(HI,xnγ) 1994Ro08,1999Ju03

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	D. Abriola(a), A. A. Sonzogni	NDS 107, 2423 (2006)	1-Jan-2006

1994Ro08: ^{58}Ni(^{40}Ca,4pγ), E=180 MeV. Measured Eγ, Iγ, γγ and γ(θ) using 15 BGO-shielded HPGe detectors situated in three rings of the NORDBALL frame.
1999Ju03: ^{58}Ni(^{40}Ca,4pγ), E=145 MeV. Measured Eγ, γγ and lifetimes using an array of six EUROBALL cluster detectors. Lifetimes were measured using recoil-distance Doppler-shift method.
1999Ju04: ^{58}Ni(^{40}Ca,4pγ), E=145 MeV. Measured magnetic moments of the 12^+ and 11^- yrast states via the IMPAD technique.
1980No06: ^{58}Ni(^{40}Ca,4pγ), E=135 MeV, 160 MeV. Measured Eγ, Iγ, γγ, $T_{1/2}$ with recoil-distance Doppler-shift method. Other: 1983Pi05, using ^{60}Ni(^{40}Ca,α2pγ).
1971Le19, 1977Ha49: ^{92}Mo(α,2nγ) E=25,30 MeV. Measured Eγ, γ(θ), $T_{1/2}$.
1977Ha49: ^{63}Cu(^{35}Cl,2p2nγ) E=120 MeV. Measured Eγ, γγ(θ),$T_{1/2}$.
Level scheme from 1994Ro08.

^{94}Ru Levels

E(level)[#]	J^{π}[†]	$T_{1/2}$	Comments
0.0[@]	0^+	51.8 min *6*	$T_{1/2}$: from Adopted Levels.
1430.71[@] *20*	2^+		
2186.6[@] *3*	4^+		
2498.0[@] *3*	6^+	65 ns *2*	$T_{1/2}$: from 1977Ha49, other: 74 ns *7* (1971Le19).
2624.4[&] *3*	5^-	0.51[‡] ns *5*	$T_{1/2}$: other: 0.53 ns *+50−20* (1980No06).
2644.1[@] *4*	8^+	71 μs *4*	$T_{1/2}$: from 1971Le19, other: 68 μs *10* (1977Ha49).
3657.6[&] *4*	(7^-)		
3930.1 *4*	(8^+)		
3991.2[@] *4*	$(10)^+$	<3.47[‡] ps	
4197.3[&] *4*	$(9)^-$		
4338.5 *4*	$(9)^-$		
4489.1[&] *4*	$(11)^-$	0.760[‡] ns *35*	$T_{1/2}$: other: 0.78 ns *12* (1980No06).
4716.6[@] *4*	$(12)^+$	23.8[‡] ps *11*	$T_{1/2}$: other: 35 ps *3* (1980No06).
5567.8[&] *4*	$(13)^-$	2.01[‡] ps *22*	$T_{1/2}$: other: 6 ps (1980No06).
6275.1 *4*	(12^+)		
6357.6 *4*	(12^+)		
6614.4[@] *4*	$(13)^+$	0.87[‡] ps *12*	$T_{1/2}$: other: 5 ps (1980No06).
6918.9 *4*	(13^-)		
7157.6[@] *4*	$(14)^+$	0.33[‡] ps *4*	
7768.3 *4*	$(13)^-$		
7773.1[@] *4*	$(15)^+$	<0.28[‡] ps	
7909.9 *4*	$(15)^+$		
7970.0 *4*	$(14)^-$		
8039.4 *4*	(14^+)		
8133.2 *4*	$(15)^-$		
8152.3 *4*	$(14)^-$		
8271.8[&] *4*	$(14)^-$	0.291[‡] ps *28*	
8411.2[@] *4*	$(16)^+$	<0.69[‡] ps	
8501.5[&] *4*	$(15)^-$	1.28[‡] ps *8*	
8736.7 *4*	$(15)^-$		
8853.4 *4*	(15^-)		
8996.7[&] *4*	$(16)^-$	<0.69[‡] ps	

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(HI,xnγ) 1994Ro08,1999Ju03 (continued)

^{94}Ru Levels (continued)

E(level)[#]	Jπ[†]	$T_{1/2}$	E(level)[#]	Jπ[†]
9041.7[@] *4*	$(17)^+$	<1.4[‡] ps	12922.8 *4*	(20^-)
9134.9 *4*	$(16)^-$		12940.0 *5*	(20^+)
9254.2 *4*	(17^-)		13053.4 *5*	(22^-)
9464.0 *4*	(16^-)		13077.7 *5*	(21^-)
9526.6[@] *4*	$(18)^+$	0.360[‡] ps *21*	13247.0 *5*	$(20^+,21^+)$
9789.2 *4*	(17^-)		13623.8 *5*	(21^+)
9921.0[@] *4*	$(19)^+$	<3.4[‡] ps	13896.9 *4*	(21^-)
9928.6[&] *4*	$(18)^-$	3.49[‡] ps *24*	13917.0 *5*	$(23^-,24^-)$
10129.4 *4*	(17^-)		13938.8 *4*	$(21^-,22^-)$
10444.3 *4*	$(19)^-$		14226.7 *5*	(21^-)
10544.8 *4*	(18^-)		14293.5 *5*	(23^-)
11041.8[&] *4*	$(20)^-$	<1.8[‡] ps	14674.8 *5*	$(21^-,22^-)$
11451.7 *5*	(19^+)		14805.7 *4*	$(21^-,22^-)$
12077.2 *5*	$(20^+,21^+)$		15289.4 *4*	$(22^-,23^-)$
12429.6 *5*	$(20^+,21^+)$		16767.4 *5*	$(24^-,25^-)$
12484.1 *4*	$(20^-,21^-)$		18321.4 *5*	$(25^-,26^-,27^-)$

[†] From γ multipolarity and band patterns (1994Ro08).
[‡] From 1999Ju03.
[#] From least-squares fit to Eγ′s, assuming Δ(Eγ)=0.2 keV for each γ, based on general comment in 1994Ro08.
[@] Band(A): Cascade based on 0^+.
[&] Band(B): Cascade based on 5^-.

γ(^{94}Ru)

Asymmetry Ratio R=2I(143°)/[I(79°)+I(101°)] from 1994Ro08.

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
119.7[@] *2*	1.1[@] *1*	9254.2	(17^-)	9134.9	$(16)^-$		R=0.76 *11*. Iγ and R for 119.7+120.1.
120.1[@] *2*	1.3[@] *1*	8271.8	$(14)^-$	8152.3	$(14)^-$		
126.5 *2*	5.2 *2*	2624.4	5^-	2498.0	6^+	E1	R=0.81 *6*.
137.0 *2*	0.7 *1*	7909.9	$(15)^+$	7773.1	$(15)^+$		
139.6 *2*	16.8 *2*	9928.6	$(18)^-$	9789.2	(17^-)	M1	R=0.82 *2*.
146.1 *2*	0.2 *1*	2644.1	8^+	2498.0	6^+	E2[#]	Mult.: from γ(θ) and B(E2) = 0.00353 *20*, closer to unity than any other multipolarity.
150.7 *2*	0.7 *1*	4489.1	$(11)^-$	4338.5	$(9)^-$	E2	R=1.18 *26*.
227.4 *2*	0.8 *1*	4716.6	$(12)^+$	4489.1	$(11)^-$		
229.8 *2*	15.3 *3*	8501.5	$(15)^-$	8271.8	$(14)^-$	M1	R=0.87 *3*.
256.7[@] *2*	24.5[@] *2*	6614.4	$(13)^+$	6357.6	(12^+)		Iγ and R for 256.7+257.3.
257.3[@] *2*	24.5[@] *2*	9254.2	(17^-)	8996.7	$(16)^-$		Iγ and R for 256.7+257.3.
259.7 *2*	4.1 *2*	8996.7	$(16)^-$	8736.7	$(15)^-$	M1	R=0.89 *5*.
267.2 *2*	2.4 *1*	4197.3	$(9)^-$	3930.1	(8^+)		R=1.08 *8*.
281.6 *2*	3.0 *1*	9134.9	$(16)^-$	8853.4	(15^-)		R=0.78 *5*.
291.7 *2*	19.8 *2*	4489.1	$(11)^-$	4197.3	$(9)^-$	E2	R=1.34 *3*.
301.7 *2*	0.8 *2*	8271.8	$(14)^-$	7970.0	$(14)^-$	M1	
311.4 *2*	6.6 *2*	2498.0	6^+	2186.6	4^+	E2[#]	R=1.25 *6*. Mult.: from γ(θ) and B(E2) = 0.117 *4*.

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(HI,xnγ) 1994Ro08,1999Ju03 (continued)

γ(^{94}Ru) (continued)

E_γ [†]	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
325.2 *2*	3.3 *2*	9789.2	(17^-)	9464.0	(16^-)		R=0.90 *6*.
349.0 *2*	6.0 *3*	8501.5	$(15)^-$	8152.3	$(14)^-$	M1	R=0.60 *5*.
368.3 *2*	4.3 *2*	8501.5	$(15)^-$	8133.2	$(15)^-$	M1	R=1.60 *9*.
383.9 *2*	2.7 *3*	8152.3	$(14)^-$	7768.3	$(13)^-$		
394.3 *2*	9.2 *3*	9921.0	$(19)^+$	9526.6	$(18)^+$	M1	R=0.76 *4*.
398.1 *2*	4.1 *2*	9134.9	$(16)^-$	8736.7	$(15)^-$		R=0.85 *6*.
401.9 *2*	1.7 *2*	9928.6	$(18)^-$	9526.6	$(18)^+$		R=0.86 *13*.
415.4 *2*	2.5 *2*	10544.8	(18^-)	10129.4	(17^-)		R=0.77 *9*.
437.7 *2*	11.3 *3*	2624.4	5^-	2186.6	4^+	E1	R=1.09 *4*.
461.9 *2*	3.7 *3*	8501.5	$(15)^-$	8039.4	(14^+)		R=0.68 *8*.
464.8 *2*	3.1 *2*	8736.7	$(15)^-$	8271.8	$(14)^-$		R=0.68 *9*.
483.8 *2*		15289.4	$(22^-,23^-)$	14805.7	$(21^-,22^-)$		
484.7 *2*	≤14.3	9526.6	$(18)^+$	9041.7	$(17)^+$	M1	R=0.76 *3*. Iγ and R for 483.8+484.7.
495.0 *2*	39.6 *5*	8996.7	$(16)^-$	8501.5	$(15)^-$	M1	R=0.76 *2*.
498.0 *2*	42.3 *4*	4489.1	$(11)^-$	3991.2	$(10)^+$	E1	R=0.98 *2*.
501.0 *2*	≤7.1	8411.2	$(16)^+$	7909.9	$(15)^+$	(M1)	R=0.72 *4*.
503.3 *2*		8271.8	$(14)^-$	7768.3	$(13)^-$		
[x]510.8 *2*	3.1 *2*						
515.6 *2*	10.3 *3*	10444.3	$(19)^-$	9928.6	$(18)^-$		R=0.81 *5*.
531.6 *2*	4.7 *2*	8501.5	$(15)^-$	7970.0	$(14)^-$	M1	R=0.90 *7*.
539.6 *2*	17.9 *3*	4197.3	$(9)^-$	3657.6	(7^-)		R=1.25 *3*.
543.0 *2*	36.2 *4*	7157.6	$(14)^+$	6614.4	$(13)^+$	M1	R=0.81 *2*.
581.8 *2*	2.7 *3*	8853.4	(15^-)	8271.8	$(14)^-$		R=0.77 *16*.
584.2 *2*	5.8 *3*	8736.7	$(15)^-$	8152.3	$(14)^-$		R=0.79 *7*.
597.5 *2*	7.4 *3*	11041.8	$(20)^-$	10444.3	$(19)^-$	M1	R=1.42 *8*.
603.7 *2*	1.3 *3*	8736.7	$(15)^-$	8133.2	$(15)^-$		
610.6 *2*	4.9 *3*	9464.0	(16^-)	8853.4	(15^-)		R=0.57 *7*.
615.3 *2*	≤22.3	7773.1	$(15)^+$	7157.6	$(14)^+$	(M1)	R=0.67 *2*. Iγ and R for 615.3+615.7.
615.7 *2*		10544.8	(18^-)	9928.6	$(18)^-$		
630.2 *2*	21.2 *3*	9041.7	$(17)^+$	8411.2	$(16)^+$	M1	R=0.72 *2*.
638.0 *2*	16.5 *3*	8411.2	$(16)^+$	7773.1	$(15)^+$	M1	R=0.72 *2*.
654.1 *2*	3.6 *2*	9789.2	(17^-)	9134.9	$(16)^-$		R=0.68 *6*.
674.4 *2*	10.4 *3*	9928.6	$(18)^-$	9254.2	(17^-)	M1	R=1.76 *5*.
680.9 *2*	1.6 *2*	4338.5	$(9)^-$	3657.6	(7^-)		R=1.14 *19*.
683.8 *2*		13623.8	(21^+)	12940.0	(20^+)		
701.1 *2*	3.9 *3*	8853.4	(15^-)	8152.3	$(14)^-$		R=0.94 *10*.
[x]707.7 *2*	1.8 *2*						
725.0 *2*		8996.7	$(16)^-$	8271.8	$(14)^-$		
725.3 *2*	≤51.8	4716.6	$(12)^+$	3991.2	$(10)^+$	E2	R=1.62 *3*. Iγ and R for 725.0+725.3.
733.3 *2*	4.3 *2*	8501.5	$(15)^-$	7768.3	$(13)^-$	E2	R=1.56 *11*.
752.1 *2*	8.2 *2*	7909.9	$(15)^+$	7157.6	$(14)^+$		R=0.73 *4*.
755.9 *2*	19.8 *3*	2186.6	4^+	1430.71	2^+	(E2)[#]	R=1.24 *3*.
792.4 *2*	17.9 *3*	9789.2	(17^-)	8996.7	$(16)^-$		R=0.81 *3*. Iγ and R for 792.4+793.4.
793.4 *2*	17.9 *3*	9928.6	$(18)^-$	9134.9	$(16)^-$	E2	DCO=0.81 *3*. Iγ and R for 792.4+793.4.
863.6 *2*	1.7 *3*	13917.0	$(23^-,24^-)$	13053.4	(22^-)		R=0.86 *24*.
867.0 *2*	1.1 *3*	14805.7	$(21^-,22^-)$	13938.8	$(21^-,22^-)$		R=1.37 *48*.
879.3 *2*	2.9 *3*	9921.0	$(19)^+$	9041.7	$(17)^+$	E2	R=2.07 *29*.
886.8 *2*	3.1 *3*	9928.6	$(18)^-$	9041.7	$(17)^+$		R=0.87 *10*.
931.9 *2*	13.5 *3*	9928.6	$(18)^-$	8996.7	$(16)^-$	E2	R=1.48 *6*.
963.4 *2*	1.3 *3*	8736.7	$(15)^-$	7773.1	$(15)^+$		R=0.82 *33*.

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(HI,xnγ) 1994Ro08,1999Ju03 (continued)

γ(^{94}Ru) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult. ‡	Comments
1033.3 *2*	18.6 *3*	3657.6	(7^-)	2624.4	5^-	(E2)#	R=1.28 *4*.
1078.8 *2*	59.0 *5*	5567.8	$(13)^-$	4489.1	$(11)^-$	E2	R=1.61 *3*.
1113.4 *2*	≤33.8	11041.8	$(20)^-$	9928.6	$(18)^-$	E2	R=1.54 *4*. Iγ and R for 1113.4+1115.6.
1115.6 *2*		9526.6	$(18)^+$	8411.2	$(16)^+$		
1158.8 *2*	5.3 *3*	7773.1	$(15)^+$	6614.4	$(13)^+$	E2	R=1.69 *14*.
x1168.8 *2*	1.5 *2*						
1190.4 *2*	9.8 *3*	10444.3	$(19)^-$	9254.2	(17^-)		R=1.49 *7*.
1215.8 *2*	1.7 *3*	14293.5	(23^-)	13077.7	(21^-)		
1225.1 *2*	1.1 *2*	9134.9	$(16)^-$	7909.9	$(15)^+$		R=0.82 *21*.
1240.1 *2*	1.2 *2*	14293.5	(23^-)	13053.4	(22^-)		R=0.73 *18*.
1253.8 *2*	2.8 *2*	8411.2	$(16)^+$	7157.6	$(14)^+$	E2	R=1.88 *23*.
1268.5 *2*	2.5 *2*	9041.7	$(17)^+$	7773.1	$(15)^+$	E2	R=1.92 *27*.
1288.0 *2*	1.5 *2*	9789.2	(17^-)	8501.5	$(15)^-$		R=0.68 *11*.
1295.5 *2*	5.1 *3*	7909.9	$(15)^+$	6614.4	$(13)^+$		R=1.30 *13*.
1344.0 *2*	10.2 *3*	8501.5	$(15)^-$	7157.6	$(14)^+$		R=1.01 *5*.
1347.1 *2*	100.0 *6*	3991.2	$(10)^+$	2644.1	8^+	E2	R=1.46 *2*.
1392.6 *2*	3.1 *4*	15289.4	$(22^-,23^-)$	13896.9	(21^-)		R=1.06 *21*.
1412.9 *2*	0.9 *4*	13896.9	(21^-)	12484.1	$(20^-,21^-)$		
1430.7 *2*	24.1 *5*	1430.71	2^+	0.0	0^+	(E2)#	R=1.20 *5*.
1432.1 *2*	0.6 *3*	3930.1	(8^+)	2498.0	6^+		
1477.9 *2*	4.0 *2*	16767.4	$(24^-,25^-)$	15289.4	$(22^-,23^-)$		R=1.29 *9*.
1553.2@ *2*	3.0@ *2*	4197.3	$(9)^-$	2644.1	8^+		R=1.07 *10*. Iγ and R for 1553.2+1554.0.
1554.0@ *2*	3.0@ *2*	18321.4	$(25^-,26^-,27^-)$	16767.4	$(24^-,25^-)$		R=1.07 *10*. Iγ and R for 1553.2+1554.0.
1582.8 *2*	0.9 *3*	8501.5	$(15)^-$	6918.9	(13^-)		
1641.0 *2*	1.1 *2*	6357.6	(12^+)	4716.6	$(12)^+$		R=1.37 *38*.
1691.0 *2*	0.4 *2*	9464.0	(16^-)	7773.1	$(15)^+$		
1718.3 *2*	0.6 *3*	10129.4	(17^-)	8411.2	$(16)^+$		
1764.3 *2*	1.2 *2*	8039.4	(14^+)	6275.1	(12^+)		R=1.80 *56*.
1795.3 *2*	0.6 *2*	13247.0	$(20^+,21^+)$	11451.7	(19^+)		
1868.5 *2*	3.3 *3*	6357.6	(12^+)	4489.1	$(11)^-$		R=0.76 *10*.
1881.3 *2*	2.2 *2*	12922.8	(20^-)	11041.8	$(20)^-$		R=1.18 *19*.
1897.9 *2*	48.3 *6*	6614.4	$(13)^+$	4716.6	$(12)^+$	M1	R=1.00 *2*.
x1907.1 *2*	1.1 *2*						
2011.6 *2*	5.2 *3*	13053.4	(22^-)	11041.8	$(20)^-$		R=1.40 *13*.
2035.8 *2*	1.9 *2*	13077.7	(21^-)	11041.8	$(20)^-$		R=0.73 *14*.
2039.9 *2*	2.8 *2*	12484.1	$(20^-,21^-)$	10444.3	$(19)^-$		R=1.16 *36*.
2156.2 *2*	0.6 *3*	12077.2	$(20^+,21^+)$	9921.0	$(19)^+$		
2200.4 *2*	13.0 *3*	7768.3	$(13)^-$	5567.8	$(13)^-$		R=1.67 *8*.
2283.8 *2*	3.1 *3*	6275.1	(12^+)	3991.2	$(10)^+$		R=1.03 *14*.
2377.6 *2*	1.9 *2*	12922.8	(20^-)	10544.8	(18^-)		R=1.19 *21*.
2402.0 *2*	5.5 *3*	7970.0	$(14)^-$	5567.8	$(13)^-$		R=0.40 *4*.
2410.0 *2*	1.0 *2*	11451.7	(19^+)	9041.7	$(17)^+$		R=1.27 *36*.
2430.0 *2*	1.0 *2*	6918.9	(13^-)	4489.1	$(11)^-$		
2440.8 *2*	1.0 *2*	7157.6	$(14)^+$	4716.6	$(12)^+$	E2	
2508.6 *2*	0.9 *3*	12429.6	$(20^+,21^+)$	9921.0	$(19)^+$		
2565.4 *2*	6.5 *3*	8133.2	$(15)^-$	5567.8	$(13)^-$		R=1.71 *12*.
2584.5 *2*	12.3 *3*	8152.3	$(14)^-$	5567.8	$(13)^-$		R=0.86 *4*.
2704.1 *2*	15.3 *3*	8271.8	$(14)^-$	5567.8	$(13)^-$	M1	R=0.93 *4*.
2805.2 *2*	0.7 *2*	15289.4	$(22^-,23^-)$	12484.1	$(20^-,21^-)$		
2854.7 *2*	0.6 *2*	13896.9	(21^-)	11041.8	$(20)^-$		
2897.1 *2*	0.7 *2*	13938.8	$(21^-,22^-)$	11041.8	$(20)^-$		
3019.0 *2*	0.7 *2*	12940.0	(20^+)	9921.0	$(19)^+$		R=0.58 *24*.

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(HI,xnγ) 1994Ro08,1999Ju03 (continued)

$\gamma(^{94}Ru)$ (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Comments
3184.8 *2*	0.5 *2*	14226.7	(21^-)	11041.8	$(20)^-$	R=0.60 *21*.
3322.7 *2*	0.6 *1*	8039.4	(14^+)	4716.6	$(12)^+$	R=1.85 *48*.
3452.6 *2*	0.7 *2*	13896.9	(21^-)	10444.3	$(19)^-$	R=1.24 *57*.
3632.9 *2*	0.4 *1*	14674.8	$(21^-,22^-)$	11041.8	$(20)^-$	R=0.71 *30*.
3702.8 *2*	0.4 *1*	13623.8	(21^+)	9921.0	$(19)^+$	R=1.46 *52*.
3763.7 *2*	0.3 *1*	14805.7	$(21^-,22^-)$	11041.8	$(20)^-$	

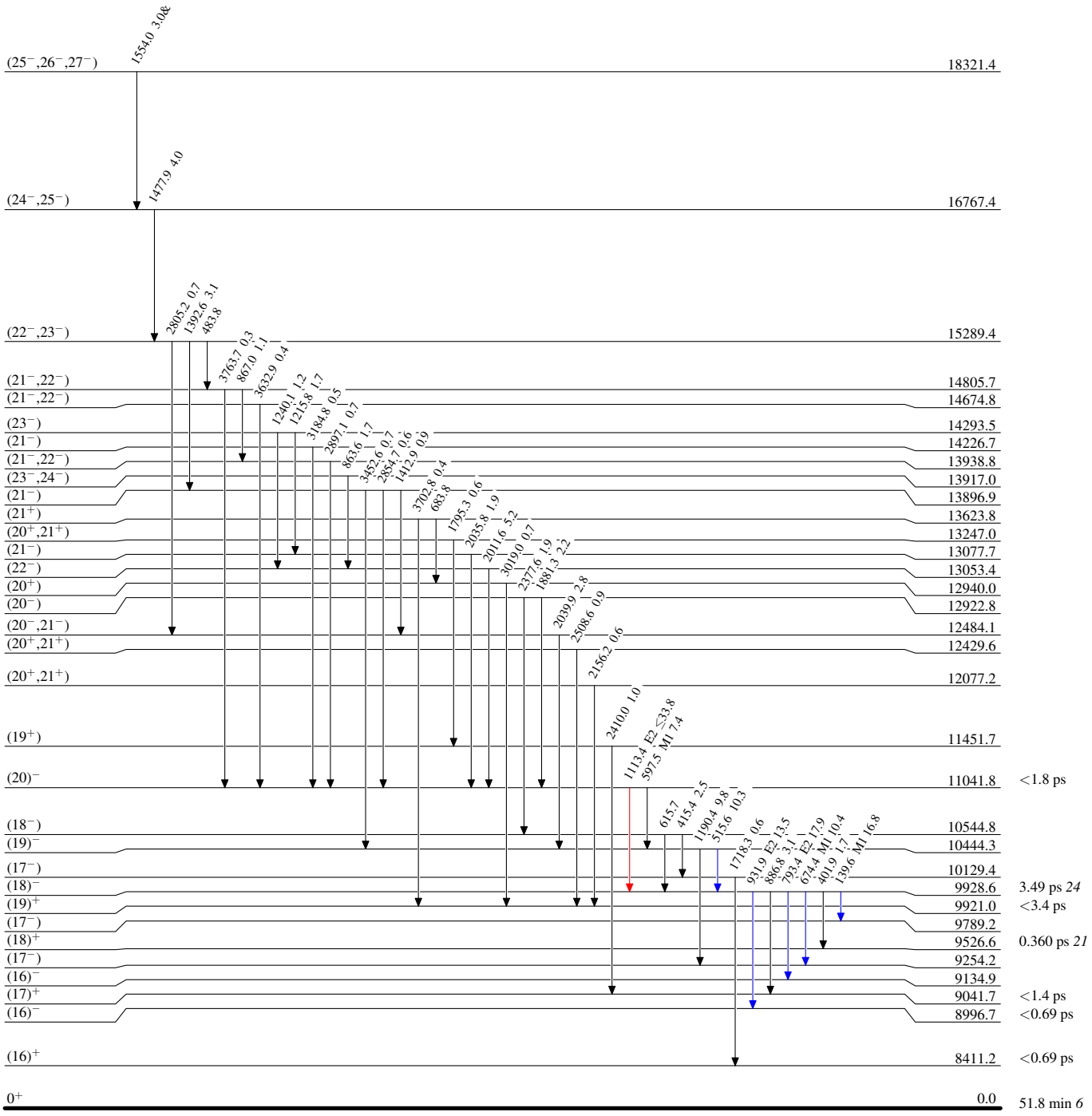
† From 1994Ro08.
‡ From Asymmetry Ratio R (1994Ro08). R=0.5-1.1 for d and 1.1-2.5 for Q. Additionally γ decay pattern was used. E1 only for inter-band transitions.
# From $\gamma(\theta)$ (1971Le19).
@ Multiply placed with undivided intensity.
x γ ray not placed in level scheme.

(HI,xnγ) 1994Ro08,1999Ju03

Level Scheme

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

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



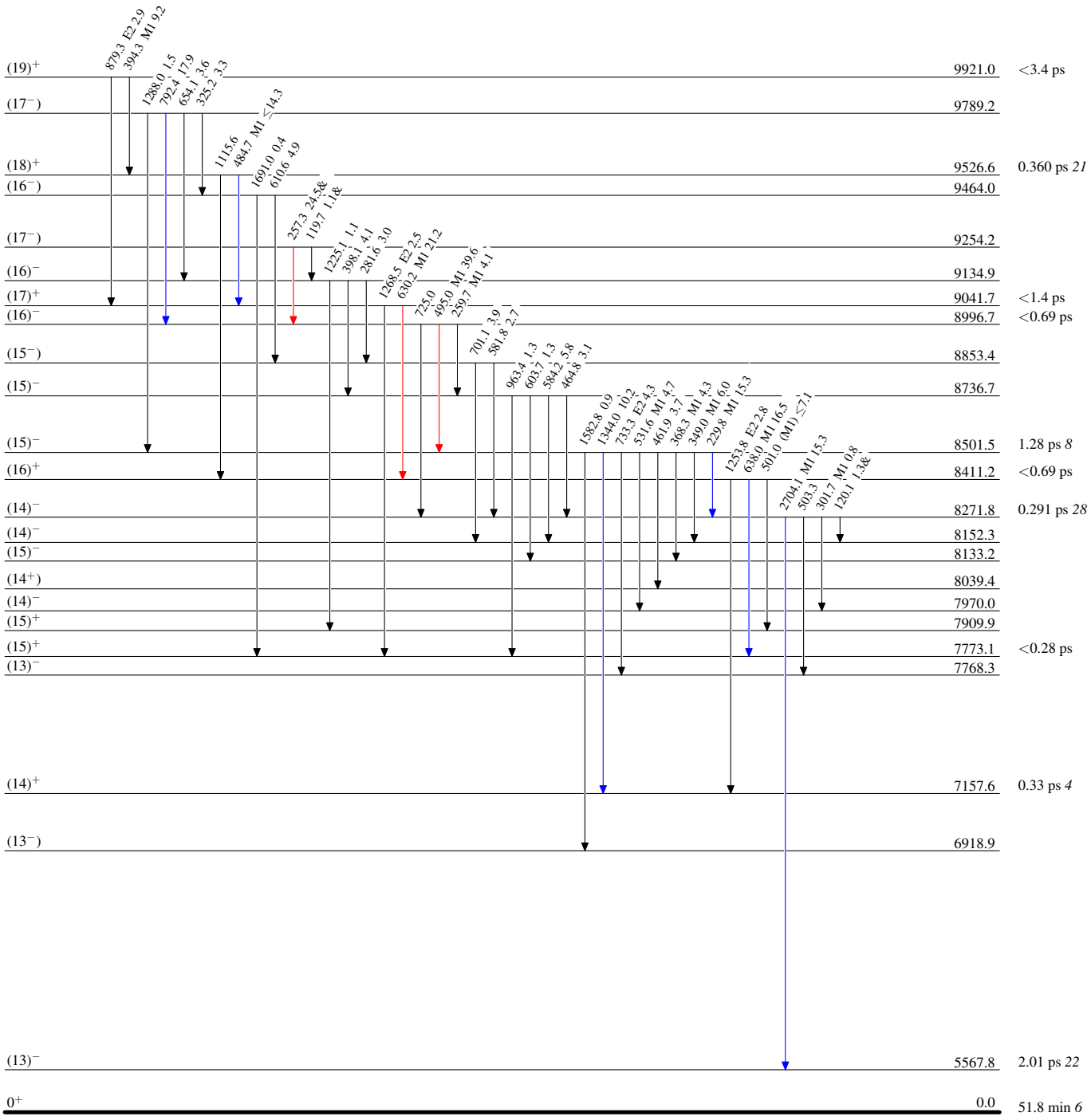
$^{94}_{44}Ru_{50}$

(HI,xnγ) 1994Ro08,1999Ju03

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

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



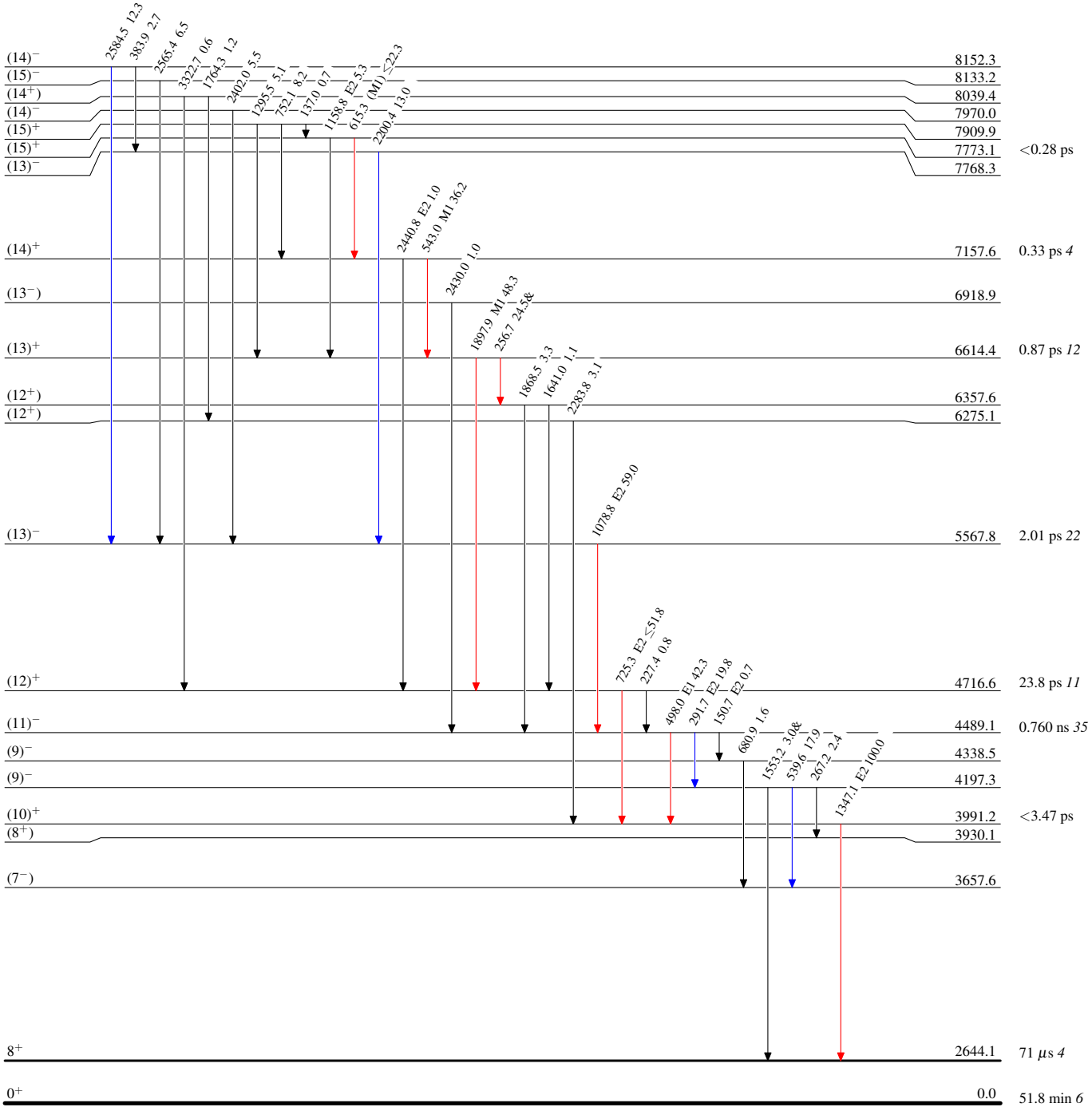
$^{94}_{44}Ru_{50}$

(HI,xnγ) 1994Ro08,1999Ju03

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

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

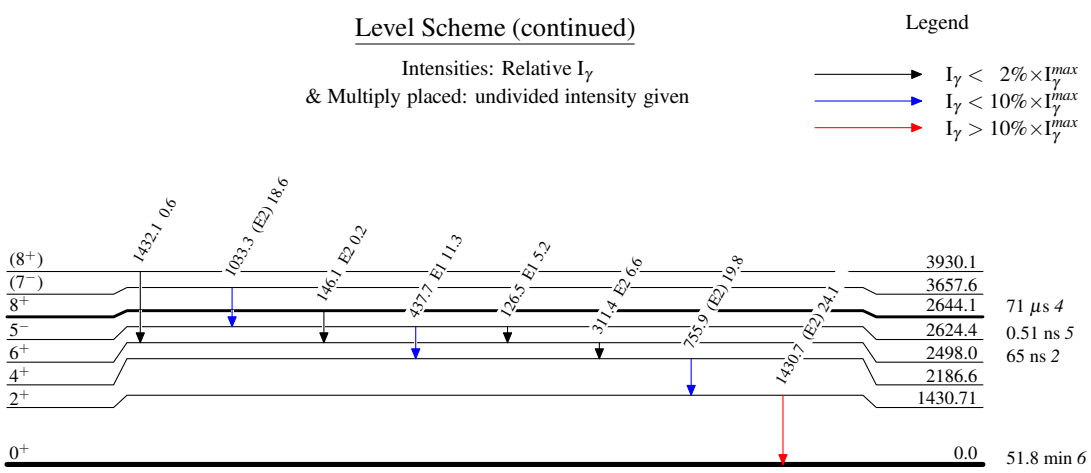


$^{94}_{44}Ru_{50}$

(HI,xnγ) 1994Ro08,1999Ju03

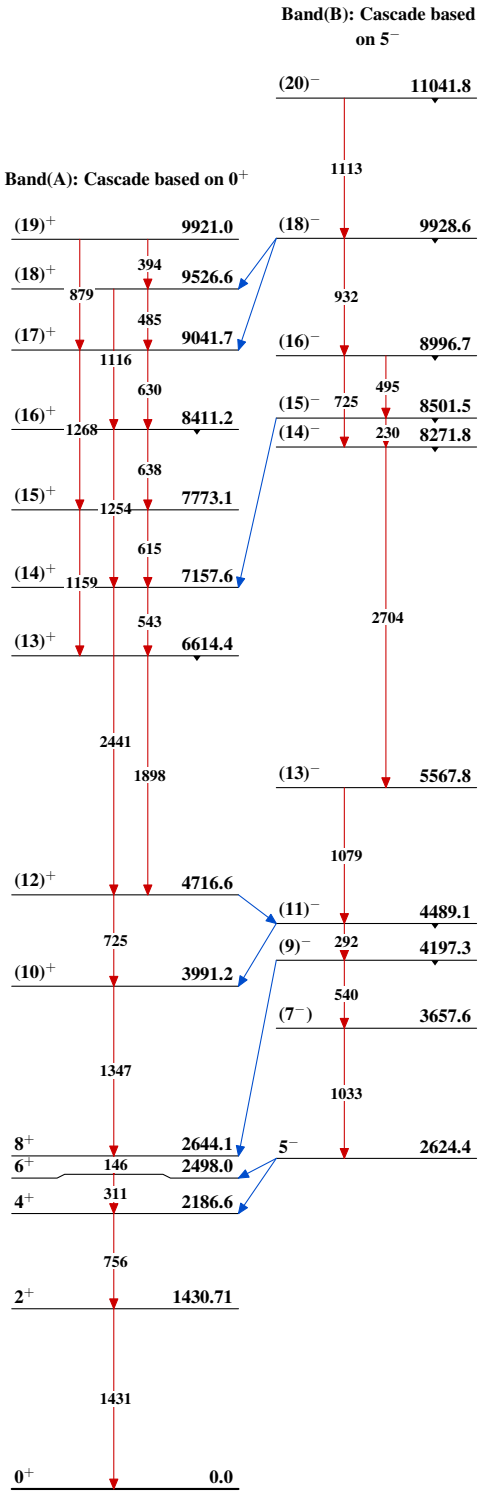
Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given



$^{94}_{44}Ru_{50}$

(HI,xnγ) 1994Ro08,1999Ju03



$^{94}_{44}Ru_{50}$