(HI,xnγ) 1990Pi11,1989Ko19,1988Ma49

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. Katakura, Z. D. Wu	NDS 109, 1655 (2008)	1-Apr-2008

1990Pi11: ^{94}Zr(^{34}S,4nγ) E=145 MeV, ^{110}Cd(^{16}O,2nγ) E=60 MeV; array of Compton suppressed Ge with multiplicity and sum-energy filter; measured Eγ, Iγ, γγ-coin, γ(θ) DCO ratios.

1989Ko19: ^{111}Cd(^{16}O,3nγ) E=65 MeV, ^{112}Cd(^{16}O,4nγ) E=85 MeV; Ge, sum-energy filter; measured Eγ, Iγ, γγ-coin, γ(θ).

1988Ma49: supersedes 1987Ma12; ^{96}Zr(^{34}S,6nγ) E=160 MeV, ^{110}Cd(^{18}O,4nγ) E=80 MeV; Compton suppressed Ge with multiplicity and sum-energy filter; measured Eγ, Iγ, γγ-coin, γ(θ), linear polarization.

2005Ma84,2005Mb05: ^{64}Ni+^{64}Ni E=255-261 MeV; Euroball, Linear polarization.

1998Uc01: ^{109}Ag(^{19}F,4n); E=75 MeV, 0.5 mg/cm^2 thick 99.4% enriched Ag self-supporting foil target, 57 mg/cm^2 thick natural Pb foil stopper, HPGe detectors, measured lifetime by means of γγ-coin recoil-distance Doppler-shift(RDDS) method.

Others: ^{94}Mo(^{33}S,2pnγ) E=150 MeV (1989Wy01); ^{110}Cd(^{16}O,2nγ) E=66 MeV (1974Co36); ^{115}In(^{14}N,5nγ) E=84 MeV, ^{116}Sn(^{12}C,4nγ) E=80 MeV (1967Cl02).

^{124}Ba Levels

E(level)[†]	Jπ[‡]	$T_{1/2}$	Comments
0.0[#]	0+		
229.91[#] *10*	2+	191 ps *8*	$T_{1/2}$: From RDDS(1998Uc01).
651.67[#] *13*	4+		
873.20[e] *12*	2+		
1162.04[d] *14*	(3+)		
1228.40[#] *14*	6+		
1324.77[e] *13*	4+		
1672.25[d] *16*	(5+)		
1721.7 *8*	(3−)		Jπ: from negative polarization of 312 keV γ from (4−) level At 2034 keV and γ to 2+ level At 230 keV.
1858.14[e] *15*	(6)+		
1912.76[&] *19*	5−		
1923.32[#] *16*	8+		
2033.55[a] *19*	(4−)		
2261.72[&] *16*	(7)−		
2267.01[b] *19*	5−		
2285.32[d] *19*	(7+)		
2359.37[a] *18*	(6)−		
2479.04[e] *18*	(8+)		
2497.5[c] *3*	(6−)		
2647.42[b] *24*	(7−)		
2688.17[#] *22*	(10+)		
2690.7 *3*			
2704.85[a] *18*	(8)−		
2721.52[&] *18*	(9)−		
2906.4[c] *3*	(8−)		
2975.19[d] *21*	(9+)		
3109.7[b] *3*	(9−)		
3156.60[a] *24*	(10−)		
3177.1[e] *5*	(10+)		
3286.69[&] *20*	(11)−		
3335.5[c] *4*	(10−)		

Continued on next page (footnotes at end of table)

(HI,xnγ) 1990Pi11,1989Ko19,1988Ma49 (continued)

^{124}Ba Levels (continued)

E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]
3436.8[@] 3	(12$^+$)	4603.8[c] 5	(14$^-$)	6081.0[#] 7	(18$^+$)	7866.8?[b] 9	(21$^-$)
3591.5[b] 4	(11$^-$)	4761.6[&] 3	(15$^-$)	6290.3[a] 8	(18$^-$)	7984.0[#] 9	(22$^+$)
3692.3[#] 4	(12$^+$)	4893.1[@] 6	(16$^+$)	6382.9[c] 7	(18$^-$)	8512.2[&] 9	(23$^-$)
3694.0[d] 3	(11$^+$)	5009.7[b] 5	(15$^-$)	6555.8[&] 7	(19$^-$)	8795.1[@] 10	(24$^+$)
3772.4[a] 4	(12$^-$)	5216.4[#] 6	(16$^+$)	6711.8[@] 8	(20$^+$)	9054.0[#] 10	(24$^+$)
3891.4[c] 5	(12$^-$)	5392.2[a] 7	(16$^-$)	6870.8[b] 8	(19$^-$)	9612.9[&] 10	(25$^-$)
3967.99[&] 22	(13)$^-$	5445.9[c] 6	(16$^-$)	7000.0[#] 8	(20$^+$)	9951.4[@] 10	(26$^+$)
4126.5[@] 4	(14$^+$)	5638.7[&] 5	(17$^-$)	7229.8[a] 9	(20$^-$)	11183.2[@] 11	(28$^+$)
4227.9[b] 5	(13$^-$)	5725.6 7		7365.9[c] 8	(20$^-$)	12491.9[@] 12	(30$^+$)
4407.9[#] 4	(14$^+$)	5763.8[@] 7	(18$^+$)	7502.4[&] 8	(21$^-$)	13881.0[@] 13	(32$^+$)
4534.1[a] 6	(14$^-$)	5905.8[b] 7	(17$^-$)	7717.1[@] 9	(22$^+$)	15336.0[@] 13	(34$^+$)

† From a least-squares fit to Eγ′s.
‡ From Adopted Levels.
\# Band(A): band 1; g.s. band.
@ Band(B): band 6; S-band.
& Band(C): Band 2; odd J, π=− possible configuration [1/2−(550) + 3/2+(422)]π.
a Band(D): Band 3; even J, π=− possible configuration [1/2−(550) + 3/2+(420)]π or [1/2−(550) + 3/2[422]]π.
b Band(E): Band 4; odd J, π=− possible configuration [1/2−(550) + 9/2+(404)]π.
c Band(F): Band 5; even J, π=− possible configuration [1/2−(550) + 9/2+(404)]π.
d Band(G): band 8; γ-band, odd J.
e Band(H): band 7; γ-band, even J.

γ(^{124}Ba)

Gamma-ray energies and intensities in in-beam gamma-ray spectroscopy

	1990Pi11 ^{110}Cd(^{16}O,2nγ)		1988Ma49 ^{110}Cd(^{18}O,4nγ)	1989Ko19 ^{111}Cd(^{16}O,3nγ)	
Level	Eγ	Iγ	Iγ	Eγ	Iγ
229.8	229.8	104.0	100	229.9 1	100 2
651.7	421.3	100.0	99	421.5 1	94 2
873.2	642.7	2.3		643.4 1	1.6 5
	872.5	0.6		873.3 3	0.7 3
1162.0	510.9	4.3**		510.0 1	n
	932.2	4.4	1	932.8 2	5.0 23
1228.4	576.4	76.2	79	576.9 1	70 3
1324.7	451.4	5.5**	39&	451.7 1	5.0 5**
	672.8	6.2	13	673.1 1	6.4 10
	1094.1	1.2		1094.5 3	0.5 2
1672.2	444.4	1.1**			
	509.9	4.3**			
	1020.8	3.7		1020.8 2	2.4 5
1858.1	533.2	3.0	4	533.4 1	3.0 2
	629.6	0.6	4	629.7 1	3.2 6
1912.7	684.6	1.1	3		
	1261.0	5.4	5	1260.6 3	4.1 6
1923.3	694.8	38.5	58	695.1 1	45 3
2033.5	I1381.8	2.1	2	1381.6 3	1.8 2
2261.7	338.4	0.2	2		
	348.6	0.7&	1	349.0 3	0.4 2
	1033.2	12.6	11	1033.3 1	9.2 12
2267.0	354.0	0.7	6		

	942.2	1.6	5	942.4 2	2.1 3
	1038.6	1.6	1		
	1615.0	1.5	1	1614.5 8	1.2 4
2285.3	612.2	3.6		612.7 2	2.8 5
	1056.6	1.4		1057.0 2	1.3 2
2359.4	325.4	1.3	2	325.8 1	1.4 2
	446.2	3.0	3	446.5 2	2.8 13
	1130.8	4.4	4	1130.9 2	4.0 10
2479.0	555.7	2.2**			
	620.9	3.3		620.9 1	3.6 5
2497.5	230.7	5.0&			
	824.9	0.3			
2647.4	288.1	0.6			
	380.3	1.2			
	385.7	2.0	4		
	789.3	0.9			
2688.2	763.8	22.4	43	764.6 2	27 4
2690.7	192.9	3.6	6	193.2 1	4.9 6
2704.9	345.3	6.1	6	345.4 1	4.8 3
	442.9	1.1**	1		
	781.3	3.2	7**	781.8 2	3.3 9**
2721.5	459.6	5.1	9	459.8 1	5.5 10
	798.0	10.0	14	798.4 2	8.3 13
2906.4	215.8	2.5	3	215.7 1	3.5 5
	408.7	0.7	2		
2975.2	691.2				
	1053.0	0.7			
3109.7	203.2	0.3			
	405.1	0.9	5		
	462.3	2.5			
3156.6	435.3	0.3	1		
	452.0	5.5**	7&	451.7 1	5.0 5**
3177.1	698.1	2.0			
3286.7	564.7	8.0	13	565.3 1	8.6 6
	598.9	3.6	2	599.5 1	2.8 6
3335.5	225.8	0.6			
	429.0	1.4			
3436.8	748.4	10.9	29	748.8 2	16 4
3591.5	256.0	2.7	17**		
	481.8	3.6			
3692.3	255.8	0.5	17**		
	1004.2	1.6	8	1003.8 3	0.5 2
3694.0	718.1	1.9&		717.8 2	1.6 6
3772.4	486.1	0.6			
	615.5	4.1	7	615.8 1	4.1 5#
3891.4	299.9	1.1	3		
	555.9	2.2**	3		
3968.0	681.0	4.1	12	681.3 1	5.2 5
4126.5	689.4	7.8&	21	689.8 1	7.0 7
4227.9	336.6	0.4	2		
	636.5	0.9	3		
4407.9	281.7				
	715.3	1.6	5		
	971.1	0.9	5		
4534.1	761.7	3.1			
4603.8	375.7	0.6	3		
	712.2	1.0			
4761.6	793.4	2.0	11	793.6 2	3.0 4
4893.1	766.6	3.1	11	767.6 5	2.4 4
5009.6	405.6				
	781.2		7**	781.8 2	3.3 9**
5216.4	808.5	0.3	5		
5392.3	858.1	0.4	15&		
5445.9	842.0	1.4			
5638.7	436.4				

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         877.1                    2
5725.6   832.5     0.9
5763.8   870.7     0.4           20
5905.8   896.1
6081.0   864.6     0.2
-----------------------------------------------------------------------
  Eγ  values are given for 94Zr(34S,4nγ)        and 111Cd(16O,3nγ).
  n: Transition energy was given, but no intensity was give by authors.
  & Composite line.
  ** Composite line multiply placed, intensity not divided.
  # Authors' value Iγ=41  5    seems to be a misprint, the evaluators
    have modified it to 4.1 5.
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E_γ[†]	I_γ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[&]	δ[&]	α[a]	Comments
[x]188.7[#] *3*									Mixed with γ rays in ^{124}Cs, ^{125}Cs decays.
191[b]		1912.76	5⁻	1721.7	(3⁻)				from 2005Mb05. Intensity is not given.
193.2 *1*	4.0	2690.7		2497.5	(6⁻)	D(+Q)	+0.01 *25*		A_2=−0.30 *7* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=−0.390 *4*, A_4=+0.002 *5* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.53 *4*, A_2=+0.19 *3* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
203.2 *4*	0.4	3109.7	(9⁻)	2906.4	(8⁻)				I_γ: from I(203.2γ)/I(462.3γ)=0.3/2.5 in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
215.7 *1*	3.9	2906.4	(8⁻)	2690.7		D(+Q)	−0.21 *+25−15*		A_2=−0.35 *19* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=−0.639 *3*, A_4=+0.072 *4* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.45 *4*, A_2=+0.25 *2* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
225.8 *4*	2.7	3335.5	(10⁻)	3109.7	(9⁻)				
229.9 *1*	100.0	229.91	2⁺	0.0	0⁺	E2		0.108	B(E2)(W.u.)=113 *5* Mult.: from γ(θ) and linear polarization (1988Ma49): A_2=+0.26 *4*, A_4=−0.35 *10*, pol=0.46 *9* in ^{96}Zr(^{34}S,6nγ), A_2=+0.41 *3* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=+0.2533 *23*, A_4=−0.038 *4* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=1.06 *2*, A_2=−0.22 *2* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
230.7 *4*	3.4	2497.5	(6⁻)	2267.01	5⁻				I_γ: composite line. Other components were not given by authors. DCO=0.46 *8* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
255.8 *4*		3692.3	(12⁺)	3436.8	(12⁺)	D+Q			DCO=1.0 *4* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
256.0 *4*	4.2	3591.5	(11⁻)	3335.5	(10⁻)				I_γ: composite line. Other components were not given by authors. A_2=+0.42 *3* for a complex line in

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(HI,xnγ) 1990Pi11,1989Ko19,1988Ma49 (continued)

γ(^{124}Ba) (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult. [&]	δ [&]	α [a]	Comments
									^{110}Cd(^{18}O,4nγ) (1988Ma49) DCO=1.09 *8*, A_2=−0.08 *3* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
281.7 *4*		4407.9	(14$^+$)	4126.5	(14$^+$)				
288.1 *4*	0.4	2647.42	(7$^-$)	2359.37	(6)$^-$	D(+Q)	−0.13 *+12−15*		I_γ: from I(288.1γ)/I(385.7γ)=0.6/2.0 in ^{110}Cd(^{16}O,2nγ) (1990Pi11). DCO=0.35 *12*, A_2=+0.34 *5* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
299.9 *4*	2.9	3891.4	(12$^-$)	3591.5	(11$^-$)	D+Q			A_2=−0.20 *7* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); DCO=0.62 *9* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
312 [@] *1*		2033.55	(4$^-$)	1721.7	(3$^-$)				observed In coincidence with 345 keV and 326 keV G. Intensity is not given. Uncertainty of energy is given by evaluator.
325.8 *1*	1.5	2359.37	(6)$^-$	2033.55	(4$^-$)	Q			A_2=+0.38 *7*, A_4=−0.16 *10* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=1.22 *14* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
336.6 *4*	2.3	4227.9	(13$^-$)	3891.4	(12$^-$)	D+Q			DCO=0.61 *18* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
338.4 *4*	0.2	2261.72	(7)$^-$	1923.32	8$^+$				I_γ: from I(338.4γ)/I(1033.2γ)=0.2/ 12.6 in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
345.4 *1*	6.2	2704.85	(8)$^-$	2359.37	(6)$^-$	Q			A_2=+0.53 *13* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=+0.28 *3*, A_4=−0.09 *4* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=1.07 *4*, A_2=−0.22 *3* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
349.0 *3*	0.5	2261.72	(7)$^-$	1912.76	5$^-$				
354.0 *4*	1	2267.01	5$^-$	1912.76	5$^-$	D+Q			I_γ: from I(354.0γ)/I(942.4γ)=0.7/1.6 in ^{110}Cd(^{16}O,2nγ) (1990Pi11). A_2=+0.23 *5* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); DCO=1.10 *18* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
375.6 *4*	1.3	4603.8	(14$^-$)	4227.9	(13$^-$)	D+Q			A_2=−0.21 *12* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); DCO=0.69 *20* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
380.3 *4*	0.6	2647.42	(7$^-$)	2267.01	5$^-$	Q			DCO=1.12 *14* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
385.7 *4*	1.8	2647.42	(7$^-$)	2261.72	(7)$^-$	D+Q			DCO=0.98 *11*, A_2=−0.20 *2* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
405.1 *4*	1.6	3109.7	(9$^-$)	2704.85	(8)$^-$	D+Q			DCO=0.43 *6* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
405.6 *4*		5009.7	(15$^-$)	4603.8	(14$^-$)				
408.7 *4*	0.3	2906.4	(8$^-$)	2497.5	(6$^-$)	Q			A_2=+0.21 *18* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); DCO=1.18 *23* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
421.5 *1*	100.0	651.67	4$^+$	229.91	2$^+$	E2		0.0160	Mult.: from γ(θ) and linear polarization (1988Ma49): A_2=+0.30 *5*, A_4=−0.15 *5*, pol=0.47 *9* in ^{96}Zr(^{34}S,6nγ), A_2=+0.31 *2* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=+0.321 *3*, A_4=−0.050 *4* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=1.03 *2*, A_2=−0.24 *2* in

(HI,xnγ) 1990Pi11,1989Ko19,1988Ma49 (continued)

$\gamma(^{124}Ba)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[&]	δ[&]	α[a]	Comments
									$^{110}Cd(^{16}O,2n\gamma)$ (1990Pi11).

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(HI,xnγ) 1990Pi11,1989Ko19,1988Ma49 (continued)

γ(^{124}Ba) (continued)

E_γ†	I_γ‡	E_i(level)	J^π_i	E_f	J^π_f	Mult.&	δ&	Comments
429.0 *4*	2.4	3335.5	(10⁻)	2906.4	(8⁻)	Q		DCO=1.13 *17*, A_2=−0.15 *4* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
435.3 *4*	0.9	3156.60	(10⁻)	2721.52	(9)⁻	D+Q		DCO=0.49 *15* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
436.4 *4*		5445.9	(16⁻)	5009.7	(15⁻)			
442.9 *4*	0.9	2704.85	(8)⁻	2261.72	(7)⁻			Iγ=0.9 for 442.9γ+444.4γ doublet (1990Pi11). DCO=0.94 *8* for 442.9γ+444.4γ in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
444.4 *4*	0.9	1672.25	(5⁺)	1228.40	6⁺			Iγ=0.9 for 442.9γ+444.4γ doublet (1990Pi11).
446.5 *2*	1.6	2359.37	(6)⁻	1912.76	5⁻	D(+Q)	−0.3 *+3−5*	A_2=−0.5 *3* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=−0.50 *4*, A_4=+0.08 *6* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.31 *4*, A_2=+0.52 *5* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
451.6 *2*	3.7	3156.60	(10⁻)	2704.85	(8)⁻			Iγ=3.7 for 451.4γ+452.0γ doublet (1990Pi11). DCO=1.25 *19* and A_2=−0.19 *2* for 451.4γ+452.0γ in ^{110}Cd(^{16}O,2nγ) (1990Pi11) A_2=+0.39 *9* in ^{110}Cd(^{18}O,4nγ) (1988Ma49) A_2=+0.333 *10*, A_4=−0.025 *16* in ^{110}Cd(^{16}O,3nγ) (1989Ko19).
451.7 *1*	3.7	1324.77	4⁺	873.20	2⁺			Iγ=3.7 for 451.4γ+452.0γ doublet (1990Pi11). A_2=0.36 *3* for a complex peak in ^{110}Cd(^{18}O,4nγ) (1988Ma49).
459.8 *1*	8.0	2721.52	(9)⁻	2261.72	(7)⁻	Q		A_2=+0.39 *8* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=+0.325 *18*, A_4=0.00 *3* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.96 *6*, A_2=−0.21 *3* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
462.3 *4*	3.7	3109.7	(9⁻)	2647.42	(7⁻)	Q		DCO=1.04 *16*, A_2=−0.18 *5* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
481.8 *4*	4.0	3591.5	(11⁻)	3109.7	(9⁻)	Q		DCO=1.26 *24*, A_2=−0.10 *5* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
486.1 *4*	1.1	3772.4	(12⁻)	3286.69	(11)⁻			I_γ: from I(486.1γ)/I(615.5γ)=0.6/4.1 in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
510.0 *1*	1.1	1162.04	(3⁺)	651.67	4⁺			Iγ=1.1 for 509.9γ+510.9γ doublet (1990Pi11). A_2=+0.15 *3*, A_4=+0.02 *4* in ^{110}Cd(^{16}O,3nγ) (1989Ko19) DCO=1.12 *14* and A_2=−0.07 *4* for 509.9γ+510.9γ in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
510.0 *1*	1.1	1672.25	(5⁺)	1162.04	(3⁺)			Iγ=1.1 for 509.9γ+510.9γ doublet (1990Pi11).
533.4 *1*	1.9	1858.14	(6)⁺	1324.77	4⁺	Q		A_2=+0.35 *15* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=+0.15 *3*, A_4=−0.08 *5* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=1.12 *16* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
555.7 *4*	4.6	2479.04	(8⁺)	1923.32	8⁺			Iγ=4.6 for 555.7γ+555.9γ doublet (1990Pi11). DCO=1.07 *20* for 555.7γ+555.9γ in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
555.9 *4*	4.6	3891.4	(12⁻)	3335.5	(10⁻)			Iγ=4.6 for 555.7γ+555.9γ doublet (1990Pi11).
565.2 *1*	16.5	3286.69	(11)⁻	2721.52	(9)⁻	E2		Mult.: from γ(θ) and linear polarization (1988Ma49): A_2=+0.18 *6*, A_4=−0.02 *8*, pol=0.50 *19* in ^{96}Zr(^{34}S,6nγ), A_2=+0.26 *4* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=+0.288 *15*, A_4=−0.064 *22* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.96 *6*, A_2=−0.13 *2* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
576.9 *1*	86.1	1228.40	6⁺	651.67	4⁺	E2		Mult.: from γ(θ) and linear polarization (1988Ma49): A_2=+0.23 *2* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=+0.314 *3*, A_4=−0.071 *4* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.92 *4*, A_2=−0.07 *4* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).

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(HI,xnγ) 1990Pi11,1989Ko19,1988Ma49 (continued)

$\gamma(^{124}Ba)$ (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [&]	δ [&]	Comments
^{x}594[#] *1*								
598.5 *1*	3.1	3286.69	(11)$^-$	2688.17	(10$^+$)	D		A_2=−0.15 *19* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=+0.30 *4*, A_4=+0.09 *6* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.89 *22* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
612.7 *2*	3.1	2285.32	(7$^+$)	1672.25	(5$^+$)	Q		A_2=+0.81 *8*, A_4=−0.09 *11* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=1.10 *14*, A_2=−0.20 *3* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
615.5 *4*	7.4	3772.4	(12$^-$)	3156.60	(10$^-$)	Q		A_2=−0.07 *3* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); DCO=1.07 *14* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
620.9 *1*	1.9	2479.04	(8$^+$)	1858.14	(6)$^+$	Q		DCO=1.07 *13* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
629.7 *1*	2.0	1858.14	(6)$^+$	1228.40	6$^+$	D+Q		I_γ: from I(534.4γ)/I(629.7γ)=3.0 *2*/3.2 *6* in ^{111}Cd(^{16}O,3nγ) (1989Ko19); other: Iγ=0.4 from I(533.2γ)/I(629.6γ)=3.0/0.6 in ^{110}Cd(^{16}O,2nγ) (1990Pi11). A_2=−0.4 *4* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=−0.02 *4*, A_4=+0.09 *5* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.89 *12* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
636.5 *4*	3.5	4227.9	(13$^-$)	3591.5	(11$^-$)	Q		DCO=1.12 *19* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
643.4 *1*	1.4	873.20	2$^+$	229.91	2$^+$	D+Q		A_2=0.00 *5*, A_4=−0.13 *8* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.95 *13* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
673.1 *1*	2.3	1324.77	4$^+$	651.67	4$^+$	D(+Q)	−0.15 *+25−20*	A_2=+0.11 *2* in ^{110}Cd(^{18}O,4nγ) (1988Ma49) A_2=+0.15 *3*, A_4=−0.11 *4* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.87 *9*, A_2=−0.20 *2* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
681.3 *1*	17.4	3967.99	(13)$^-$	3286.69	(11)$^-$	E2		Mult.: from γ(θ) and linear polarization (1988Ma49): pol=+0.52 *18* in ^{96}Zr(^{34}S,6nγ), A_2=+0.28 *8* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=+0.194 *25*, A_4=−0.11 *4* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.91 *13*, A_2=−0.20 *2* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
684.6 *4*	0.6	1912.76	5$^-$	1228.40	6$^+$	D		A_2=−0.08 *6* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); DCO=0.89 *18* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
689.8 *1*		2975.19	(9$^+$)	2285.32	(7$^+$)			
689.8 *2*	31.4	4126.5	(14$^+$)	3436.8	(12$^+$)	E2		I_γ: composite line. Other components were not given by authors. Mult.: from γ(θ), γγ(θ), DCO and linear polarization (1988Ma49). A_2=+0.32 *4*, A_4=−0.30 *5*, pol=+0.58 *18* in ^{96}Zr(^{34}S,6nγ), A_2=+0.27 *3* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=+0.42 *3*, A_4=−0.05 *4* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=1.08 *9*, A_2=−0.26 *2* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
695.1 *1*	67.6	1923.32	8$^+$	1228.40	6$^+$	Q		A_2=0.28 *2* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=+0.280 *6*, A_4=−0.064 *9* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.95 *8*, A_2=−0.25 *2* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
698.1 *4*		3177.1	(10$^+$)	2479.04	(8$^+$)	Q		DCO=1.05 *12* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
712.2 *4*	2.6	4603.8	(14$^-$)	3891.4	(12$^-$)			

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(HI,xnγ) 1990Pi11,1989Ko19,1988Ma49 (continued)

γ(^{124}Ba) (continued)

E_γ†	I_γ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.&	Comments
715.3 *4*	4.3	4407.9	(14+)	3692.3	(12+)	Q	DCO=1.15 *21* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
718.8 *2*		3694.0	(11+)	2975.19	(9+)		DCO=1.19 *22* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
748.8 *2*	35.4	3436.8	(12+)	2688.17	(10+)	Q	A_2=+0.34 *3* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=+0.271 *14*, A_4=−0.070 *21* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.91 *6*, A_2=−0.30 *3* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
761.7 *4*	3.0	4534.1	(14−)	3772.4	(12−)	Q	DCO=0.68 *12*, A_2=−0.32 *3* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
764.6 *4*	55.1	2688.17	(10+)	1923.32	8+	Q	A_2=+0.33 *3* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=+0.295 *10*, A_4=−0.108 *15* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.95 *5*, A_2=−0.29 *2* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
766.6 *4*	21.1	4893.1	(16+)	4126.5	(14+)	Q	A_2=+0.15 *3* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); DCO=0.95 *18*, A_2=−0.26 *3* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
781.8 *2*	5.7	2704.85	(8)−	1923.32	8+		Iγ=5.7 for 781.2γ+781.3γ doublet (1990Pi11). A_2=+0.22 *3*, A_4=−0.10 *5* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.89 *15* for 781.2γ+781.3 in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
781.8 *2*	5.7	5009.7	(15−)	4227.9	(13−)		Iγ=5.7 for 781.2γ+781.3γ doublet (1990Pi11). A_2=+0.15 *6* in ^{110}Cd(^{18}O,4nγ) (1988Ma49).
789.3 *4*	0.8	2647.42	(7−)	1858.14	(6)+	D	I_γ: from I(385.7γ)/I(789.3γ)=2.0/0.9 in ^{110}Cd(^{16}O,2nγ) (1990Pi11). DCO=0.55 *16* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
793.6 *2*	13.5	4761.6	(15−)	3967.99	(13)−	Q	A_2=+0.25 *6* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=+0.22 *3*, A_4=+0.08 *5* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.82 *17*, A_2=−0.36 *7* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
798.4 *2*	11.9	2721.52	(9)−	1923.32	8+	E1	Mult.: from γ(θ) and linear polarization (1988Ma49). Pol=+0.36 *15* in ^{96}Zr(^{34}S,6nγ), A_2=−0.35 *7* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=−0.203 *14*, A_4=+0.037 *21* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.58 *5*, A_2=+0.28 *4* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
808.5 *4*	5.0	5216.4	(16+)	4407.9	(14+)		
824.9 *4*	0.2	2497.5	(6−)	1672.25	(5+)		I_γ: from I(230.7γ)/I(824.9γ)=5.0/0.3 in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
832.5 *4*	5.0	5725.6		4893.1	(16+)	(D+Q)	DCO=0.35 *13* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
842.0 *4*	3.3	5445.9	(16−)	4603.8	(14−)		
x847.9# *3*							
858.1 *4*	5.8	5392.2	(16−)	4534.1	(14−)	Q	A_2=+0.16 *3* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); DCO=1.09 *13* in 94Zr(^{34}S,4nγ) (1990Pi11).
864.6 *4*	4.1	6081.0	(18+)	5216.4	(16+)		
870.7 *4*	13.1	5763.8	(18+)	4893.1	(16+)	Q	DCO=1.10 *15* in 94Zr(^{34}S,4nγ) (1990Pi11).
873.3 *3*	0.6	873.20	2+	0.0	0+		I_γ: from I(643.4γ)/I(873.3γ)=1.6 *5*/0.7 *3* in ^{111}Cd(^{16}O,3nγ) (1989Ko19); other: Iγ=0.4 from I(642.7γ)/I(872.5γ)=2.3/0.6 in ^{110}Cd(^{16}O,2nγ) (1990Pi11). A_2=+0.06 *5*, A_4=−0.04 *7* in ^{110}Cd(^{16}O,3nγ) (1989Ko19).
877.1 *4*	7.7	5638.7	(17−)	4761.6	(15−)		A_2=+0.2 *3* in ^{110}Cd(^{18}O,4nγ) (1988Ma49).
896.1 *4*	4.4	5905.8	(17−)	5009.7	(15−)		Iγ=4.4 for 896.1γ+898.0γ doublet (1990Pi11).
898.0 *4*	4.4	6290.3	(18−)	5392.2	(16−)		Iγ=4.4 for 896.1γ+898.0γ doublet (1990Pi11).
917.1 *4*	7.5	6555.8	(19−)	5638.7	(17−)		
919.0 *4*	<1	7000.0	(20+)	6081.0	(18+)		
932.8 *2*	4.4	1162.04	(3+)	229.91	2+		A_2=+0.17 *20* in ^{110}Cd(^{18}O,4nγ) (1988Ma49) DCO=0.78 *17* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
937.0 *4*	<1	6382.9	(18−)	5445.9	(16−)		
939.5 *4*	1.3	7229.8	(20−)	6290.3	(18−)		
942.4 *2*	2.2	2267.01	5−	1324.77	4+	D	A_2=+0.26 *11* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=−0.10 *7*,

Continued on next page (footnotes at end of table)

(HI,xnγ) 1990Pi11,1989Ko19,1988Ma49 (continued)

γ(^{124}Ba) (continued)

E_γ †	I_γ ‡	E_i(level)	J^π_i	E_f	J^π_f	Mult.&	Comments
							A_4=−0.11 *11* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.83 *17* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
946.6 *4*	5.8	7502.4	(21⁻)	6555.8	(19⁻)		
947.9 *3*	6.3	6711.8	(20⁺)	5763.8	(18⁺)	Q	DCO=0.95 *13* in ^{94}Zr(^{34}S,4nγ) (1990Pi11).
965.0 *4*	<1	6870.8	(19⁻)	5905.8	(17⁻)		
971.1 *4*	4.7	4407.9	(14⁺)	3436.8	(12⁺)	Q	A_2=+0.30 *15* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); DCO=0.90 *23* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
983.0 *4*	<1	7365.9	(20⁻)	6382.9	(18⁻)		Iγ<1 for 983.0γ+984.0γ (1990Pi11).
984.0 *4*	<1	7984.0	(22⁺)	7000.0	(20⁺)		Iγ<1 for 983.0γ+984.0γ (1990Pi11).
996.0[b] *4*	<1	7866.8?	(21⁻)	6870.8	(19⁻)		Not observed in ^{64}Ni(^{64}Ni,4nγ).
1003.8 *3*		3692.3	(12⁺)	2688.17	(10⁺)	Q	A_2=+0.20 *15* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); DCO=0.98 *13* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
1005.3 *4*	5.0	7717.1	(22⁺)	6711.8	(20⁺)	Q	DCO=0.89 *12* in ^{94}Zr(^{34}S,4nγ) (1990Pi11).
1009.8 *4*	3.0	8512.2	(23⁻)	7502.4	(21⁻)		
1020.8 *2*	3	1672.25	(5⁺)	651.67	4⁺	(D+Q)	I_γ: from I(444.4γ)/I(1020.8γ)=1.1/3.7 in ^{110}Cd(^{16}O,2nγ) (1990Pi11). A_2=+0.54 *6*, A_4=+0.19 *9* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.96 *15* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
1033.3 *1*	13.2	2261.72	(7)⁻	1228.40	6⁺	E1	Mult.: from γ(θ) and linear polarization (1988Ma49): A_2=−0.41 *10*, A_4=0.0 *2*, pol=0.62 *25* in ^{96}Zr(^{34}S,6nγ), A_2=−0.23 *6* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=−0.238 *19*, A_4=+0.03 *3* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.56 *5*, A_2=+0.22 *5* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
1038.6 *4*	1.4	2267.01	5⁻	1228.40	6⁺	D	A_2=−0.23 *23* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); DCO=0.8 *3* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
1053.0 *4*		2975.19	(9⁺)	1923.32	8⁺		
1057.0 *2*	1.2	2285.32	(7⁺)	1228.40	6⁺	(D+Q)	I_γ: from I(612.2γ)/I(1056.6γ)=3.6/1.4 in ^{110}Cd(^{16}O,2nγ) (1990Pi11). DCO=1.0 *3* in ^{110}Cd(^{16}O,2nγ) (1990Pi11) A_2=+0.22 *9*, A_4=+0.20 *13* in ^{110}Cd(^{16}O,3nγ) (1989Ko19).
1070.0 *4*	<1	9054.0	(24⁺)	7984.0	(22⁺)		
1071[b]		1721.7	(3⁻)	651.67	4⁺		from 2005Mb05. Intensity is not given.
1078.0 *4*	≈1	8795.1	(24⁺)	7717.1	(22⁺)		
[x]1088[#] *1*							A_2=−0.4 *5* in ^{110}Cd(^{18}O,4nγ) (1988Ma49).
1094.5 *3*	2.0	1324.77	4⁺	229.91	2⁺	Q	DCO=1.2 *4*, A_2=−0.21 *5* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
1100.7 *4*	2.1	9612.9	(25⁻)	8512.2	(23⁻)		
1130.9 *2*	3.8	2359.37	(6)⁻	1228.40	6⁺	D	A_2=+0.43 *18* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=+0.25 *4*, A_4=+0.03 *6* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=1.06 *7*, A_2=−0.21 *8* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
1156.3 *4*	≈1	9951.4	(26⁺)	8795.1	(24⁺)	Q	DCO=0.97 *13* in ^{94}Zr(^{34}S,4nγ) (1990Pi11).
1231.8 *4*	≈1	11183.2	(28⁺)	9951.4	(26⁺)		
1260.6 *3*	3.6	1912.76	5⁻	651.67	4⁺	E1	Mult.: from γ(θ) and linear polarization (1988Ma49): A_2=−0.45 *10*, A_4=+0.4 *3*, pol=0.37>in ^{96}Zr(^{34}S,6nγ), A_2=−0.25 *12* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=−0.19 *4*, A_4=+0.06 *6* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.55 *7*, A_2=+0.18 *13* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
1308.7 *4*	0.8	12491.9	(30⁺)	11183.2	(28⁺)		
1381.6 *3*	0.8	2033.55	(4⁻)	651.67	4⁺	D	A_2=+0.31 *20* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); A_2=+0.35 *9*, A_4=+0.09 *13* in ^{110}Cd(^{16}O,3nγ) (1989Ko19); DCO=0.91 *21* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).
1389.1 *4*	0.4	13881.0	(32⁺)	12491.9	(30⁺)		
1455.0 *4*	<1	15336.0	(34⁺)	13881.0	(32⁺)		

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(HI,xnγ) 1990Pi11,1989Ko19,1988Ma49 (continued)

γ(^{124}Ba) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[&]	Comments
1492[@] *1*		1721.7	(3$^-$)	229.91	2$^+$		observed In coincidence with 345 keV and (326 keV or 312 keV) G. Intensity is not given. Uncertainty of energy is given by evaluator.
1615.0 *4*	0.8	2267.01	5$^-$	651.67	4$^+$	D	A_2=−0.3 *3* in ^{110}Cd(^{18}O,4nγ) (1988Ma49); DCO=0.73 *23* in ^{110}Cd(^{16}O,2nγ) (1990Pi11).

[†] Eγ with ΔE<0.5 keV are from ^{111}Cd(^{16}O,3nγ) (1989Ko19). Other Eγ′s are from ^{94}Zr(^{34}S,4nγ) E=145 MeV and ^{110}Cd(^{16}O,2nγ) E=60 MeV (1990Pi11); ΔE=0.4 keV is assigned by the evaluators.

[‡] From ^{94}Zr(^{34}S,4nγ) E=145 MeV (1990Pi11); relative to I(229.8γ)=100.

[#] Only reported by 1988Ma49 as γ′s originating from 2646- and 3096-keV levels in their decay scheme.

[@] From 2005Ma84. Intensity is not given.

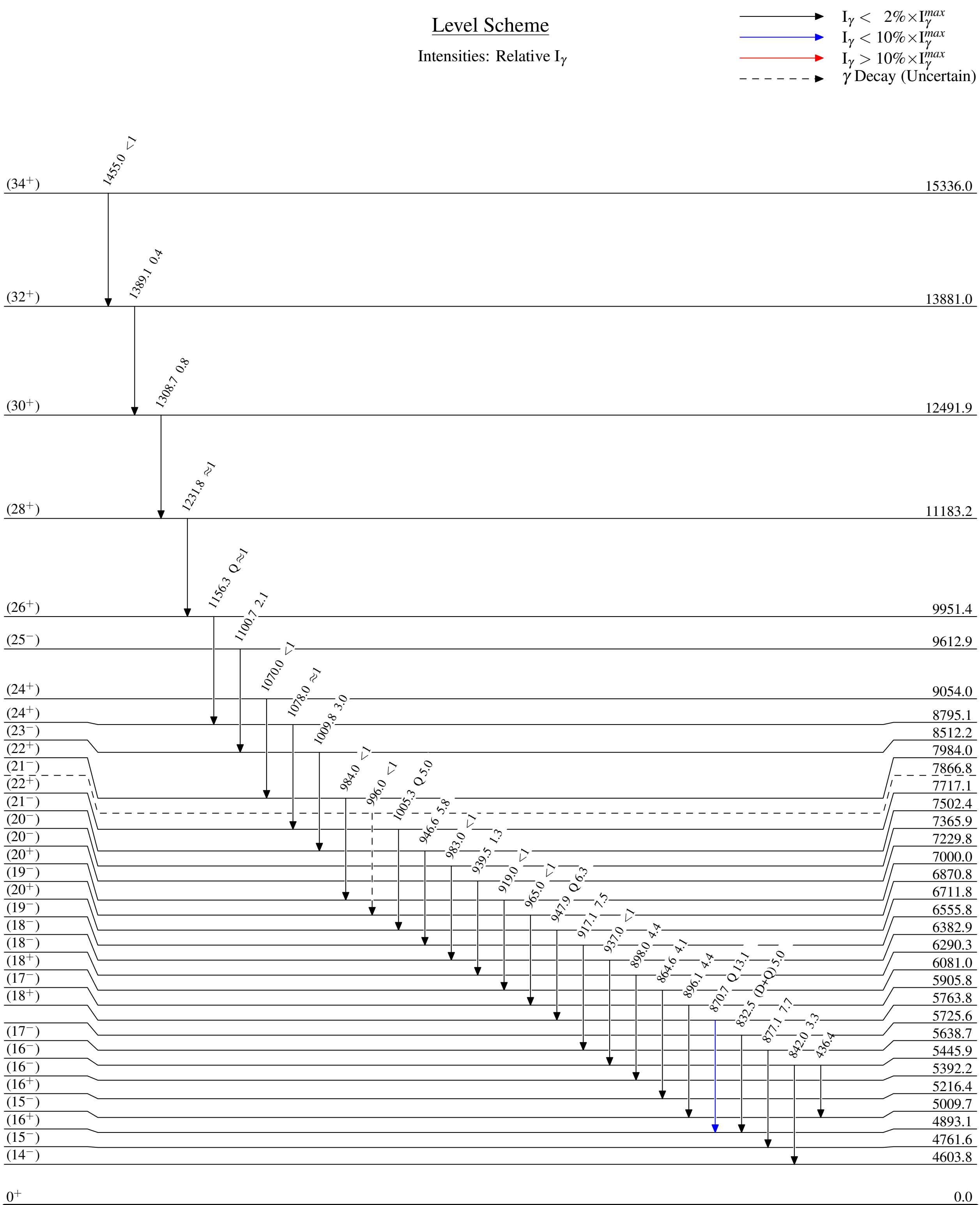
[&] From γ(θ) (1989Ko19, 1988Ma49, 1990Pi11) and DCO data (1990Pi11), unless otherwise noted. These data are included in the comment column, note, however, that the signs of A_2 given by 1990Pi11 are opposite because of the use of Rose and Brink phase convention.

[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.

[x] γ ray not placed in level scheme.

(HI,xnγ) 1990Pi11,1989Ko19,1988Ma49

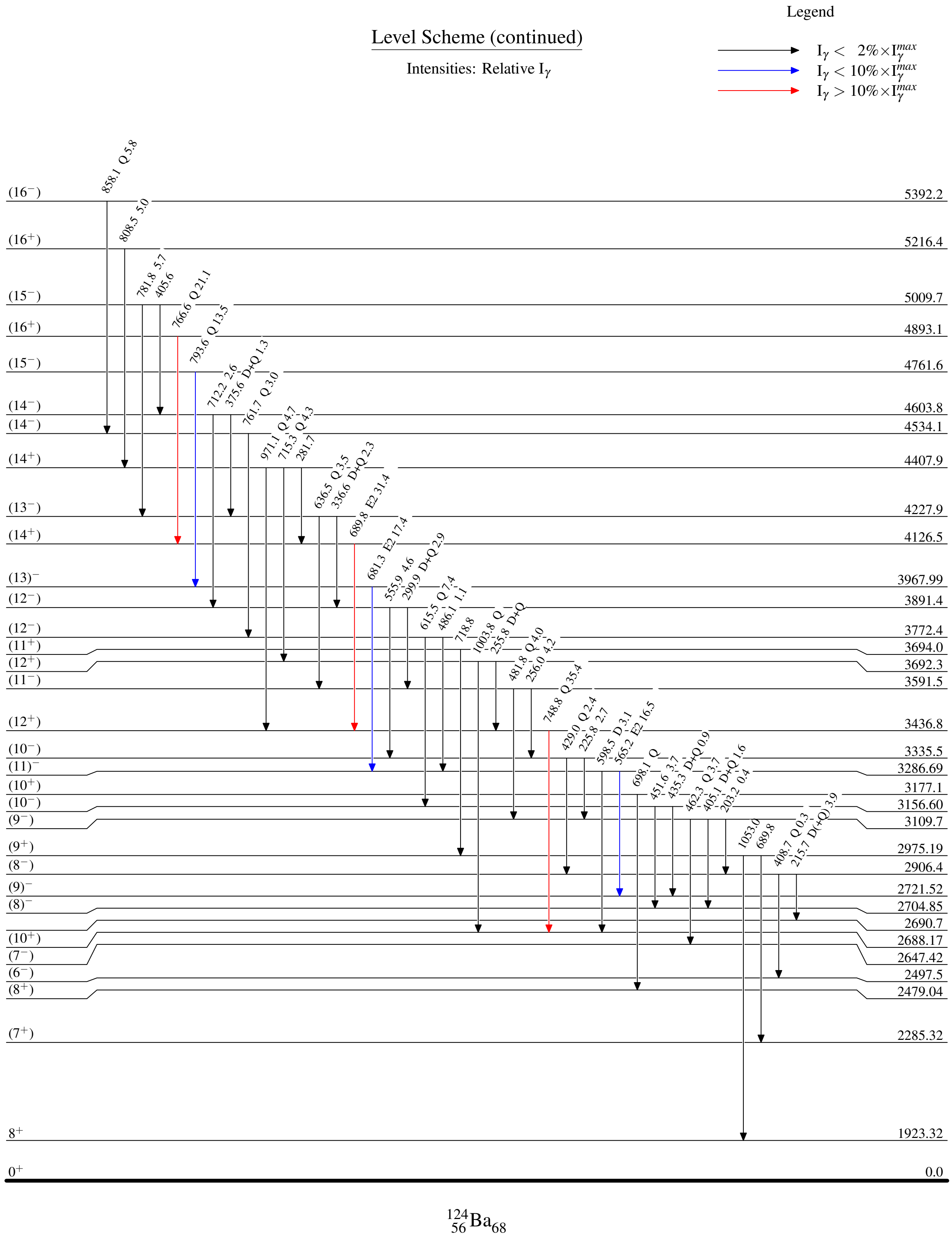


$^{124}_{56}Ba_{68}$

(HI,xnγ) 1990Pi11,1989Ko19,1988Ma49

Level Scheme (continued)

Intensities: Relative I_γ

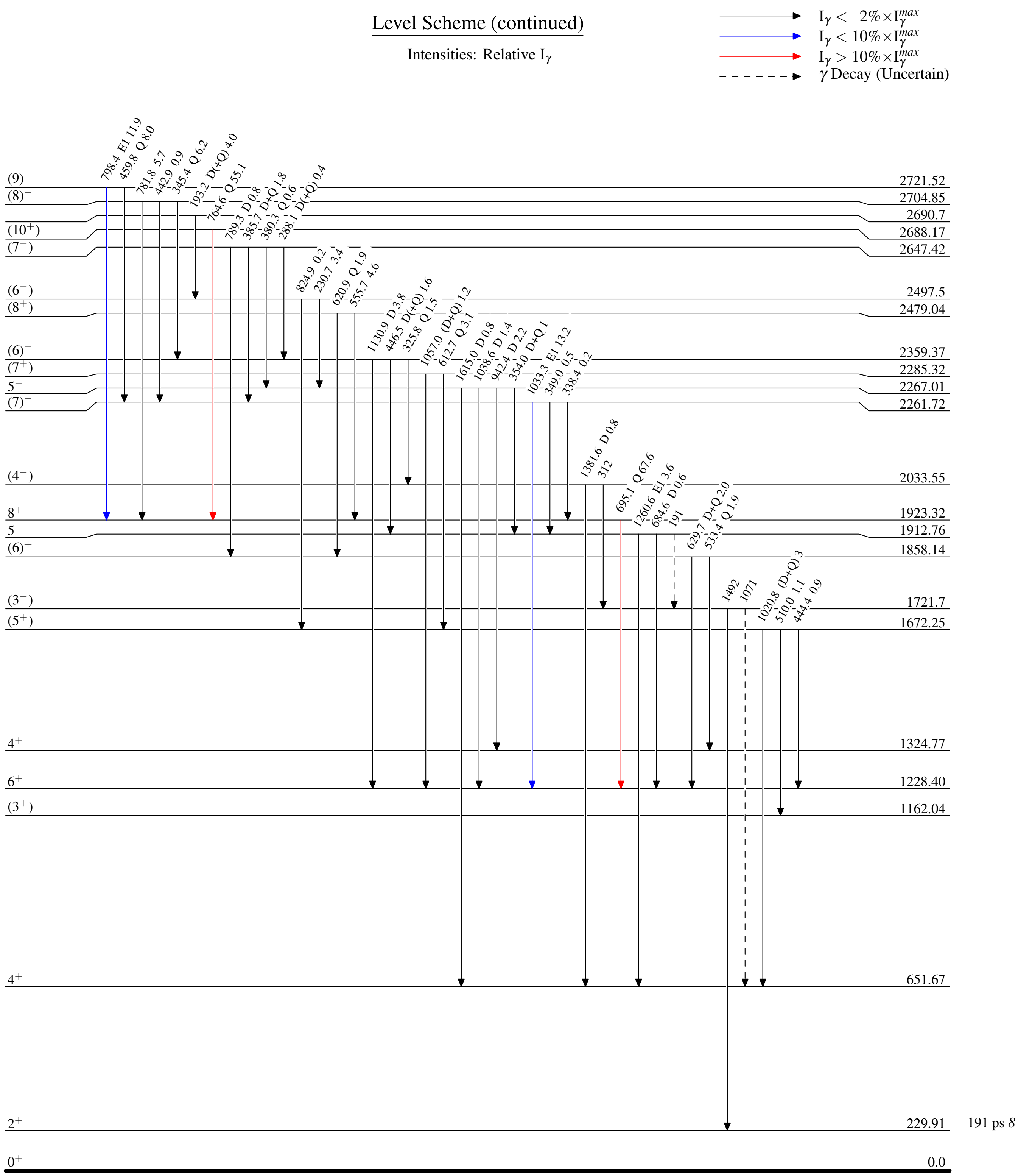


(HI,xnγ) 1990Pi11,1989Ko19,1988Ma49

Legend

Level Scheme (continued)

Intensities: Relative I_γ

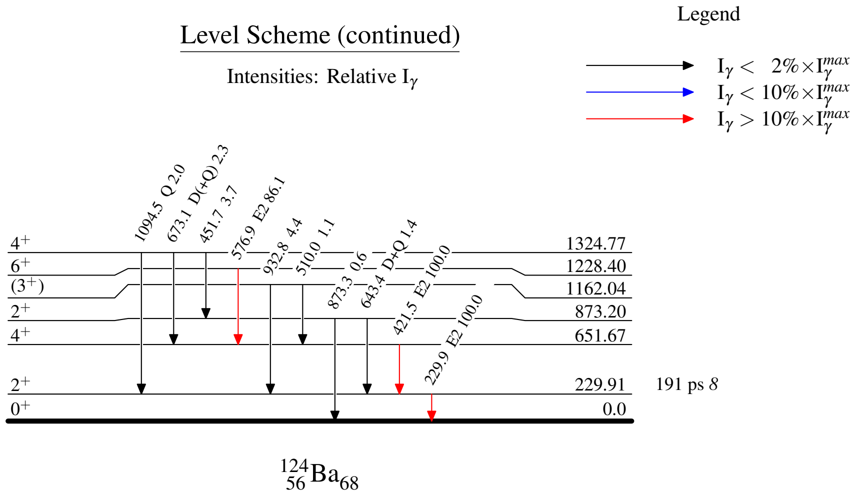


$^{124}_{56}Ba_{68}$

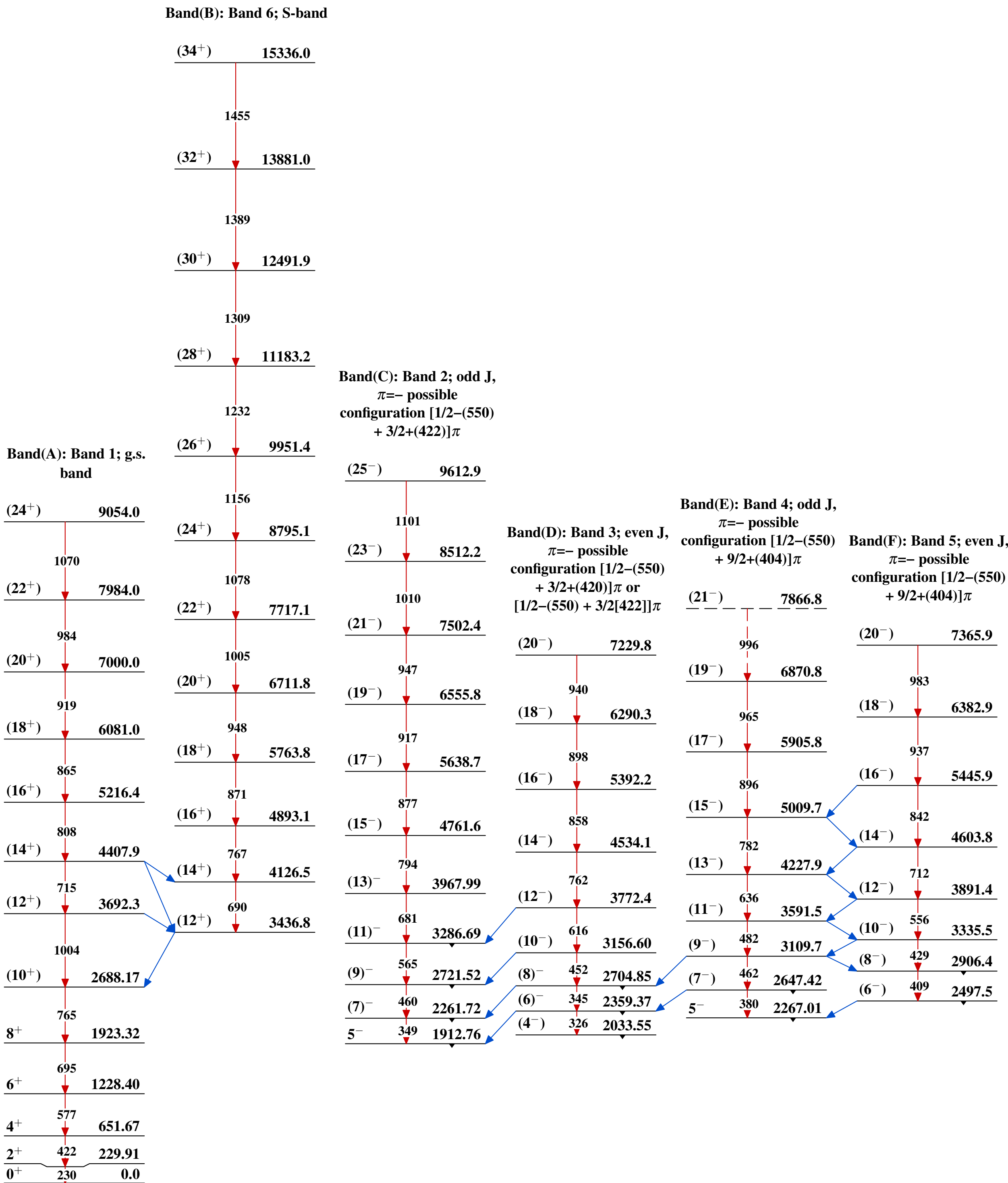
(HI,xnγ) 1990Pi11,1989Ko19,1988Ma49

Level Scheme (continued)

Intensities: Relative I_γ

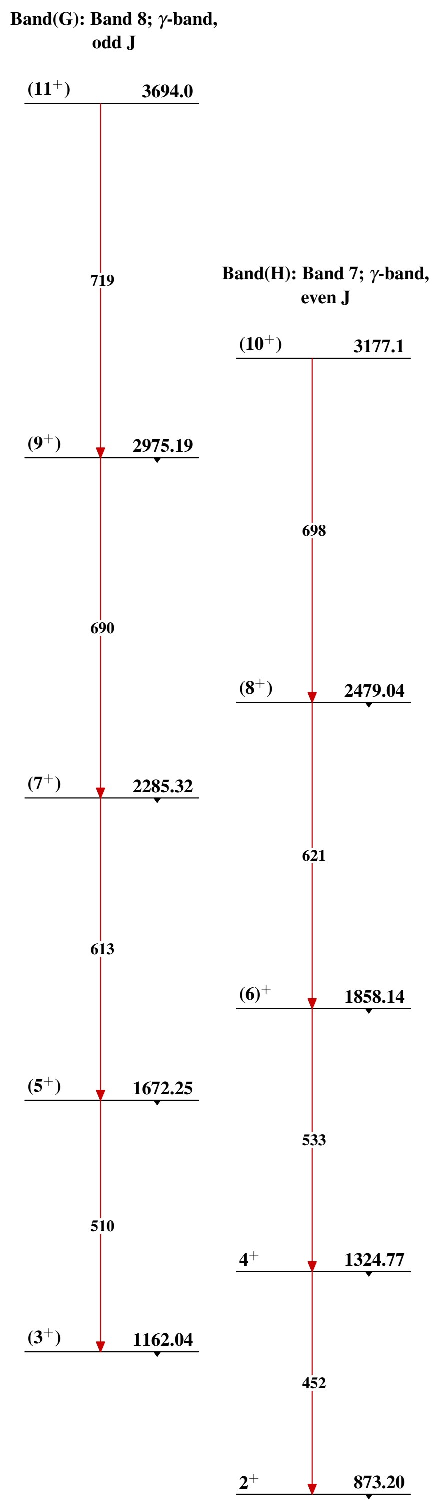


(HI,xnγ) 1990Pi11,1989Ko19,1988Ma49



$^{124}_{56}Ba_{68}$

(HI,xnγ) 1990Pi11,1989Ko19,1988Ma49 (continued)



$^{124}_{56}Ba_{68}$