(HI,xnγ) 1995Ni06,1985Ho17,1981Ha17

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 110, 1 (2009)	20-Nov-2008

SD bands:

1999Ai04 (also 2000Sc43): ^{123}Sb(^{37}Cl,5n$\alpha\gamma$) E=191 MeV. Measured γ, Eα, $\alpha\gamma$ coin, deduced feeding pattern of normal-deformed and SD bands through measurement of α-particle energy distributions. The value of average Eα=14.1 MeV *5* with FWHM=6.7 MeV for feeding of yrast SD band and Eα=17.1 MeV with FWHM=8.3 MeV for feeding of normal-deformed structures. Eurogam array for γ-ray measurements and DIAMANT array of CsI detectors for α particles.

2000LaZW: ^{76}Ge(^{80}Se,Xγ) E=320 MeV. Search for linking transitions from SD bands to normal-deformed bands, but none reported.

1995Ni06, 1988Ra19: ^{122}Sn(^{34}S,5nγ) E=175 MeV. Measured γ, $\gamma\gamma$, $\gamma(\theta)$, deduced five SD bands. The first SD band was reported by 1988Ra19.

1993FoZY: ^{108}Pd(^{48}Ca,5nγ) E=220 MeV. Measured $\gamma\gamma$, deduced SD band.

1992Mu10: ^{124}Sn(^{33}S,^{6}nγ) E=160, 170 MeV. Measured γ(evaporation residue) coincidence, deduced SD band population.

Additional information 1.

Normal high-spin states:

1985Ho17 (also 1983Ho09): ^{124}Sn(^{32}S,5nγ) E=150-163 MeV. Measured prompt and delayed γ, $\gamma\gamma$, and lifetimes by recoil-distance method.

1981Ha17: ^{124}Sn(^{32}S,5nγ) E=129-165 MeV and ^{142}Nd(^{12}C,3nγ) E=56-61 MeV. Measured prompt and delayed γ, $\gamma\gamma$, γ(t), $\gamma(\theta)$, linear polarization, lifetime by recoil-distance method.

1979Li14: ^{122}Sn(^{32}S,3nγ) E=115-165 MeV and ^{141}Pr(^{14}N,4n) E=60-101 MeV. Measured delayed γ, prompt $\gamma\gamma$, excitation functions, $\gamma(\theta)$, γ(t) and $\gamma\gamma$(t).

1979Pi07: ^{152}Gd(α,5nγ) E=72 MeV. Measured excitation functions, $\gamma(\theta)$, γ, $\gamma\gamma$. ^{136}Ce(^{18}O,3n) E=83 MeV. Measured ce, ceγ.

1979Fl05: ^{142}Nd(^{12}C,3nγ) E=60-62 MeV. Measured excitation functions, γ, $\gamma\gamma$, $\gamma(\theta)$. Their results agree well with the other authors up to 2911 keV, but above this level they completely disagree.

1971FlZW: ^{24}Mg(^{132}Xe,5nγ) E=0.88, 1.19 MeV/nucleon. Measured γ, $T_{1/2}$.

Other heavy-ion reactions dealing with cross section measurements, yields, and continuum γ-spectra:

2006Go19: ^{144}Sm(^{9}Be,2n) E=30-44 MeV.

1995Ri13: ^{144}Nd(^{12}C,5nγ) E=94 MeV. Analyzed σ(evaporation residue)(θ).

1986Ru02: ^{92}Zr(^{64}Ni,αn) E=239 MeV and ^{144}Sm(^{12}C,nα) E=73.5 MeV. Measured evaporation residue yield vs spin.

1986Bo16: ^{74}Ge(^{84}Kr,α3n) E=340 MeV. Measured $\gamma(\theta)$, DSA.

1985Th05: ^{118}Sn(^{40}Ar,α3n) E=185 MeV. Measured γ- and x-ray spectra, $\gamma(\theta)$, relative yields.

1985Ma34, 1984Ma37: ^{138}Ba(^{22}Ne,^{9}N). Measured residual ion recoil charge spectra. Deduced high-spin isomer decay connections.

1985Ko30: ^{141}Pr(^{14}N,4n) E=80 MeV. Measured prompt and delayed γ-ray spectra, excitation functions, γ-ray multiplicity. Cross sections were measured in the following reactions: ^{144}Sm(^{12}C,2p3n); ^{147}Sm(^{12}C,2p6n); ^{150}Sm(^{12}C,2p9n); ^{144}Sm(^{14}N,3p4n); ^{147}Sm(^{14}N,3p7n); ^{141}Pr(^{14}N,4n).

1985Ca35: ^{87}Rb(^{65}Cu,n) E=237 MeV. Measured $\gamma\gamma$, n-γ coin.; deduced yrast sequence.

1985Bo37: ^{124}Sn(^{32}S,5n) E=160 MeV. Measured γ, deduced yrast population.

1983Wa07: ^{124}Sn(^{32}S,5n) E=165 MeV. Measured γ, $\gamma(\theta)$ of continuum region. Deduced γ-multiplicity.

1982Tr01, 1979Tr08: ^{124}Sn(^{32}S,5n) E=150 MeV. Measured linear polarization of continuum γ rays.

1982Du15: (^{12}C,X) on targets of Dy, Ho, Er, Tm and Yb. Measured production cross sections.

1980Vr01: (^{16}O,X) on targets of ^{142}Nd, ^{139}La and ^{141}Pr. Measured limits of α decay of high-spin isomers.

1980Bo07: ^{106}Pd(^{50}Ti,2p3n). Measured γ, γ(t), sum spectra. Deduced isomer lifetime.

1979Ha29: (^{12}C,X) reaction on targets of ^{142}Nd, ^{144}Nd, ^{146}Nd, ^{144}Sm, ^{148}Sm, ^{149}Sm, ^{150}Sm. Measured $T_{1/2}$(isomer) and γ-multiplicity.

1975Sc01: ^{141}Pr(^{14}N,4n) E=92 MeV. Measured cross section.

E(6007.2 level): 1979Pi07 and 1981Ha17 assume that the 25-keV transition is isomeric and is followed by the 264-keV transition. However, on the basis of the observed time distributions, 1979Li14 assume that the 264-keV transition is the isomer one followed by the 25-keV transition. If this were the case, there would be a level at 5767.8 keV ($45/2^{+}$) instead of 6007.2 keV (47/2).

E(7037.5 level): 1979Li14 give a different ordering of the 182 and 1005 keV transitions which leads to a level at 6214 keV instead of 7038 keV.

(HI,xnγ) 1995Ni06,1985Ho17,1981Ha17 (continued)

^{151}Dy Levels

The levels at 3136 and 3331 deexcited by 225.0γ and 254.0γ, respectively, were reported only by 1979Fl05. These have not been included here.

E(level)[‡]	J^{π}[@]	$T_{1/2}$[†]	Comments
0.0	$7/2^{(-)}$		
527.38 *9*	$(9/2^-)$		
775.57 *11*	$(11/2^-)$		
968.61 *13*	$(13/2^+)$		
1348.7 *1*	$(13/2^-)$		
1511.16 *12*	$(15/2^-)$		
1733.7?[#] *11*	$(17/2^+)$		
1918.58 *11*	$(17/2^-)$		
2263.02 *11*	$(21/2^-)$		
2402.0?[#]	$(21/2^+)$		
2911.66 *12*	$(25/2^-)$		
2958.6 *10*	$(27/2^-)$	1.3 ns *6*	This level was introduced by 1979Pi07 on the basis of the 46.9-keV transition seen in ce data. $T_{1/2}$: from centroid-shift method (1979Pi07).
3078.2?[#] *12*	$(25/2^+)$		
3428.5 *11*	(29/2)		
3733.9 *11*	$(31/2^-)$		
4306.3 *11*	(33/2)		
4387.3 *11*	$(35/2^-)$		
4741.5 *11*	(37/2)		
4903.8 *11*	(41/2)	5.9 ns *7*	$T_{1/2}$: weighted average of 6.0 ns *10* (1981Ha17), 7 ns *2* (1979Li14) and 5.5 ns *10* (1979Pi07).
5742.9 *11*	(43/2)		
6007.2? *11*	(47/2)		
6032.2 *15*	$(49/2^+)$	11.9 ns *8*	Possible configuration=$(\pi h^2_{11/2})_{10+}\otimes(\nu f_{7/2})\ (\nu h_{9/2})(\nu i_{13/2})$ (1985Ho17). $T_{1/2}$: weighted average of 12.6 ns *5* (1981Ha17) and 10.9 s *6* (1979Li14). Others: 15 ns *3* (1979Pi07), 18 ns *4* (1979Ha29), 12 ns *1* (1980Bo07).
7037.5 *15*	$(51/2^-)$	1.2 ps *6*	
7219.5 *15*	$(53/2^-)$	13.7 ps *6*	
8177.8 *15*	$(55/2^-)$	4.5 ps *15*	
8302.7 *15*	$(57/2^-)$	20.8 ps *12*	$T_{1/2}$: other:≈42 ps (1981Ha17).
8680.3 *15*	$(59/2^-)$	2.0 ps *3*	
8891.7 *15*	$(61/2^-)$	19.8 ps *20*	$T_{1/2}$: 1985Ho17 give two values: 19.8 ps *20* and 19.8 ps *13*. Other:≈42 ps (1981Ha17).
9813.4? *18*			
10029.8? *16*	(63/2)	≤1.4 ps	
10131.3? *18*			
10279.1? *21*			
10320.7? *18*		≤1.4 ps	
10562.6? *19*		≤1.4 ps	
10749.9? *22*			
11143.5? *21*			
11840.7? *22*			
x[&]	J≈(43/2)		J^{π}: 1993Ra07 suggest 43/2, 47/2. J=(51/2) (1988Ra19) from deexcitation out of band. An intensity plot given by 1994Tw01 (fig. 11 b) suggests that 577γ is 51/2 to 47/2 transition. Additional information 2. $T_{1/2}$: estimated (1988Ra19) as<43 fs for deexcitation between top nine transitions.
527.3+x[&]	J+2		

Continued on next page (footnotes at end of table)

(HI,xnγ) 1995Ni06,1985Ho17,1981Ha17 (continued)

^{151}Dy Levels (continued)

E(level)[‡]	Jπ[@]	Comments
1104.7+x[&]	J+4	
1732.4+x[&]	J+6	
2414.2+x[&]	J+8	
3148.2+x[&]	J+10	
3933.9+x[&]	J+12	
4771.7+x[&]	J+14	
5660.8+x[&]	J+16	
6601.4+x[&]	J+18	
7593.3+x[&]	J+20	
8636.1+x[&]	J+22	
9729.9+x[&]	J+24	
10874.0+x[&]	J+26	
12068.7+x[&]	J+28	
13313.7+x[&]	J+30	
14608.5+x[&]	J+32	
15953.1+x[&]	J+34	
17346.9+x[&]	J+36	
18791.0+x[&]	J+38	
20283.4+x[&]	J+40	
21825.2+x[&]	J+42	
y[a]	J1	Additional information 3.
633.0+y[a]	J1+2	
1310.7+y[a]	J1+4	
2029.9+y[a]	J1+6	
2795.5+y[a]	J1+8	
3607.7+y[a]	J1+10	
4466.9+y[a]	J1+12	
5373.6+y[a]	J1+14	
6327.9+y[a]	J1+16	
7329.6+y[a]	J1+18	
8379.6+y[a]	J1+20	
9477.8+y[a]	J1+22	
10624.4+y[a]	J1+24	
11819.6+y[a]	J1+26	
13063.1+y[a]	J1+28	
14355.5+y[a]	J1+30	
15696.4+y[a]	J1+32	
17085.8+y[a]	J1+34	
18525.9+y[a]	J1+36	
20018.4+y[a]	J1+38	
z[b]	J2	Additional information 4.
728.5+z[b]	J2+2	
1493.6+z[b]	J2+4	
2306.6+z[b]	J2+6	
3167.1+z[b]	J2+8	
4076.7+z[b]	J2+10	
5035.3+z[b]	J2+12	

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(HI,xnγ) 1995Ni06,1985Ho17,1981Ha17 (continued)

^{151}Dy Levels (continued)

E(level)[‡]	Jπ[@]	Comments
6041.8+z[b]	J2+14	
7098.5+z[b]	J2+16	
8204.5+z[b]	J2+18	
9360.2+z[b]	J2+20	
10565.0+z[b]	J2+22	
11819.7+z[b]	J2+24	
13123.3+z[b]	J2+26	
14475.3+z[b]	J2+28	
15878.7+z[b]	J2+30	
17328.5+z[b]	J2+32	
u[c]	J3	Additional information 5.
712.0+u[c]	J3+2	
1470.7+u[c]	J3+4	
2276.0+u[c]	J3+6	
3128.4+u[c]	J3+8	
4027.7+u[c]	J3+10	
4974.5+u[c]	J3+12	
5968.9+u[c]	J3+14	
7011.5+u[c]	J3+16	
8102.0+u[c]	J3+18	
9240.2+u[c]	J3+20	
10426.6+u[c]	J3+22	
11661.5+u[c]	J3+24	
12944.4+u[c]	J3+26	
14274.1+u[c]	J3+28	
15652.9+u[c]	J3+30	
17077.8+u[c]	J3+32	
v[d]	J4	Additional information 6.
959.3+v[d]	J4+2	
1967.7+v[d]	J4+4	
3028.0+v[d]	J4+6	
4139.9+v[d]	J4+8	
5305.8+v[d]	J4+10	
6521.3+v[d]	J4+12	
7784.5+v[d]	J4+14	
9097.9+v[d]	J4+16	
10463.6+v[d]	J4+18	

† From recoil-distance method (1985Ho17), unless otherwise noted. 1985Ho17 report $T_{1/2}$=139 ps *35* (from recoil-distance data) for a level of unknown energy decaying via two transitions of intensities 5.3 and 2.1, respectively, relative to 99.5 for 1005γ.

‡ From least-squares fit to Eγ′s. The levels above 8894 keV are indicated as uncertain because the ordering of the γ rays is tentative.

\# Reported by 1979Pi07 and 1979Fl05 only.

@ From 'Adopted Levels'. J>15/2 values were assigned from these experiments.

& Band(A): SD-1 band. Band from 1988Ra19 and 1995Ni06. Q(intrinsic)=16.9 *+2−3* (1997Ni01). Percent population=1.3

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(HI,xnγ) 1995Ni06,1985Ho17,1981Ha17 (continued)

^{151}Dy Levels (continued)

(1988Ra19), 1.0 (1995Ni06). Other: 2.3 *8* (1992Mu10) in ^{122}Sn(^{34}S,5nγ) E=170 MeV. Intruder configuration=$\pi 6^4 \nu 7^1$ (1997Ni01).

[a] Band(B): SD-2 band. Q(intrinsic)=18.2 *4* (1997Ni01). Band intensity=0.39 *7* (1995Ni06) (relative to 1.0 for SD-1 band). It has the same high N intruder configuration as ^{152}Dy SD band. The transition energies are close to 3/4 point Eγ's of ^{152}Dy yrast SD band. Probable 5/2[642] neutron excitation (1995Ni06). 1995Ni06 searched for its signature partner band but none was found.

[b] Band(C): SD-3 band. Q(intrinsic)=17.9 *6* (1997Ni01). Band intensity=0.30 *5* (1995Ni06) (relative to 1.0 for SD-1 band).

[c] Band(D): SD-4 band. Q(intrinsic)=17.5 *+11−7* (1997Ni01). Band intensity=0.20 *7* (1995Ni06) (relative to 1.0 for SD-1 band). It has the same high N intruder configuration as ^{152}Dy SD band. The γ-ray energies in this band are close to mid-point transition energies of the ^{152}Dy yrast SD band (1995Ni06). Search for its signature partner band proved negative (1995Ni06).

[d] Band(E): SD-5 band. Percent population=0.13 *4* (1995Ni06) (relative to 1.0 for SD-1 band).

γ(^{151}Dy)

The quoted A_2 and A_4 values are from 1979Li14 and were measured in the ^{141}Pr(^{14}N,3nγ) reaction at E=75 MeV for transitions depopulating the 6033-keV isomer. For the isomer-feeding transitions A_2, A_4 and pol are from 1981Ha17 measured in ^{124}Sn(^{32}S,5n) reaction at 145 MeV. Pol=(N(1)−N(2))/(N(1)+N(2)) *1/Q, where Q is the polarization sensitivity and N(1), N(2) are the counting rates in the planes perpendicular and parallel to the reaction plane, respectively.

Iγ's from ^{141}Pr(^{14}N,4nγ) reaction at E=75 MeV (1979Li14)

Eγ	Iγ	Eγ	Iγ	Eγ	Iγ
162.32	59 1	469.91	16 1	735.59	29 1
182.07	10 1	527.40	74 1	775.38	72 1
193.00	3 1	542.50	3 1	775.53	39 1
264.29	25 1	569.88	74 1	821.32	68 1
344.44	100	572.5	7 1	839.02	32 1
354.28	48 1	573.2	5 1	877.79	3 1
407.40	32 1	648.64	99 1	1005.5	7 1
435.16	11 1	653.37	65 1		

Iγ's from pulsed-beam experiment in ^{141}Pr(^{14}N,4nγ) E=80 MeV (1979Li14)

Eγ	Iγ	Eγ	Iγ	Eγ	Iγ
264.3	100	625.6 5	10 2	1084.8 12	13 3
377.6 5	6 3	958.7 7	11 2	1142.2 15	7 3
418.8 7	15 2	991.2 7	10 2		

The 418.8γ, 625.6γ, 991.2γ and 1142.2γ remain unplaced in the level scheme above the 6032 isomer

Iγ's from ^{142}Nd(^{12}C,3nγ) reaction at E=60 MeV (1979Fl05)

Eγ	Iγ	Eγ	Iγ	Eγ	Iγ
162.4	1.96 18	527.1	73.2 16	735.6	24.6 6
192.9	45 3	542.4	7.3 3	765.3	25.8
225.0	3.73 18	569.7	53.1 11	775.4	100.0 20
254.3		572.8	7.3 3	821.3	50.2 16
344.2	55.2 13	648.6	53.3 14		
354.0	5.3 4	653.1	10.7 4		
407.2	19.4 5	667.8	12.0 6		
469.7	4.92 24	675.7	4.3 3		

Energy uncertainty is ≈0.3 keV
the 225.0γ and 254.3γ have not been reported by other studies

Iγ's for γ transitions feeding the 6033-keV isomer

$^{151}_{66}Dy_{85}$-6

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In the 124Sn(32S,5nγ) reaction at E=145 MeV (1981Ha17)

Eγ          Iγ          Eγ          Iγ          Eγ          Iγ
-----       ----        -----       ----        ------      -----
182.3       45 3        589.0       14 2        1005.3      100
211.5       12 2        749.1        9 2        1083.2       46 3
377.7       32 2        958.2       23 2        1138.1        9 2

ΔIγ: authors quote 5 to 20%.   Energy uncertainty is ≈0.3 keV
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E_i(level)	J^π_i	E_γ[‡]	I_γ[†]	E_f	J^π_f	Mult.[#]	α[a]	Comments
527.38	(9/2⁻)	527.40 *10*	100	0.0	7/2$^{(-)}$	D		A_2=+0.11 *4*, A_4=−0.07 *4*. δ(Q/D)<−9 (1979Fl05). Additional information 7.
775.57	(11/2⁻)	775.53 *15*	100	0.0	7/2$^{(-)}$	E2	0.00526	α(K)=0.00437 *7*; α(L)=0.000694 *10*; α(M)=0.0001537 *22*; α(N+..)=4.06×10^{-5} *6* α(N)=3.53×10^{-5} *5*; α(O)=5.03×10^{-6} *7*; α(P)=2.51×10^{-7} *4* A_2=+0.13 *2*, A_4=−0.02 *2*. Additional information 8.
968.61	(13/2⁺)	193.00 *10*	100	775.57	(11/2⁻)	D		A_2=−0.19 *4*, A_4=0.00 *4* (1979Fl05). δ(Q/D)=−0.19 +*17*−*23* (1979Fl05).
1348.7	(13/2⁻)	573.2 *5*	7.5 *15*	775.57	(11/2⁻)	(D)		A_2=−0.14 *1*, A_4=−0.02 *3* (1979Li14) for a composite line. Additional information 9. δ(Q/D)=−5.7 +*17*−*28*.
		821.32 *5*	100 *2*	527.38	(9/2⁻)	E2	0.00463	α(K)=0.00386 *6*; α(L)=0.000603 *9*; α(M)=0.0001333 *19*; α(N+..)=3.53×10^{-5} *5* α(N)=3.07×10^{-5} *5*; α(O)=4.37×10^{-6} *7*; α(P)=2.22×10^{-7} *4* A_2=+0.12 *2*, A_4=−0.04 *2*. Additional information 10.
1511.16	(15/2⁻)	542.50 *10*	10 *3*	968.61	(13/2⁺)	(D)		A_2=−0.05 *3*, A_4=0.00 *5*. δ(Q/D)=+0.05 (1979Fl05). Additional information 11.
		735.59 *5*	100 *3*	775.57	(11/2⁻)	E2	0.00592	α(K)=0.00491 *7*; α(L)=0.000792 *11*; α(M)=0.0001758 *25*; α(N+..)=4.64×10^{-5} *7* α(N)=4.04×10^{-5} *6*; α(O)=5.73×10^{-6} *8*; α(P)=2.81×10^{-7} *4* A_2=+0.09 *4*, A_4=−0.03 *5*. Additional information 12.
1733.7?	(17/2⁺)	765.3[&b] *3*	100	968.61	(13/2⁺)	E2	0.00542	α(K)=0.00450 *7*; α(L)=0.000717 *10*; α(M)=0.0001589 *23*; α(N+..)=4.20×10^{-5} *6* α(N)=3.65×10^{-5} *6*; α(O)=5.19×10^{-6} *8*; α(P)=2.58×10^{-7} *4* A_2=+0.29 *3*, A_4=−0.04 *4* (1979Fl05).
1918.58	(17/2⁻)	407.40 *10*	43.2 *13*	1511.16	(15/2⁻)	(D)		A_2=−0.14 *3*, A_4=−0.02 *3*. Additional information 13. δ(Q/D)=−3.1 +*9*−*18* (1979Fl05).
		569.88 *5*	100 *2*	1348.7	(13/2⁻)	E2	0.01086	α(K)=0.00885 *13*; α(L)=0.001571 *22*; α(M)=0.000352 *5*; α(N+..)=9.24×10^{-5}

γ(^{151}Dy) (continued)

E_i(level)	J^π_i	E_γ[‡]	I_γ[†]	E_f	J^π_f	Mult.[#]	α[a]	Comments
								13 α(N)=8.06×10^{-5} *12*; α(O)=1.124×10^{-5} *16*; α(P)=5.01×10^{-7} *7* A_2=+0.10 *2*, A_4=−0.01 *4*. Additional information 14.
2263.02	(21/2⁻)	344.44 *4*	100	1918.58	(17/2⁻)	E2	0.0426	α(K)=0.0327 *5*; α(L)=0.00768 *11*; α(M)=0.001757 *25*; α(N+..)=0.000455 *7* α(N)=0.000400 *6*; α(O)=5.33×10^{-5} *8*; α(P)=1.747×10^{-6} *25* A_2=+0.13 *1*, A_4=−0.05 *2*. Additional information 15.
2402.0?	(21/2⁺)	668.3[&b] *3*	100	1733.7?	(17/2⁺)	E2	0.00739	α(K)=0.00609 *9*; α(L)=0.001016 *15*; α(M)=0.000226 *4*; α(N+..)=5.96×10^{-5} *9* α(N)=5.19×10^{-5} *8*; α(O)=7.32×10^{-6} *11*; α(P)=3.48×10^{-7} *5* A_2=+0.40 *5*, A_4=−0.12 *6* (1979Fl05).
2911.66	(25/2⁻)	648.64 *5*	100	2263.02	(21/2⁻)	E2	0.00793	α(K)=0.00652 *10*; α(L)=0.001100 *16*; α(M)=0.000245 *4*; α(N+..)=6.45×10^{-5} *9* α(N)=5.63×10^{-5} *8*; α(O)=7.91×10^{-6} *11*; α(P)=3.72×10^{-7} *6* A_2=+0.13 *1*, A_4=−0.03 *2*. Additional information 16.
2958.6	(27/2⁻)	46.9[@]	100	2911.66	(25/2⁻)	M1	3.45	α(L)=2.70 *4*; α(M)=0.593 *9*; α(N+..)=0.1583 *23* α(N)=0.1371 *20*; α(O)=0.0200 *3*; α(P)=0.001137 *16* Mult.: from L/(M+N) ratio and intensity balance in 1979Pi07.
3078.2?	(25/2⁺)	676.2[&b] *3*	100	2402.0?	(21/2⁺)	E2	0.00719	α(K)=0.00593 *9*; α(L)=0.000985 *14*; α(M)=0.000219 *3*; α(N+..)=5.78×10^{-5} *9* α(N)=5.03×10^{-5} *7*; α(O)=7.10×10^{-6} *10*; α(P)=3.39×10^{-7} *5* A_2=+0.36 *7*, A_4=−0.05 *8* (1979Fl05).
3428.5	(29/2)	469.91 *12*	100	2958.6	(27/2⁻)	D		A_2=−0.17 *4*, A_4=0.00 *4*. Additional information 17.
3733.9	(31/2⁻)	305.3 *3*		3428.5	(29/2)			Reported by 1981Ha17. No branching ratios are given.
		775.38 *15*		2958.6	(27/2⁻)	E2	0.00526	α(K)=0.00437 *7*; α(L)=0.000694 *10*; α(M)=0.0001537 *22*; α(N+..)=4.06×10^{-5} *6* α(N)=3.54×10^{-5} *5*; α(O)=5.03×10^{-6} *7*; α(P)=2.51×10^{-7} *4* A_2=+0.18 *1*, A_4=+0.03 *1*.
4306.3	(33/2)	572.5 *5*	100 *14*	3733.9	(31/2⁻)	(D)		
		877.79 *16*	43 *13*	3428.5	(29/2)	(E2)	0.00401	α(K)=0.00335 *5*; α(L)=0.000514 *8*; α(M)=0.0001134 *16*; α(N+..)=3.00×10^{-5} *5* α(N)=2.61×10^{-5} *4*; α(O)=3.74×10^{-6} *6*; α(P)=1.93×10^{-7} *3* A_2=+0.08 *4*, A_4=−0.05 *5*.
4387.3	(35/2⁻)	653.37 *6*	100	3733.9	(31/2⁻)	E2	0.00780	α(K)=0.00642 *9*; α(L)=0.001079 *16*; α(M)=0.000240 *4*; α(N+..)=6.33×10^{-5} *9* α(N)=5.52×10^{-5} *8*; α(O)=7.76×10^{-6} *11*; α(P)=3.66×10^{-7} *6* A_2=+0.15 *1*, A_4=−0.02 *1*. Additional information 18.
4741.5	(37/2)	354.28 *7*	100 *2*	4387.3	(35/2⁻)	D		A_2=−0.15 *3*, A_4=+0.04 *4*.
		435.16 *13*	22.9 *21*	4306.3	(33/2)	E2	0.0219	α(K)=0.01741 *25*; α(L)=0.00353 *5*; α(M)=0.000799 *12*; α(N+..)=0.000208 *3* α(N)=0.000183 *3*; α(O)=2.49×10^{-5} *4*; α(P)=9.60×10^{-7} *14* A_2=+0.18 *5*, A_4=−0.10 *5*.

γ(^{151}Dy) (continued)

E_i(level)	J^π_i	E_γ[‡]	I_γ[†]	E_f	J^π_f	Mult.[#]	α[a]	Comments
4903.8	(41/2)	162.32 5	100	4741.5	(37/2)	E2	0.480	α(K)=0.294 5; α(L)=0.1430 21; α(M)=0.0338 5; α(N+..)=0.00857 12 α(N)=0.00761 11; α(O)=0.000945 14; α(P)=1.335×10^{-5} 19 A_2=+0.12 2, A_4=−0.04 2. Additional information 19.
5742.9	(43/2)	839.02 10	100	4903.8	(41/2)	E1	1.74×10^{-3}	α(K)=0.001490 21; α(L)=0.000199 3; α(M)=4.33×10^{-5} 6; α(N+..)=1.151×10^{-5} 17 α(N)=9.97×10^{-6} 14; α(O)=1.454×10^{-6} 21; α(P)=8.28×10^{-8} 12 A_2=−0.08 3, A_4=+0.03 5. Pol=+0.40 7. Mult.: from linear polarization by 1981Ha17. 1979Pi07 assigned M1 but later remeasured the conversion electron spectra and reassigned it as E1 (see footnote in 1981Kl05).
6007.2?	(47/2)	264.29 8	100	5742.9	(43/2)	E2	0.0956	α(K)=0.0697 10; α(L)=0.0201 3; α(M)=0.00465 7; α(N+..)=0.001195 17 α(N)=0.001054 15; α(O)=0.0001369 20; α(P)=3.54×10^{-6} 5 A_2=+0.09 3, A_4=−0.04 3.
6032.2	(49/2$^+$)	25.0[@]	100	6007.2?	(47/2)	D		It is not certain whether this is the isomeric transition. See comment on 6007.2 level in the level table (general comment section). Mult.: from lifetime value, if this is the isomeric transition in (1979Pi07). However, E2 cannot be ruled out (evaluator).
7037.5	(51/2$^-$)	1005.3 3	100	6032.2	(49/2$^+$)	E1	1.24×10^{-3}	α(K)=0.001057 15; α(L)=0.0001402 20; α(M)=3.04×10^{-5} 5; α(N+..)=8.10×10^{-6} 12 α(N)=7.02×10^{-6} 10; α(O)=1.025×10^{-6} 15; α(P)=5.90×10^{-8} 9 A_2=−0.47 15, A_4=+0.12 16. Pol=+0.21 8. Additional information 20.
7219.5	(53/2$^-$)	182.07 9	100	7037.5	(51/2$^-$)	D		A_2=−0.17 5, A_4=0.00 7. Additional information 21. Mult.: 1981Ha17 and 1985Ho17 suggest magnetic character on the basis of lifetime. However, E1 character cannot be ruled out (evaluator).
8177.8	(55/2$^-$)	958.2 3	100	7219.5	(53/2$^-$)	M1	0.00589	α(K)=0.00500 7; α(L)=0.000693 10; α(M)=0.0001512 22; α(N+..)=4.04×10^{-5} 6 α(N)=3.50×10^{-5} 5; α(O)=5.15×10^{-6} 8; α(P)=3.02×10^{-7} 5 A_2=−0.19 10, A_4=+0.09 13. Pol=−0.3 3.
8302.7	(57/2$^-$)	124.8 3	14 2	8177.8	(55/2$^-$)	D		I_γ: Iγ(124.8γ)/Iγ(1083.2γ)=8.2/57.4 (communicated to the evaluator by one of the authors of 1981Ha17).
		1083.2 3	100 10	7219.5	(53/2$^-$)	E2	0.00258	α(K)=0.00218 3; α(L)=0.000318 5; α(M)=6.99×10^{-5} 10; α(N+..)=1.86×10^{-5} 3 α(N)=1.611×10^{-5} 23; α(O)=2.33×10^{-6} 4; α(P)=1.256×10^{-7} 18 A_2=+0.36 9, A_4=−0.03 8. Pol=+0.55 15.
8680.3	(59/2$^-$)	377.7 3	100	8302.7	(57/2$^-$)	M1	0.0614	α(K)=0.0519 8; α(L)=0.00742 11; α(M)=0.001626 23; α(N+..)=0.000435 7 α(N)=0.000376 6; α(O)=5.52×10^{-5} 8; α(P)=3.19×10^{-6} 5 A_2=−0.19 5, A_4=+0.12 10. Pol=−0.6 2.
8891.7	(61/2$^-$)	211.5 3	99 10	8680.3	(59/2$^-$)	D		A_2=−0.12 10, A_4=0.00 15.
		589.0 3	100 10	8302.7	(57/2$^-$)	E2	0.01001	α(K)=0.00818 12; α(L)=0.001432 21; α(M)=0.000320 5;

γ(^{151}Dy) (continued)

E_i(level)	J^π_i	E_γ[‡]	I_γ[†]	E_f	J^π_f	Mult.[#]	Comments
							α(N+..)=8.41×10^{-5} *12* α(N)=7.34×10^{-5} *11*; α(O)=1.026×10^{-5} *15*; α(P)=4.64×10^{-7} *7* A_2=+0.34 *9*, A_4=−0.07 *9*. Pol=+0.3 *4*.
9813.4?		1133 *1*		8680.3	(59/2$^-$)		
10029.8?	(63/2)	1138.1 *3*	100	8891.7	(61/2$^-$)	(D)	A_2=−0.36 *27*, A_4=+0.48 *35*.
10131.3?		1451 *1*	100	8680.3	(59/2$^-$)		
10279.1?		148 *1*		10131.3?			
10320.7?		291.1 *3*		10029.8?	(63/2)	(D)	
10562.6?		242 *1*		10320.7?			
		533[b] *1*		10029.8?	(63/2)		
		749.1 *3*		9813.4?		(D)	A_2=−0.29 *5*, A_4=−0.07 *8*.
10749.9?		471 *1*		10279.1?			
11143.5?		864[b] *1*		10279.1?			
		1012 *1*		10131.3?			
11840.7?		697 *1*		11143.5?			
		1091 *1*		10749.9?			
		1281 *1*		10562.6?			
527.3+x	J+2	527.3[b] *1*	0.21 *15*	x	J≈(43/2)		E_γ: 522.4 (1988Ra19). 1993FoZY did not find any evidence for a 522.4γ, they assigned the 577γ as the lowest energy transition in the SD cascade and assigned the 577γ as 51/2 to 47/2 transition. An intensity plot (fig. ^{11}B) by 1994Tw01 also shows the first transition (most likely 577γ) as 51/2 to 47/2 transition.
1104.7+x	J+4	577.4 *1*	0.62 *5*	527.3+x	J+2		
1732.4+x	J+6	627.7 *1*	0.78 *10*	1104.7+x	J+4		
2414.2+x	J+8	681.8 *1*	0.81 *7*	1732.4+x	J+6		
3148.2+x	J+10	734.0 *1*	0.90 *10*	2414.2+x	J+8		
3933.9+x	J+12	785.7 *1*	0.91 *10*	3148.2+x	J+10		
4771.7+x	J+14	837.8 *1*	1.00 *10*	3933.9+x	J+12		
5660.8+x	J+16	889.1 *1*	0.93 *10*	4771.7+x	J+14		
6601.4+x	J+18	940.6 *1*	1.03 *10*	5660.8+x	J+16		
7593.3+x	J+20	991.9 *1*	1.07 *15*	6601.4+x	J+18		
8636.1+x	J+22	1042.8 *1*	1.02 *10*	7593.3+x	J+20		
9729.9+x	J+24	1093.8 *1*	1.00 *10*	8636.1+x	J+22		
10874.0+x	J+26	1144.1 *1*	0.69 *7*	9729.9+x	J+24		
12068.7+x	J+28	1194.7 *1*	0.59 *7*	10874.0+x	J+26		
13313.7+x	J+30	1245.0 *1*	0.57 *10*	12068.7+x	J+28		
14608.5+x	J+32	1294.8 *2*	0.48 *7*	13313.7+x	J+30		E_γ: 1293.3 (1988Ra19).
15953.1+x	J+34	1344.6 *2*	0.34 *7*	14608.5+x	J+32		E_γ: 1343.4 (1988Ra19).
17346.9+x	J+36	1393.8 *3*	0.38 *7*	15953.1+x	J+34		
18791.0+x	J+38	1444.1 *4*	0.22 *5*	17346.9+x	J+36		E_γ: 1442.4 (1988Ra19).
20283.4+x	J+40	1492.4 *6*	0.09 *5*	18791.0+x	J+38		E_γ: 1490.3 (1988Ra19).
21825.2+x	J+42	1541.8 *6*		20283.4+x	J+40		
633.0+y	J1+2	633.0 *10*		y	J1		

γ(^{151}Dy) (continued)

E_i(level)	J^{π}_i	E_{γ}‡	I_{γ}†	E_f	J^{π}_f
1310.7+y	J1+4	677.7 5	0.35 8	633.0+y	J1+2
2029.9+y	J1+6	719.2 1	0.67 10	1310.7+y	J1+4
2795.5+y	J1+8	765.6 1	0.95 13	2029.9+y	J1+6
3607.7+y	J1+10	812.2 1	0.92 13	2795.5+y	J1+8
4466.9+y	J1+12	859.2 1	0.94 14	3607.7+y	J1+10
5373.6+y	J1+14	906.7 1	1.10 10	4466.9+y	J1+12
6327.9+y	J1+16	954.3 1	1.00 8	5373.6+y	J1+14
7329.6+y	J1+18	1001.7 2	1.00 12	6327.9+y	J1+16
8379.6+y	J1+20	1050.0 1	1.02 19	7329.6+y	J1+18
9477.8+y	J1+22	1098.2 1	0.95 8	8379.6+y	J1+20
10624.4+y	J1+24	1146.6 2	0.74 7	9477.8+y	J1+22
11819.6+y	J1+26	1195.2 2	0.67 7	10624.4+y	J1+24
13063.1+y	J1+28	1243.5 2	0.54 7	11819.6+y	J1+26
14355.5+y	J1+30	1292.4 2	0.45 8	13063.1+y	J1+28
15696.4+y	J1+32	1340.9 3	0.35 8	14355.5+y	J1+30
17085.8+y	J1+34	1389.4 3	0.18 6	15696.4+y	J1+32
18525.9+y	J1+36	1440.1 5	0.18 6	17085.8+y	J1+34
20018.4+y	J1+38	1492.5 10		18525.9+y	J1+36
728.5+z	J2+2	728.5 1		z	J2
1493.6+z	J2+4	765.1 2		728.5+z	J2+2
2306.6+z	J2+6	813.0 1		1493.6+z	J2+4
3167.1+z	J2+8	860.5 2		2306.6+z	J2+6
4076.7+z	J2+10	909.6 2		3167.1+z	J2+8
5035.3+z	J2+12	958.6 2		4076.7+z	J2+10
6041.8+z	J2+14	1006.5 1		5035.3+z	J2+12
7098.5+z	J2+16	1056.7 2		6041.8+z	J2+14
8204.5+z	J2+18	1106.0 2		7098.5+z	J2+16
9360.2+z	J2+20	1155.7 2		8204.5+z	J2+18
10565.0+z	J2+22	1204.8 2		9360.2+z	J2+20
11819.7+z	J2+24	1254.7 2		10565.0+z	J2+22
13123.3+z	J2+26	1303.6 2		11819.7+z	J2+24
14475.3+z	J2+28	1352.0 4		13123.3+z	J2+26
15878.7+z	J2+30	1403.4 5		14475.3+z	J2+28
17328.5+z	J2+32	1449.8 6		15878.7+z	J2+30
712.0+u	J3+2	712.0 4	0.41 12	u	J3
1470.7+u	J3+4	758.7 3	0.92 15	712.0+u	J3+2
2276.0+u	J3+6	805.3 2	0.96 15	1470.7+u	J3+4
3128.4+u	J3+8	852.4 2	1.00 18	2276.0+u	J3+6
4027.7+u	J3+10	899.3 2	0.84 22	3128.4+u	J3+8
4974.5+u	J3+12	946.8 4	1.00 19	4027.7+u	J3+10
5968.9+u	J3+14	994.4 2	1.08 22	4974.5+u	J3+12
7011.5+u	J3+16	1042.6 4	1.00 18	5968.9+u	J3+14
8102.0+u	J3+18	1090.5 2	0.98 18	7011.5+u	J3+16
9240.2+u	J3+20	1138.2 2	0.68 12	8102.0+u	J3+18
10426.6+u	J3+22	1186.4 6	0.48 10	9240.2+u	J3+20
11661.5+u	J3+24	1234.9 3	0.41 15	10426.6+u	J3+22
12944.4+u	J3+26	1282.9 2	0.35 12	11661.5+u	J3+24
14274.1+u	J3+28	1329.7 6	0.16 8	12944.4+u	J3+26
15652.9+u	J3+30	1378.8 8	0.17 8	14274.1+u	J3+28
17077.8+u	J3+32	1424.9 10		15652.9+u	J3+30
959.3+v	J4+2	959.3 5		v	J4
1967.7+v	J4+4	1008.4 5		959.3+v	J4+2
3028.0+v	J4+6	1060.3 4		1967.7+v	J4+4
4139.9+v	J4+8	1111.9 5		3028.0+v	J4+6
5305.8+v	J4+10	1165.9 5		4139.9+v	J4+8
6521.3+v	J4+12	1215.5 5		5305.8+v	J4+10
7784.5+v	J4+14	1263.2 5		6521.3+v	J4+12
9097.9+v	J4+16	1313.4 8		7784.5+v	J4+14
10463.6+v	J4+18	1365.7 5		9097.9+v	J4+16

† Photon branching ratios. For relative intensities see tables for isomer feeding transitions and for transitions below the isomer. See 1979Li14 for a list of Iγ′s for the isomer (at 6032 keV) decay from two reactions: ^{141}Pr(^{14}N,4nγ) and ^{122}Sn(^{32}S,3nγ). For SD bands, the values are relative γ-ray intensities within a band, and are from 1988Ra19 for SD-1 and from 1995Ni06 for other SD bands.

‡ For transitions up to the 49/2 isomer Eγ′s are taken from 1979Li14. For transitions feeding the isomer, Eγ′s are taken from 1981Ha17, except the ones quoted to the nearest keV only: they are taken from 1985Ho17. For SD bands values are from 1995Ni06.

γ′s above isomer: from γ(θ), linear polarization and lifetimes in 1981Ha17. For γ′s below isomer: from γ(θ) and lifetime limits in 1981Ha17 and 1979Li14 and conversion electron measurements by 1979Pi07.

@ Seen only in conversion electron spectra by 1979Pi07.

& Reported by 1979Pi07 and 1979Fl05 only.

$^{151}_{66}Dy_{85}$-11

γ(^{151}Dy) (continued)

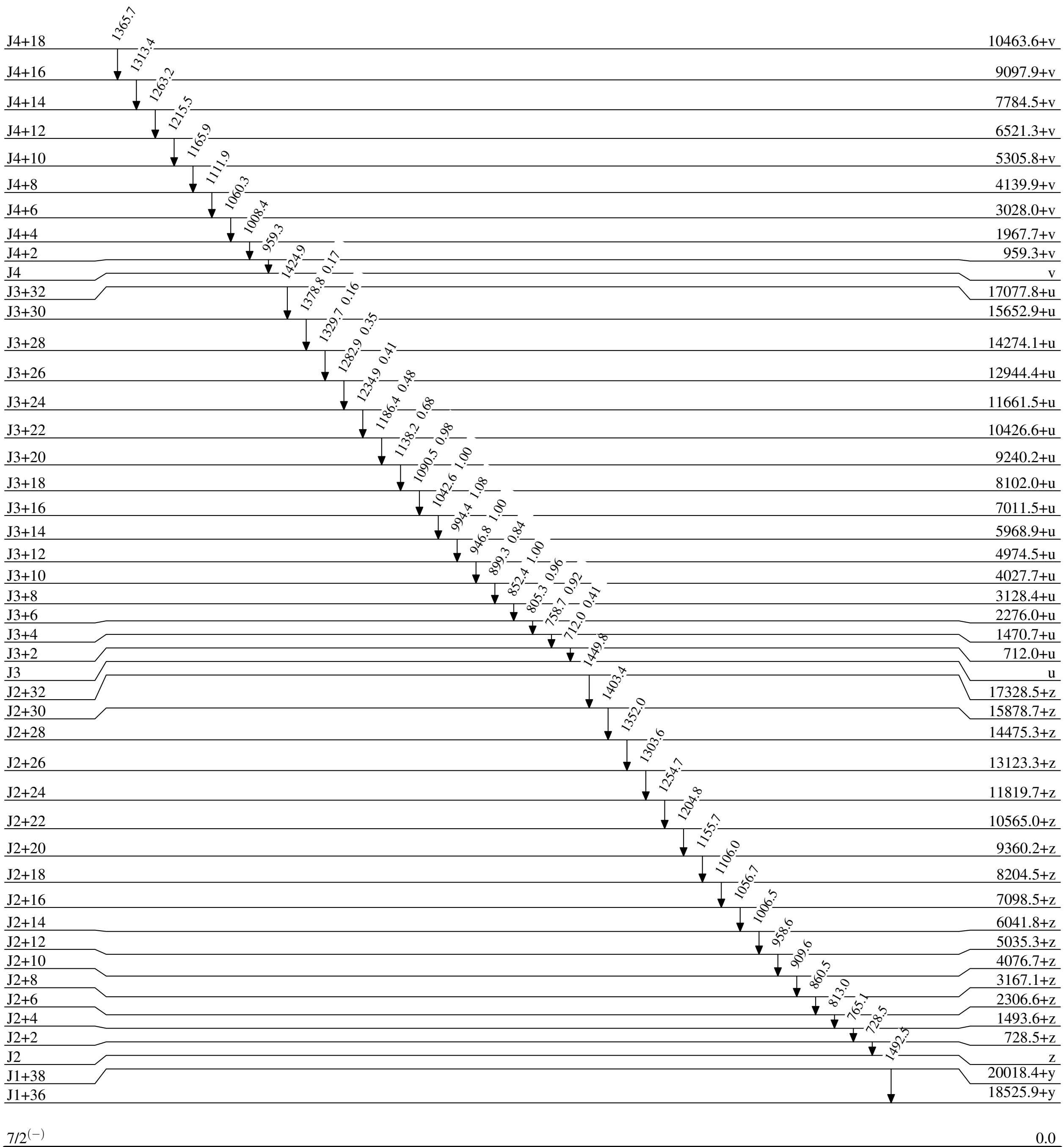
[a] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
[b] Placement of transition in the level scheme is uncertain.

$^{151}_{66}Dy_{85}$-12

(HI,xnγ) 1995Ni06,1985Ho17,1981Ha17

Level Scheme

Intensities: Relative photon branching from each level

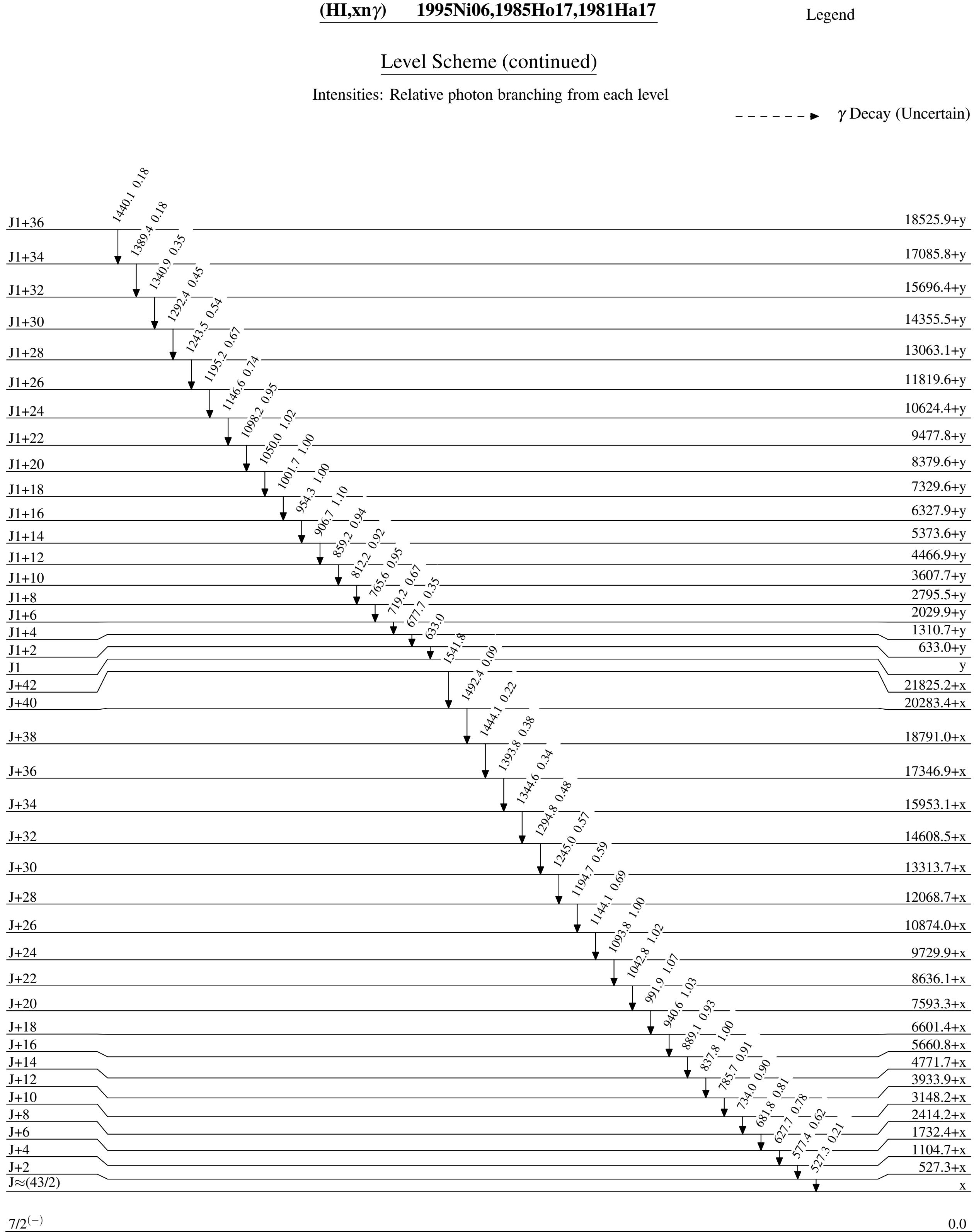


$^{151}_{66}Dy_{85}$

(HI,xnγ) 1995Ni06,1985Ho17,1981Ha17

Level Scheme (continued)

Intensities: Relative photon branching from each level

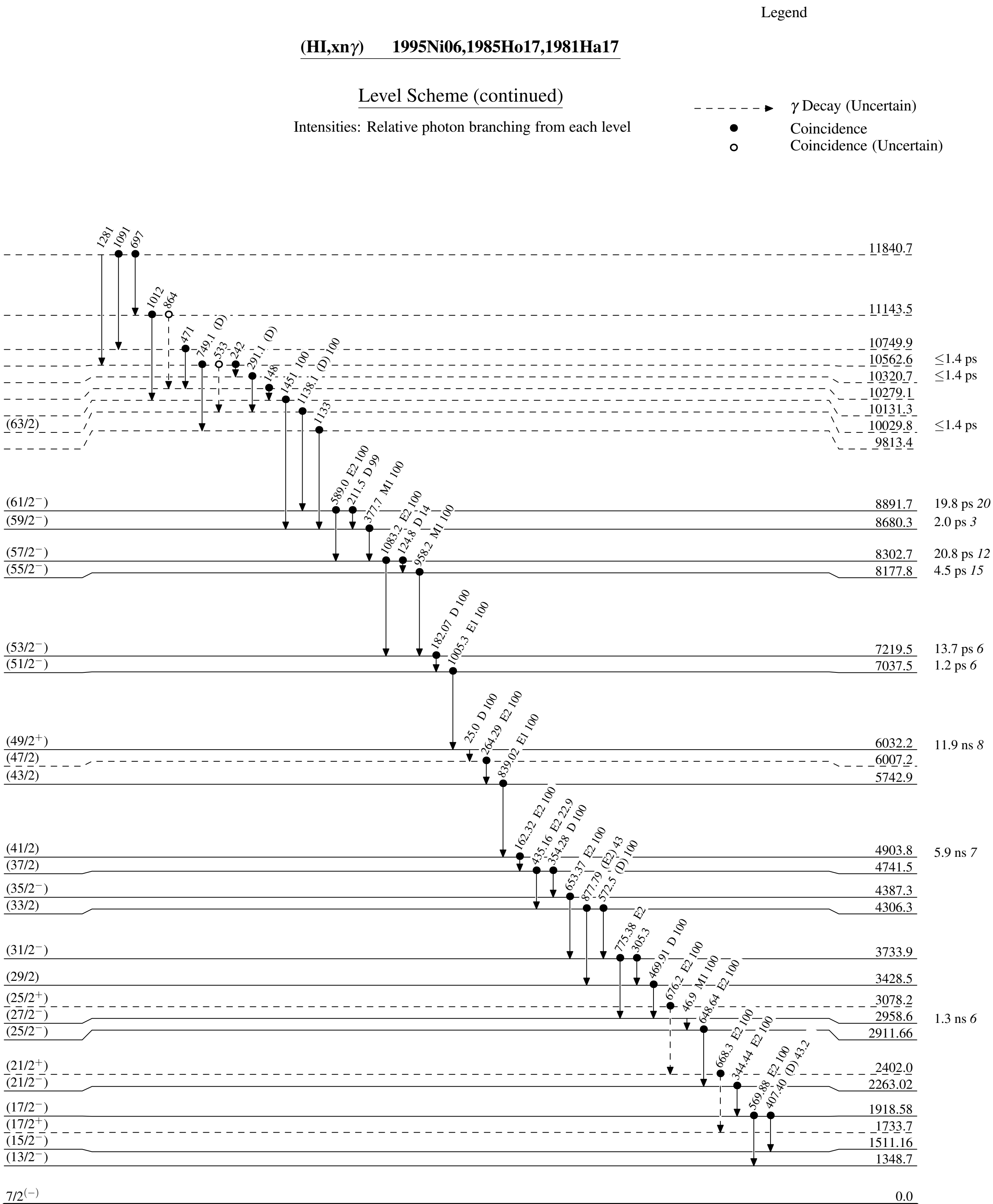


$^{151}_{66}Dy_{85}$

(HI,xnγ) 1995Ni06,1985Ho17,1981Ha17

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{151}_{66}Dy_{85}$

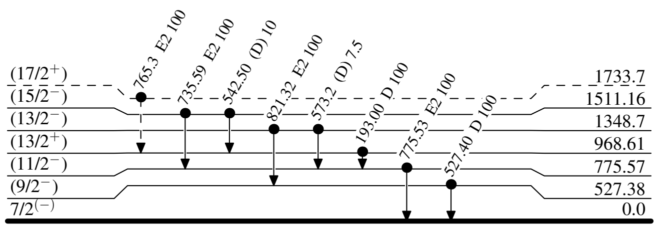
(HI,xnγ) 1995Ni06,1985Ho17,1981Ha17

Legend

Level Scheme (continued)

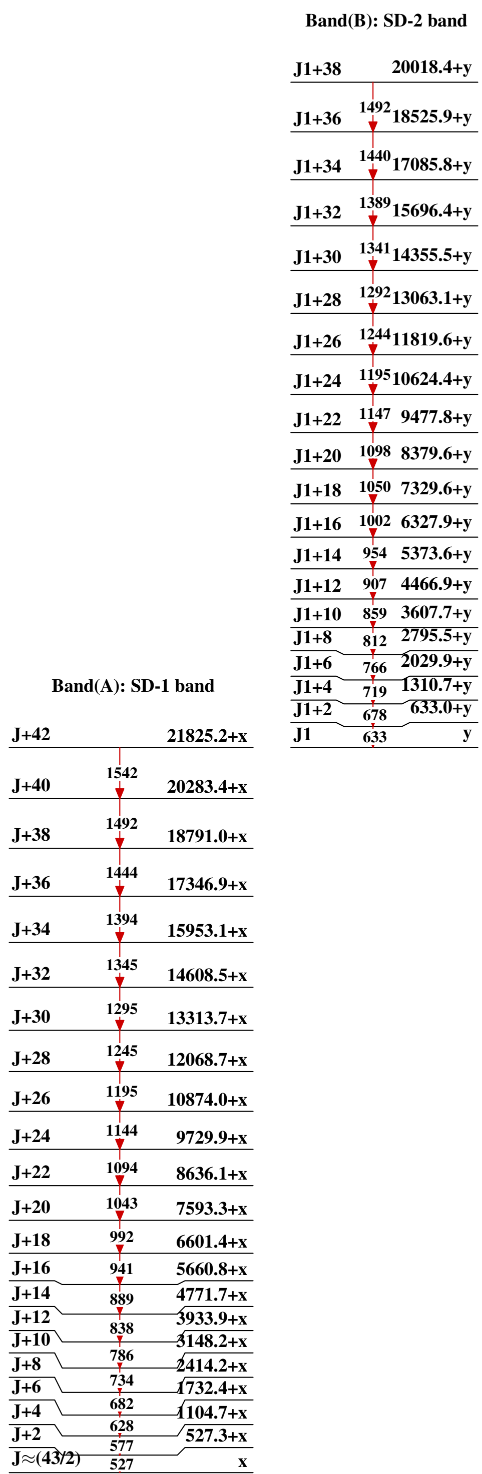
Intensities: Relative photon branching from each level

γ Decay (Uncertain)
Coincidence



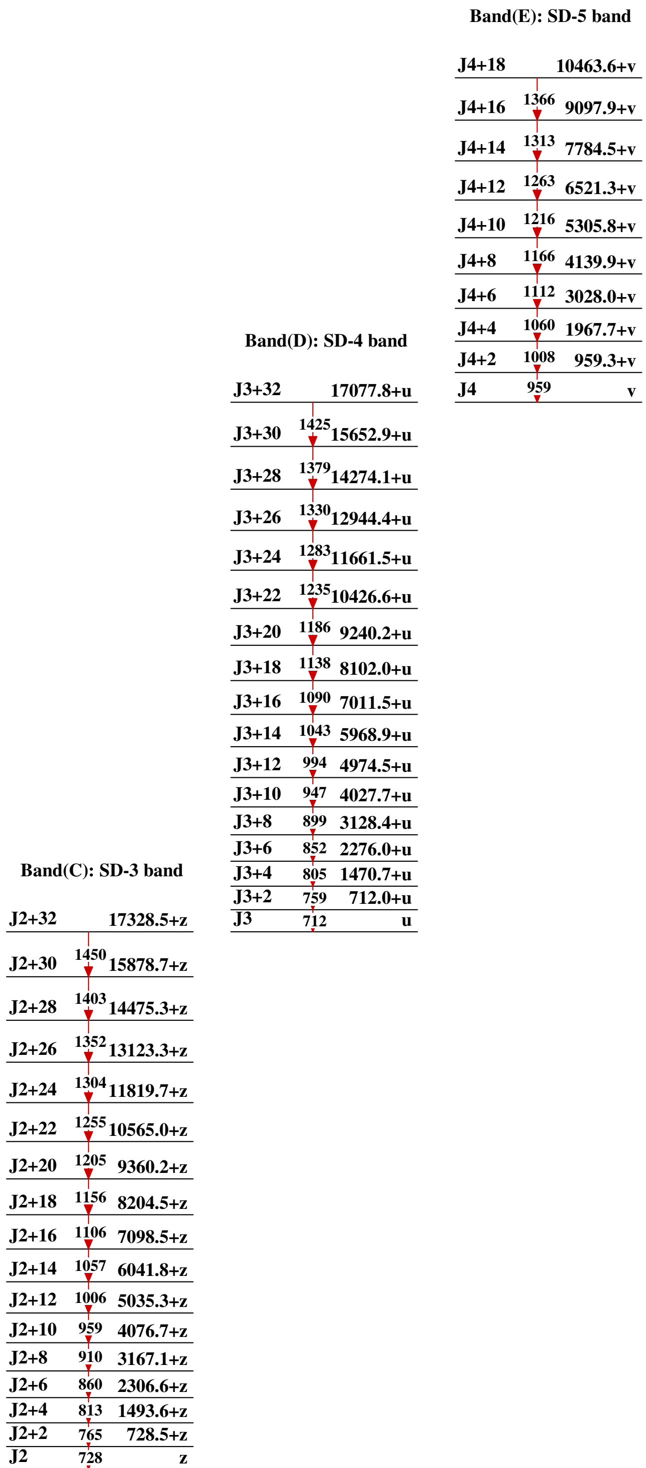
$^{151}_{66}Dy_{85}$

(HI,xnγ) 1995Ni06,1985Ho17,1981Ha17



$^{151}_{66}Dy_{85}$

(HI,xnγ) 1995Ni06,1985Ho17,1981Ha17 (continued)



$^{151}_{66}Dy_{85}$