^{58}Ni(^{32}S,4pγ) 2000Do04,2003Wi03

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Alexandru Negret, Balraj Singh	NDS 124, 1 (2015)	30-Nov-2014

2000Do04, 2003Wo03: E=135 MeV. Measured Eγ, $\gamma\gamma$, Iγ, and $\gamma\gamma(\theta)$(DCO) using the Gammasphere array of 36 Compton suppressed Ge detectors and a 95 element Microball array for proton detection. Lifetime measurements by DSAM using a 415 μg/cm^2 ^{58}Ni target on a 10.3 mg/cm^2 Ta backing.

g factor and lifetime measurements:

2001Zh44: E=110 MeV. Measured g factors by a transient magnetic field-ion implanted perturbed angular distribution method.

1999Te02 (also 1998Ju10): E=110 MeV. Measured g factors by recoil-distance transient-field-$\gamma\gamma$ technique.

1998Ka19: E=130 MeV. Measured lifetimes by recoil-distance method.

1995We03: ^{58}Ni(^{32}S,4pg): E=110 MeV. Measured $\gamma(\theta$,H), g factor from ion implantation perturbed angular distribution.

^{86}Zr Levels

Values of g factors measured in 2001Zh44 using ion-implanted PAD method have been read by evaluators from authors′ figure 1.

E(level)[‡]	J$^\pi$[†]	T$_{1/2}$[#]	Comments
0[e]	0$^+$		
752.0[e] *10*	2$^+$	7.8 ps *19*	g=+0.5 *5* (2001Zh44)
1667.0[e] *15*	4$^+$	5.4 ps *24*	g=+0.5 *5* (2001Zh44)
2670.1[e] *17*	6$^+$	8.5 ps *34*	g=+0.1 *7* (2001Zh44)
2706.0[g] *17*	5$^-$	14 ps *7*	
3016.9[f] *18*	5$^-$		
3271.9[h] *18*	6$^-$		
3298.2[i] *18*	8$^+$	46 ps *6*	g=−0.02 *33* (1999Te02) g: others: +0.28 *46* (1999Te02), −0.03 *9* (1995We03), −1.1 *7* (2001Zh44).
3424.0[g] *17*	7$^-$	5.3 ps *21*	
3532.2[a] *18*	8$^+$	3.3 ps *7*	g=+1.9 *15* (1999Te02)
3646.9[f] *18*	7$^-$		
4133.9[h] *18*	8$^-$		
4325.2[i] *18*	10$^+$	2.2 ps *7*	g=−0.7 *11* (1999Te02) g: other: −1.3 *9* (2001Zh04).
4418.2[a] *18*	10$^+$	7.6[@] ps *28*	
4429.9[g] *18*	9$^-$	7.6 ps *28*	
4636.9[f] *18*	9$^-$		
4696.9 *19*	(9$^-$)		
5066.9[h] *19*	10$^-$		
5233.8[b] *18*	11$^-$		
5388.9[g] *20*	11$^-$		
5395.6[i] *19*	12$^+$	3.5[@] ps *14*	g=−1.7 *8* (1999Te02) g: others: −0.3 *6* (2001Zh44).
5523.4[a] *19*	12$^+$	0.34 ps *+10−7*	
5974.9[h] *19*	12$^-$		
6232.8[b] *19*	13$^-$		
6286.8 *20*	13$^+$	0.55 ps *+12−13*	
6320.5[d] *19*	14$^+$		g=+2.2 *5* (1999Te02) g: others: +0.8 *9* (2001Zh44).
6339.0[g] *20*	13$^-$		
6461.9 *20*	13$^-$		
6752.6[a] *19*	14$^+$	0.31 ps *6*	

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^{58}Ni(^{32}S,4pγ) 2000Do04,2003Wi03 (continued)

^{86}Zr Levels (continued)

E(level)‡	Jπ†	$T_{1/2}$#	Comments
6795.1 *20*	14^+		
7014.8 *20*	15^+	0.40 ps *8*	
7060.7 *21*	14^-		
7344.6[b] *20*	15^-		
7395.6[d] *20*	16^+	0.33 ps *+6−4*	g=+0.9 *9* (2001Zh44)
7470.0[g] *20*	15^-	0.64 ps *+17−12*	
7640.0 *23*	15^-	1.23[@] ps *+19−12*	
7954.0 *20*	16^+	0.53 ps *+15−9*	
8144.6[a] *22*	16^+	0.19 ps *+8−5*	
8212.3[c] *21*	16^-	0.22 ps *+5−4*	
8248.0 *20*	17^+	0.194 ps *21*	
8575.4[b] *21*	17^-	0.67 ps *+6−5*	
8649.2[d] *21*	18^+	0.201 ps *14*	
8671.0[g] *21*	17^-		
9372.6[c] *21*	18^-	0.33 ps *+11−8*	
9532.5 *22*	(18^-)	0.34 ps *+17−9*	
9652.7[a] *24*	(18^+)	0.37[@] ps *+9−8*	
9880.4[b] *21*	19^-	0.17 ps *+4−3*	
9891.1 *22*	19^+	0.229 ps *+28−21*	
10142.2[d] *22*	20^+	0.132 ps *14*	
10207.0 *21*	19^-	0.33 ps *+7−5*	
10794.9[c] *22*	20^-	0.15 ps *5*	
10918.2 *22*	20^+	0.10 ps *+6−5*	
11175.3[&] *23*	20^+	0.049 ps *+35−28*	
11176.2 *22*	(20^-)	0.24 ps *+17−12*	
11232.1[b] *22*	21^-	0.24 ps *4*	
11755.8 *22*	(21^-)	0.11 ps *+6−5*	
12059.2[d] *23*	22^+	0.062 ps *+21−28*	
12359.0[c] *22*	22^-	0.180 ps *21*	
12606.3[&] *23*	22^+	0.12 ps *5*	
12740.9[b] *23*	23^-	0.17 ps *4*	
14147.3[&] *24*	24^+	0.055 ps *14*	
14164.2[c] *23*	(24^-)		
14376.5[b] *24*	25^-	0.27 ps *+5−4*	
16050[&] *3*	26^+	0.028 ps *+14−7*	
16617[b] *3*	27^-	0.083[@] ps *+35−21*	
18063[&] *3*	28^+	0.049 ps *14*	
20532[&] *3*	30^+	0.042[@] ps *14*	

† As proposed by 2003Xi03 and 2000Do04. See also Adopted Levels.
‡ From least-squares fit to Eγ values, assuming Δ(Eγ)=1 keV.
# From DSAM (1998Ka18, 2003Wi03).
@ Effective half-life, not corrected for side feeding.
& Band(A): Band based on 20^+.
a Band(B): Band based on 8^+.
b Band(C): Band based on 11^-.

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^{58}Ni(^{32}S,4pγ) 2000Do04,2003Wi03 (continued)

^{86}Zr Levels (continued)

[c] Band(D): Band based on 16^-.
[d] Band(E): Band based on 14^+.
[e] Band(F): g.s. band.
[f] Band(G): negative parity γ cascade.
[g] Band(H): Band based on 5^-.
[h] Band(I): Band based on 6^-.
[i] Band(J): positive parity γ cascade.

$\gamma(^{86}Zr)$

DCO ratios are from 2000Do04. A_2 and A_4 coefficients are from 1999Te02.

E_i(level)	J_i^π	E_γ	I_γ[‡]	E_f	J_f^π	Mult.[†]	Comments
752.0	2^+	752	100	0	0^+		I_γ: 100.
1667.0	4^+	915	100	752.0	2^+		
2670.1	6^+	1003	100	1667.0	4^+		(234γ)(1003γ)(θ): A_2=+0.26 *5*, A_4=−0.07 *5*.
2706.0	5^-	1039		1667.0	4^+		
3016.9	5^-	311	100	2706.0	5^-		
3271.9	6^-	566		2706.0	5^-		
3298.2	8^+	628	100	2670.1	6^+		(234γ)(628γ)(θ): A_2=+0.26 *5*, A_4=−0.07 *5*. (1028γ)(628γ)(θ): A_2=+0.47 *9*, A_4=−0.18 *10*. (γ)(θ): A_2=+0.29 *3*, A_4=−0.07 *3*.
3424.0	7^-	718	100	2706.0	5^-		
		754		2670.1	6^+		E_γ: from 1998Ka19.
3532.2	8^+	234	86 *2*	3298.2	8^+		A_2=+0.38 *5*, A_4=0.00 *3*.
		862[#]	14[#] *2*	2670.1	6^+		
3646.9	7^-	223	40 *3*	3424.0	7^-		
		630	60 *3*	3016.9	5^-		
4133.9	8^-	710		3424.0	7^-		
		862[#]	[#]	3271.9	6^-		
4325.2	10^+	1027	100	3298.2	8^+		A_2=+0.36 *4*, A_4=−0.05 *4*.
4418.2	10^+	886	87 *2*	3532.2	8^+		A_2=+0.29 *4*, A_4=+0.05 *4*.
		1120	13 *2*	3298.2	8^+		
4429.9	9^-	783	3 *2*	3646.9	7^-		
		1006	97 *2*	3424.0	7^-		
4636.9	9^-	207		4429.9	9^-		
		990		3646.9	7^-		
4696.9	(9^-)	267		4429.9	9^-		
5066.9	10^-	933		4133.9	8^-		
5233.8	11^-	167	2 *1*	5066.9	10^-		
		537	9 *2*	4696.9	(9^-)		
		597	20 *1*	4636.9	9^-		
		804	15 *2*	4429.9	9^-		
		815		4418.2	10^+	(D)	DCO=0.63 *6*.
		909		4325.2	10^+		
5388.9	11^-	959	100	4429.9	9^-	(Q)	DCO=1.05 *6*.
5395.6	12^+	978	34 *1*	4418.2	10^+		
		1070	66 *1*	4325.2	10^+		A_2=+0.30 *5*, A_4=−0.01 *5*.
5523.4	12^+	1105	52 *2*	4418.2	10^+		I_γ: 7.0 *10*.
		1198	48 *2*	4325.2	10^+		I_γ: 6.5 *4*.
5974.9	12^-	741	76 *2*	5233.8	11^-	(D)	DCO=0.45 *4*.
		908	24 *2*	5066.9	10^-		
6232.8	13^-	258	8 *2*	5974.9	12^-		

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^{58}Ni(^{32}S,4pγ) 2000Do04,2003Wi03 (continued)

γ(^{86}Zr) (continued)

E_i(level)	J_i^π	E_γ	I_γ[‡]	E_f	J_f^π	Mult.[†]	Comments
6232.8	13^-	999	92 *2*	5233.8	11^-	(Q)	DCO=0.90 *8*.
6286.8	13^+	891	100	5395.6	12^+		I_γ: 2.8 *2*.
6320.5	14^+	797[#]	18[#] *2*	5523.4	12^+		
		925	82 *2*	5395.6	12^+		A_2=+0.40 *8*, A_4=−0.12 *8*.
6339.0	13^-	950		5388.9	11^-		
6461.9	13^-	487		5974.9	12^-		
6752.6	14^+	432	13 *3*	6320.5	14^+		I_γ: 2.1 *7*.
		1229	69 *3*	5523.4	12^+		I_γ: 11.0 *9*.
		1357	18 *3*	5395.6	12^+		I_γ: 2.9 *8*.
6795.1	14^+	508		6286.8	13^+		
		1400		5395.6	12^+		
7014.8	15^+	220	9 *2*	6795.1	14^+		
		694	91 *2*	6320.5	14^+	(D)	I_γ: 18.3 *7*. DCO=0.47 *3*.
7060.7	14^-	828		6232.8	13^-		
7344.6	15^-	284		7060.7	14^-		
		1112		6232.8	13^-	(Q)	DCO=1.01 *6*.
7395.6	16^+	381	70 *2*	7014.8	15^+	(D)	I_γ: 14.7 *23*. DCO=0.51 *2*.
		1075	30 *2*	6320.5	14^+		I_γ: 6.3 *3*.
7470.0	15^-	1008	58 *2*	6461.9	13^-		
		1131	30 *2*	6339.0	13^-		I_γ: 3.9 *4*.
		1237	12 *2*	6232.8	13^-		
7640.0	15^-	1301	100	6339.0	13^-		I_γ: 2.2 *2*.
7954.0	16^+	939	38 *2*	7014.8	15^+		I_γ: 2.0 *5*.
		1159	8 *4*	6795.1	14^+		I_γ: 0.4 *3*.
		1201	12 *3*	6752.6	14^+		I_γ: 0.6 *3*.
		1634[#]	42[#] *2*	6320.5	14^+		I_γ: 2.2 *3*.
8144.6	16^+	1392	100	6752.6	14^+		I_γ: 2.8 *2*.
8212.3	16^-	573[@]		7640.0	15^-		
		742	100	7470.0	15^-		I_γ: 8.8 *5*.
8248.0	17^+	294	16 *2*	7954.0	16^+		
		852	49 *2*	7395.6	16^+	(D)	I_γ: 7.0 *4*. DCO=0.55 *3*.
		1233	35 *2*	7014.8	15^+		
8575.4	17^-	363	28 *2*	8212.3	16^-		
		1231	72 *2*	7344.6	15^-	(Q)	I_γ: 12.6 *7*. DCO=1.12 *8*.
8649.2	18^+	401	46 *1*	8248.0	17^+	(D)	I_γ: 6.2 *3*. DCO=0.48 *3*.
		1254	54 *1*	7395.6	16^+		I_γ: 7.3 *3*.
8671.0	17^-	1201		7470.0	15^-		
9372.6	18^-	797[#]	71[#] *3*	8575.4	17^-		I_γ: 7.7 *4*.
		1160	29 *3*	8212.3	16^-		
9532.5	(18^-)	862[#]	100[#]	8671.0	17^-		I_γ: 5.5 *3*.
9652.7	(18^+)	1508	100	8144.6	16^+		I_γ: 1.8 *2*.
9880.4	19^-	348	6 *4*	9532.5	(18^-)		
		508	35 *2*	9372.6	18^-		
		1209	17 *2*	8671.0	17^-		
		1305	42 *1*	8575.4	17^-	(Q)	I_γ: 6.7 *4*. DCO=1.10 *14*. I_γ: branching ratio= 42 *1*.
9891.1	19^+	1242	30 *2*	8649.2	18^+		I_γ: 1.3 *3*.
		1643	70 *2*	8248.0	17^+		I_γ: 3.0 *4*.

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^{58}Ni(^{32}S,4pγ) 2000Do04,2003Wi03 (continued)

$\gamma(^{86}Zr)$ (continued)

E_i(level)	J_i^π	E_γ	I_γ ‡	E_f	J_f^π	Mult. †	Comments
10142.2	20^+	251	13 *2*	9891.1	19^+	(D)	I_γ: 1.5 *3*. DCO=0.48 *12*.
		1493	87 *2*	8649.2	18^+	(Q)	DCO=1.04 *12*. I_γ: 9.8 *5*.
10207.0	19^-	834	67 *3*	9372.6	18^-		I_γ: 4.6 *3*.
		1632	33 *3*	8575.4	17^-		I_γ: 2.3 *5*.
10794.9	20^-	588	52 *2*	10207.0	19^-		
		915@		9880.4	19^-		
		1422	48 *2*	9372.6	18^-		I_γ: 2.6 *3*.
10918.2	20^+	776	32 *3*	10142.2	20^+		I_γ: 1.5 *4*.
		2269	68 *3*	8649.2	18^+		I_γ: 3.1 *4*.
11175.3	20^+	2526	100	8649.2	18^+		I_γ: 2.2 *4*.
11176.2	(20^-)	1644	100	9532.5	(18^-)		I_γ: 3.3 *4*.
11232.1	21^-	437	50 *2*	10794.9	20^-		I_γ: 6.6 *8*.
		1352	50 *2*	9880.4	19^-	(Q)	DCO=1.06 *15*. I_γ: 6.6 *3*.
11755.8	(21^-)	580	50 *2*	11176.2	(20^-)		I_γ: 2.2 *6*.
		1875	50 *2*	9880.4	19^-		I_γ: 2.2 *4*.
12059.2	22^+	1917	100	10142.2	20^+	(Q)	I_γ: 6.0 *3*. DCO=0.97 *10*.
12359.0	22^-	603	46 *1*	11755.8	(21^-)		I_γ: 3.4 *2*.
		1128@		11232.1	21^-		
		1564	54 *1*	10794.9	20^-		I_γ: 4.1 *2*.
12606.3	22^+	1431	56 *3*	11175.3	20^+		I_γ: 2.7 *3*.
		1688	44 *3*	10918.2	20^+		I_γ: 2.2 *2*.
12740.9	23^-	381	39 *2*	12359.0	22^-		I_γ: 5.2 *7*.
		1509	61 *2*	11232.1	21^-	(Q)	I_γ: 8.1 *4*. DCO=1.20 *14*.
14147.3	24^+	1541	57 *2*	12606.3	22^+		I_γ: 3.8 *6*.
		2088	43 *2*	12059.2	22^+	(Q)	DCO=0.93 *10*. I_γ: 2.9 *2*.
14164.2	(24^-)	1424		12740.9	23^-		
		1806		12359.0	22^-		
14376.5	25^-	214	14 *2*	14164.2	(24^-)		I_γ: 0.9 *2*.
		1634#	86# *2*	12740.9	23^-		DCO=1.19 *15*. I_γ: 5.7 *3*.
16050	26^+	1903	100	14147.3	24^+	(Q)	I_γ: 5.2 *3*. DCO=1.02 *12*.
16617	27^-	2240	100	14376.5	25^-	(Q)	I_γ: 3.2 *2*. DCO=1.03 *21*.
18063	28^+	2013	100	16050	26^+	(Q)	I_γ: 3.6 *2*. DCO=0.94 *15*.
20532	30^+	2469	100	18063	28^+	(Q)	I_γ: 2.3 *2*. DCO=1.05 *12*.

† Suggested by the DCO ratio.

‡ The I_γ column lists branching ratios normalized to 100 for each level. I_γ values from the comments represent relative intensities normalized to 100 for the 752-keV line.

Multiply placed with intensity suitably divided.

@ Placement of transition in the level scheme is uncertain.

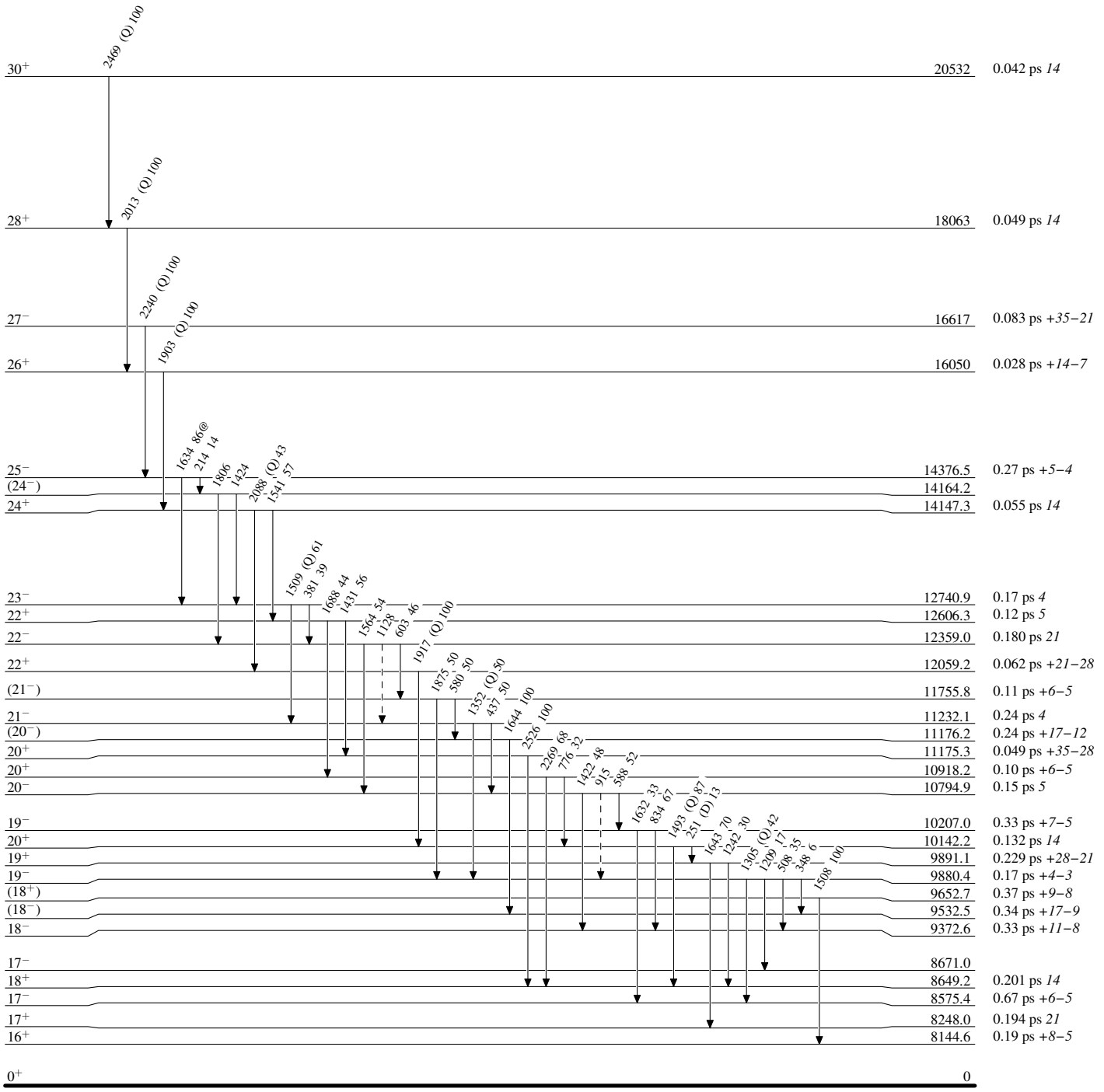
^{58}Ni(^{32}S,4pγ) 2000Do04,2003Wi03

Legend

Level Scheme

Intensities: % photon branching from each level
@ Multiply placed: intensity suitably divided

- - - - - - ► γ Decay (Uncertain)



$^{86}_{40}Zr_{46}$

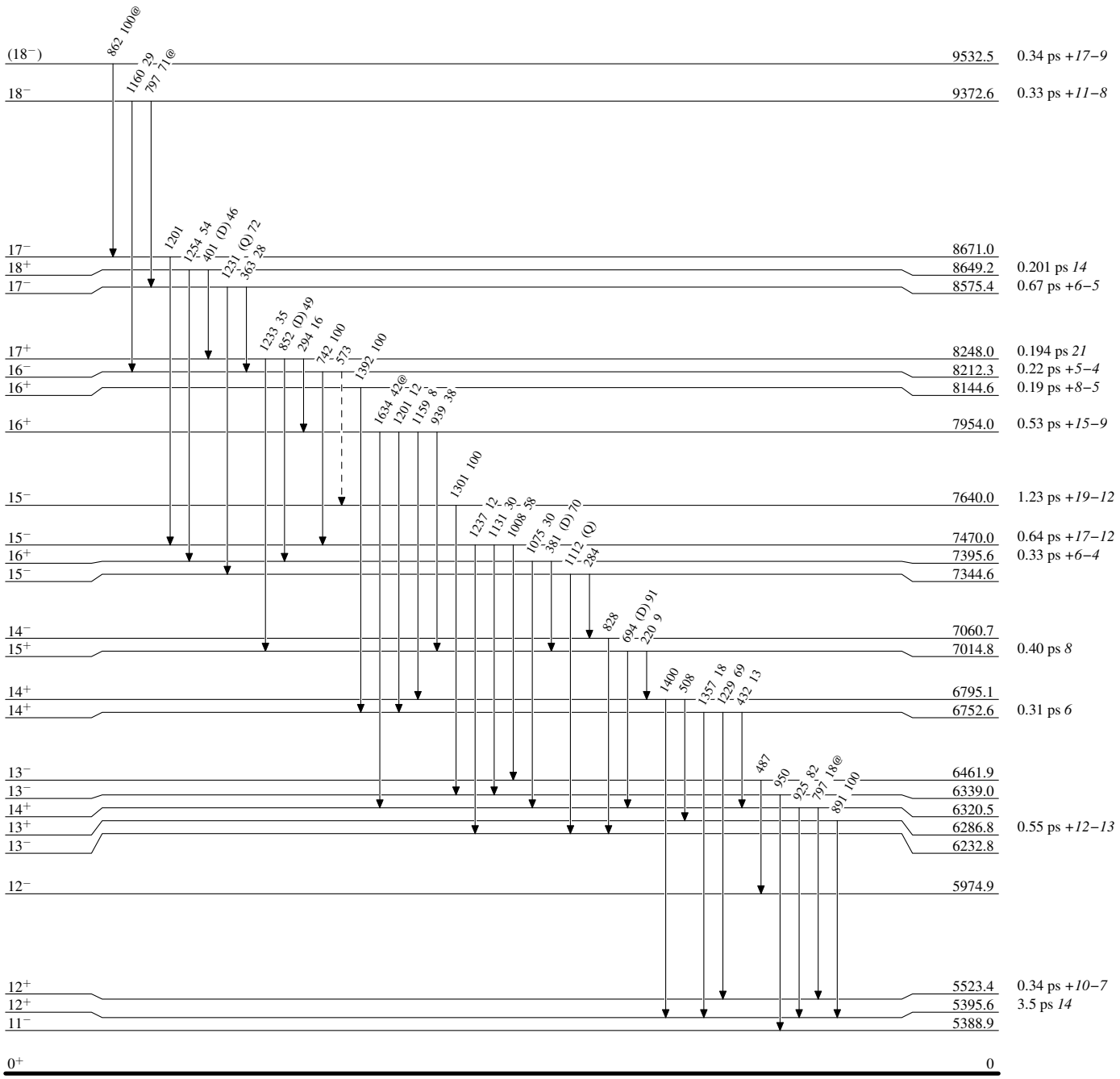
^{58}Ni(^{32}S,4pγ) 2000Do04,2003Wi03

Legend

Level Scheme (continued)

Intensities: % photon branching from each level
@ Multiply placed: intensity suitably divided

γ Decay (Uncertain)

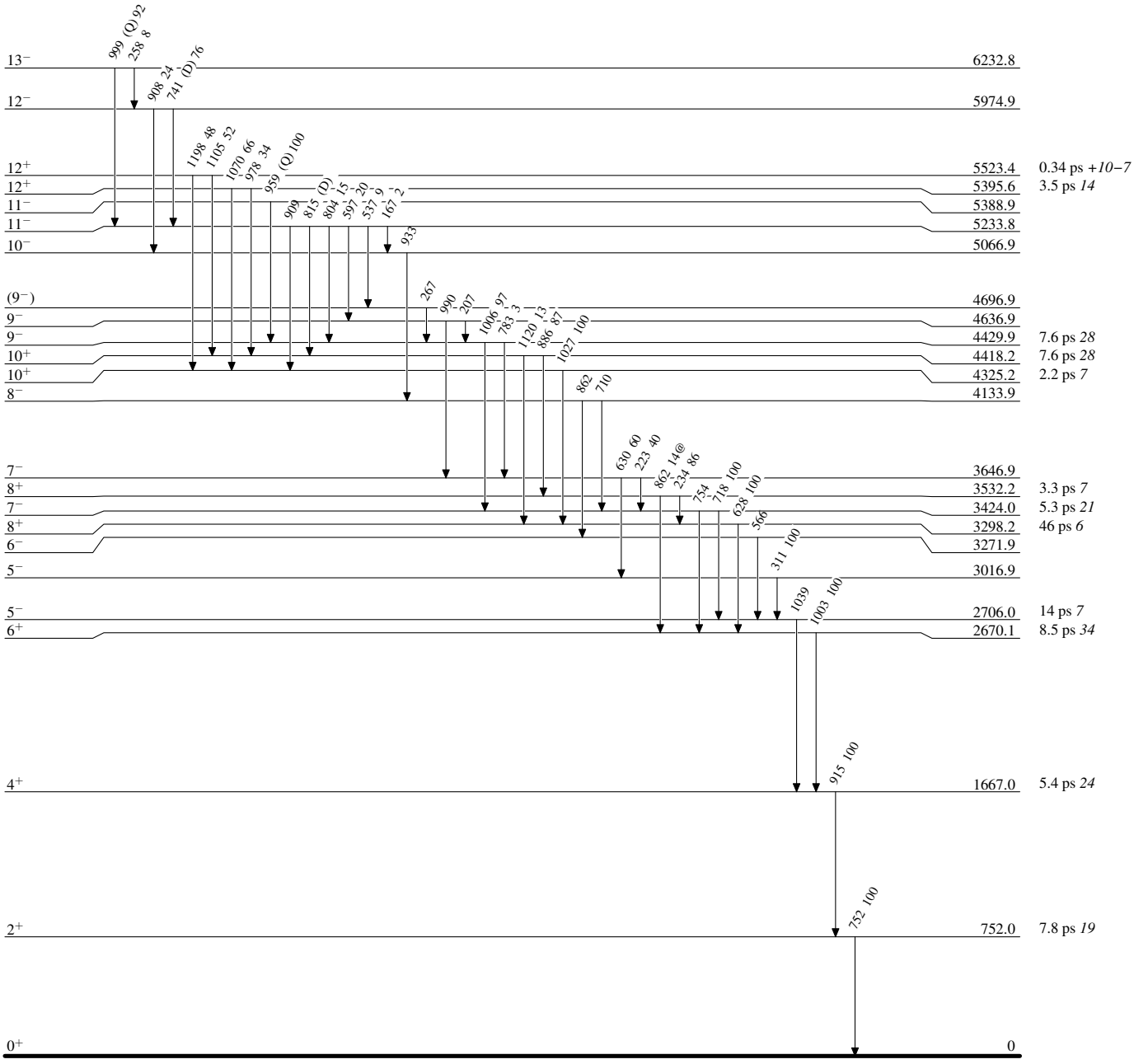


$^{86}_{40}Zr_{46}$

^{58}Ni(^{32}S,4pγ) 2000Do04,2003Wi03

Level Scheme (continued)

Intensities: % photon branching from each level
@ Multiply placed: intensity suitably divided



$^{86}_{40}Zr_{46}$

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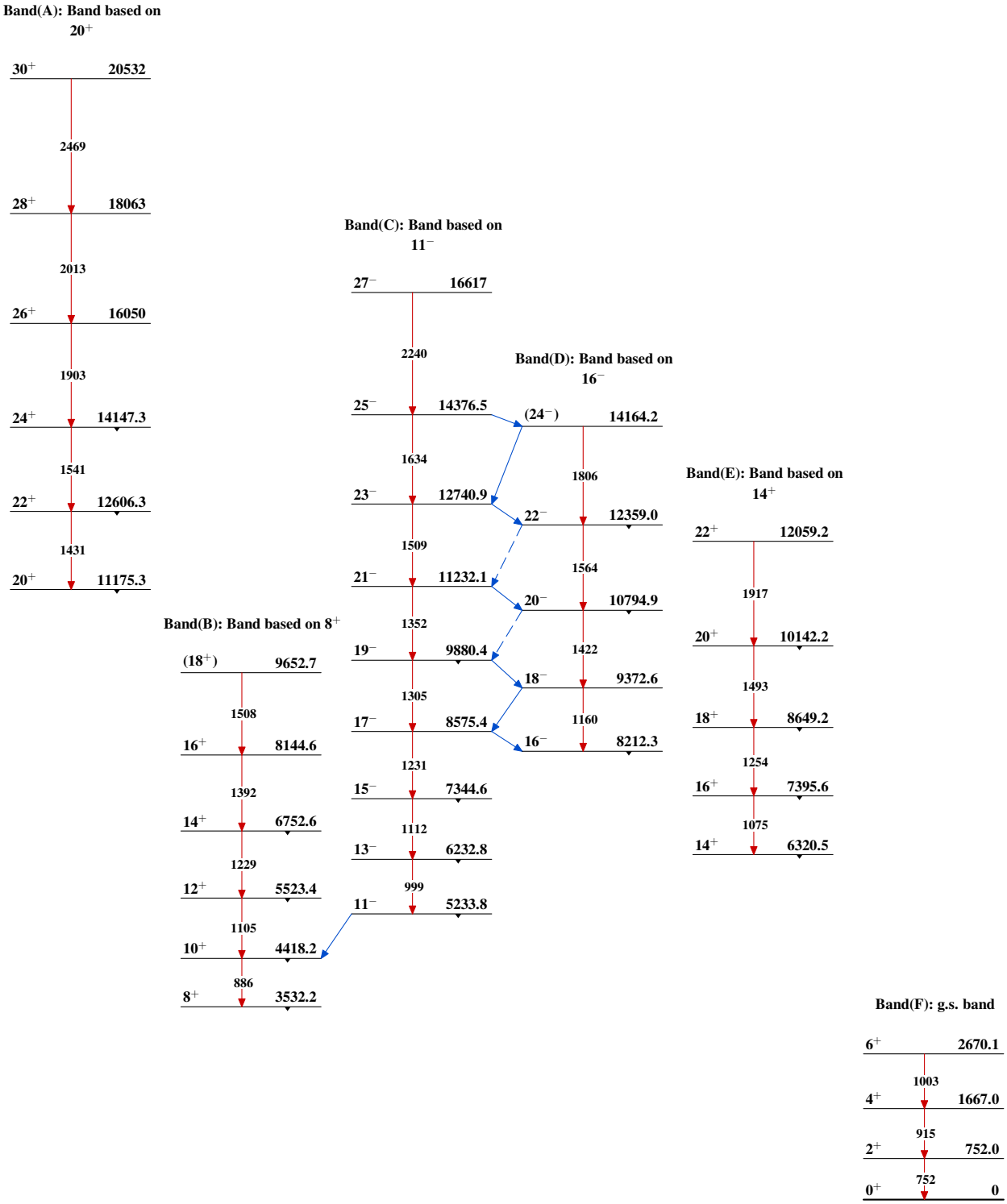
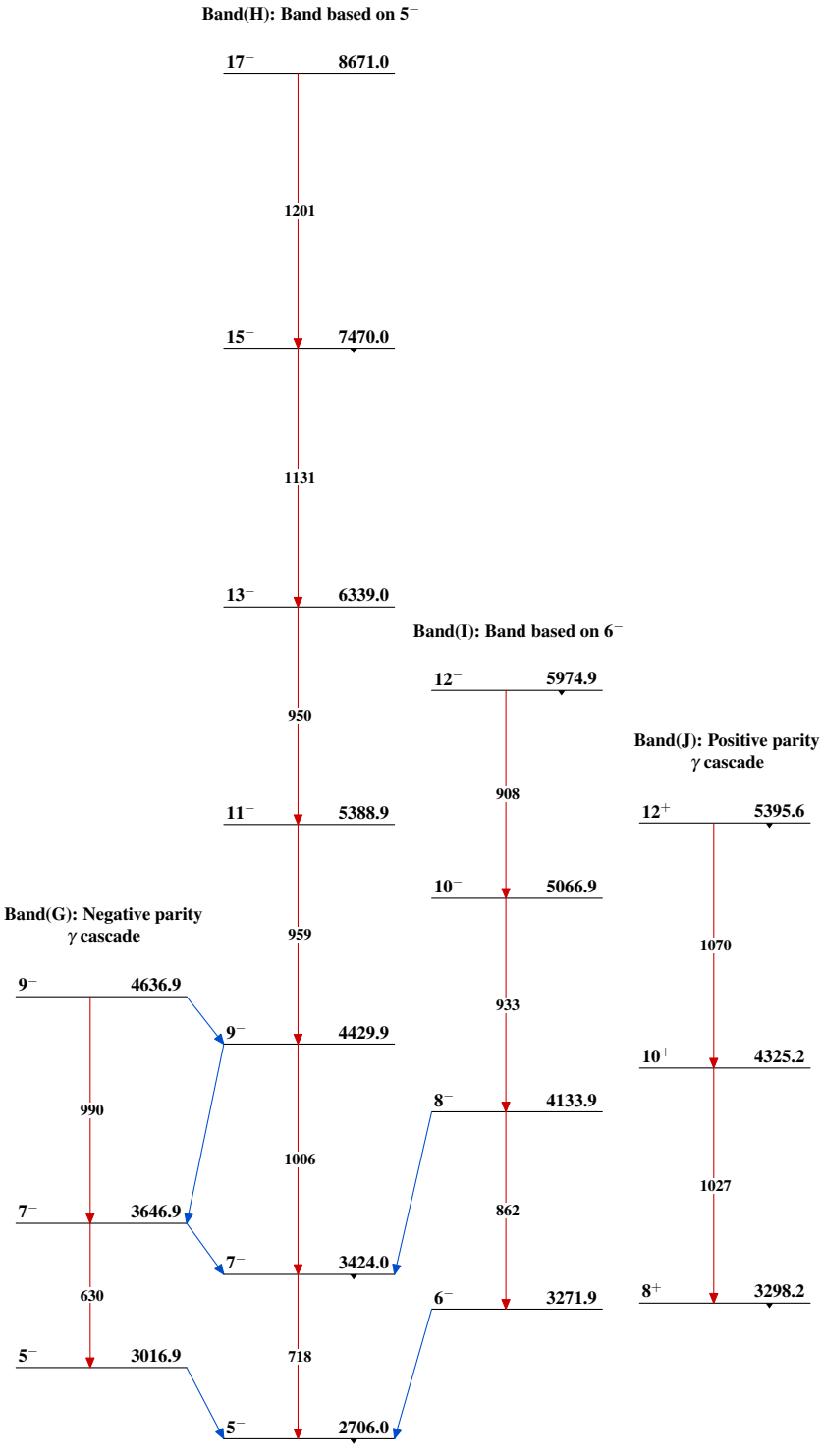


$^{86}_{40}Zr_{46}$

^{58}Ni(^{32}S,4pγ) 2000Do04,2003Wi03 (continued)



$^{86}_{40}Zr_{46}$