	E2			
238.2	11/2$^-$	(24.6 *7*)	100	213.56	7/2$^+$	[M2]		730 *9*	B(M2)(W.u.)=0.12 *1*
297.48	(7/2)$^-$	294.72 *11*	100	2.81	5/2$^+$	D(+Q)	0.03 *3*		
346.38	3/2$^+$	172.0 *10*	0.38 *3*	174.26	1/2$^+$				
		210.2 *3*	43 *4*	136.079	5/2$^+$	D+Q			Mult.: δ=0.03 *+4−5* or 3.2 *+5−7*.
		343.46 *12*	23.8 *8*	2.81	5/2$^+$				
		346.377 *12*	100 *3*	0.0	3/2$^+$				E_γ: from 1979Bo26.
404.15	(7/2)$^+$	190.46 *24*	8.2[b] *15*	213.56	7/2$^+$				
		268.6 *10*	21[b] *8*	136.079	5/2$^+$	D+Q	−1.1 *+4−9*		δ: from (α,nγ).
		401.47 *20*	100[b] *18*	2.81	5/2$^+$	D+Q	−1.1 *2*		δ: from (α,nγ). Mult.: from γ(θ).
406.08	3/2$^+$,5/2$^+$	231.85 *23*	4.5 *7*	174.26	1/2$^+$				
		270.09 *10*	23.5 *24*	136.079	5/2$^+$				
		403.11 *19*	100 *3*	2.81	5/2$^+$				
		406.20 *20*	2.6 *7*	0.0	3/2$^+$				
432.06	1/2$^+$	257.5 *4*	14.6[&] *14*	174.26	1/2$^+$				
		432.08 *9*	100[&] *4*	0.0	3/2$^+$				
475.9?		301.6 *8*		174.26	1/2$^+$				
501.15	(5/2)$^+$	287.57 *9*	27.5 *20*	213.56	7/2$^+$	M1+E2			−9<δ<−0.4 or 0.2<δ<7.
		365.07 *17*	17.4 *20*	136.079	5/2$^+$				
		501.20 *9*	100 *3*	0.0	3/2$^+$				
548.21	(1/2$^+$)	201.8 *3*	9.8[&] *11*	346.38	3/2$^+$				
		250.53 *19*	100[&] *5*	297.48	(7/2)$^-$	D+Q	−0.39 *17*		
		373.9 *3*	16[&] *5*	174.26	1/2$^+$				
		545.50 *20*	80[&] *4*	2.81	5/2$^+$				
554.58	(1/2$^+$)	122.5 *4*	2.2[&] *13*	432.06	1/2$^+$				
		380.3 *3*	15.8[&] *9*	174.26	1/2$^+$				
		554.92 *16*	100[&] *3*	0.0	3/2$^+$				

$^{103}_{44}Ru_{59}$-5

Adopted Levels, Gammas (continued)

γ(^{103}Ru) (continued)

E_i(level)	J_i^π	E_γ[@]	I_γ[@]	E_f	J_f^π	Mult.[†‡]	δ[#]	Comments
557.7	(9/2$^+$)	153.5 *8*	11.6 *12*	404.15	(7/2)$^+$			
		344.0 *5*	70 *4*	213.56	7/2$^+$	D+Q	−0.21 *9*	δ: from (α,nγ) if J_i=9/2.
		421.9 *8*	29.1 *23*	136.079	5/2$^+$	Q		
		555.0 *8*	100 *6*	2.81	5/2$^+$	Q		
562.87	(3/2$^+$,5/2$^+$)	388.59 *9*	31.8 *19*	174.26	1/2$^+$			
		426.8 *4*	5.4 *18*	136.079	5/2$^+$			
		559.7 *3*	3.0 *8*	2.81	5/2$^+$			
		562.90 *9*	100 *4*	0.0	3/2$^+$			
568.17		270.59 *24*	100[&] *6*	297.48	(7/2)$^-$	Q		Mult.: from (n,γ).
		568.4 *3*	6.9[&] *18*	0.0	3/2$^+$			
591.97	(5/2)$^+$	245.7 *2*	35 *7*	346.38	3/2$^+$			
		378.02 *10*	100 *7*	213.56	7/2$^+$	D+Q		−9<δ<−0.4 if δ(210γ)>0 or −0.09<δ<8 if δ(210γ)<0.
		417.9 *3*	28 *8*	174.26	1/2$^+$			
		456.08 *9*	45 *4*	136.079	5/2$^+$			
		589.13 *9*	61 *4*	2.81	5/2$^+$			
		592.10 *9*	65 *5*	0.0	3/2$^+$			
622.0	(5/2$^+$)	324.6 *6*	100	297.48	(7/2)$^-$			
653.7	15/2$^-$	415.5 *3*	100[a]	238.2	11/2$^-$	E2		
661.55	(3/2)$^+$	160.82 *24*	27 *6*	501.15	(5/2)$^+$			
		315.18 *14*	49 *7*	346.38	3/2$^+$			
		487.29 *9*	52 *7*	174.26	1/2$^+$			
		525.50 *21*	13.8 *15*	136.079	5/2$^+$			
		658.7 *4*	69 *5*	2.81	5/2$^+$			
		661.5 *3*	100 *4*	0.0	3/2$^+$			
697.2	7/2$^+$,9/2$^+$	561.2 *3*	100	136.079	5/2$^+$			
735.2	(5/2$^+$)	330.8 *8*	57[a] *5*	404.15	(7/2)$^+$	D+Q	−0.6 *+2−3*	
		521.3 *3*	<22[a]	213.56	7/2$^+$			
		599.4 *5*	100[a] *29*	136.079	5/2$^+$			
		732.3 *5*	91[a] *7*	2.81	5/2$^+$			
736.89	1/2$^+$	182.5 *9*	12 *3*	554.58	(1/2$^+$)			
		304.4 *9*	9 *4*	432.06	1/2$^+$			
		330.4 *3*	20 *4*	406.08	3/2$^+$,5/2$^+$			
		562.9 *2*	81 *11*	174.26	1/2$^+$			
		600.6 *3*	24 *4*	136.079	5/2$^+$			
		736.9 *3*	100 *24*	0.0	3/2$^+$			
748.8	(5/2$^+$)	190.9 *3*	100	557.7	(9/2$^+$)	Q		
774.1	11/2$^+$	216.0 *3*	12.1[a] *13*	557.7	(9/2$^+$)			
		560.50 *30*	100[a]	213.56	7/2$^+$	(E2)		
774.77	(3/2$^+$,5/2$^+$)	368.70 *10*	37[b] *7*	406.08	3/2$^+$,5/2$^+$			
		370.60 *10*	27[b] *5*	404.15	(7/2)$^+$			

$^{103}_{44}Ru_{59}$-6

Adopted Levels, Gammas (continued)

γ(^{103}Ru) (continued)

E_i(level)	J_i^π	E_γ[@]	I_γ[@]	E_f	J_f^π	Mult.[†‡]	Comments
774.77	(3/2$^+$,5/2$^+$)	428.35 *15*	44[b] *12*	346.38	3/2$^+$		
		638.7 *3*	53[b] *7*	136.079	5/2$^+$		
		772.0 *3*	17[b] *10*	2.81	5/2$^+$		
		774.83 *17*	100[b] *7*	0.0	3/2$^+$		
873.71	(3/2$^+$,5/2$^+$)	305.4 *3*	<59[a]	568.17			
		576.23 *19*	100[a] *12*	297.48	(7/2)$^-$		
903.05	(≤5/2$^+$)	401.4 *3*	21[&] *12*	501.15	(5/2)$^+$		
		605.7 *3*	23[&] *9*	297.48	(7/2)$^-$		
		729.7 *4*	23[&] *7*	174.26	1/2$^+$		
		902.5 *6*	100[&] *28*	0.0	3/2$^+$		
905.36	3/2$^+$,5/2$^+$	692.5[d] *3*	18 *5*	213.56	7/2$^+$		E_γ: only observed in ^{102}Ru(n,γ) E=th.
		769.20 *18*	86[b] *6*	136.079	5/2$^+$		
		902.4 *3*	100[b] *9*	2.81	5/2$^+$		
		905.2 *3*	57[b] *9*	0.0	3/2$^+$		
907.64	(≤5/2$^+$)	694.3 *3*	24[&] *8*	213.56	7/2$^+$		
		733.3 *5*	55[&] *25*	174.26	1/2$^+$		
		771.5 *3*	100[&] *27*	136.079	5/2$^+$		
		907.4 *6*	100[&] *25*	0.0	3/2$^+$		
911.6	(7/2$^+$)	565.0 *8*		346.38	3/2$^+$		
		614.2 *8*	100[a]	297.48	(7/2)$^-$		
		775.0 *8*		136.079	5/2$^+$		
927.24	1/2$^+$	305.4 *6*	1.4[&] *7*	622.0	(5/2$^+$)		
		359.00 *20*	86[&] *4*	568.17			
		378.4 *6*	100[&] *7*	548.21	(1/2$^+$)	D+Q	Mult.: if J^π=1/2$^+$ Q excluded. δ<−5.8 or δ>0.42.
		630.0 *4*	24[&] *6*	297.48	(7/2)$^-$		
		753.0 *7*	5.0[&] *21*	174.26	1/2$^+$		
		791.3 *8*	11[&] *3*	136.079	5/2$^+$		
931.3	(3/2,5/2)	383.0 *3*	100	548.21	(1/2$^+$)		
940.50		727.1 *4*	12 *3*	213.56	7/2$^+$		
		804.4 *3*	36 *8*	136.079	5/2$^+$		
		937.71 *17*	100 *9*	2.81	5/2$^+$		
		940.4 *3*	16 *7*	0.0	3/2$^+$		
954.4	(3/2)	818.4 *8*	100	136.079	5/2$^+$		
988.8		487.8 *3*	100	501.15	(5/2)$^+$		

$^{103}_{44}Ru_{59}$-7

Adopted Levels, Gammas (continued)

γ(^{103}Ru) (continued)

E_i(level)	J_i^π	E_γ[@]	I_γ[@]	E_f	J_f^π	Mult.[†‡]	δ[#]	α[c]	Comments
988.8		775.0 *8*		213.56	$7/2^+$				
991.6		778.0 *5*	100	213.56	$7/2^+$				
1018.1	(5/2,7/2)	720.6 *8*	100[a]	297.48	$(7/2)^-$				
1020.4	$(11/2^-,13/2^-)$	366.7 *8*	100[a]	653.7	$15/2^-$	D+Q	−0.7 *9*	0.0112 *16*	δ: from (α,nγ) if J_i=13/2.
1065.14	$3/2^+,5/2^+,7/2^+$	661.13 *21*	100 *9*	404.15	$(7/2)^+$				
		852.02 *18*	57 *8*	213.56	$7/2^+$				
		929.42 *20*	32 *5*	136.079	$5/2^+$				
		1062.70 *20*	38 *6*	2.81	$5/2^+$				
		1065.60 *20*	34 *5*	0.0	$3/2^+$				
1079.6	$(7/2^+,9/2^+)$	675.3 *8*	100	404.15	$(7/2)^+$				
1106.7	$1/2^+$	932.4 *7*	100	174.26	$1/2^+$				
1110.1	$(3/2^+,5/2^+)$	678.1 *3*	20[&] *13*	432.06	$1/2^+$				
		704.4 *7*	33[&] *20*	406.08	$3/2^+,5/2^+$				
		1109.7 *7*	100[&] *33*	0.0	$3/2^+$				
1110.6	$(11/2^+)$	552.7 *3*	27 *3*	557.7	$(9/2^+)$				
		706.5 *3*	100 *8*	404.15	$(7/2)^+$	Q			
1133.7		729.3 *8*	100	404.15	$(7/2)^+$				
		920.2 *8*	100	213.56	$7/2^+$				
1140.6	(3/2,5/2)	736.3 *8*	100	404.15	$(7/2)^+$				
1171.3	(1/2,3/2)	623.0 *8*		548.21	$(1/2^+)$				
		873.8 *8*		297.48	$(7/2)^-$				
1174.08	(3/2)	625.8 *3*	100	548.21	$(1/2^+)$	D+Q	−0.13 *11*		
1199.9	$(13/2^+)$	426.0 *3*	<15	774.1	$11/2^+$	D+Q	−3.0 *+15−30*		δ: from ^{100}Mo(α,n) (1986Ka37).
		642.0 *8*	100 *7*	557.7	$(9/2^+)$	Q			
1269.8		865.5 *8*		404.15	$(7/2)^+$				
1288.2		720.0 *8*		568.17					
1301.5	$19/2^-$	647.8 *8*	100[a]	653.7	$15/2^-$	E2			
1313.6	$(11/2)^+$	539.7 *8*	100 *10*	774.1	$11/2^+$				
		755.7 *8*	38 *3*	557.7	$(9/2^+)$	D+Q	−0.8 *+4−3*		δ: from ^{100}Mo(α,n) (1986Ka37).
1324.2		978.00 *3*	100[&]	346.38	$3/2^+$				
1347.12		845.8 *3*	44[&] *9*	501.15	$(5/2)^+$				
		1050.3 *7*	100[&] *38*	297.48	$(7/2)^-$				
		1211.0 *4*	59[&] *28*	136.079	$5/2^+$				
1378.4		810.2 *8*		568.17					
1400.98		739.7 *4*	28[&] *11*	661.55	$(3/2)^+$				
		837.8 *3*	36[&] *15*	562.87	$(3/2^+,5/2^+)$				
		969.1 *4*	40[&] *15*	432.06	$1/2^+$				
		994.9 *3*	68[&] *17*	406.08	$3/2^+,5/2^+$				

$^{103}_{44}Ru_{59}$-8

Adopted Levels, Gammas (continued)

γ(^{103}Ru) (continued)

E_i(level)	J_i^π	E_γ[@]	I_γ[@]	E_f	J_f^π	Mult.[†‡]
1400.98		1104.6 *4*	64[&] *21*	297.48	$(7/2)^-$	
		1400.6 *3*	100[&] *38*	0.0	$3/2^+$	
1431.12		863.1 *3*	100[&] *24*	568.17		
		868.2 *4*	61[&] *16*	562.87	$(3/2^+,5/2^+)$	
		1295.4 *7*	21[&] *9*	136.079	$5/2^+$	
1443.7	$15/2^+$	669.6 *8*	100[a]	774.1	$11/2^+$	E2
1473.8		1069.5 *8*	100	404.15	$(7/2)^+$	
1604.47		1036.6 *5*	20[&] *7*	568.17		
		1172.1 *9*	27[&] *9*	432.06	$1/2^+$	
		1198.6 *5*	96[&] *25*	406.08	$3/2^+,5/2^+$	
		1430.0 *3*	64[&] *17*	174.26	$1/2^+$	
		1467.7 *9*	24[&] *9*	136.079	$5/2^+$	
		1604.4 *4*	100[&] *21*	0.0	$3/2^+$	
1717.0		1581.1 *12*	59[&] *24*	136.079	$5/2^+$	
		1716.5 *9*	100[&] *26*	0.0	$3/2^+$	
1730.4		1298.4 *7*	13[&] *5*	432.06	$1/2^+$	
		1730.3 *5*	100[&] *12*	0.0	$3/2^+$	
1835.88		909.2 *7*	10[&] *4*	927.24	$1/2^+$	
		1174.8 *9*	35[&] *13*	661.55	$(3/2)^+$	
		1243.2 *7*	46[&] *19*	591.97	$(5/2)^+$	
		1699.6 *5*	100[&] *19*	136.079	$5/2^+$	
1880.54		706.9 *5*	12[&] *4*	1174.08	(3/2)	
		1288.3 *7*	28[&] *8*	591.97	$(5/2)^+$	
		1332.2 *3*	100[&] *20*	548.21	$(1/2^+)$	
		1743.9 *9*	16[&] *4*	136.079	$5/2^+$	
		1880.1 *10*	21[&] *7*	0.0	$3/2^+$	
1906.06	$(3/2^-,1/2^-)$	731.7 *4*	20[&] *8*	1174.08	(3/2)	
		1246.2 *7*	100[&] *24*	661.55	$(3/2)^+$	
		1560.2 *9*	29[&] *12*	346.38	$3/2^+$	
		1732.0 *6*	79[&] *18*	174.26	$1/2^+$	
1961.94	$3/2^+,5/2^+$	561.2 *3*	23[&] *13*	1400.98		
		1034.4 *5*	63[&] *17*	927.24	$1/2^+$	
		1369.6 *3*	100[&] *20*	591.97	$(5/2)^+$	

$^{103}_{44}Ru_{59}$-9

Adopted Levels, Gammas (continued)

$\gamma(^{103}Ru)$ (continued)

E_i(level)	J_i^π	E_γ[@]	I_γ[@]	E_f	J_f^π	Mult.[†‡]	Comments
1961.94	$3/2^+,5/2^+$	1461.6 *9*	39[&] *13*	501.15	$(5/2)^+$		
		1614.5 *9*	21[&] *11*	346.38	$3/2^+$		
		1959.5 *7*	91[&] *36*	2.81	$5/2^+$		
2003.6		1076.4 *7*	100[&]	927.24	$1/2^+$		
2129.7	$23/2^-$	828.9 *4*	100	1301.5	$19/2^-$	E2	
2131.8	$19/2^+$	688.3 *8*	100	1443.7	$15/2^+$	E2	
2167	$7/2^+,9/2^+$	830	100	1338			
2206.04		805.2 *3*	73[&] *23*	1400.98			
		1031.6 *7*	58[&] *20*	1174.08	(3/2)		
		1277.4 *9*	33[&] *13*	927.24	$1/2^+$		
		1298.4 *7*	100[&] *50*	907.64	$(\leq 5/2^+)$		
		1544.3 *9*	58[&] *13*	661.55	$(3/2)^+$		
		1859.6 *5*	73[&] *25*	346.38	$3/2^+$		
		2031.8 *9*	68[&] *25*	174.26	$1/2^+$		
2223.6		2223.8 *4*	100[&]	0.0	$3/2^+$		
2576.20		1838.9 *5*	100[&] *26*	736.89	$1/2^+$		
		2027.8 *9*	68[&] *36*	548.21	$(1/2^+)$		
		2075.6 *9*	64[&] *34*	501.15	$(5/2)^+$		
		2577.1 *9*	84[&] *20*	0.0	$3/2^+$		
2679.6	$23/2^+$	547.9 *4*	100	2131.8	$19/2^+$	E2	
3078.7	$27/2^-$	947.1 *5*	100	2129.7	$23/2^-$	E2	
3275.6	$(27/2^+)$	595.8 *4*	100	2679.6	$23/2^+$	(E2)	
4058.6	$(31/2^+)$	782.5 *6*	100	3275.6	$(27/2^+)$	(E2)	
4083.0	$(31/2^-)$	1004.3 *4*	100	3078.7	$27/2^-$	(E2)	
5028	$(35/2^+)$	969.0 *6*	100	4058.6	$(31/2^+)$	(E2)	
5127	$(35/2^-)$	1044 *2*		4083.0	$(31/2^-)$		Only observed by 2005Re11.

† From $\gamma(\theta)$ in ^{100}Mo(α,nγ) and $\gamma\gamma(\theta)$ in ^{102}Ru(n,γ) and RUL.
‡ Stretched intraband quadrupole transitions assumed to be E2 in (HI,xnγ).
# From ^{100}Mo(α,nγ) or ^{102}Ru(n,γ) E=thermal.
@ Unless noted otherwise, calculated with least-squares procedure, using data from ^{102}Ru(n,γ), ^{103}Tc β^- decay and ^{100}Mo(α,nγ) if all available.
& Adopted from (n,γ).
[a] Adopted from ^{100}Mo(α,nγ).
[b] Adopted from ^{103}Tc β^- decay.
[c] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned

$^{103}_{44}Ru_{59}$-10

Adopted Levels, Gammas (continued)

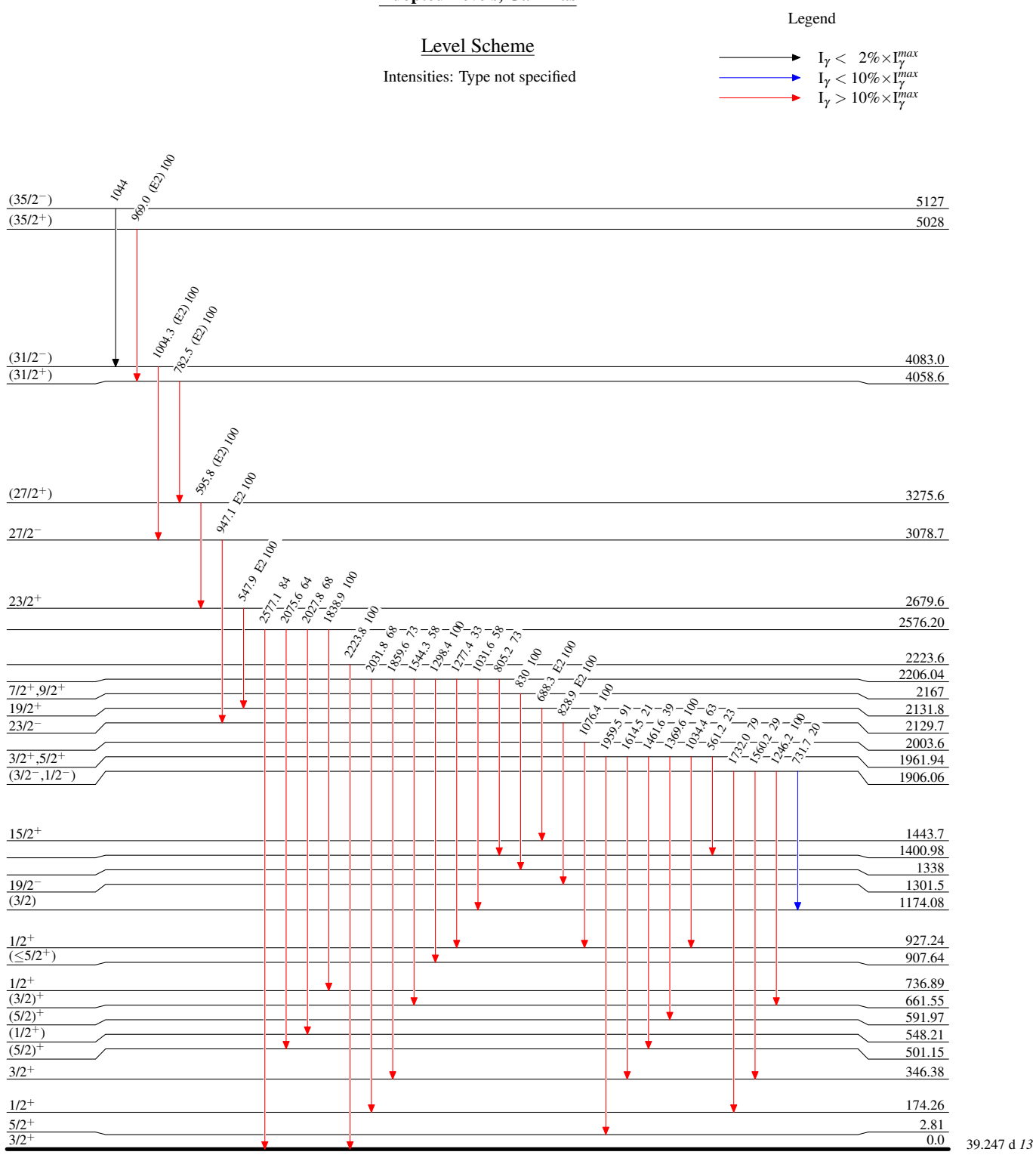
$\gamma(^{103}Ru)$ (continued)

multipolarities, and mixing ratios, unless otherwise specified.
[d] Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Type not specified

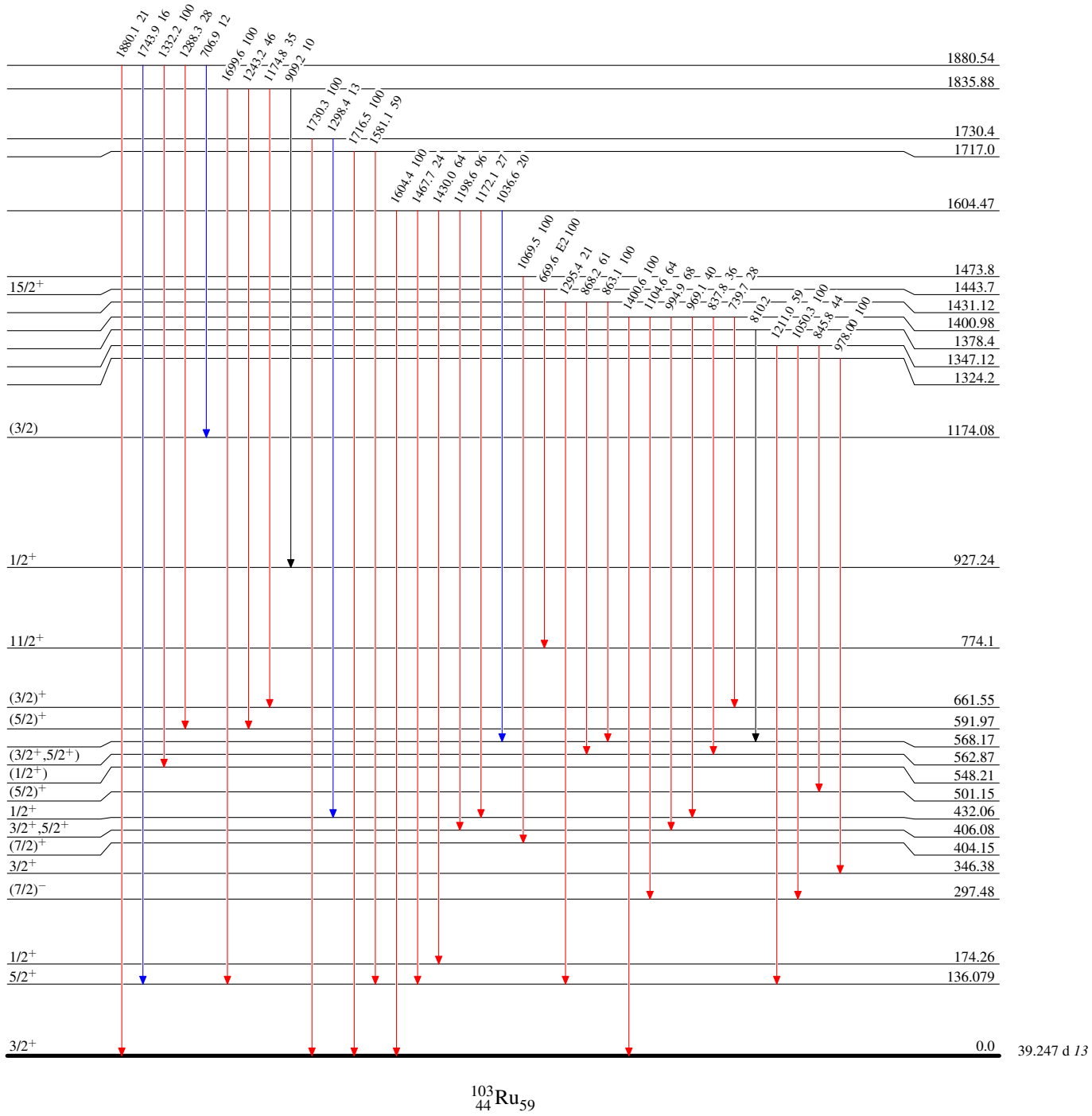


$^{103}_{44}Ru_{59}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified

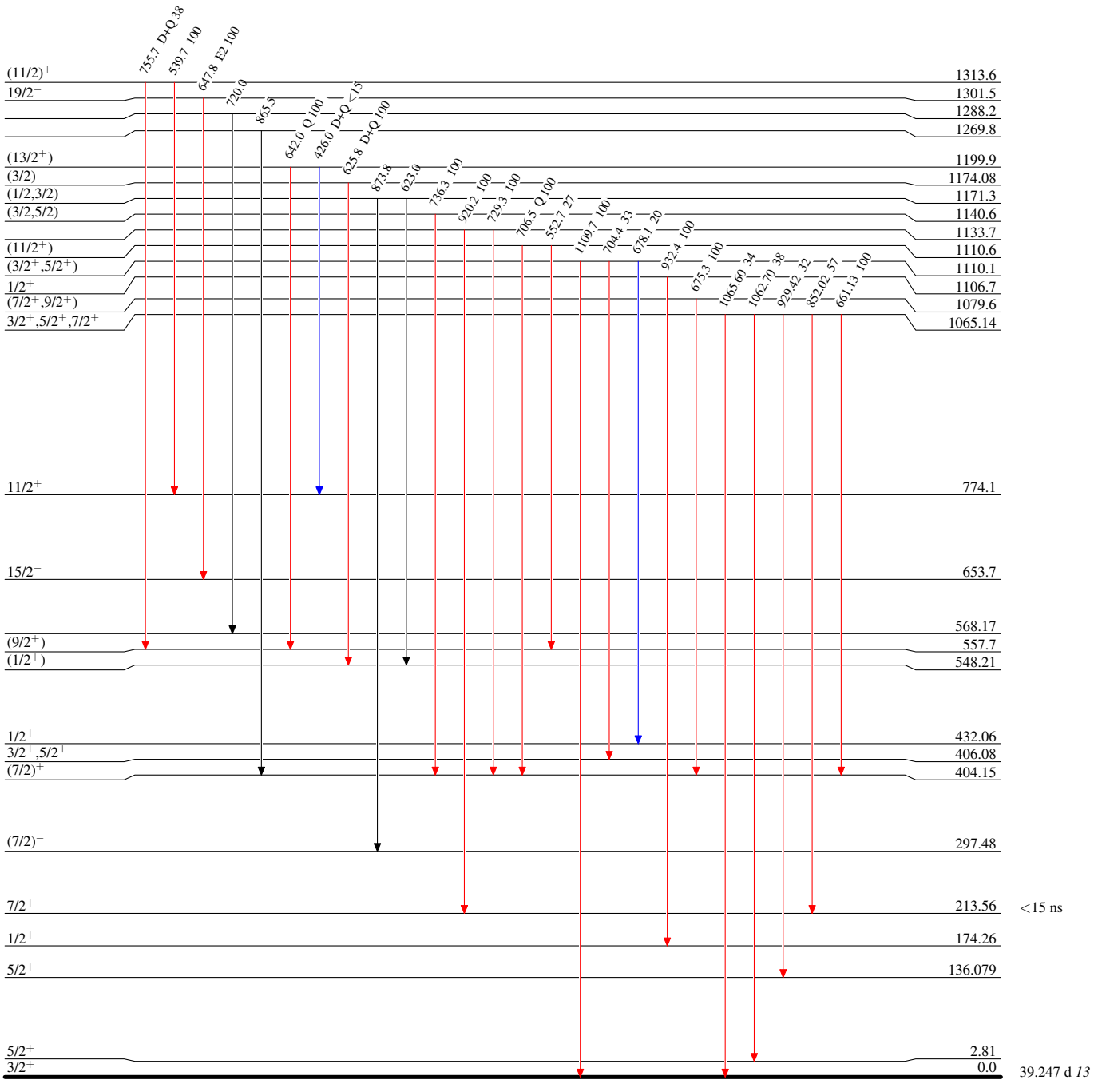


$^{103}_{44}Ru_{59}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified

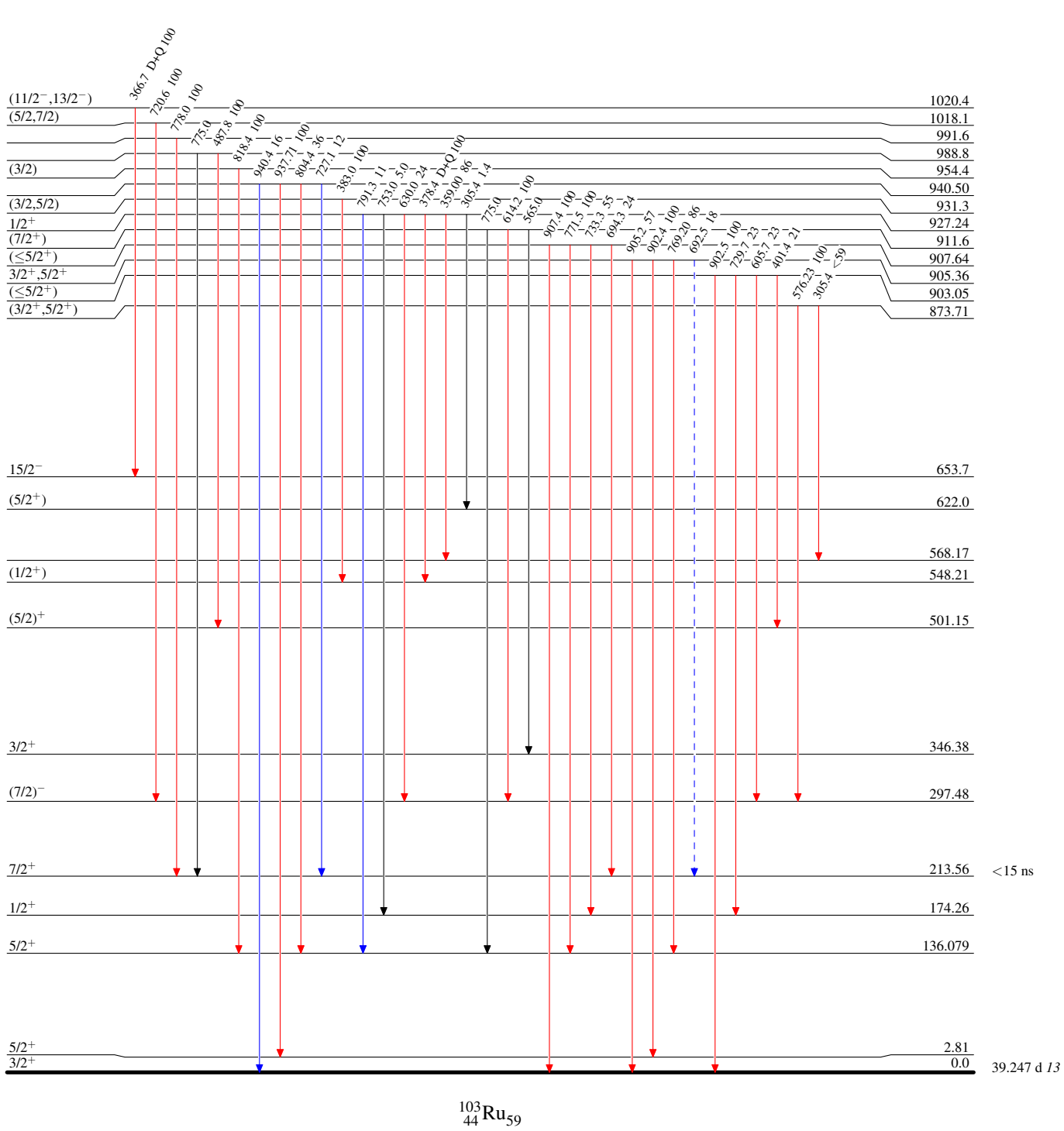


$^{103}_{44}Ru_{59}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified

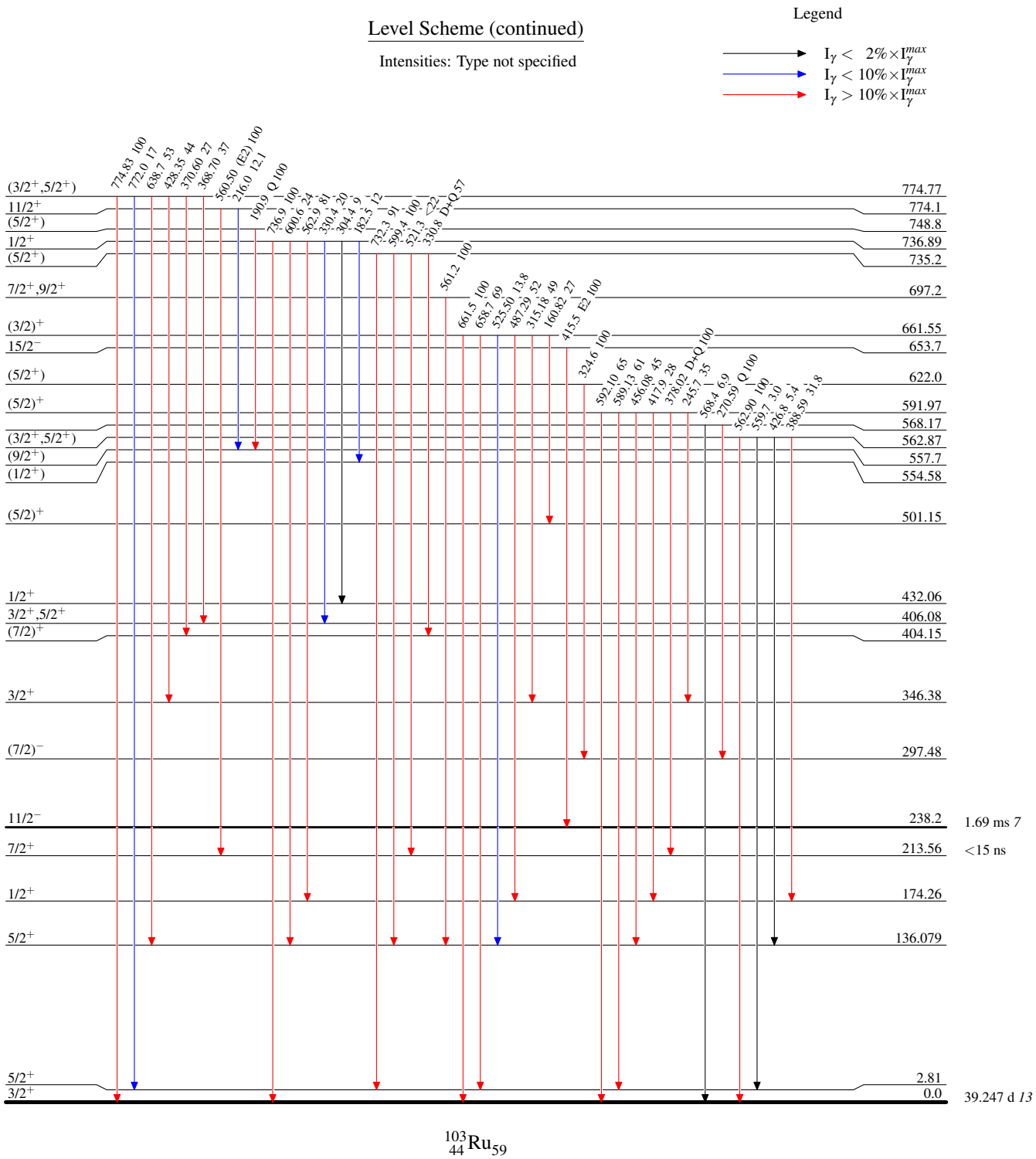


$^{103}_{44}Ru_{59}$

Adopted Levels, Gammas

Level Scheme (continued)

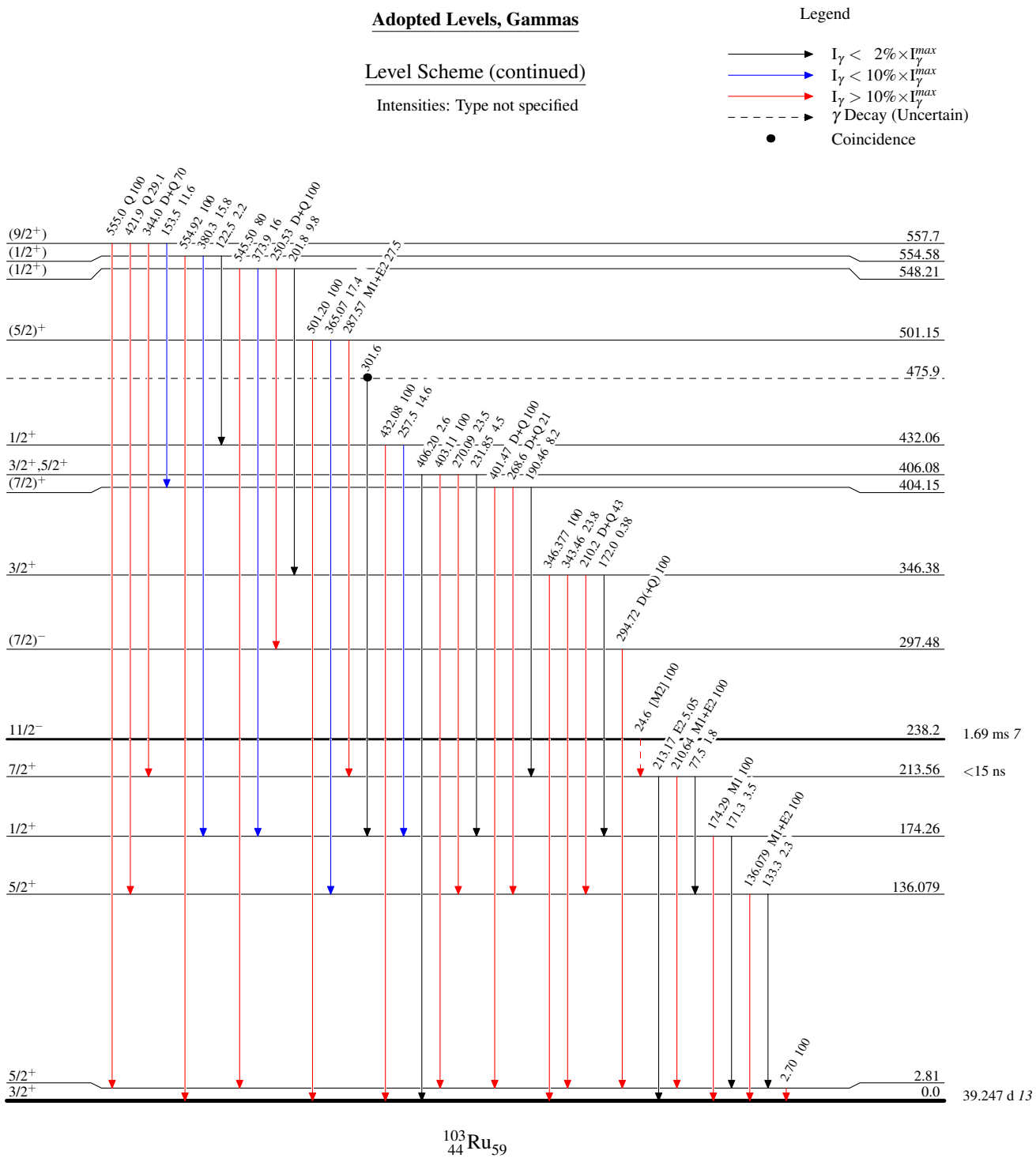
Intensities: Type not specified



Adopted Levels, Gammas

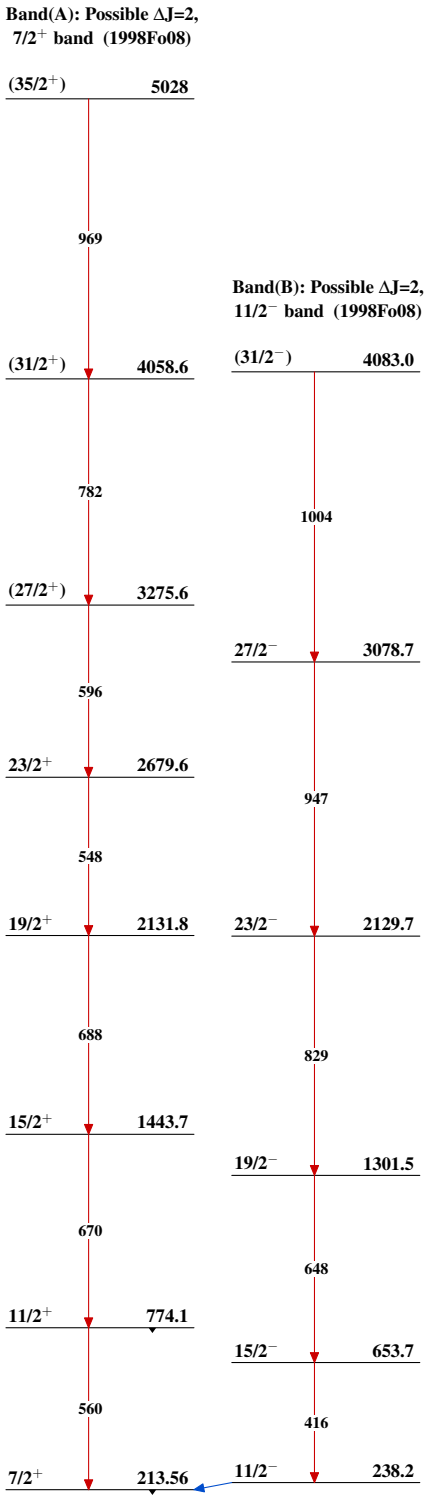
Level Scheme (continued)

Intensities: Type not specified



$^{103}_{44}Ru_{59}$

Adopted Levels, Gammas



$^{103}_{44}Ru_{59}$