^{232}Th(^{136}Xe,Xγ) 1999Co02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, M. S. Basunia, Jun Chen et al. ,	NDS 192,315 (2023)	25-Sep-2023

Dataset prepared by Balraj Singh, Jun Chen, and IAEA-ICTP-workshop participants: Diwanshu and B. Rohila.

1999Co02 (also 1997Co08,1997Co14,1998Bu17,2000BuZY): E=833 MeV ^{136}Xe beam was produced from the 88-inch cyclotron at LBNL. Target was 36 mg/cm^2 ^{232}Th. γ rays were detected with the Gammasphere array of 73 HPGe detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma\gamma$-coin. Deduced g.s. band and an octupole band.

^{222}Ra Levels

D_0=intrinsic electric dipole moment. Q_0=intrinsic electric quadrupole moment.

E(level)†	J$^\pi$‡	Comments
0.0#	0^+	
111.2# *2*	2^+	
301.9# *3*	4^+	
474.0@ *5*	(5^-)	
550.3# *4*	(6^+)	
703.2@ *4*	(7^-)	D_0/Q_0=0.00451 b$^{-1/2}$ *28* (1999Co02).
843.3# *4*	(8^+)	D_0/Q_0=0.00449 b$^{-1/2}$ *35* (1999Co02).
992.4@ *5*	(9^-)	D_0/Q_0=0.00378 b$^{-1/2}$ *21* (1999Co02).
1173.3# *5*	(10^+)	D_0/Q_0=0.00459 b$^{-1/2}$ *42* (1999Co02).
1330.8@ *6*	(11^-)	D_0/Q_0=0.00394 b$^{-1/2}$ *20* (1999Co02).
1537.2# *6*	(12^+)	D_0/Q_0=0.00324 b$^{-1/2}$ *30* (1999Co02).
1710.3@ *6*	(13^-)	D_0/Q_0=0.00522 b$^{-1/2}$ *69* (1999Co02).
1933.2# *7*	(14^+)	
2125.3@ *7*	(15^-)	D_0/Q_0=0.00467 b$^{-1/2}$ *98* (1999Co02).
2358.7# *8*	(16^+)	
2570.1@ *8*	(17^-)	
2811.0# *10*	(18^+)	
3040.9@ *10*	(19^-)	
3287.7# *11*	(20^+)	

† From a least-squares fit to Eγ data.

‡ As assigned in level-scheme Fig. 8 in 1999Co02, based on proposed band structures. Note that definite J^π assignments are listed in authors' Table A.4.

Band(A): g.s. band.

@ Band(B): Octupole-vibrational band. Weighted averaged of D_0/Q_0=0.00402 b$^{1/2}$ *11* (1999Co02). Average electric dipole moment D_0=0.027 eb$^{1/2}$ *4* from J=7-15 (1999Co02).

γ(^{222}Ra)

E$_\gamma$†	I$_\gamma$†	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.‡	α@
111.2 *2*	28 *12*	111.2	2^+	0.0	0^+	E2#	6.11 *10*
140.1 *2*	66 *12*	843.3	(8^+)	703.2	(7^-)	[E1]	0.2126 *31*
149.3 *5*	50 *8*	992.4	(9^-)	843.3	(8^+)	[E1]	0.1822 *30*
153.1 *5*	72 *23*	703.2	(7^-)	550.3	(6^+)	[E1]	0.1715 *28*

Continued on next page (footnotes at end of table)

^{232}Th(^{136}Xe,Xγ) 1999Co02 (continued)

γ(^{222}Ra) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[@]
157.4 *5*	27 *4*	1330.8	(11^-)	1173.3	(10^+)	[E1]	0.1604 *26*
172.2 *5*		474.0	(5^-)	301.9	4^+		
173.1 *5*	28 *4*	1710.3	(13^-)	1537.2	(12^+)	[E1]	0.1275 *20*
180.9 *2*	57 *13*	1173.3	(10^+)	992.4	(9^-)	[E1]	0.1147 *16*
190.7 *2*	100 *19*	301.9	4^+	111.2	2^+	E2[#]	0.696 *10*
192.1 *5*	23 *10*	2125.3	(15^-)	1933.2	(14^+)	[E1]	0.0993 *15*
206.2 *5*	27 *5*	1537.2	(12^+)	1330.8	(11^-)	[E1]	0.0839 *13*
211.4 *5*		2570.1	(17^-)	2358.7	(16^+)		
229.3 *5*	13 *4*	703.2	(7^-)	474.0	(5^-)	[E2]	0.362 *6*
248.4 *2*	86 *17*	550.3	(6^+)	301.9	4^+	[E2]	0.276 *4*
289.0 *5*	44 *5*	992.4	(9^-)	703.2	(7^-)	[E2]	0.1705 *26*
292.9 *2*	61 *5*	843.3	(8^+)	550.3	(6^+)	[E2]	0.1636 *23*
330.1 *2*	43 *4*	1173.3	(10^+)	843.3	(8^+)	[E2]	0.1147 *16*
338.3 *5*	42 *4*	1330.8	(11^-)	992.4	(9^-)	[E2]	0.1069 *16*
363.9 *5*	42 *4*	1537.2	(12^+)	1173.3	(10^+)	[E2]	0.0871 *13*
379.6 *5*	34 *3*	1710.3	(13^-)	1330.8	(11^-)	[E2]	0.0776 *11*
396.0 *5*	30 *4*	1933.2	(14^+)	1537.2	(12^+)	[E2]	0.0693 *10*
415.0 *5*	34 *4*	2125.3	(15^-)	1710.3	(13^-)	[E2]	0.0613 *9*
425.5 *5*	24 *4*	2358.7	(16^+)	1933.2	(14^+)	[E2]	0.0575 *8*
444.8 *5*	32 *6*	2570.1	(17^-)	2125.3	(15^-)	[E2]	0.0514 *7*
452.3 *5*	17 *4*	2811.0	(18^+)	2358.7	(16^+)	[E2]	0.0493 *7*
470.8 *5*	15 *4*	3040.9	(19^-)	2570.1	(17^-)	[E2]	0.0447 *6*
476.7 *5*	10 *4*	3287.7	(20^+)	2811.0	(18^+)	[E2]	0.0434 *6*

[†] From 1999Co02. Energy uncertainty is stated as 0.2 keV for transitions from low-lying positive-parity levels and 0.5 keV for higher-lying levels, as well as for transitions from the negative-parity levels. Evaluators assign 0.2 keV for transitions from positive-parity levels up to (10^+), and 0.5 keV for all the others.

[‡] 1999Co02 assign definite multipolarities for transitions from levels up to (11^-), but no supporting data are available, thus the evaluators treat these as assumed assignments based on band assignments, except as noted.

[#] From Adopted Gammas.

[@] 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.

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Level Scheme

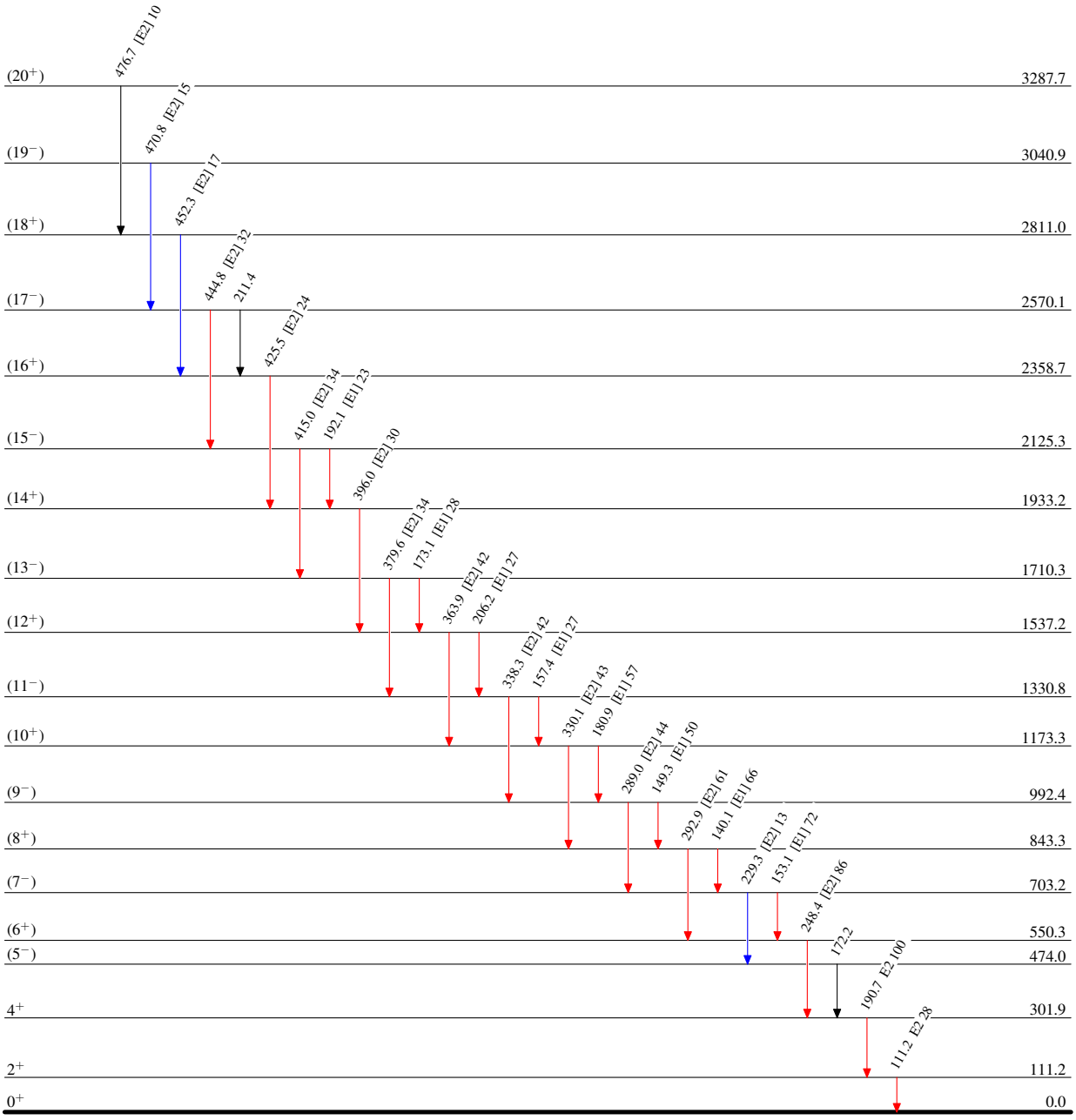
Intensities: Relative I_γ

Legend

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

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

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



$^{222}_{88}Ra_{134}$

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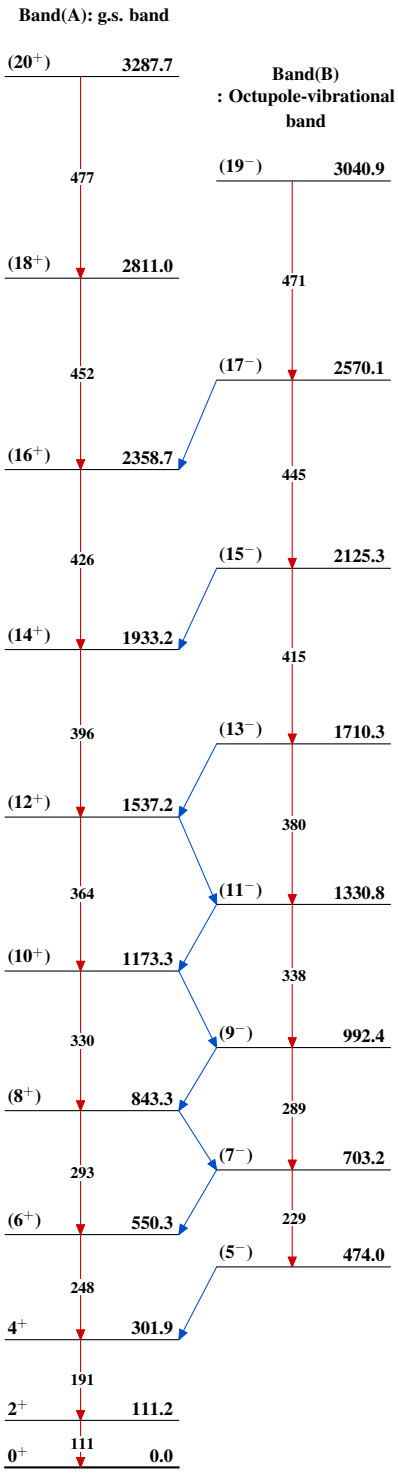

$^{222}_{88}Ra_{134}$