(HI,xnγ):SD,tsd 2013Re11,2001La17,1995Be36

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 200,2 (2025)	22-Aug-2022

Additional information 1.

2013Re11 compiled for the XUNDL database by B. Singh (McMaster).

2013Re11 (also 2012Re23): ^{110}Pd(^{48}Ti,4nγ), E(^{48}Ti)=215 MeV at ATLAS and Gammasphere array of 101 HPGe detectors at ANL. Used 1 mg/cm^2 thick ^{110}Pd target on 10 mg/cm^2 thick ^{197}Au backing, with 0.07 mg/cm^2 thick Al layer in between. Measured Eγ, Iγ, $\gamma\gamma$ and fractional Doppler shifts. Found SD band and three triaxial strongly deformed (TSD) bands (keV rounded-off Eγ values and no Iγ's) and deduced transition quadrupole moments and configurations. Comparison with cranked Nilsson-Strutinsky method without pairing.

2001La17: ^{110}Pd(^{48}Ti,4nγ), E(^{48}Ti)=215 MeV. Target consisted of α stack of two self-supporting metallic foils (thickness=2×500 μg/cm^2) of enrichment 98.64%. Measured Eγ and $\gamma\gamma$ using the EUROBALL detector array, consisting of 13 cluster detectors, 25 Clover detectors and 26 tapered escape-suppressed detectors. Found SD and TSD-1 bands (precise Eγ values with uncertainties, no Iγ's).

1995Be36: ^{118}Sn(^{40}Ar,4nγ), E(^{40}Ar)=185 MeV. Measured γ's using 36 Compton-suppressed Ge detectors on Gammasphere. Measured Eγ, Iγ, coincidences. Deduced mults for several transitions. Found TSD-1 band (initially considered SD) (precise Eγ values with uncertainties and Iγ's).

^{154}Er Levels

E(level)	J$^\pi$	Comments
x†	J1	J$^\pi$: 2001La17 suggest $J_1\approx(24^+)$, which is the value shown in the compilation of 2002Si26. This band appears to feed into the normal-deformed levels of J^π=19$^-$ to 25$^-$ (2001La17). Other: (26$^+$) (1995Be36), from considerations of γ intensity within the SD and yrast bands. This latter value appears in the compilation of 1999Ha56. E(level): 1995Be36 infer that the likely entry region of the SD band into the states of normal deformation in ^{154}Er is near an excitation energy of 7.4 MeV.
696.37+x† *17*	J1+2	
1430.72+x† *18*	J1+4	
2207.93+x† *20*	J1+6	
3032.37+x† *21*	J1+8	
3907.13+x† *22*	J1+10	
4834.58+x† *24*	J1+12	
5814.46+x† *25*	J1+14	
6847.0+x† *3*	J1+16	
7932.7+x† *3*	J1+18	
9070.6+x† *3*	J1+20	
10261.6+x† *4*	J1+22	
11504.5+x† *4*	J1+24	
12804.9+x† *5*	J1+26	
14154.4+x† *5*	J1+28	
y‡	J2	J$^\pi$: 2001La17 suggest $J_2\approx(26^+)$. This band appears to have a feeding pattern similar to that of the SD-1 band, although it may feed levels somewhat higher up in the spectrum of states of normal deformation.
744.73+y‡ *20*	J2+2	
1533.57+y‡ *25*	J2+4	
2367.0+y‡ *3*	J2+6	
3246.1+y‡ *3*	J2+8	
4171.6+y‡ *4*	J2+10	

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(HI,xnγ):SD,tsd 2013Re11,2001La17,1995Be36 (continued)

^{154}Er Levels (continued)

E(level)	Jπ	E(level)	Jπ	E(level)	Jπ	E(level)	Jπ
5143.8+y‡ *4*	J2+12	13260.2+y‡ *6*	J2+26	5873+z#	J3+12	1929+u@	J4+4
6162.1+y‡ *4*	J2+14	z#	J3	7041+z#	J3+14	2994+u@	J4+6
7227.6+y‡ *4*	J2+16	848+z#	J3+2	8264+z#	J3+16	4125+u@	J4+8
8340.2+y‡ *4*	J2+18	1744+z#	J3+4	9542+z#	J3+18	5325+u@	J4+10
9499.0+y‡ *5*	J2+20	2695+z#	J3+6	10875+z#	J3+20	6594+u@	J4+12
10706.2+y‡ *5*	J2+22	3700+z#	J3+8	u@	J4	7939+u@	J4+14
11959.6+y‡ *5*	J2+24	4759+z#	J3+10	931+u@	J4+2	9364+u@	J4+16

† Band(A): TSD-1 band. Found by 1995Be36 and confirmed by 2001La17 and 2013Re11. Average transition quadrupole moment Q_t=11.0 *10* deduced from measured fractional Doppler shifts (2013Re11). Population of the reaction channel leading to ^{154}Er: 0.5% (2001La17), ≈ 0.4% (1995Be36), and 0.6% (2013Re11).

‡ Band(B): SD band. Found by 2001La17 and confirmed by 2013Re11 Probable prolate shape, with conf $\pi 6^4 \nu 7^2$. Average transition quadrupole moment Q_t=19.5 *32* deduced from measured fractional Doppler shifts (2013Re11). Population is about 1/3 (2001La17) and 1/2 (2013Re11) of that for TSD-1 band.

Band(C): TSD-2 band. Found by 2013Re11. Average transition quadrupole moment Q_t=9.9 *22* deduced from measured fractional Doppler shifts (2013Re11). Population is about 1/4 of that for TSD-1 band.

@ Band(D): Possible TSD-3 band. Found by 2013Re11. Population is about 1/4 of that for TSD-1 band.

γ(^{154}Er)

Eγ†	Iγ‡	Ei(level)	Jπi	Ef	Jπf	Mult.#	Comments
696.37 *17*	0.21 *5*	696.37+x	J1+2	x	J1	[E2]	Eγ: other: 695.06 *25* (1995Be36).
734.35 *5*	1.00 *8*	1430.72+x	J1+4	696.37+x	J1+2	E2	Eγ: other: 734.26 *23* (1995Be36). Mult.: from R=1.79 *25*.
744.73 *20*		744.73+y	J2+2	y	J2		Eγ: other: 742 (2013Re11).
777.21 *8*	0.98 *8*	2207.93+x	J1+6	1430.72+x	J1+4	E2	Eγ: other: 776.73 *22* (1995Be36). Mult.: from R=1.39 *39*.
788.84 *15*		1533.57+y	J2+4	744.73+y	J2+2		Eγ: other: 789 (2013Re11).
824.44 *7*	0.96 *9*	3032.37+x	J1+8	2207.93+x	J1+6	[E2]	Eγ: other: 824.09 *21* (1995Be36), 824 (2013Re11).
833.45 *7*		2367.0+y	J2+6	1533.57+y	J2+4		Eγ: other: 832 (2013Re11).
848		848+z	J3+2	z	J3		
874.76 *6*	0.68 *7*	3907.13+x	J1+10	3032.37+x	J1+8	[E2]	Eγ: other: 874.95 *23* (1995Be36), 875 (2013Re11).
879.04 *8*		3246.1+y	J2+8	2367.0+y	J2+6		Eγ: other: 879 (2013Re11).
896		1744+z	J3+4	848+z	J3+2		
925.56 *17*		4171.6+y	J2+10	3246.1+y	J2+8		Eγ: other: 924 (2013Re11).
927.45 *9*	0.76 *7*	4834.58+x	J1+12	3907.13+x	J1+10	E2	Eγ: other: 927.51 *26* (1995Be36), 927 (2013Re11). Mult.: from R=1.80 *39*.
931		931+u	J4+2	u	J4		
951		2695+z	J3+6	1744+z	J3+4		
972.13 *11*		5143.8+y	J2+12	4171.6+y	J2+10		Eγ: other: 971 (2013Re11).
979.88 *8*	0.73 *7*	5814.46+x	J1+14	4834.58+x	J1+12	E2	Eγ: other: 981.04 *44* (1995Be36), 979 (2013Re11). Mult.: from R=1.44 *40*.
998		1929+u	J4+4	931+u	J4+2		
1005		3700+z	J3+8	2695+z	J3+6		
1018.36 *15*		6162.1+y	J2+14	5143.8+y	J2+12		Eγ: other: 1018 (2013Re11).
1032.58 *9*	0.71 *9*	6847.0+x	J1+16	5814.46+x	J1+14	E2	Eγ: other: 1032.14 *20* (1995Be36), 1032

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(HI,xnγ):SD,tsd 2013Re11,2001La17,1995Be36 (continued)

γ(^{154}Er) (continued)

E_γ†	I_γ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	Comments
							(2013Re11). Mult.: from R=1.40 *47*.
1059		4759+z	J3+10	3700+z	J3+8		
1065		2994+u	J4+6	1929+u	J4+4		
1065.53 *10*		7227.6+y	J2+16	6162.1+y	J2+14		E_γ: other: 1065 (2013Re11).
1085.61 *10*	0.71 *8*	7932.7+x	J1+18	6847.0+x	J1+16	E2	E_γ: other: 1085.24 *22* (1995Be36), 1085 (2013Re11). Mult.: from R=1.78 *62*.
1112.59 *11*		8340.2+y	J2+18	7227.6+y	J2+16		E_γ: other: 1111 (2013Re11).
1114		5873+z	J3+12	4759+z	J3+10		
1131		4125+u	J4+8	2994+u	J4+6		
1137.98 *13*	0.63 *7*	9070.6+x	J1+20	7932.7+x	J1+18	E2	E_γ: other: 1137.88 *30* (1995Be36), 1138 (2013Re11). Mult.: from R=1.27 *52*.
1158.81 *12*		9499.0+y	J2+20	8340.2+y	J2+18		E_γ: other: 1159 (2013Re11).
1168		7041+z	J3+14	5873+z	J3+12		
1190.95 *23*	0.63 *7*	10261.6+x	J1+22	9070.6+x	J1+20	E2	E_γ: other: 1191.39 *28* (1995Be36), 1191 (2013Re11). Mult.: from R=1.61 *40*.
1200		5325+u	J4+10	4125+u	J4+8		
1207.19 *13*		10706.2+y	J2+22	9499.0+y	J2+20		E_γ: other: 1206 (2013Re11).
1223		8264+z	J3+16	7041+z	J3+14		
1242.93 *11*	0.41 *7*	11504.5+x	J1+24	10261.6+x	J1+22	[E2]	E_γ: other: 1243.84 *34* (1995Be36), 1242 (2013Re11).
1253.39 *18*		11959.6+y	J2+24	10706.2+y	J2+22		E_γ: other: 1253 (2013Re11).
1269		6594+u	J4+12	5325+u	J4+10		
1278		9542+z	J3+18	8264+z	J3+16		
1300.39 *18*	0.37 *6*	12804.9+x	J1+26	11504.5+x	J1+24	[E2]	E_γ: other: 1301.93 *51* (1995Be36).
1300.54 *24*		13260.2+y	J2+26	11959.6+y	J2+24		E_γ: other: 1301 (2013Re11).
1333		10875+z	J3+20	9542+z	J3+18		
1345		7939+u	J4+14	6594+u	J4+12		
1349.49 *20*		14154.4+x	J1+28	12804.9+x	J1+26	[E2]	
ˣ1368.4@ *12*	0.12 *8*						
ˣ1424.26@ *39*	0.30 *8*						
1425		9364+u	J4+16	7939+u	J4+14		

† From 2001La17 for TSD-1 and SD bands and from 2013Re11 for TSD-2 and TSD-3 bands respectively.

‡ From 1995Be36. 2001La17 and 2013Re11 do not report γ intensities.

\# From an asymmetry ratio R (1995Be36), defined to be R=Iγ(forward+backward angles)/Iγ(90°). For stretched quadrupole transitions, R=1.59 *25*; and, for stretched dipoles, R=0.82 *24*. Stretched quadrupole transitions are assigned E2.

@ γ reported by 1995Be36, but not placed in their SD band.

ˣ γ ray not placed in level scheme.

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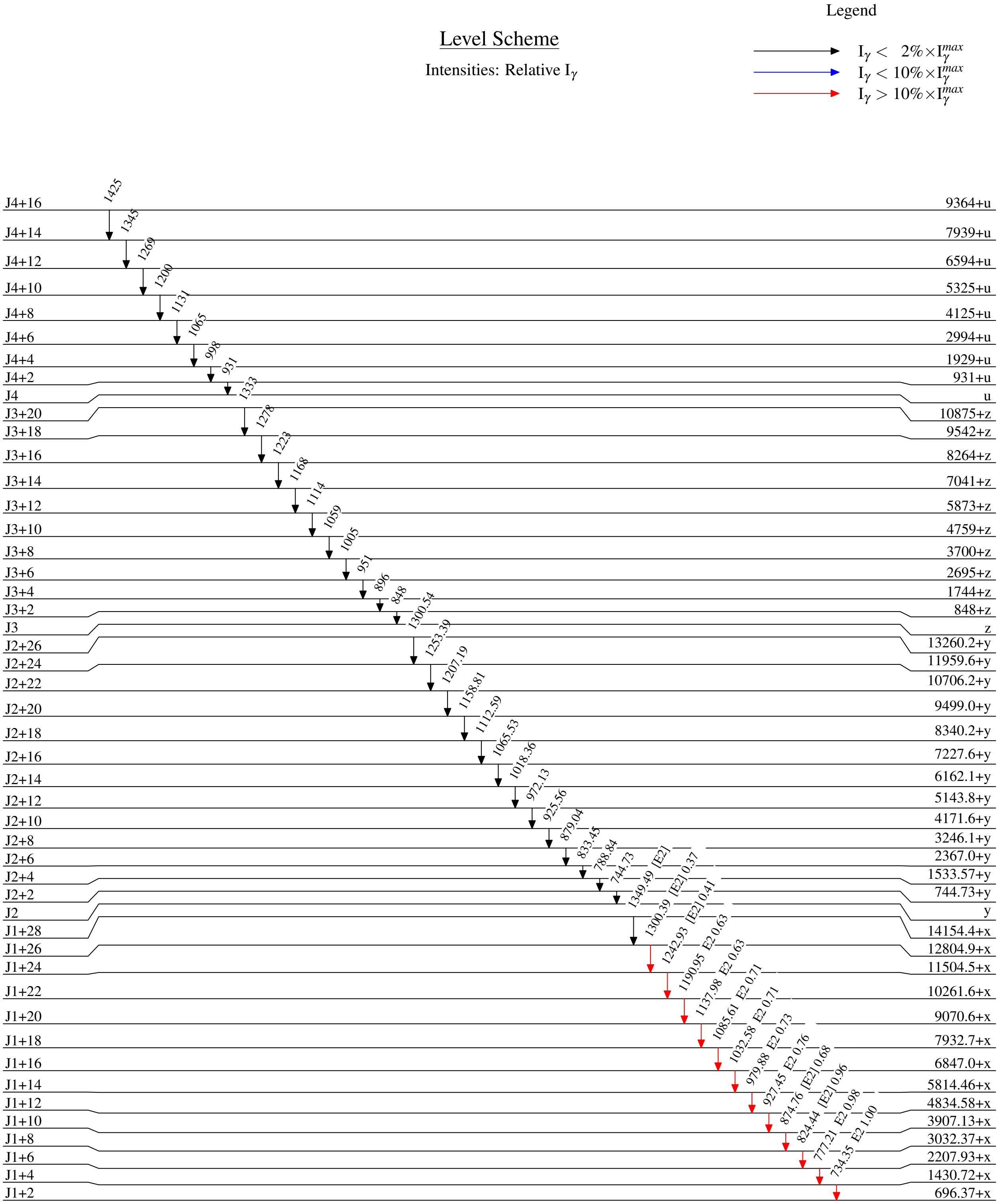
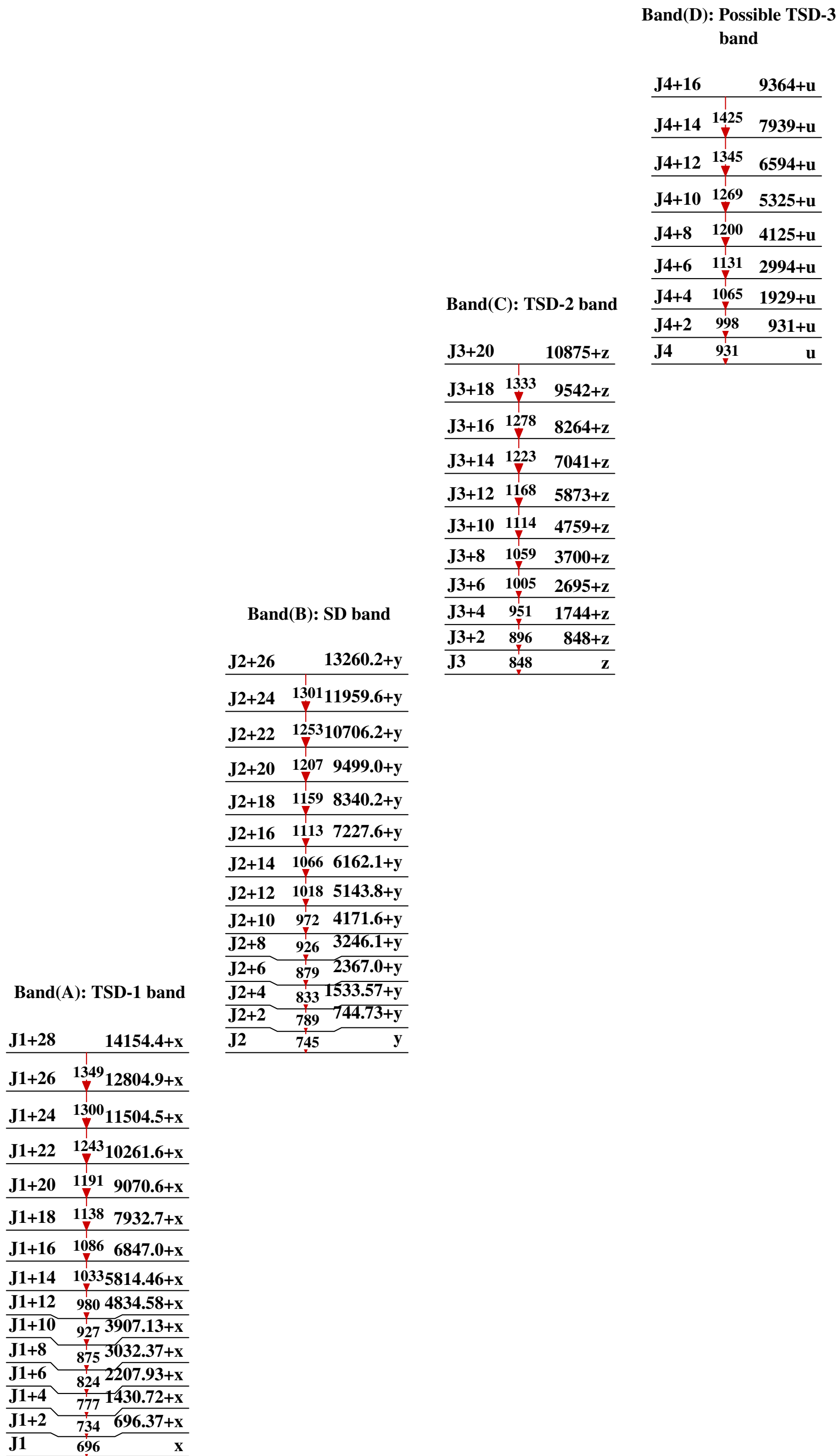
Level Scheme

Intensities: Relative I_γ



$^{154}_{68}Er_{86}$

(HI,xnγ):SD,tsd 2013Re11,2001La17,1995Be36



$^{154}_{68}Er_{86}$