^{58}Ni(^{29}Si,α2pγ) 1995Ch56,2003Le08

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia	NDS 199,271 (2025)	1-Sep-2024

Slightly edited dataset of May 13, 2003 (by B. Singh) of SD band data.
Additional information 1.
1995Ch56: E=128 MeV; self-supporting enriched target, GAMMASPHERE array (36 Compton-suppressed HPGe detectors) and microball (95 charged particle detectors); measured Eγ, Iγ, α(2p)($\gamma\gamma\gamma$) coin. Lifetime data analyzed by 1997De51 and transition quadrupole moment deduced for SD-1 and SD-2 bands.
2003Le08, 1999Le56: E=130 MeV. Measured Eγ, Iγ, $\gamma\gamma$, lifetimes by DSAM using GAMMASPHERE array with 100 Compton-suppressed HPGe detectors and Microball array for charged particles with 95 CsI(Tl) detectors. Deduced SD bands and transition quadrupole moments.

^{81}Sr Levels

E(level)†	J$^\pi$@	E(level)†	J$^\pi$@	E(level)†	J$^\pi$@
0#	1/2$^-$&	8823‡g	(39/2$^-$)	9613.1+x[a] *21*	J1+12
79[e]	5/2$^-$	9250‡f	39/2$^-$	9714.8+x[c] *23*	J1+12
89#	(7/2$^+$)&	9404‡h	41/2$^+$	11753.1+x[a] *23*	J1+14
132[h]	9/2$^+$	9930‡e	41/2$^-$	11918.8+x[c] *25*	J1+14
366[f]	7/2$^-$	10397‡g	(43/2$^-$)	14047.2+x[a] *25*	J1+16
707[e]	9/2$^-$	10829‡f	43/2$^-$	14288+x[c] *3*	J1+16
904[h]	13/2$^+$	11256‡h	45/2$^+$	16488+x[a] *3*	J1+18
1055[f]	11/2$^-$	11615‡e	45/2$^-$	16823+x[c] *3*	J1+18
1506[e]	13/2$^-$	12115[g]	(47/2$^-$)	19052+x[a] *3*	J1+20
1864[h]	17/2$^+$	12525[f]	47/2$^-$	19519+x[c] *3*	J1+20
1910[f]	15/2$^-$	13426[h]	49/2$^+$	21713+x[a] *3*	J1+22
2449[e]	17/2$^-$	13487[e]	49/2$^-$	22364+x?[c] *4*	J1+22
2904[f]	19/2$^-$	14011[g]	(51/2$^-$)	24460+x[a] *4*	J1+24
2961[h]	21/2$^+$	14424[f]	51/2$^-$	y[b]	J2≈(33/2)
3497[e]	21/2$^-$	15577[e]	53/2$^-$	1646.0+y[b] *10*	J2+2
3978[f]	23/2$^-$	15923[h]	53/2$^+$	3420.0+y[b] *15*	J2+4
4105[h]	25/2$^+$	16177[g]	(55/2$^-$)	5346.1+y[b] *18*	J2+6
4552[e]	25/2$^-$	16794[f]	55/2$^-$	7430.1+y[b] *20*	J2+8
4999‡g	(27/2$^-$)	17957[e]	57/2$^-$	9670.1+y[b] *23*	J2+10
5103‡f	27/2$^-$	18721[g]	(59/2$^-$)	12068.2+y[b] *25*	J2+12
5241‡h	29/2$^+$	x[a]	J1≈(31/2)	14608+y[b] *3*	J2+14
5706‡e	29/2$^-$	1215.0+x[a] *10*	J1+2	17305+y[b] *3*	J2+16
6135‡g	(31/2$^-$)	2586.0+x[a] *15*	J1+4	z[d]	J3≈(41/2)
6358‡f	31/2$^-$	2591.4+x[c] *20*	J1+4	1940.0+z[d] *10*	J3+2
6483‡h	33/2$^+$	4105.7+x[a] *17*	J1+6	4042.1+z[d] *15*	J3+4
6990‡e	33/2$^-$	4119.4+x[c] *17*	J1+6	6302.1+z[d] *18*	J3+6
7403‡g	(35/2$^-$)	5785.4+x[a] *17*	J1+8	8711.1+z[d] *20*	J3+8
7761‡f	35/2$^-$	5796.7+x[c] *17*	J1+8	11253.2+z[d] *23*	J3+10
7859‡h	37/2$^+$	7625.1+x[a] *18*	J1+10	13852.2+z?[d] *25*	J3+12
8404‡e	37/2$^-$	7679.7+x[c] *20*	J1+10		

† From a least-squares fit to Eγ, assigning equal weight to all Eγ and holding E(level)=79, 132, 366 fixed.

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^{58}Ni(^{29}Si,α2pγ) 1995Ch56,2003Le08 (continued)

^{81}Sr Levels (continued)

‡ Level fed by decay of SD band(s).
# Rounded-off energy from Adopted Levels; level not indicated in level scheme in fig. 2 of 1995Ch56, but it must be populated because the 79 and 132 levels are populated.
@ From 1995Ch56 for normal deformation states and from 2003Le08 for superdeformed band members, except as noted. Justification of J values not given by authors. These values differ from the adopted ones only with regard to the use of parentheses.
& Adopted value.
a Band(A): SD-1 band (2003Le08,1995Ch56,1999Le56). Q(transition)=3.30 *+18−16* (1999Le56), 3.08 *+16−15* (2003Le08), 3.5 *+8−7* (1997De51, reanalysis of data of 1995Ch56). Configuration: $\nu 5^1\pi 5^0$ (2003Le08). Percent population=1.02 (2003Le08), ≈1.5 (1995Ch56). Probable (π,α)=(−,+1/2) corresponding to configuration: ((ν 1/2[550])$^{-1}$). Predicted β_2=0.50 (1995Ch56).
b Band(B): SD-2 band (2003Le08,1995Ch56). Q(transition)=3.30 *+27−21* (2003Le08), 3.8 *+7−5* (1997De51, reanalysis of data of 1995Ch56). Configuration: $\nu 5^1\pi 5^0$ (2003Le08). Percent population=0.63 (2003Le08), ≈1.0 (1995Ch56). Probable (π,α)=(+,−1/2) corresponding to configuration: ((ν 1/2[431])$^{-1}$). Predicted β_2=0.55 (1995Ch56).
c Band(C): SD-3 band (2003Le08,1995Ch56). Percent population=0.40 (2003Le08), ≈0.6 (1995Ch56). Probable (π,α)=(+,+1/2) corresponding to configuration: ((ν 5/2[422])$^{-1}$). Predicted β_2=0.55 (1995Ch56).
d Band(D): SD-4 band (2003Le08,1995Ch56). Percent population=0.29 (2003Le08), ≈0.6 (1995Ch56).
e Band(E): (ν 5/2[303]), α=+1/2 band.
f Band(e): (ν 5/2[303]), α=−1/2 band.
g Band(F): Possible π=−, α=−1/2 band.
h Band(G): (ν 5/2[422]) decoupled yrast band.

γ(^{81}Sr)

E_γ †	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π
628		707	9/2$^-$	79	5/2$^-$
689		1055	11/2$^-$	366	7/2$^-$
772		904	13/2$^+$	132	9/2$^+$
799		1506	13/2$^-$	707	9/2$^-$
855		1910	15/2$^-$	1055	11/2$^-$
943		2449	17/2$^-$	1506	13/2$^-$
960		1864	17/2$^+$	904	13/2$^+$
994		2904	19/2$^-$	1910	15/2$^-$
1021 *1*		4999	(27/2$^-$)	3978	23/2$^-$
1048		3497	21/2$^-$	2449	17/2$^-$
1055 *1*		4552	25/2$^-$	3497	21/2$^-$
1074 *1*		3978	23/2$^-$	2904	19/2$^-$
1097		2961	21/2$^+$	1864	17/2$^+$
1125 *1*		5103	27/2$^-$	3978	23/2$^-$
1136 *1*		5241	29/2$^+$	4105	25/2$^+$
1136 *1*		6135	(31/2$^-$)	4999	(27/2$^-$)
1144 *1*		4105	25/2$^+$	2961	21/2$^+$
1154 *1*		5706	29/2$^-$	4552	25/2$^-$
1215 *1*	0.65 *10*	1215.0+x	J1+2	x	J1≈(31/2)
1242 *1*		6483	33/2$^+$	5241	29/2$^+$
1255 *1*		6358	31/2$^-$	5103	27/2$^-$
1268 *1*		7403	(35/2$^-$)	6135	(31/2$^-$)
1284 *1*		6990	33/2$^-$	5706	29/2$^-$
1371 *1*	0.95 *10*	2586.0+x	J1+4	1215.0+x	J1+2
1376 *1*		7859	37/2$^+$	6483	33/2$^+$
1403 *1*		7761	35/2$^-$	6358	31/2$^-$
1414 *1*		8404	37/2$^-$	6990	33/2$^-$
1420 *1*		8823	(39/2$^-$)	7403	(35/2$^-$)
1489 *1*		9250	39/2$^-$	7761	35/2$^-$

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^{58}Ni(^{29}Si,α2pγ) 1995Ch56,2003Le08 (continued)

$\gamma(^{81}Sr)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Comments
1520 *1*	1.25 *15*	4105.7+x	J1+6	2586.0+x	J1+4	E_γ: 1518 (1995Ch56).
1526 *1*		9930	41/2$^-$	8404	37/2$^-$	
1528 *1*		4119.4+x	J1+6	2591.4+x	J1+4	
1533 *1*		4119.4+x	J1+6	2586.0+x	J1+4	
1545 *1*		9404	41/2$^+$	7859	37/2$^+$	
1574 *1*		10397	(43/2$^-$)	8823	(39/2$^-$)	
1579 *1*		10829	43/2$^-$	9250	39/2$^-$	
1646 *1*		1646.0+y	J2+2	y	J2≈(33/2)	E_γ: from 2003Le08 only.
1666 *1*		5785.4+x	J1+8	4119.4+x	J1+6	
1677 *1*		5796.7+x	J1+8	4119.4+x	J1+6	
1680 *1*	1.10 *10*	5785.4+x	J1+8	4105.7+x	J1+6	E_γ: 1678 (1995Ch56).
1685 *1*		11615	45/2$^-$	9930	41/2$^-$	
1691 *1*		5796.7+x	J1+8	4105.7+x	J1+6	
1696 *1*		12525	47/2$^-$	10829	43/2$^-$	
1718 *1*		12115	(47/2$^-$)	10397	(43/2$^-$)	
1774 *1*	0.95 *15*	3420.0+y	J2+4	1646.0+y	J2+2	
1828 *1*		7625.1+x	J1+10	5796.7+x	J1+8	
1840 *1*	1.45 *15*	7625.1+x	J1+10	5785.4+x	J1+8	
1852 *1*		11256	45/2$^+$	9404	41/2$^+$	
1872 *1*		13487	49/2$^-$	11615	45/2$^-$	
1883 *1*	0.60 *20*	7679.7+x	J1+10	5796.7+x	J1+8	E_γ: 1881 (1995Ch56).
1896 *1*		14011	(51/2$^-$)	12115	(47/2$^-$)	
1899 *1*		14424	51/2$^-$	12525	47/2$^-$	
1926 *1*	0.90 *15*	5346.1+y	J2+6	3420.0+y	J2+4	E_γ: 1924 (1995Ch56).
1940 *1*	0.50 *20*	1940.0+z	J3+2	z	J3≈(41/2)	E_γ: 1938 (1995Ch56).
1988 *1*	1.50 *15*	9613.1+x	J1+12	7625.1+x	J1+10	E_γ: 1986 (1995Ch56).
2035 *1*	0.80 *20*	9714.8+x	J1+12	7679.7+x	J1+10	
2084 *1*	1.20 *20*	7430.1+y	J2+8	5346.1+y	J2+6	
2090 *1*		15577	53/2$^-$	13487	49/2$^-$	
2102 *1*	0.70 *20*	4042.1+z	J3+4	1940.0+z	J3+2	E_γ: 2100 (1995Ch56).
2140 *1*	1.70 *15*	11753.1+x	J1+14	9613.1+x	J1+12	E_γ: 2138 (1995Ch56).
2166 *1*		16177	(55/2$^-$)	14011	(51/2$^-$)	
2170 *1*		13426	49/2$^+$	11256	45/2$^+$	
2204 *1*	0.50 *15*	11918.8+x	J1+14	9714.8+x	J1+12	E_γ: 2202 (1995Ch56).
2240 *1*	0.80 *20*	9670.1+y	J2+10	7430.1+y	J2+8	E_γ: 2238 (1995Ch56).
2260 *1*	0.55 *20*	6302.1+z	J3+6	4042.1+z	J3+4	E_γ: 2257 (1995Ch56).
2294 *1*	1.60 *15*	14047.2+x	J1+16	11753.1+x	J1+14	E_γ: 2292 (1995Ch56).
2369 *1*	0.50 *15*	14288+x	J1+16	11918.8+x	J1+14	
2370 *1*		16794	55/2$^-$	14424	51/2$^-$	
2380 *1*		17957	57/2$^-$	15577	53/2$^-$	
2398 *1*	0.75 *20*	12068.2+y	J2+12	9670.1+y	J2+10	E_γ: 2395 (1995Ch56).
2409 *1*	0.95 *20*	8711.1+z	J3+8	6302.1+z	J3+6	
2441 *1*	1.15 *15*	16488+x	J1+18	14047.2+x	J1+16	E_γ: 2439 (1995Ch56).
2497 *1*		15923	53/2$^+$	13426	49/2$^+$	
2535 *1*	0.45 *15*	16823+x	J1+18	14288+x	J1+16	E_γ: 2532 (1995Ch56).
2540 *1*	0.45 *20*	14608+y	J2+14	12068.2+y	J2+12	E_γ: 2537 (1995Ch56).
2542 *1*	0.55 *20*	11253.2+z	J3+10	8711.1+z	J3+8	
2544 *1*		18721	(59/2$^-$)	16177	(55/2$^-$)	
2564 *1*	0.80 *10*	19052+x	J1+20	16488+x	J1+18	E_γ: 2562 (1995Ch56).
2599[#]		13852.2+z?	J3+12	11253.2+z	J3+10	E_γ: from 2003Le08 only.
2661 *1*	0.20 *10*	21713+x	J1+22	19052+x	J1+20	E_γ: 2658 (1995Ch56).
2696 *1*	0.20 *10*	19519+x	J1+20	16823+x	J1+18	E_γ: 2691 (1995Ch56).
2697 *1*		17305+y	J2+16	14608+y	J2+14	E_γ: from 2003Le08 only.
2747 *1*	0.10 *5*	24460+x	J1+24	21713+x	J1+22	
2845[#]		22364+x?	J1+22	19519+x	J1+20	E_γ: from 1995Ch56; not reported by 2003Le08.

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^{58}Ni(^{29}Si,α2pγ) 1995Ch56,2003Le08 (continued)

$\gamma(^{81}Sr)$ (continued)

† From figure 2 of 1995Ch56; $\Delta E\gamma$?1 keV for highest lying transitions. The evaluator has assigned $\Delta E\gamma$=1. For SD bands, values are from 2003Le08 unless otherwise stated. The corresponding values from 1995Ch56 are generally lower by 2-3 keV.

‡ For SD bands: from the intensity pattern shown in fig. 3 of 1995Ch56. Values represent (approximately) percent intensities of the ^{81}Sr channel in the reaction used. Iγ not stated by authors for other gammas.

Placement of transition in the level scheme is uncertain.

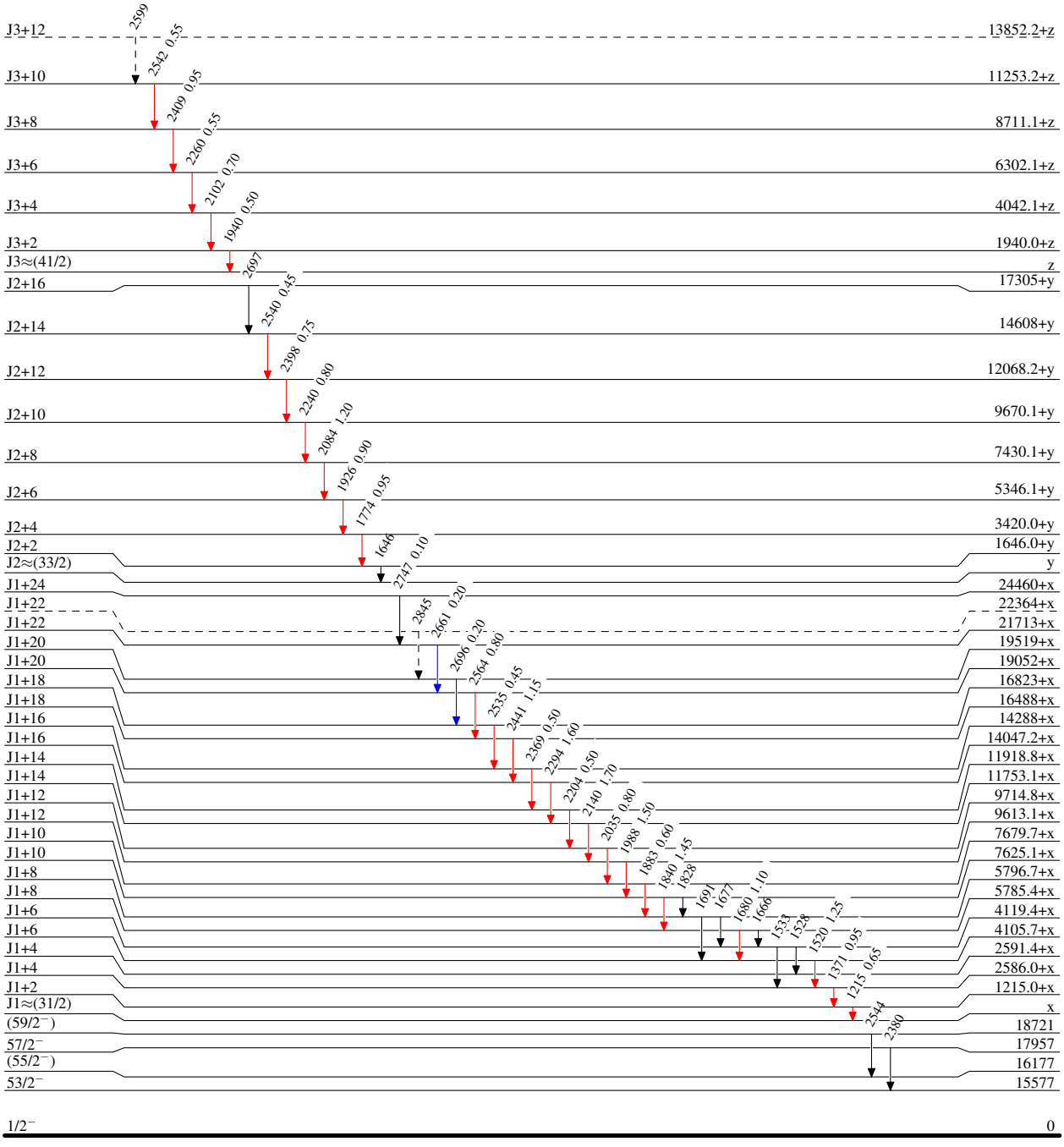
^{58}Ni(^{29}Si,α2pγ) 1995Ch56,2003Le08

Level Scheme

Intensities: Relative I_γ

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)

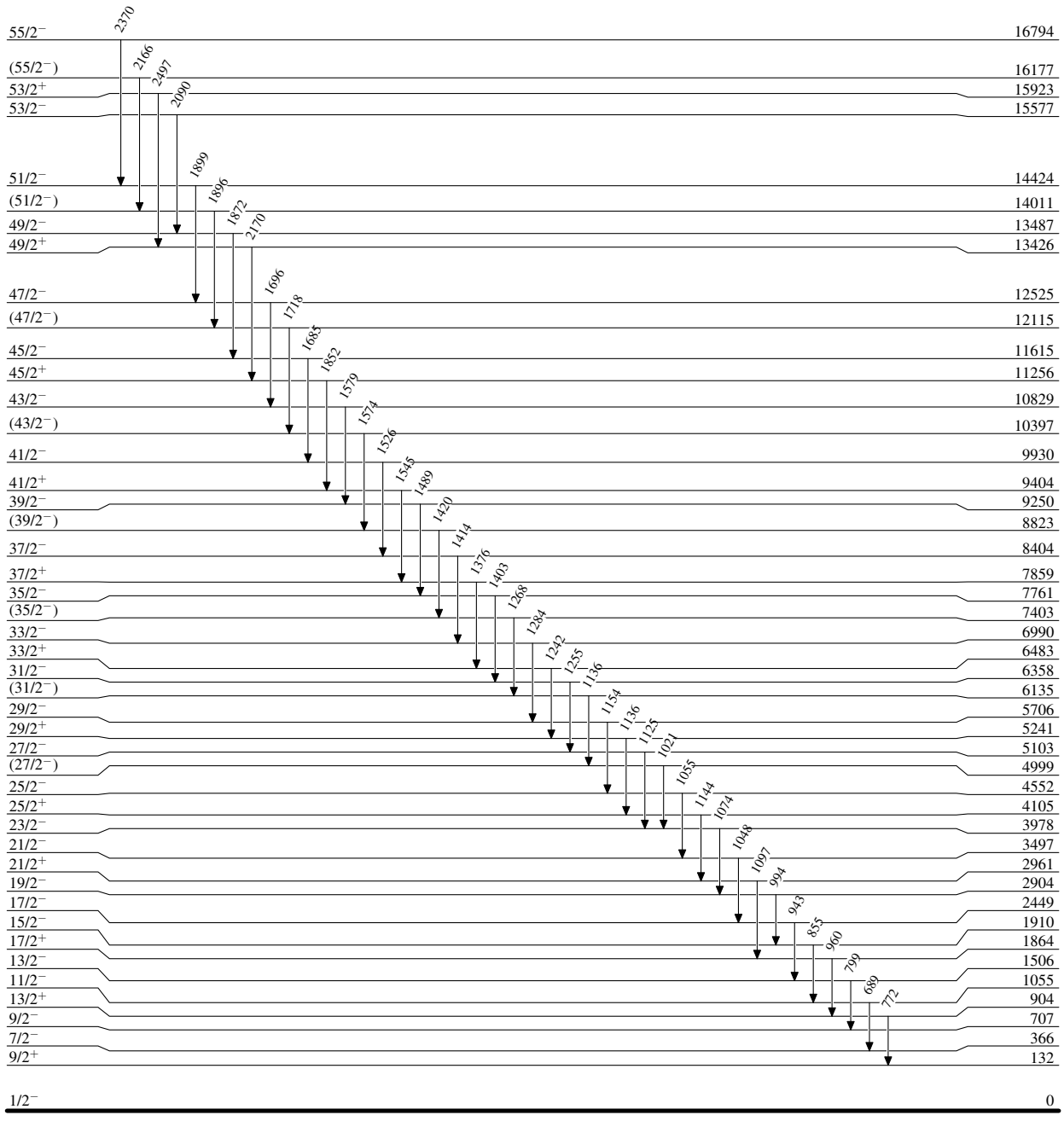


$^{81}_{38}Sr_{43}$

^{58}Ni(^{29}Si,α2pγ) 1995Ch56,2003Le08

Level Scheme (continued)

Intensities: Relative I_γ



$^{81}_{38}Sr_{43}$

^{58}Ni(^{29}Si,α2pγ) 1995Ch56,2003Le08

Band(A): SD-1 band (2003Le08, 1995Ch56,1999Le56)

J1+24		24460+x
	2747	
J1+22		21713+x
	2661	
J1+20		19052+x
	2564	
J1+18		16488+x
	2441	
J1+16		14047.2+x
	2294	
J1+14		11753.1+x
	2140	
J1+12		9613.1+x
	1988	
J1+10		7625.1+x
	1840	
J1+8		5785.4+x
	1680	
J1+6		4105.7+x
	1520	
J1+4		2586.0+x
	1371	
J1+2		1215.0+x
	1215	
J1≈(31/2)		x

Band(B): SD-2 band (2003Le08, 1995Ch56)

J2+16		17305+y
	2697	
J2+14		14608+y
	2540	
J2+12		12068.2+y
	2398	
J2+10		9670.1+y
	2240	
J2+8		7430.1+y
	2084	
J2+6		5346.1+y
	1926	
J2+4		3420.0+y
	1774	
J2+2		1646.0+y
	1646	
J2≈(33/2)		y

Band(C): SD-3 band (2003Le08,1995Ch56)

J1+22		22364+x
	2845	
J1+20		19519+x
	2696	
J1+18		16823+x
	2535	
J1+16		14288+x
	2369	
J1+14		11918.8+x
	2204	
J1+12		9714.8+x
	2035	
J1+10		7679.7+x
	1883	
J1+8		5796.7+x
	1677	
J1+6		4119.4+x
	1528	
J1+4		2591.4+x

Band(D): SD-4 band (2003Le08, 1995Ch56)

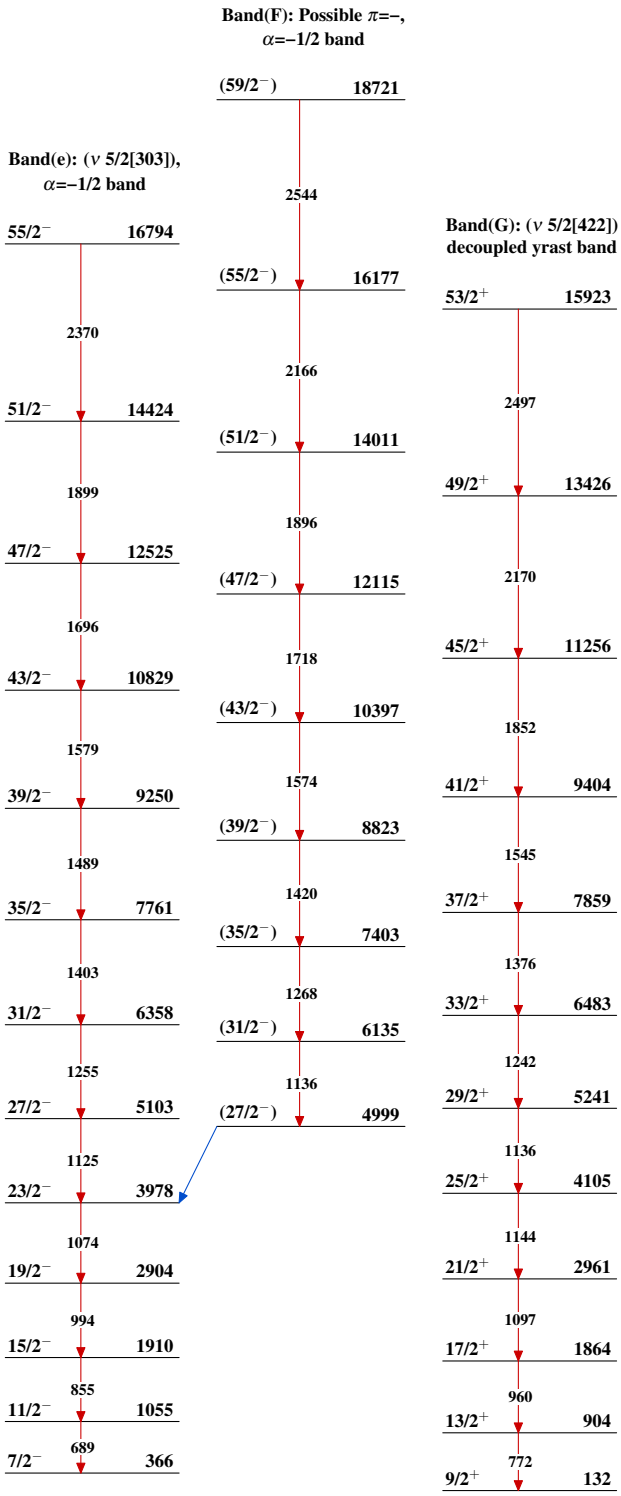
J3+12		13852.2+z
	2599	
J3+10		11253.2+z
	2542	
J3+8		8711.1+z
	2409	
J3+6		6302.1+z
	2260	
J3+4		4042.1+z
	2102	
J3+2		1940.0+z
	1940	
J3≈(41/2)		z

Band(E): (ν 5/2[303]), α=+1/2 band

57/2$^-$		17957
	2380	
53/2$^-$		15577
	2090	
49/2$^-$		13487
	1872	
45/2$^-$		11615
	1685	
41/2$^-$		9930
	1526	
37/2$^-$		8404
	1414	
33/2$^-$		6990
	1284	
29/2$^-$		5706
	1154	
25/2$^-$		4552
	1055	
21/2$^-$		3497
	1048	
17/2$^-$		2449
	943	
13/2$^-$		1506
	707	
9/2$^-$		707
	79	
5/2$^-$		79

$^{81}_{38}Sr_{43}$

^{58}Ni(^{29}Si,α2pγ) 1995Ch56,2003Le08 (continued)



$^{81}_{38}Sr_{43}$