(HI,xnγ):SD 1993Ha19,1991Rz01,1990He14

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Yu. Khazov, A. Rodionov and G. Shulyak	NDS 136, 163 (2016)	14-Jul-2016

1995Sc31: ^{102}Ru(^{48}Ca,4nγ), E=203 MeV; measured Eγ, Iγ, γγ coin. ^{146}Gd; deduced SD band levels, J^{π}. EUROGAM I spectrometer.

1991Rz01,1990He14 (also 1987He16,1990Li32): ^{110}Pd(^{40}Ar,4nγ), E=175 MeV; measured γγ coin., sum spectra, DSAM. ^{146}Gd; deduced levels, J^{π}, $T_{1/2}$, SD band structure, intrinsic quadrupole moments. OSIRIS spectrometer.

1993Ha19: ^{122}Sn(^{29}Si,5nγ) E=155 MeV; measured Eγ, Iγ, γγ coin., DCO ratios. ^{146}Gd; deduced, γ multiplicities, J^{π}, levels, SD bands. Compton-suppressed HPGe detector array, 4π BGO ball. Cranked shell-model-Strutinsky calculations.

1996La23: ^{100}Mo(^{51}V,p4nγ) E=230 MeV; measured γγγ, γγγ(particle) coin. GAMMASPHERE array with Microball for particle detection. No definite evidence for band structure.

2001Cl05: ^{122}Sn(^{29}Si,5nγ), E=155 MeV; measured Eγ, Iγ, γγ coin, lifetimes, DSAM. ^{146}Gd; deduced SD band levels, J^{π}, intrinsic quadrupole moments. GAMMASPHERE array with Microball for particle detection.

Two superdeformed SD-1 and SD-2 bands are identified in ^{146}Gd nuclide firmly; the SD-3 band may belong to ^{146}Gd or ^{147}Gd.

^{146}Gd Levels

E(level)[†]	J^{π}	Comments
0.0	0^+	
0.0+x[@]	J1[‡]	J^{π}: $J_1^{\pi}=33^-$. Additional information 1.
826.3+x[@] *3*	J1+2	
1704.3+x[@] *5*	J1+4	
2634.8+x[@] *5*	J1+6	
3618.0+x[@] *5*	J1+8	
4656.6+x[@] *6*	J1+10	
5750.0+x[@] *7*	J1+12	
6898.8+x[@] *7*	J1+14	
8100.0+x[@] *8*	J1+16	
9350.3+x[@] *9*	J1+18	
10648.1+x[@] *9*	J1+20	
11993.2+x[@] *10*	J1+22	
13386.9+x[@] *11*	J1+24	
14833.1+x[@] *12*	J1+26	
16331.6+x[@] *14*	J1+28	
17885.3+x[@] *17*	J1+30	
0.0+y[&]	J2[#]	J^{π}: $J_2^{\pi}=32^-$. Additional information 2.
806.2+y[&] *3*	J2+2	
1663.2+y[&] *5*	J2+4	
2571.7+y[&] *6*	J2+6	
3532.8+y[&] *6*	J2+8	
4549.0+y[&] *6*	J1+10	
5621.2+y[&] *7*	J2+12	
6749.0+y[&] *7*	J2+14	
7933.8+y[&] *8*	J2+16	
9176.4+y[&] *9*	J1+18	
10475.7+y[&] *9*	J1+20	

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(HI,xnγ):SD 1993Ha19,1991Rz01,1990He14 (continued)

^{146}Gd Levels (continued)

E(level)[†]	Jπ	Comments
11832.6+y[&] *10*	J1+22	
13246.0+y[&] *11*	J2+24	
14718.7+y[&] *13*	J2+26	
16248.6+y[&] *15*	J1+28	
17830.6+y[&] *19*	J1+30	
0.0+z?[a]	J3	Additional information 3.
958.5+z?[a] *5*	J3+2	
1964.6+z?[a] *8*	J3+4	
3029.5+z?[a] *10*	J3+6	
4153.0+z?[a] *13*	J3+8	
5328.7+z?[a] *15*	J3+10	
6554.3+z?[a] *18*	J3+12	
7832.3+z?[a] *23*	J3+14	
9155+z?[a] *3*	J3+16	
10524+z?[a] *4*	J3+18	

[†] Calculated using transition energies.
[‡] from 1993Ha19. All J′s could be shifted by two units jointly. From theoretical analysis, 1993Ra07 suggests J=31 or 33. Population of normal states of J=29, 27 and 26 by the band (1995Sc31) suggests J>31.
[#] from 1993Ha19. All J′s could be shifted by two units jointly. From theoretical analysis, 1993Ra07 suggests J=30 or 32. 1995Sc31 suggests J>31, presumably from population of normal states by the SD band.
[@] Band(A): SD-1 BAND (1995Sc31,1990He14,1993Ha19,2001Cl05). Percent population=0.65 *19* (1993Ha19) in ^{122}Sn(^{29}Si,5nγ), ≈1 (1990He14) in ^{110}Pd(^{40}Ar,4nγ). Q(intrinsic)=13.9 *4* (2001Cl05), 12 *2* (1990He14).
[&] Band(B): SD-2 BAND (1995Sc31,1991Rz01,1993Ha19,2001Cl05). Percent population=0.39 *12* (1993Ha19) in ^{122}Sn(^{29}Si,5nγ), ≈0.7 (1991Rz01) in ^{110}Pd(^{40}Ar,4nγ). Q(intrinsic)=13.9 *3* (2001Cl05), 8 *2* (1992StZU).
[a] Band(C): SD-3 BAND (?) (1995Sc31). This band belongs to ^{147}Gd or ^{146}Gd (1995Sc31). Population=1/8 of SD-1 (1995Sc31).

γ(^{146}Gd)

Eγ[†]	Iγ[†‡]	Ei(level)	Jiπ	Ef	Jfπ	Mult.[#]
806.2 *3*	0.51 *5*	806.2+y	J2+2	0.0+y	J2	
826.3 *3*	0.61 *5*	826.3+x	J1+2	0.0+x	J1	
857.0[@] *3*	0.68 *6*	1663.2+y	J2+4	806.2+y	J2+2	
878.0 *3*	0.71 *8*	1704.3+x	J1+4	826.3+x	J1+2	
908.5 *3*	0.89 *9*	2571.7+y	J2+6	1663.2+y	J2+4	
930.5 *2*	0.84 *7*	2634.8+x	J1+6	1704.3+x	J1+4	
958.5 *5*	1.00 *16*	958.5+z?	J3+2	0.0+z?	J3	
961.1[&] *2*	1.00 *7*	3532.8+y	J2+8	2571.7+y	J2+6	
983.2 *2*	0.91 *5*	3618.0+x	J1+8	2634.8+x	J1+6	
1006.1 *6*	0.84 *14*	1964.6+z?	J3+4	958.5+z?	J3+2	
1016.2 *2*	0.91 *7*	4549.0+y	J1+10	3532.8+y	J2+8	
1038.6 *3*	1.00 *6*	4656.6+x	J1+10	3618.0+x	J1+8	E2
1064.9 *6*	0.94 *16*	3029.5+z?	J3+6	1964.6+z?	J3+4	
1072.2 *2*	0.78 *8*	5621.2+y	J2+12	4549.0+y	J1+10	
1093.4 *3*	0.92 *5*	5750.0+x	J1+12	4656.6+x	J1+10	E2
1123.5 *8*	0.73 *16*	4153.0+z?	J3+8	3029.5+z?	J3+6	
1127.8 *3*	0.77 *7*	6749.0+y	J2+14	5621.2+y	J2+12	
1148.8 *2*	0.81 *5*	6898.8+x	J1+14	5750.0+x	J1+12	E2

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(HI,xnγ):SD 1993Ha19,1991Rz01,1990He14 (continued)

γ(^{146}Gd) (continued)

E_γ [†]	I_γ [†‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]
1175.7 *8*	0.69 *16*	5328.7+z?	J3+10	4153.0+z?	J3+8	
1184.8[a] *3*	0.73 *8*	7933.8+y	J2+16	6749.0+y	J2+14	
1201.2 *3*	0.60 *4*	8100.0+x	J1+16	6898.8+x	J1+14	E2
1225.6 *10*	0.64 *18*	6554.3+z?	J3+12	5328.7+z?	J3+10	
1242.6 *3*	0.73 *7*	9176.4+y	J1+18	7933.8+y	J2+16	
1250.3 *4*	0.52 *4*	9350.3+x	J1+18	8100.0+x	J1+16	E2
1278.0 *14*	0.49 *17*	7832.3+z?	J3+14	6554.3+z?	J3+12	
1297.8[b] *3*	0.51 *5*	10648.1+x	J1+20	9350.3+x	J1+18	E2
1299.3 *4*	0.60 *7*	10475.7+y	J1+20	9176.4+y	J1+18	
1322.4 *11*	0.59 *17*	9155+z?	J3+16	7832.3+z?	J3+14	
1345.1[c] *3*	0.47 *5*	11993.2+x	J1+22	10648.1+x	J1+20	E2
1356.9[d] *4*	0.55 *6*	11832.6+y	J1+22	10475.7+y	J1+20	
1368.9 *19*	0.30 *17*	10524+z?	J3+18	9155+z?	J3+16	
1393.7 *4*	0.37 *6*	13386.9+x	J1+24	11993.2+x	J1+22	
1413.4[e] *4*	0.37 *5*	13246.0+y	J2+24	11832.6+y	J1+22	
1446.2 *5*	0.23 *4*	14833.1+x	J1+26	13386.9+x	J1+24	
1472.7 *6*	0.20 *4*	14718.7+y	J2+26	13246.0+y	J2+24	
1498.5 *7*	0.24 *5*	16331.6+x	J1+28	14833.1+x	J1+26	
1529.9 *8*	0.13 *3*	16248.6+y	J1+28	14718.7+y	J2+26	
1553.6 *9*	0.16 *5*	17885.3+x	J1+30	16331.6+x	J1+28	
1582.0 *11*	0.12 *4*	17830.6+y	J1+30	16248.6+y	J1+28	

[†] From 1995Sc31. Eγ′s and Iγ′s are also available from 1990He14 and 1993Ha19 for SD-1 band and from 1991Rz01 and 1993Ha19 for SD-2 band. In the majority, Eγ′s agree within the uncertainty limits, and some of Iγ′s differ irregular up to 1.5.
[‡] Intensities are relative within each band.
[#] Stretched quadrupole from Iγ(34°/146°)/Iγ(90°) ratios (1987He16).
[@] 855.7 *3* (1993Ha19).
[&] 963.0 *4* (1993Ha19).
[a] 1186.1 *5* (1993Ha19).
[b] 1299.4 *7* (1993Ha19).
[c] 1343.0 *5* (1993Ha19).
[d] 1360.2 *10* (1993Ha19).
[e] 1417.2 *10* (1993Ha19).

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Level Scheme

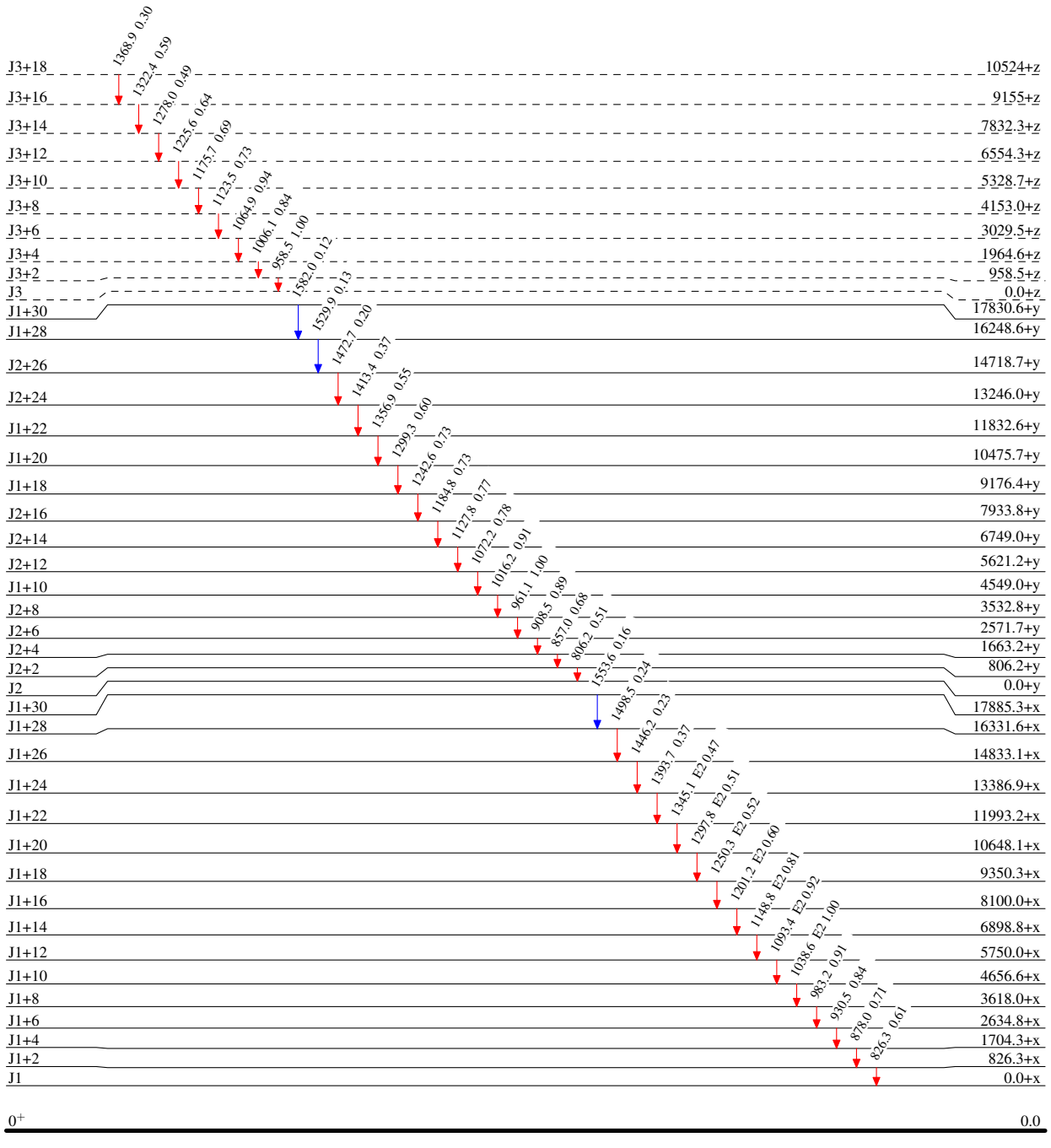
Intensities: Relative I_γ

Legend

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

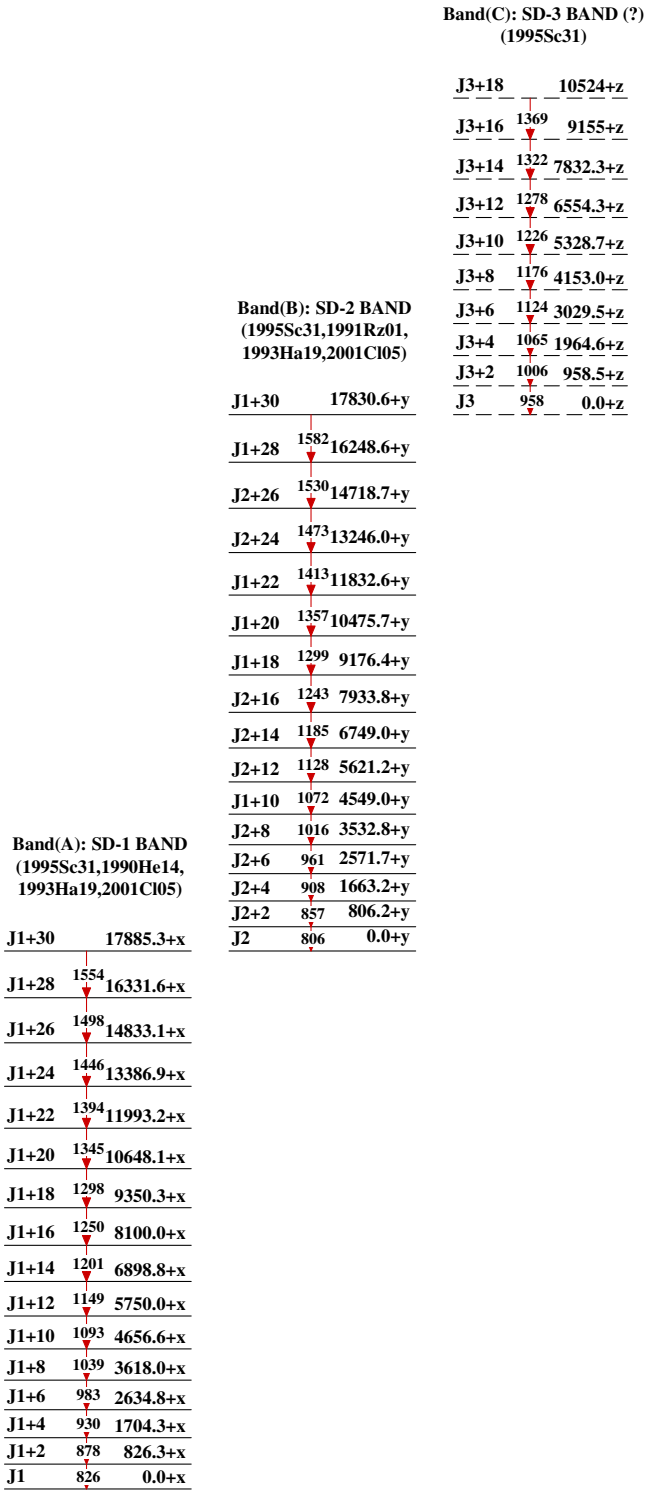
$I_\gamma < 10\% \times I_\gamma^{max}$

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



$^{146}_{64}Gd_{82}$

(HI,xnγ):SD 1993Ha19,1991Rz01,1990He14



$^{146}_{64}Gd_{82}$