^{54}Fe(^{58}Ni,3pγ) 1996Sc29,1994Is01,1998LaZU

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	S. Kumar(a), J. Chen(b) and F. G. Kondev	NDS 137, 1 (2016)	31-May-2016

1996Sc29: E(^{58}Ni)=243 MeV, 88 inch Cyclotron at the Lawrence Berkeley National Laboratory. Target: thin target consisting of two-self supporting of 500 μg/cm^2 (97 % isotopically enriched) and a backed target consisting of a 500 μg/cm^2 foil backed on 15 mg/cm^2 Au. Detectors: Gammasphere γ-ray spectrometer (Earlier Implementation), 24 BGO-suppressed Ge detectors. Measured: Eγ, $\gamma\gamma$, $\gamma\gamma\gamma$.

1998LaZU: same as 1996Sc29.

1994Is01,1993IsZx: E(^{58}Ni)=225 MeV, JAERI, Japan. Target: 2.1 mg/cm^2 (98 % enriched) on a 10.3 mg/cm^2 Au backing. Detectors: 6 Ge detectors, charged particle multiplicity filter (Si Box). Measured: Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$, linear polarization.

1994Ja06: E(^{58}Ni)=243 MeV, TASCC facility at Chalk River Laboratory,Canada. Target: Thin, self supporting and Au-backed target. Detectors: 24 Compton-suppressed HPGe, 71 BGO. Measured: Eγ, $\gamma\gamma$, $\gamma\gamma\gamma$.

1998Wa02: they used same facility as 1996Sc29, determined lifetimes using the Doppler-shift attenuation method for band 1. Deduced quadrupole moments for rotational states, in support of the phenomenon of smooth band termination.

The level scheme is from 1996Sc29 and 1998LaZU, unless otherwise noted.

^{109}Sb Levels

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[#]	Comments
0.0[f]	5/2$^+$		
832.2[g] 4	7/2$^+$		
1100.8[f] 4	9/2$^+$		
1341.0[g] 4	9/2$^+$		
1500.9[i] 6	11/2$^-$		
1854.7[g] 4	11/2$^+$		
2092.1[f] 5	13/2$^+$		
2193.9[g] 4	13/2$^+$		
2271.6[g] 5	15/2$^+$		
2580.6[i] 6	15/2$^-$		
2650.5[g] 6	17/2$^+$		
2820.9 8	(17/2$^+$)		
2826.6 9	17/2$^-$		
3214.7 8	(19/2$^+$)		
3300.9[f] 6	17/2$^+$		
3377.4 6	19/2$^+$		
3487.9[i] 6	19/2$^-$		
3534.8 8	(21/2$^+$)		
3589.3 10	19/2$^-$		
3750.4[h] 6	21/2$^-$		
3761.7 6	21/2$^+$		
3805.3 10	19/2$^-$		
3873.6[d] 8	(23/2$^+$)		
3930.3[h] 7	23/2$^-$	84 ps 7	T$_{1/2}$: from 1994Is01 by recoil distance method (RDM).
4067.5 9			
4234.1[d] 8	(25/2$^+$)		
4243.8 7	21/2$^-$		
4245.4 7	21/2$^-$		
4455.9 8	23/2$^-$		
4484.2[h] 7	25/2$^-$		
4487.0[e] 7	23/2$^-$		
4600.8 13	(27/2$^-$)		

Continued on next page (footnotes at end of table)

^{54}Fe(^{58}Ni,3pγ) 1996Sc29,1994Is01,1998LaZU (continued)

^{109}Sb Levels (continued)

E(level)†	Jπ‡	$T_{1/2}$#	Comments
4626.4[d] 8	(27/2+)		
4684.1 9	23/2−		
4805.7[e] 8	25/2−		
4959.5 8	25/2−		
4980.4[h] 7	27/2−		
5043.4[d] 8	(29/2+)		
5165.1[e] 8	27/2−		
5189.7 10	(27/2−)		
5488.0 8	(31/2+)		
5488.1[h] 9	29/2−		
5505.4[d] 10	(31/2+)		
5561.7 10	(27/2−)		
5568.9[e] 8	29/2−		
5716.8 13			
5798.8 13			
5823.9[h] 8	31/2−		
5892.7 8	(29/2−)		
5976.0 10	(31/2−)		
5983.4[d] 11	(33/2+)		
5985.2 10	(33/2+)		
5997.0[e] 8	31/2−		
6157.3 10	(31/2−)		
6335.5[h] 8	33/2−		
6451.5[e] 8	33/2−		
6508.4[d] 12	(35/2+)		
6511.1 11	(35/2+)		
6570.2 13			
6630.8 9	(31/2−)		
6668.0[h] 11	35/2−		
6840.1 15	(31/2−)		
6844.2 12	(31/2−)		
6915.3[e] 9	35/2−		
6949.2 13			
7041.4[d] 13	(37/2+)		
7349.5[h] 13	37/2−		
7437.2[@] 8	(35/2−)		
7465.3 14	(35/2−)		
7482.4[e] 11	37/2−		
7606.1 11	(35/2−)		
7683.7[e] 12	39/2−		
8228.2[@] 12	(39/2−)	449 fs +61−49	
9089.2[@] 15	(43/2−)	283 fs +32−23	
9089.2+x[&]	(43/2+)		Additional information 1.
10058.0+x[&] 10	(47/2+)		
10066.2[@] 18	(47/2−)	175 fs +22−19	
10066.2+w[c]	(49/2−)		Additional information 2.
10066.2+y[a]	(49/2+)		Additional information 3.
11093.0+x[&] 15	(51/2+)		
11159.2[@] 21	(51/2−)	103 fs 10	
11169.0+y[a] 10	(53/2+)		

Continued on next page (footnotes at end of table)

^{54}Fe(^{58}Ni,3pγ) 1996Sc29,1994Is01,1998LaZU (continued)

^{109}Sb Levels (continued)

E(level)†	Jπ‡	$T_{1/2}$#	Comments
11350.0+w[c] *10*	(53/2$^-$)		
12216.0+x[&] *18*	(55/2$^+$)		
12362.2[@] *23*	(55/2$^-$)	74 fs *+8–10*	
12362.2+z[b]	(59/2$^+$)		Additional information 4.
12394.0+y[a] *15*	(57/2$^+$)		
12879.0+w[c] *15*	(57/2$^-$)		
13439.0+x[&] *20*	(59/2$^+$)		
13688[@] *3*	(59/2$^-$)	43 fs *+4–6*	
13704.0+z[b] *10*	(63/2$^+$)		
13708.0+y[a] *18*	(61/2$^+$)		
14640.0+w[c] *18*	(61/2$^-$)		
14781.0+x[&] *23*	(63/2$^+$)		
15114.0+y[a] *20*	(65/2$^+$)		
15164[@] *3*	(63/2$^-$)	35 fs *6*	
15233.0+z[b] *15*	(67/2$^+$)		
16284.0+x[&] *25*	(67/2$^+$)		
16577.1+w[c] *20*	(65/2$^-$)		
16624.0+y[a] *23*	(69/2$^+$)		
16812[@] *3*	(67/2$^-$)	21 fs *5*	
16957.0+z[b] *18*	(71/2$^+$)		
17962+x[&] *3*	(71/2$^+$)		
18273.1+y[a] *25*	(73/2$^+$)		
18637.1+w[c] *23*	(69/2$^-$)		
18661[@] *3*	(71/2$^-$)	20 fs *5*	
18886.1+z[b] *20*	(75/2$^+$)		
19842+x[&] *3*	(75/2$^+$)		
20124+y[a] *3*	(77/2$^+$)		
20758[@] *4*	(75/2$^-$)	13 fs *+4–3*	
21044.1+z[b] *23*	(79/2$^+$)		
21958+x[&] *3*	(79/2$^+$)		
22242+y[a] *3*	(81/2$^+$)		
23143[@] *4*	(79/2$^-$)		
23504.1+z[b] *25*	(83/2$^+$)		
24374+x[&] *4*	(83/2$^+$)		
24662+y[a] *3*	(85/2$^+$)		
25880[@] *4*	(83/2$^-$)		
26314+z[b] *3*	(87/2$^+$)		
27196+x[&] *4*	(87/2$^+$)		
27394+y[a] *4*	(89/2$^+$)		

† From a least-squares fit to Eγ.

‡ From 1996Sc29, 1994Is01 and 1998LaZU, based on deduced γ-ray transition multipolarities and the observed band structures, unless otherwise stated. 1994Ja06 give different spin-parity assignments for the high-spin states.

From 1998Wa02, unless otherwise noted.

@ Band(A): Band 1; Configuration=$\pi(h_{11/2})^{+1}[(d_{5/2}g_{7/2})^{+2}(g_{9/2})^{-2}]$, at high spin $\pi(h_{11/2})^{+1}[(d_{5/2}g_{7/2})^{+2}(g_{9/2})^{-2}]\otimes$

Continued on next page (footnotes at end of table)

^{54}Fe(^{58}Ni,3pγ) 1996Sc29,1994Is01,1998LaZU (continued)

^{109}Sb Levels (continued)

$\nu[(h_{11/2})^2(d_{5/2}g_{7/2})^6]$; Terminating state $J^\pi=(83/2^-)$.

& Band(B): Band 2, $\alpha=-1/2$; Configuration=$\pi(h_{11/2})^{+1}[(d_{5/2}g_{7/2})^{+2}(g_{9/2})^{-2}]\otimes\nu[(h_{11/2})^{+3}(g_{7/2}d_{5/2})^{+5}]$.

a Band(C): Band 3, $\alpha=+1/2$; Configuration=$\pi(h_{11/2})^{+1}[(d_{5/2}g_{7/2})^{+2}(g_{9/2})^{-2}]\otimes\nu[(h_{11/2})^{+3}(g_{7/2}d_{5/2})^{+5}]$.

b Band(D): Band 4; Configuration=$\pi[(h_{11/2})^{+2}(d_{5/2}g_{7/2})^{+1}(g_{9/2})^{-2}]\otimes\nu[(h_{11/2})^{+2}(d_{5/2}g_{7/2})^{+6}]$; Terminating state $J^\pi=(87/2^+)$.

c Band(E): Band 5; Configuration=$\pi[(h_{11/2})^{+1}(d_{5/2}g_{7/2})^{+1}(g_{9/2})^{-1}]\otimes\nu[(h_{11/2})^{+2}(g_{7/2}d_{5/2})^{+6}]$.

d Band(F): Band 6; Configuration=$\pi[(d_{5/2}g_{7/2})^{+2}(g_{9/2})^{-1}]$.

e Band(G): Band 7; Configuration=$\pi[(d_{5/2}g_{7/2})^{+2}(g_{9/2})^{-1}]\otimes J^{\pi-}$, where $J^{\pi-}=5^-$ or 7^- are the two-neutron states of the ^{108}Sn core.

f Band(H): Band 8; Configuration=$\pi d^{+1}_{5/2}\otimes J^\pi$(^{108}Sn core).

g Band(I): Band 9; Configuration=$\pi g^{+1}_{7/2}\otimes J^\pi$(^{108}Sn core).

h Band(J): band 10.

i Band(K): Band 11; Configuration=$\pi h^{+1}_{11/2}\otimes J^\pi$(^{108}Sn core).

γ(^{109}Sb)

E_γ †	I_γ #	E_i(level)	J^π_i	E_f	J^π_f	Mult.&	δ#	Comments
77.8 *5*	18@ *5*	2271.6	15/2$^+$	2193.9	13/2$^+$	D		Mult.: $A_2/A_0=-0.21$ *3*, $A_4/A_0=+0.04$ *7* (1994Is01).
168.6 *5*	4 *1*	3930.3	23/2$^-$	3761.7	21/2$^+$			
176 *1*		2826.6	17/2$^-$	2650.5	17/2$^+$			E_γ: 1994Is01 placed a 176.3γ from the E=4244 level.
176.3 *5*	2 *1*	4243.8	21/2$^-$	4067.5				E_γ: placed by 1994Is01. 1996Sc29 placed a 176γ from the E=2827 level.
179.5b *5*	20b *6*	2271.6	15/2$^+$	2092.1	13/2$^+$	D		Mult.: $A_2/A_0=-0.27$ *3*, $A_4/A_0=-0.02$ *7* (1994Is01), for both 179.5γ and 179.9 γ.
179.9b *5*	44b *13*	3930.3	23/2$^-$	3750.4	21/2$^-$	D		Mult.: $A_2/A_0=-0.27$ *3*, $A_4/A_0=+0.02$ *7* (1994Is01) for both 179.5γ and 179.9γ, mixed Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
187.0 *5*	6 *1*	3487.9	19/2$^-$	3300.9	17/2$^+$			
237c		2092.1	13/2$^+$	1854.7	11/2$^+$			E_γ: from 1994Ja06 only.
241 *1*		2820.9	(17/2$^+$)	2580.6	15/2$^-$			
241.5 *5*	12@ *2*	4487.0	23/2$^-$	4245.4	21/2$^-$	M1(+E2)	≈+0.1	Mult.: $A_2/A_0=-0.07$ *3*, $A_4/A_0=+0.04$ *7* (1994Is01), both for 241.5γ and 243.3γ; Magnetic Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
243.3 *5*	16@ *2*	4487.0	23/2$^-$	4243.8	21/2$^-$	M1(+E2)	≈+0.1	Mult.: $A_2/A_0=-0.07$ *3*, $A_4/A_0=+0.04$ *7* (1994Is01), for both 241.5γ and 243.3 γ ; Magnetic Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
262.5 *5*	31@ *2*	3750.4	21/2$^-$	3487.9	19/2$^-$	M1(+E2)	≈−0.1	Mult.: $A_2/A_0=-0.35$ *3*, $A_4/A_0=+0.04$ *7* (1994Is01), Magnetic Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
268.6 *5*	3@ *1*	1100.8	9/2$^+$	832.2	7/2$^+$	D		Mult.: $A_2/A_0=-0.19$ *8*, $A_4/A_0=+0.15$ *12* (1994Is01).
275 *1*		4959.5	25/2$^-$	4684.1	23/2$^-$			
318.4b *5*	23b@ *6*	4805.7	25/2$^-$	4487.0	23/2$^-$	M1(+E2)	≈+0.1	Mult.: $A_2/A_0=-0.10$ *3*, $A_4/A_0=+0.07$ *7* (1994Is01), both for 318.4γ and 320.1γ; Magnetic Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
320.1b *5*	17b@ *5*	3534.8	(21/2$^+$)	3214.7	(19/2$^+$)	M1(+E2)	≈+0.1	Mult.: $A_2/A_0=-0.10$ *3*, $A_4/A_0=+0.07$ *7*

Continued on next page (footnotes at end of table)

^{54}Fe(^{58}Ni,3pγ) 1996Sc29,1994Is01,1998LaZU (continued)

γ(^{109}Sb) (continued)

E_γ[†]	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	δ[#]	Comments
								(1994Is01), both for 318.4γ and 320.1γ; Magnetic Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
331[‡] *1*		5892.7	(29/2$^-$)	5561.7	(27/2$^-$)			
338.9[b] *5*	16[b] *5*	3873.6	(23/2$^+$)	3534.8	(21/2$^+$)	D+Q	≈+0.1	Mult.: A_2/A_0=−0.10 *3*, A_4/A_0=+0.04 *7* (1994Is01), for both 338.9γ and 339.1γ.
339.1[b] *5*	20[b] *6*	2193.9	13/2$^+$	1854.7	11/2$^+$	M1+E2	≈+0.1	Mult.: A_2/A_0=−0.10 *3*, A_4/A_0=+0.04 *7* (1994Is01), for both 338.9γ and 339.1γ, Magnetic Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
359.1[a] *5*	17[a@] *5*	5165.1	27/2$^-$	4805.7	25/2$^-$	M1(+E2)	≈+0.1	Mult.: A_2/A_0=−0.10 *3*, A_4/A_0=+0.06 *7* (1994Is01), for both 359.1γ and 360.5γ; Magnetic Multipole(from polarization anisotropy, Fig.2 in 1994Is01).
360.5[a] *5*	17[a@] *5*	4234.1	(25/2$^+$)	3873.6	(23/2$^+$)	M1(+E2)	≈+0.1	Mult.: A_2/A_0=−0.10 *3*, A_4/A_0=+0.06 *7* (1994Is01) both for 359.1γ and 360.5γ Magnetic Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
373.1 *5*	17[@] *2*	3750.4	21/2$^-$	3377.4	19/2$^+$	E1		Mult.: A_2/A_0=−0.21 *3*, A_4/A_0=+0.03 *7* (1994Is01), Electric Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
379.1 *5*	35 *5*	2650.5	17/2$^+$	2271.6	15/2$^+$	M1(+E2)	≈−0.1	Mult.: A_2/A_0=−0.29 *3*, A_4/A_0=+0.04 *4* (1994Is01), Magnetic Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
384[‡] *1*		5189.7	(27/2$^-$)	4805.7	25/2$^-$			E_γ: 1994Is01 placed a 384.1γ from the E=3762 level.
384.1 *5*	1 *1*	3761.7	21/2$^+$	3377.4	19/2$^+$			E_γ: not given by 1996Sc29, seen and placed in 1994Is01. 1998LaZU placed a 384γ from a level at E=5190, J^π=(27/2$^-$).
392.4 *5*	15[@] *3*	4626.4	(27/2$^+$)	4234.1	(25/2$^+$)	M1(+E2)	≈+0.1	Mult.: A_2/A_0=−0.14 *5*, A_4/A_0=+0.14 *9* (1994Is01), Magnetic Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
394 *1*		3214.7	(19/2$^+$)	2820.9	(17/2$^+$)			
400.2 *5*	53[@] *5*	1500.9	11/2$^-$	1100.8	9/2$^+$	E1		Mult.: A_2/A_0=−0.22 *3*, A_4/A_0=+0.05 *7* (1994Is01), Electric Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
403.6 *5*	12[@] *2*	5568.9	29/2$^-$	5165.1	27/2$^-$	D+Q	≈+0.1	Mult.: A_2/A_0=−0.08 *5*, A_4/A_0=−0.01 *9* (1994Is01).
407[‡] *1*		5976.0	(31/2$^-$)	5568.9	29/2$^-$			
416.7[b] *5*	4[b] *1*	2271.6	15/2$^+$	1854.7	11/2$^+$	Q		E_γ: seen and placed only in 1994Is01. Mult.: A_2/A_0=−0.12 *3*, A_4/A_0=+0.07 *7* (1994Is01), for both 416.7γ and 416.9 γ.
416.9[b] *5*	10[b] *3*	5043.4	(29/2$^+$)	4626.4	(27/2$^+$)	D+Q	≈+0.1	Mult.: A_2/A_0=−0.12 *3*, A_4/A_0=+0.07 *7* (1994Is01), both for 416.7γ and 416.9 γ.
428.2 *5*	7[@] *2*	5997.0	31/2$^-$	5568.9	29/2$^-$	D+Q	≈+0.1	Mult.: A_2/A_0=−0.05 *5*, A_4/A_0=+0.03 *9* (1994Is01).
444.5 *5*	3 *1*	5488.0	(31/2$^+$)	5043.4	(29/2$^+$)			
454.4 *5*	5 *2*	6451.5	33/2$^-$	5997.0	31/2$^-$			
[x]462.0 *5*	4 *2*							
462 *1*		5505.4	(31/2$^+$)	5043.4	(29/2$^+$)			
463.3 *5*	3 *1*	6915.3	35/2$^-$	6451.5	33/2$^-$			
478 *1*		5983.4	(33/2$^+$)	5505.4	(31/2$^+$)			
488 *1*		7437.2	(35/2$^-$)	6949.2				E_γ: 1994Is01 placed a 488.6γ from the 2580 level.

Continued on next page (footnotes at end of table)

^{54}Fe(^{58}Ni,3pγ) 1996Sc29,1994Is01,1998LaZU (continued)

γ(^{109}Sb) (continued)

E_γ †	I_γ #	E_i(level)	J_i^π	E_f	J_f^π	Mult.&	δ#	Comments
488.6 *5*	4 *2*	2580.6	15/2$^-$	2092.1	13/2$^+$			
496.3 *5*	1 *1*	4980.4	27/2$^-$	4484.2	25/2$^-$			
497 *1*		5985.2	(33/2$^+$)	5488.0	(31/2$^+$)			
504‡ *1*		4959.5	25/2$^-$	4455.9	23/2$^-$			
508 *1*		5488.1	29/2$^-$	4980.4	27/2$^-$			
508.6 *5*	6 *2*	1341.0	9/2$^+$	832.2	7/2$^+$			
511.6 *5*	4@ *2*	6335.5	33/2$^-$	5823.9	31/2$^-$			
513.4 *5*	15@ *5*	1854.7	11/2$^+$	1341.0	9/2$^+$	M1+E2	≈+0.28	Mult.: A_2/A_0=+0.15 *3*, A_4/A_0=+0.04 *7* (1994Is01), Magnetic Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
525 *1*		6508.4	(35/2$^+$)	5983.4	(33/2$^+$)			
526 *1*		6511.1	(35/2$^+$)	5985.2	(33/2$^+$)			
533 *1*		7041.4	(37/2$^+$)	6508.4	(35/2$^+$)			
549 *1*		2820.9	(17/2$^+$)	2271.6	15/2$^+$			
554.0 *5*	18@ *3*	4484.2	25/2$^-$	3930.3	23/2$^-$	D+Q	≈−0.1	Mult.: A_2/A_0=−0.42 *5*, A_4/A_0=+0.04 *9* (1994Is01), mixed Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
564 *1*		3214.7	(19/2$^+$)	2650.5	17/2$^+$			
567 *1*		7482.4	37/2$^-$	6915.3	35/2$^-$			
593 *1*		7437.2	(35/2$^-$)	6844.2	(31/2$^-$)			
622 *1*		8228.2	(39/2$^-$)	7606.1	(35/2$^-$)			
658.8 *5*	3 *1*	3873.6	(23/2$^+$)	3214.7	(19/2$^+$)			
678.5 *5*	3 *1*	5165.1	27/2$^-$	4487.0	23/2$^-$			
699.4 *5*	5 *2*	4234.1	(25/2$^+$)	3534.8	(21/2$^+$)			
703‡ *1*		5892.7	(29/2$^-$)	5189.7	(27/2$^-$)			
706‡ *1*		4455.9	23/2$^-$	3750.4	21/2$^-$			
714 *1*		3534.8	(21/2$^+$)	2820.9	(17/2$^+$)			
727.1 *5*	2 *1*	3377.4	19/2$^+$	2650.5	17/2$^+$			E_γ: not given by 1996Sc29, seen and placed in 1994Is01 an 1994Ja06.
728‡ *1*		5892.7	(29/2$^-$)	5165.1	27/2$^-$			
738 *1*		6630.8	(31/2$^-$)	5892.7	(29/2$^-$)			
752.6 *5*	4 *2*	4626.4	(27/2$^+$)	3873.6	(23/2$^+$)			
753.6 *5*	4 *2*	1854.7	11/2$^+$	1100.8	9/2$^+$			
756.0[a] *5*	7[a]@ *3*	4243.8	21/2$^-$	3487.9	19/2$^-$	D+Q	≈−0.1	Mult.: A_2/A_0=−0.42 *5*, A_4/A_0=+0.04 *9* (1994Is01), for both 756.0γ and 757.4γ.
756‡ *1*		5561.7	(27/2$^-$)	4805.7	25/2$^-$			
757.4[a] *5*	7[a]@ *3*	4245.4	21/2$^-$	3487.9	19/2$^-$	D+Q		Mult.: A_2/A_0=−0.42 *5*, A_4/A_0=+0.04 *9* (1994Is01), both for 756.0γ and 757.4γ.
762 *1*		7606.1	(35/2$^-$)	6844.2	(31/2$^-$)			
763.0 *5*	5 *2*	5568.9	29/2$^-$	4805.7	25/2$^-$			
766 *1*		7606.1	(35/2$^-$)	6840.1	(31/2$^-$)			
791 *1*		8228.2	(39/2$^-$)	7437.2	(35/2$^-$)			
806 *1*		7437.2	(35/2$^-$)	6630.8	(31/2$^-$)			
809.4 *5*	5 *2*	5043.4	(29/2$^+$)	4234.1	(25/2$^+$)			
832 *1*		6630.8	(31/2$^-$)	5798.8				
832.1[b] *5*	4[b] *2*	5997.0	31/2$^-$	5165.1	27/2$^-$			
832.2[b] *5*	18[b] *4*	832.2	7/2$^+$	0.0	5/2$^+$	D+Q	≈−0.1	Mult.: A_2/A_0=−0.34 *5*, A_4/A_0=+0.02 *9* (1994Is01), for both 832.1γ and 832.2γ.
837.3 *5*	7@ *2*	3487.9	19/2$^-$	2650.5	17/2$^+$	D		Mult.: A_2/A_0=−0.18 *8*, A_4/A_0=+0.16 *12* (1994Is01).
843.7 *5*	13@ *2*	5823.9	31/2$^-$	4980.4	27/2$^-$			
844 *1*		6668.0	35/2$^-$	5823.9	31/2$^-$			
847.5 *5*	5 *2*	6335.5	33/2$^-$	5488.0	(31/2$^+$)			

Continued on next page (footnotes at end of table)

^{54}Fe(^{58}Ni,3pγ) 1996Sc29,1994Is01,1998LaZU (continued)

γ(^{109}Sb) (continued)

E_γ[†]	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	Comments
852.9 *5*	20[@] *2*	2193.9	13/2$^+$	1341.0	9/2$^+$	E2	Mult.: A_2/A_0=+0.26 *5*, A_4/A_0=−0.02 *9* (1994Is01), Electric Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
861 *1*		9089.2	(43/2$^-$)	8228.2	(39/2$^-$)		
862 *1*		5488.0	(31/2$^+$)	4626.4	(27/2$^+$)		
867 *1*		7437.2	(35/2$^-$)	6570.2			
878[‡] *1*		4684.1	23/2$^-$	3805.3	19/2$^-$		
879 *1*		5505.4	(31/2$^+$)	4626.4	(27/2$^+$)		
882.4 *5*	3 *1*	6451.5	33/2$^-$	5568.9	29/2$^-$		
[x]903 *1*							Eγ: only given in 1994Ja06, placed as a transition from the (43/2$^+$) level in band 2.
907.4 *5*	39 *8*	3487.9	19/2$^-$	2580.6	15/2$^-$	E2	Mult.: A_2/A_0=+0.31 *5*, A_4/A_0=−0.16 *9* (1994Is01), Electric Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
912[‡] *1*		5892.7	(29/2$^-$)	4980.4	27/2$^-$		
914 *1*		6630.8	(31/2$^-$)	5716.8			
918.6 *5*	3 *1*	6915.3	35/2$^-$	5997.0	31/2$^-$		
933 *1*		5892.7	(29/2$^-$)	4959.5	25/2$^-$		
938[‡] *1*		7606.1	(35/2$^-$)	6668.0	35/2$^-$		
940 *1*		5983.4	(33/2$^+$)	5043.4	(29/2$^+$)		
942 *1*		5985.2	(33/2$^+$)	5043.4	(29/2$^+$)		
968 *1*		10058.0+x	(47/2$^+$)	9089.2+x	(43/2$^+$)		
968[‡] *1*		4455.9	23/2$^-$	3487.9	19/2$^-$		Eγ: 1996Sc29 placed a 968γ from the (47/2$^+$) level in band 2.
977 *1*		10066.2	(47/2$^-$)	9089.2	(43/2$^-$)		
991.4 *5*	30[@] *6*	2092.1	13/2$^+$	1100.8	9/2$^+$	E2	Mult.: A_2/A_0=+0.29 *3*, A_4/A_0=−0.10 *7* (1994Is01), Electric Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
1003 *1*		6508.4	(35/2$^+$)	5505.4	(31/2$^+$)		
1003.8 *5*	6[@] *2*	5488.1	29/2$^-$	4484.2	25/2$^-$	Q	Mult.: A_2/A_0=+0.28 *8*, A_4/A_0=+0.12 *12* (1994Is01).
[x]1005 *1*							Eγ: only given in 1994Ja06, placed as a transition from the (49/2$^+$) level in band 3.
1009[‡] *1*		3589.3	19/2$^-$	2580.6	15/2$^-$		
1014 *1*		7349.5	37/2$^-$	6335.5	33/2$^-$		
1015.7 *5*	4 *2*	7683.7	39/2$^-$	6668.0	35/2$^-$		Eγ: placed as deexciting a 35/2$^-$ level in 1994Is01.
1022.6 *5*	5 *2*	1854.7	11/2$^+$	832.2	7/2$^+$		
1023 *1*		6511.1	(35/2$^+$)	5488.0	(31/2$^+$)		
1029[‡] *1*		4959.5	25/2$^-$	3930.3	23/2$^-$		Eγ: 1994Is01 placed a 1029.4γ from the 3301 level.
1029.4 *5*	2 *1*	3300.9	17/2$^+$	2271.6	15/2$^+$		Eγ: not given by 1996Sc29, seen and placed by 1994Is01. 1998LaZU placed a 1029γ from a level at E=4960, J^π=(25/2$^-$).
1031 *1*		7482.4	37/2$^-$	6451.5	33/2$^-$		
1035 *1*		11093.0+x	(51/2$^+$)	10058.0+x	(47/2$^+$)		
1050.0 *5*	26[@] *4*	4980.4	27/2$^-$	3930.3	23/2$^-$	E2	Mult.: A_2/A_0=+0.35 *3*, A_4/A_0=−0.18 *7* (1994Is01), Electric Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
1058 *1*		7041.4	(37/2$^+$)	5983.4	(33/2$^+$)		
1079.7 *5*	46[@] *3*	2580.6	15/2$^-$	1500.9	11/2$^-$	E2	Mult.: A_2/A_0=+0.29 *2*, A_4/A_0=−0.06 *4* (1994Is01), Electric Multipole (from polarization anisotropy, Fig.2 in 1994Is01).
1093 *1*		11159.2	(51/2$^-$)	10066.2	(47/2$^-$)		
1093.3 *5*	16[@] *3*	2193.9	13/2$^+$	1100.8	9/2$^+$	Q	Eγ: not given by 1996Sc29, seen and placed in 1994Is01 and 1994Ja06. Mult.: A_2/A_0=+0.11 *8*, A_4/A_0=−0.01 *12* (1994Is01).

Continued on next page (footnotes at end of table)

^{54}Fe(^{58}Ni,3pγ) 1996Sc29,1994Is01,1998LaZU (continued)

γ(^{109}Sb) (continued)

E_γ [†]	I_γ [#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	Comments
1095[‡] *1*		4684.1	23/2$^-$	3589.3	19/2$^-$		
1100[c]		3750.4	21/2$^-$	2650.5	17/2$^+$		E_γ: from 1994Ja06 only.
1100.7 *5*	100[@]	1100.8	9/2$^+$	0.0	5/2$^+$	E2	Mult.: A_2/A_0=+0.27 *2*, A_4/A_0=−0.08 *4* (1994Is01), Electric Multipole (Fig.2 in 1994Is01, polarization anisotropy).
1102 *1*		11169.0+y	(53/2$^+$)	10066.2+y	(49/2$^+$)		
1105.6 *5*	30[@] *3*	3377.4	19/2$^+$	2271.6	15/2$^+$	Q	Mult.: A_2/A_0=+0.30 *3*, A_4/A_0=−0.21 *7* (1994Is01).
1111.3 *5*	6[@] *3*	3761.7	21/2$^+$	2650.5	17/2$^+$	Q	Mult.: A_2/A_0=+0.25 *8*, A_4/A_0=−0.25 *12* (1994Is01).
1123 *1*		12216.0+x	(55/2$^+$)	11093.0+x	(51/2$^+$)		
1143[‡] *1*		6630.8	(31/2$^-$)	5488.0	(31/2$^+$)		
1177[‡] *1*		6157.3	(31/2$^-$)	4980.4	27/2$^-$		
1203 *1*		12362.2	(55/2$^-$)	11159.2	(51/2$^-$)		
1208.8 *5*	6 *3*	3300.9	17/2$^+$	2092.1	13/2$^+$		
1223 *1*		13439.0+x	(59/2$^+$)	12216.0+x	(55/2$^+$)		
1224[‡] *1*		3805.3	19/2$^-$	2580.6	15/2$^-$		
1225 *1*		12394.0+y	(57/2$^+$)	11169.0+y	(53/2$^+$)		
1280 *1*		7437.2	(35/2$^-$)	6157.3	(31/2$^-$)		
1283 *1*		11350.0+w	(53/2$^-$)	10066.2+w	(49/2$^-$)		
1308[‡] *1*		7465.3	(35/2$^-$)	6157.3	(31/2$^-$)		
1314 *1*		13708.0+y	(61/2$^+$)	12394.0+y	(57/2$^+$)		
1326 *1*		13688	(59/2$^-$)	12362.2	(55/2$^-$)		
1341 *1*		13704.0+z	(63/2$^+$)	12362.2+z	(59/2$^+$)		
1341.1 *5*	29 *9*	1341.0	9/2$^+$	0.0	5/2$^+$	Q	Mult.: A_2/A_0=+0.25 *8*, A_4/A_0=−0.20 *12* (1994Is01).
1342 *1*		14781.0+x	(63/2$^+$)	13439.0+x	(59/2$^+$)		
1406 *1*		15114.0+y	(65/2$^+$)	13708.0+y	(61/2$^+$)		
1417 *1*		4243.8	21/2$^-$	2826.6	17/2$^-$		
1440[‡] *1*		7437.2	(35/2$^-$)	5997.0	31/2$^-$		
1461[‡] *1*		7437.2	(35/2$^-$)	5976.0	(31/2$^-$)		
1476 *1*		15164	(63/2$^-$)	13688	(59/2$^-$)		
1503 *1*		16284.0+x	(67/2$^+$)	14781.0+x	(63/2$^+$)		
1510 *1*		16624.0+y	(69/2$^+$)	15114.0+y	(65/2$^+$)		
1529 *1*		12879.0+w	(57/2$^-$)	11350.0+w	(53/2$^-$)		
1529 *1*		15233.0+z	(67/2$^+$)	13704.0+z	(63/2$^+$)		
1614[‡] *1*		7437.2	(35/2$^-$)	5823.9	31/2$^-$		
1648 *1*		16812	(67/2$^-$)	15164	(63/2$^-$)		
1649 *1*		18273.1+y	(73/2$^+$)	16624.0+y	(69/2$^+$)		
1650[‡] *1*		6630.8	(31/2$^-$)	4980.4	27/2$^-$		
1678 *1*		17962+x	(71/2$^+$)	16284.0+x	(67/2$^+$)		
1724 *1*		16957.0+z	(71/2$^+$)	15233.0+z	(67/2$^+$)		
1761 *1*		14640.0+w	(61/2$^-$)	12879.0+w	(57/2$^-$)		
1849 *1*		18661	(71/2$^-$)	16812	(67/2$^-$)		
1851 *1*		20124+y	(77/2$^+$)	18273.1+y	(73/2$^+$)		
1880 *1*		19842+x	(75/2$^+$)	17962+x	(71/2$^+$)		
1929 *1*		18886.1+z	(75/2$^+$)	16957.0+z	(71/2$^+$)		
1937 *1*		16577.1+w	(65/2$^-$)	14640.0+w	(61/2$^-$)		
2030 *1*		6630.8	(31/2$^-$)	4600.8	(27/2$^-$)		
2060 *1*		18637.1+w	(69/2$^-$)	16577.1+w	(65/2$^-$)		
2097 *1*		20758	(75/2$^-$)	18661	(71/2$^-$)		
2116 *1*		21958+x	(79/2$^+$)	19842+x	(75/2$^+$)		
2118 *1*		22242+y	(81/2$^+$)	20124+y	(77/2$^+$)		

Continued on next page (footnotes at end of table)

^{54}Fe(^{58}Ni,3pγ) 1996Sc29,1994Is01,1998LaZU (continued)

$\gamma(^{109}Sb)$ (continued)

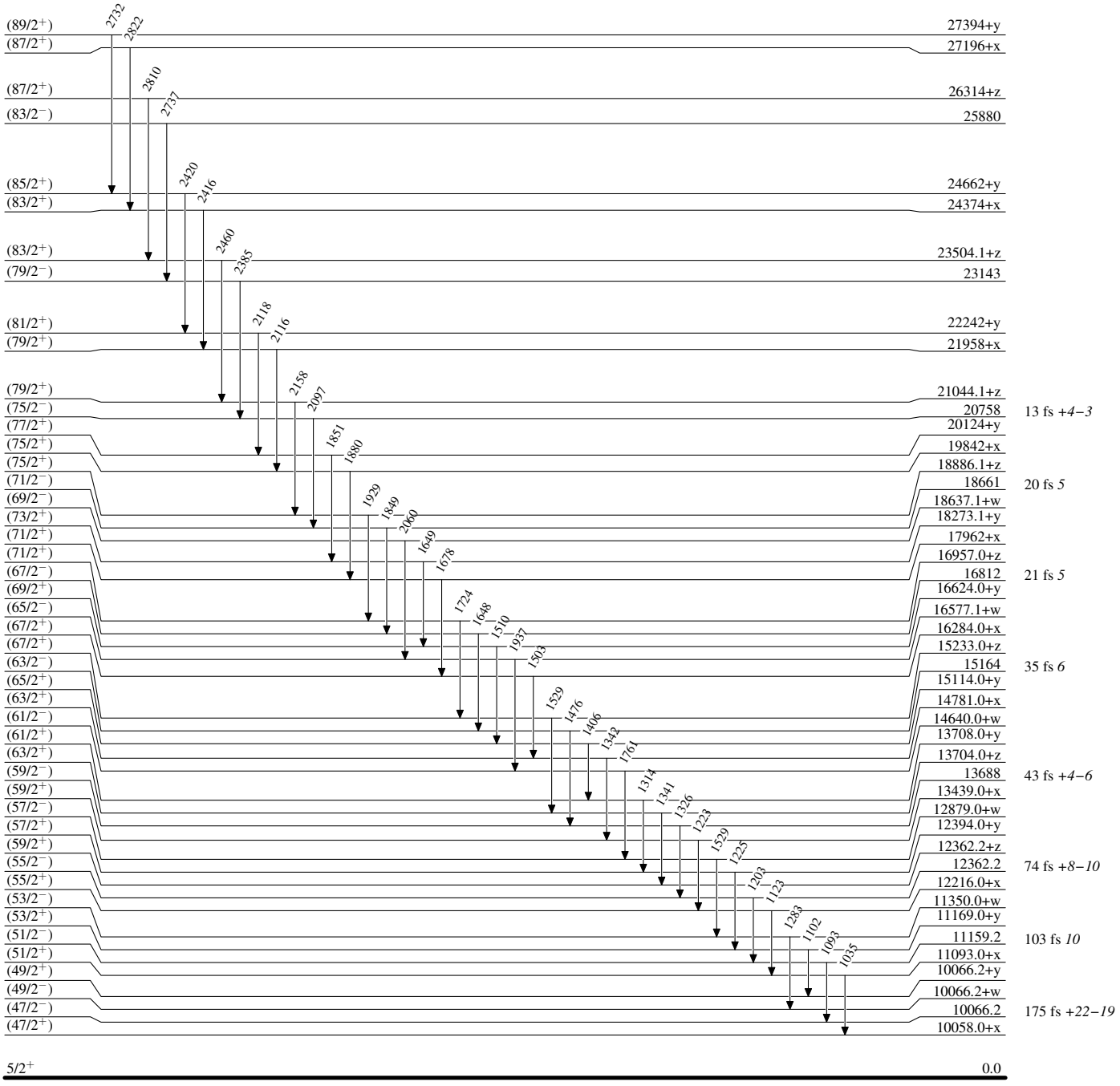
E_γ †	E_i(level)	J_i^π	E_f	J_f^π	E_γ †	E_i(level)	J_i^π	E_f	J_f^π
2158 *1*	21044.1+z	$(79/2^+)$	18886.1+z	$(75/2^+)$	2732 *1*	27394+y	$(89/2^+)$	24662+y	$(85/2^+)$
2385 *1*	23143	$(79/2^-)$	20758	$(75/2^-)$	2737 *1*	25880	$(83/2^-)$	23143	$(79/2^-)$
2416 *1*	24374+x	$(83/2^+)$	21958+x	$(79/2^+)$	2810 *1*	26314+z	$(87/2^+)$	23504.1+z	$(83/2^+)$
2420 *1*	24662+y	$(85/2^+)$	22242+y	$(81/2^+)$	2822 *1*	27196+x	$(87/2^+)$	24374+x	$(83/2^+)$
2460 *1*	23504.1+z	$(83/2^+)$	21044.1+z	$(79/2^+)$					

† Energies with decimal point are from 1994Is01 with $\Delta E\gamma$=0.5 keV assumed by evaluators. The other energies are from the level scheme of 1996Sc29 and/or 1998LaZU with $\Delta E\gamma$=1 keV assumed by evaluators.
‡ From 1998LaZU only.
# From 1994Is01, unless otherwise stated.
@ From 1994Is01, taken from a singles spectrum.
& From 1994Is01 based on $\gamma(\theta)$, γ-linear polarization and 1996Sc29 based on coincidences and systematics. DCO were measured in 1994Ja06.
a Multiply placed with undivided intensity.
b Multiply placed with intensity suitably divided.
c Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

^{54}Fe(^{58}Ni,3pγ) 1996Sc29,1994Is01,1998LaZU

Level Scheme

Intensities: Relative I_γ



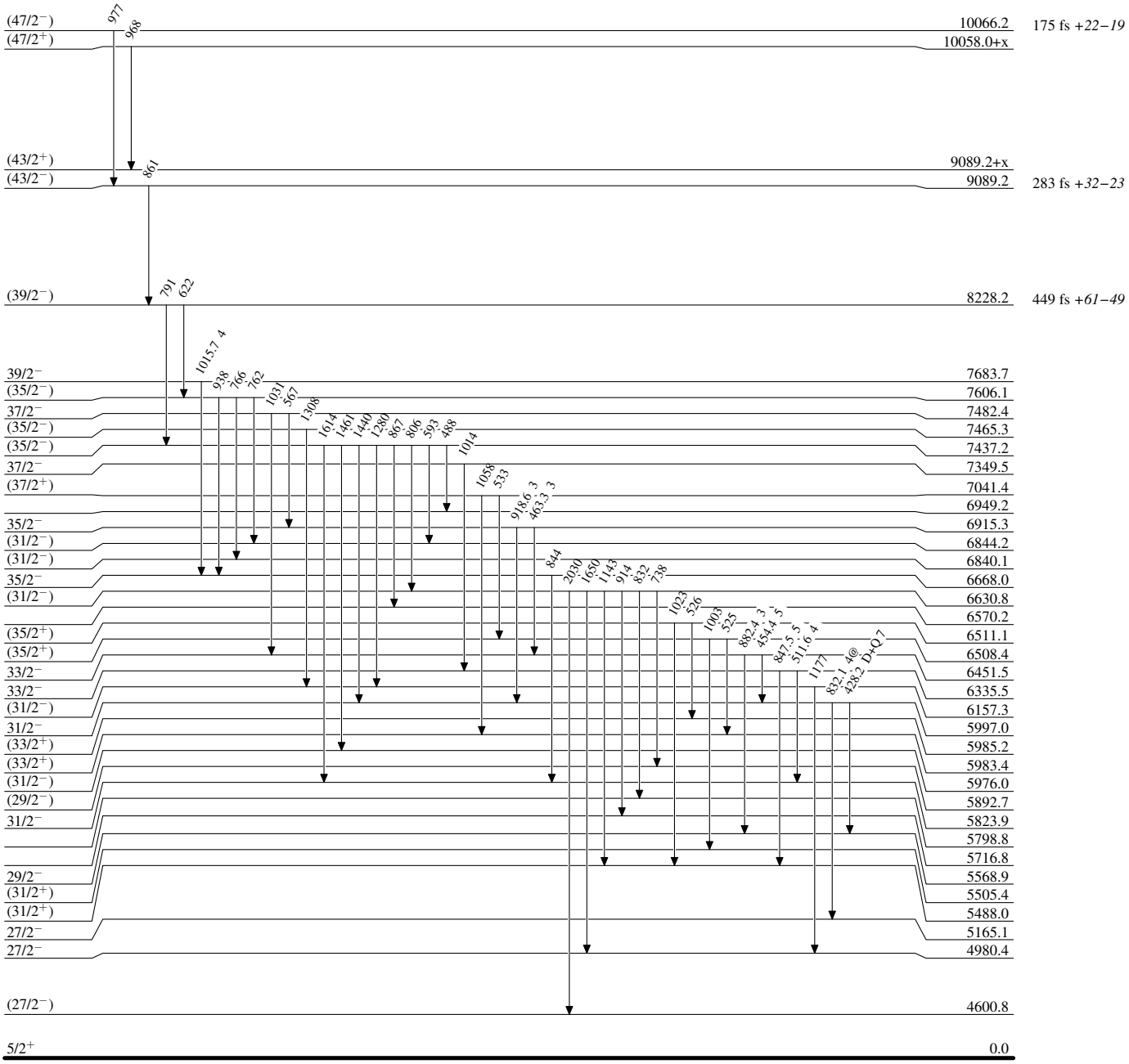
$^{109}_{51}Sb_{58}$

^{54}Fe(^{58}Ni,3pγ) 1996Sc29,1994Is01,1998LaZU

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

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



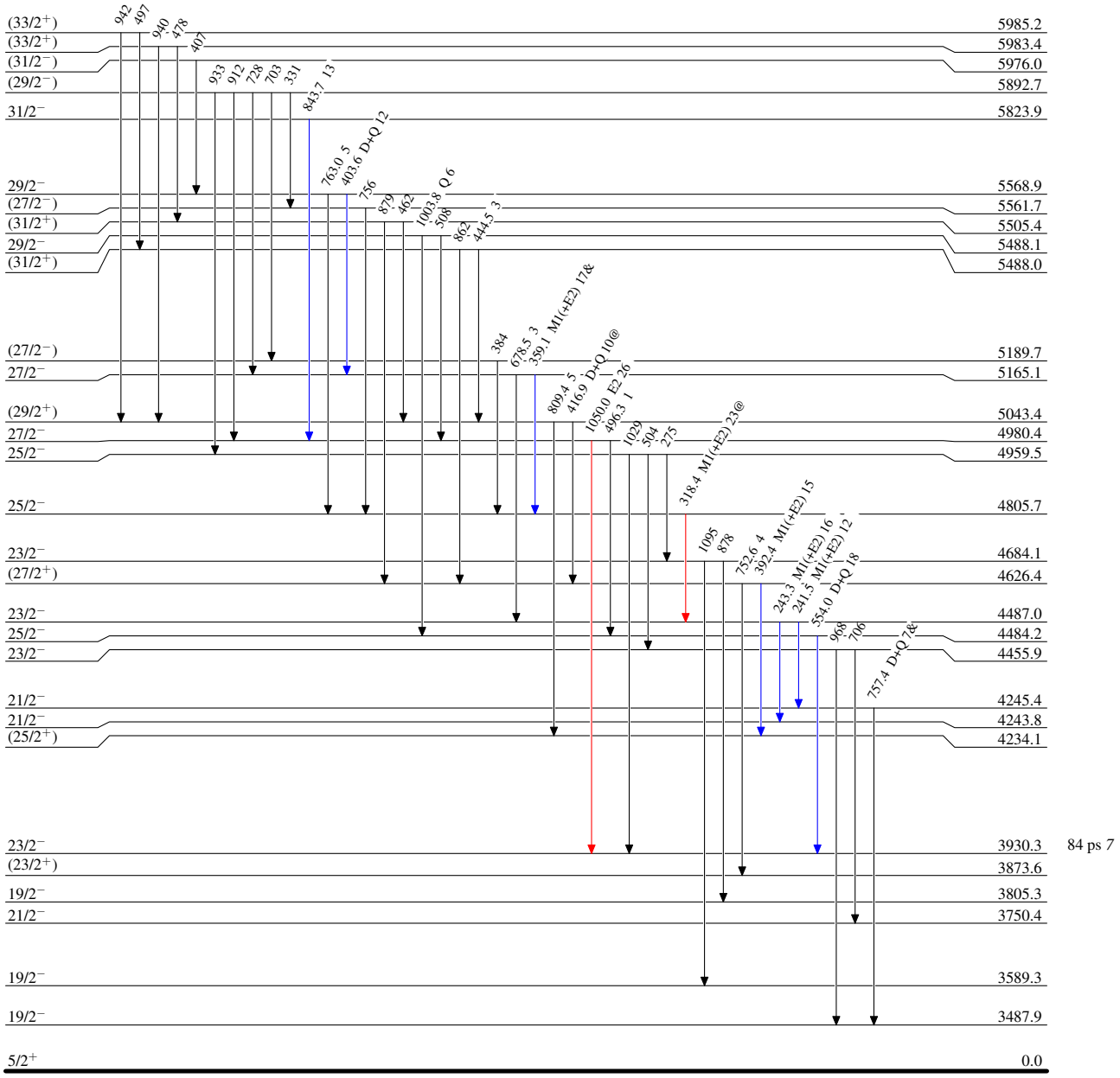
$^{109}_{51}Sb_{58}$

^{54}Fe(^{58}Ni,3pγ) 1996Sc29,1994Is01,1998LaZU

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

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



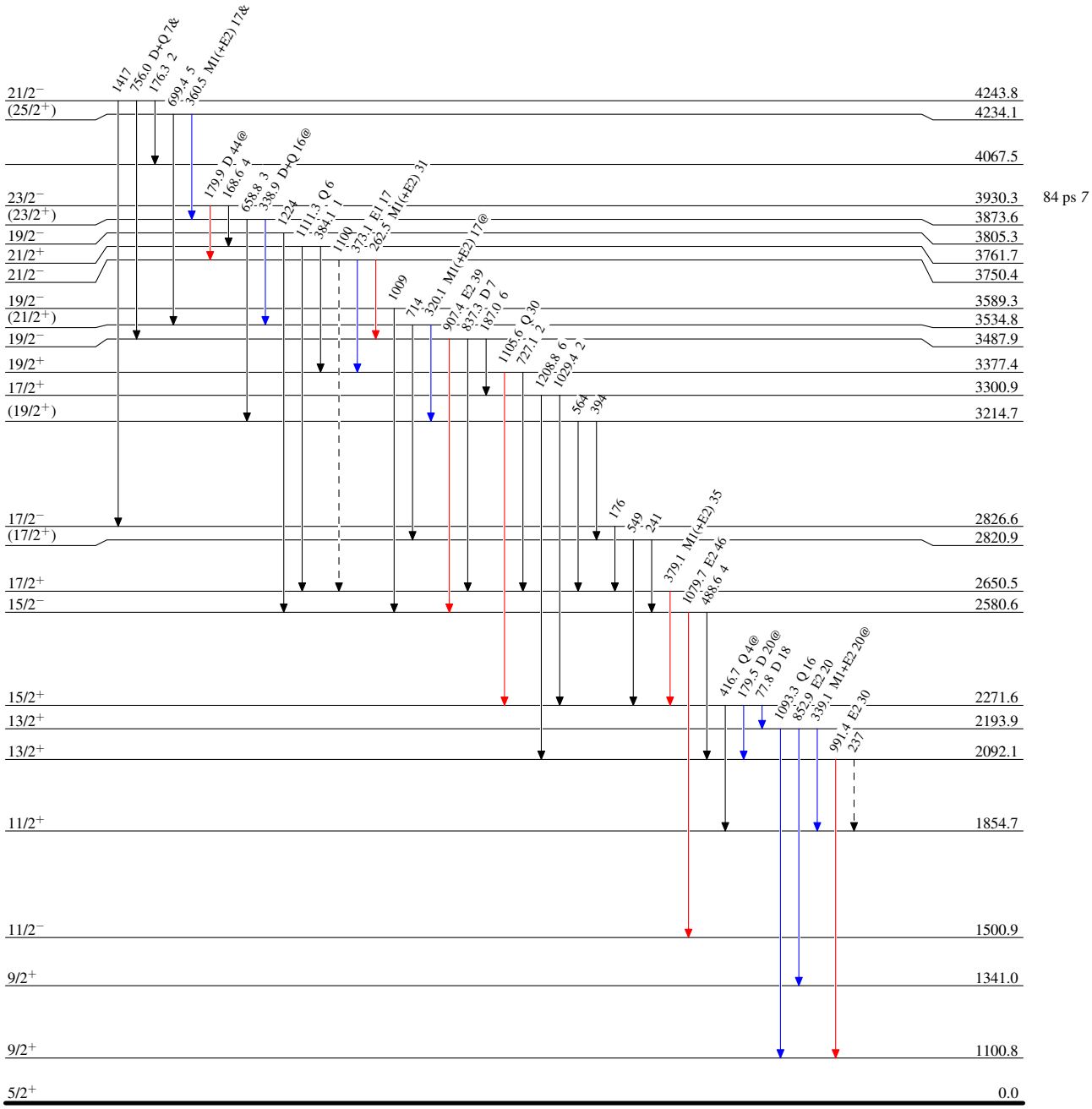
$^{109}_{51}Sb_{58}$

^{54}Fe(^{58}Ni,3pγ) 1996Sc29,1994Is01,1998LaZU

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



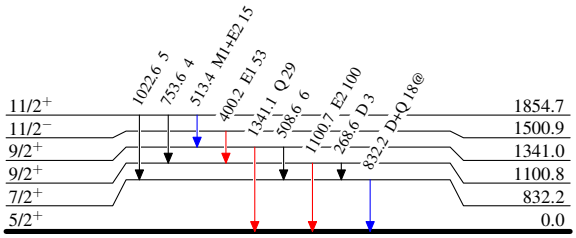
$^{109}_{51}Sb_{58}$

^{54}Fe(^{58}Ni,3pγ) 1996Sc29,1994Is01,1998LaZU

Level Scheme (continued)

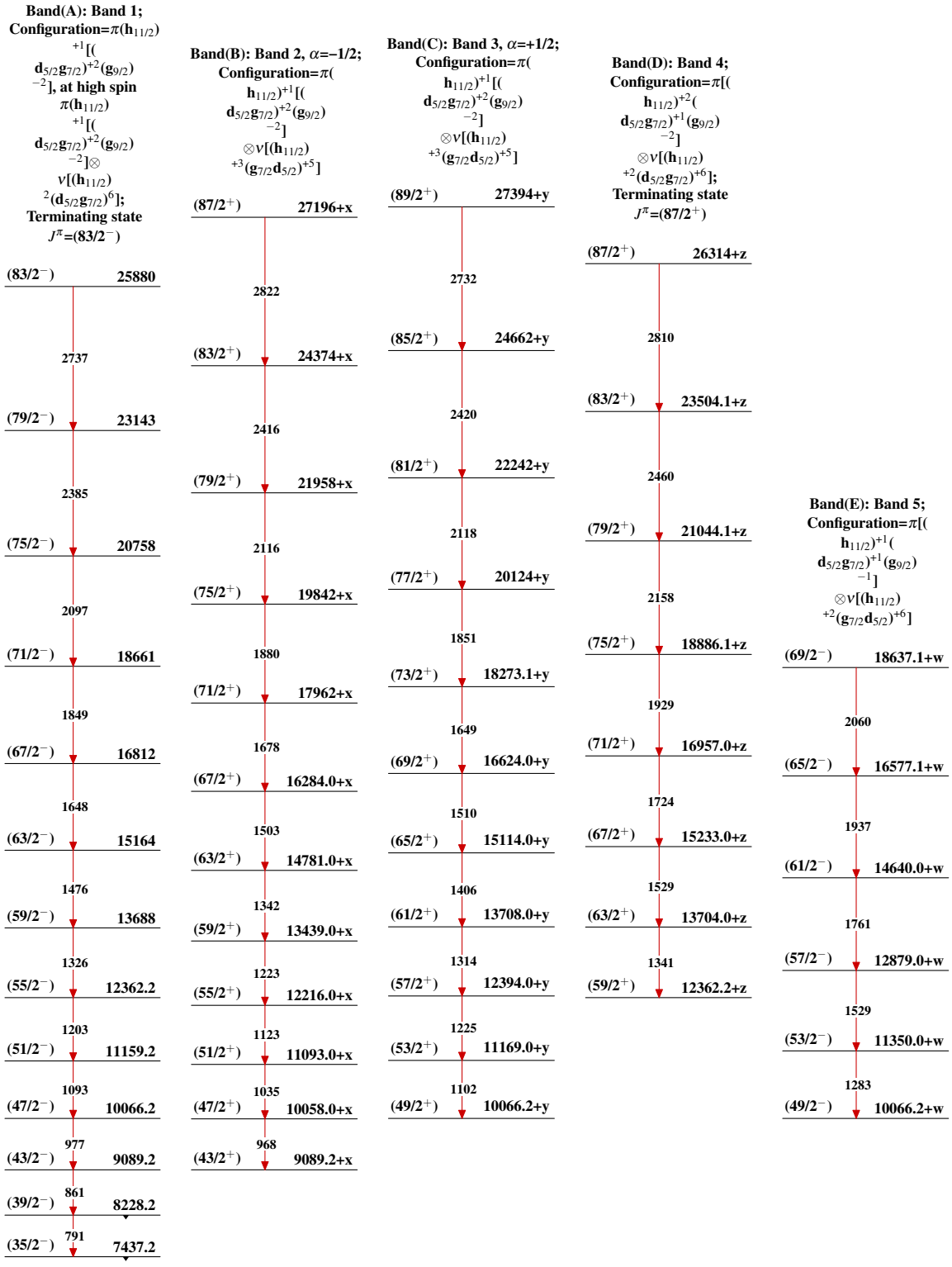
Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

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



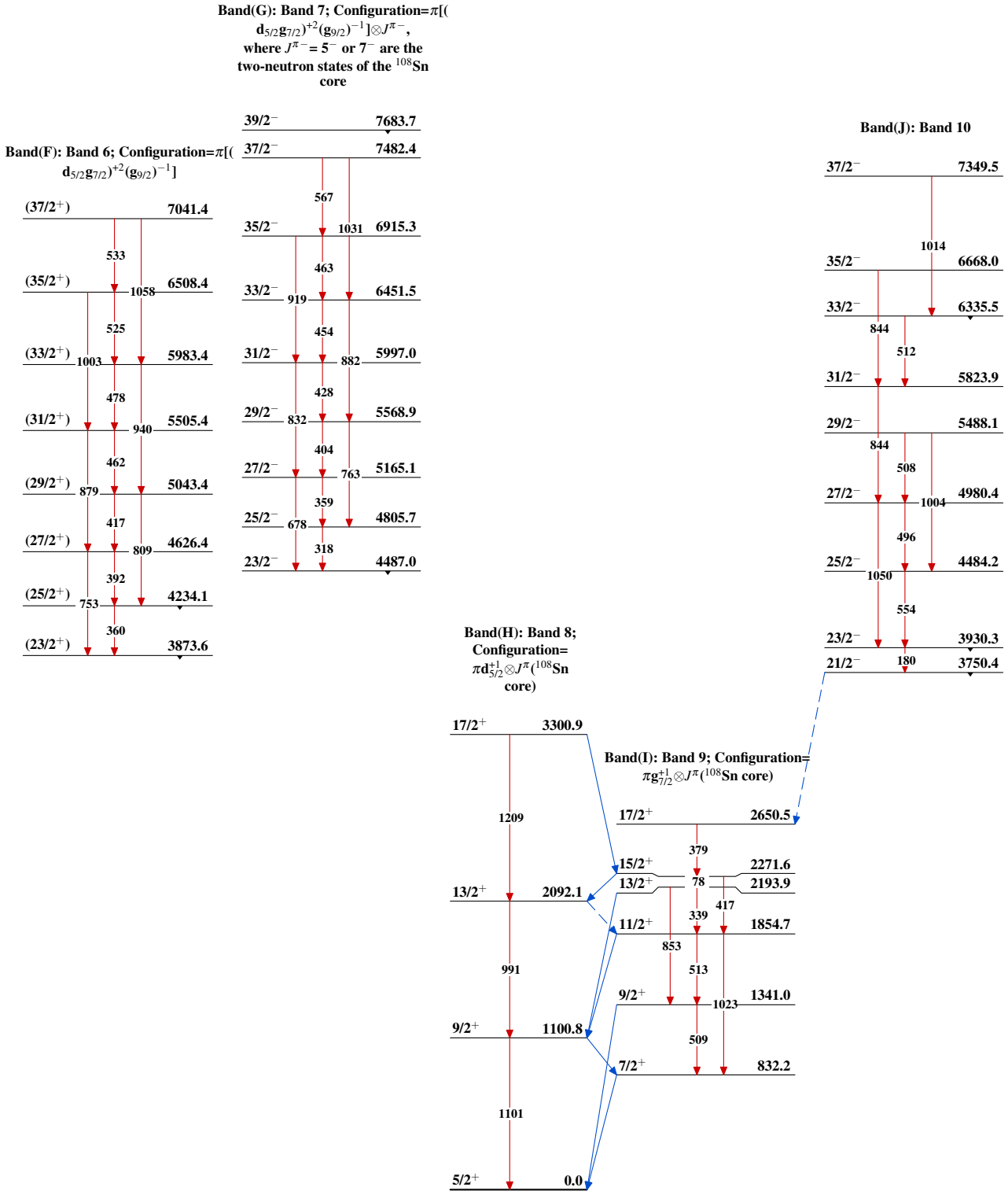
$^{109}_{51}Sb_{58}$

^{54}Fe(^{58}Ni,3pγ) 1996Sc29,1994Is01,1998LaZU



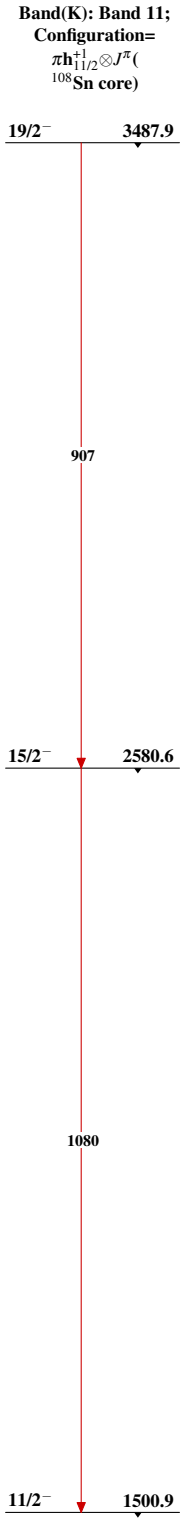
$^{109}_{51}Sb_{58}$

$^{54}Fe(^{58}Ni,3p\gamma)$ 1996Sc29,1994Is01,1998LaZU (continued)



$^{109}_{51}Sb_{58}$

^{54}Fe(^{58}Ni,3pγ) 1996Sc29,1994Is01,1998LaZU (continued)



$^{109}_{51}Sb_{58}$