Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	E. Browne	NDS 93,846 (2001)	1-May-2001

Q(β^-)=−1559 *12*; S(n)=6866 *9*; S(p)=3784 *9*; Q(α)=6783.2 *10* 2012Wa38
Note: Current evaluation has used the following Q record $ −1555 126863 93783 8 *6783*.1 9 1995Au04.

^{223}Ac Levels

The level structure presents the characteristic parity doublet bands and has been interpreted in terms of a nucleus with both quadrupole and octupole stable deformations (1988Le13,1989Ah05,1990Sh16,1990Sh15). A 5/2[523] configuration was assigned to the ground state of ^{223}Ac, and a 3/2[532] configuration is expected to lie close to the ground state (1988Le13). Favored α decay from ^{227}Pa (5/2$^-$) populates the g.s. of ^{223}Ac (HF=2.5) and the 50.7 (5/2$^-$) level (HF=5.1) through the Coriolis mixing between these states. No direct α decay from ^{227}Pa (5/2$^-$) to levels with J^π=3/2$^-$ has been observed because such levels are not be mixed with the favored (J^π=5/2$^-$) ground state (1988Le13). Level parities assigned by 1990Sh16 and 1990Sh15 are opposite to those given by 1989Ah05. These quantities are essentially determined by the parity of the ^{223}Ac ground state, which has been adopted as odd in this evaluation.

Because of the small quadrupole, and the suggested octupole deformations in this region, nuclear states are no longer characterized by single Nilsson orbitals. These are, however, used here more as labels rather than to accurately describe the nature of those states.

Cross Reference (XREF) Flags

A ^{227}Pa α decay

E(level)‡	J$^\pi$†	$T_{1/2}$[b]	XREF	Comments
0.0#	(5/2$^-$)	2.10 min *5*	A	%α=99; %ε=1 J$^\pi$: calculations of 1988Le13 predict 3/2 and 5/2 parity doublets at and near the ^{223}Ac g.s. 1990Sh15 and 1990Sh16 suggest J^π=5/2$^-$, whereas 1989Ah05 prefer J^π=5/2$^+$ for the g.s. of ^{223}Ac. $\alpha\gamma(\theta)$ results are consistent with J^π=5/2$^-$ (1999Sc17). $T_{1/2}$: from 1987Mi10. Other value: 2.2 min *1* (1951Me10). %α: from 1951Me10.
12.5?& *2*	(3/2$^-$)		A	
42.4# *1*	(7/2$^-$)	≤0.25 ns	A	J$^\pi$: 42.2γ M1+E2 to (5/2$^-$).
50.7& *1*	(5/2$^-$)	≤0.25 ns	A	J$^\pi$: 50.7γ M1+E2 to (5/2$^-$). Low α hindrance factor (HF=5.1) from ^{227}Pa suggests Coriolis mixing with favored (J^π=(5/2$^-$)) ground state.
64.62@ *4*	(5/2$^+$)	≤0.25 ns	A	J$^\pi$: 22.3γ E1 to (7/2$^-$), 64.6γ E1 to (5/2$^-$).
90.7# *1*	(9/2$^-$)	≤0.25 ns	A	J$^\pi$: 48.3γ M1 to (7/2$^-$).
107.2& *2*	(7/2$^-$)	≤0.25 ns	A	J$^\pi$: 107.0γ M1 to (5/2$^-$).
110.06@ *4*	(7/2$^+$)	≤0.25 ns	A	J$^\pi$: 110.0γ E1 to (5/2$^-$), 67.6γ E1 to (7/2$^-$).
130.7[a] *1*	(7/2$^+$)		A	J$^\pi$: 130.7γ E1 to (5/2$^-$).
141# *5*	(11/2$^-$)		A	
167.5@ *1*	(9/2$^+$)	≤0.25 ns	A	J$^\pi$: 125.1γ E1 to (7/2$^-$), 77.0γ (E1) to (9/2$^-$).

† Parity doublet rotational band assignments are from 1990Sh16, 1990Sh15, 1989Ah05, and 1990Ja11. Spin and parity assignments are based on rotational band structure and γ-ray multipolarities. Specific arguments are given with individual levels.
‡ From ^{227}Pa α decay.
# Band(A): 5/2(523) parity doublet rotational band. Rotational parameter: A=6.0 (1990Ja11).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{223}Ac Levels (continued)

@ Band(B): 5/2(642) parity doublet rotational band. Rotational parameter: A=6.4 (1990Ja11).
& Band(C): 3/2(532) parity doublet rotational band. Rotational parameter: A=9.3 (1990Ja11).
a Band(D): 3/2(651) parity doublet rotational band. Rotational parameter: A=4.3 (1990Ja11).
b From ^{227}Pa α decay (1989Ah05).

$\gamma(^{223}Ac)$

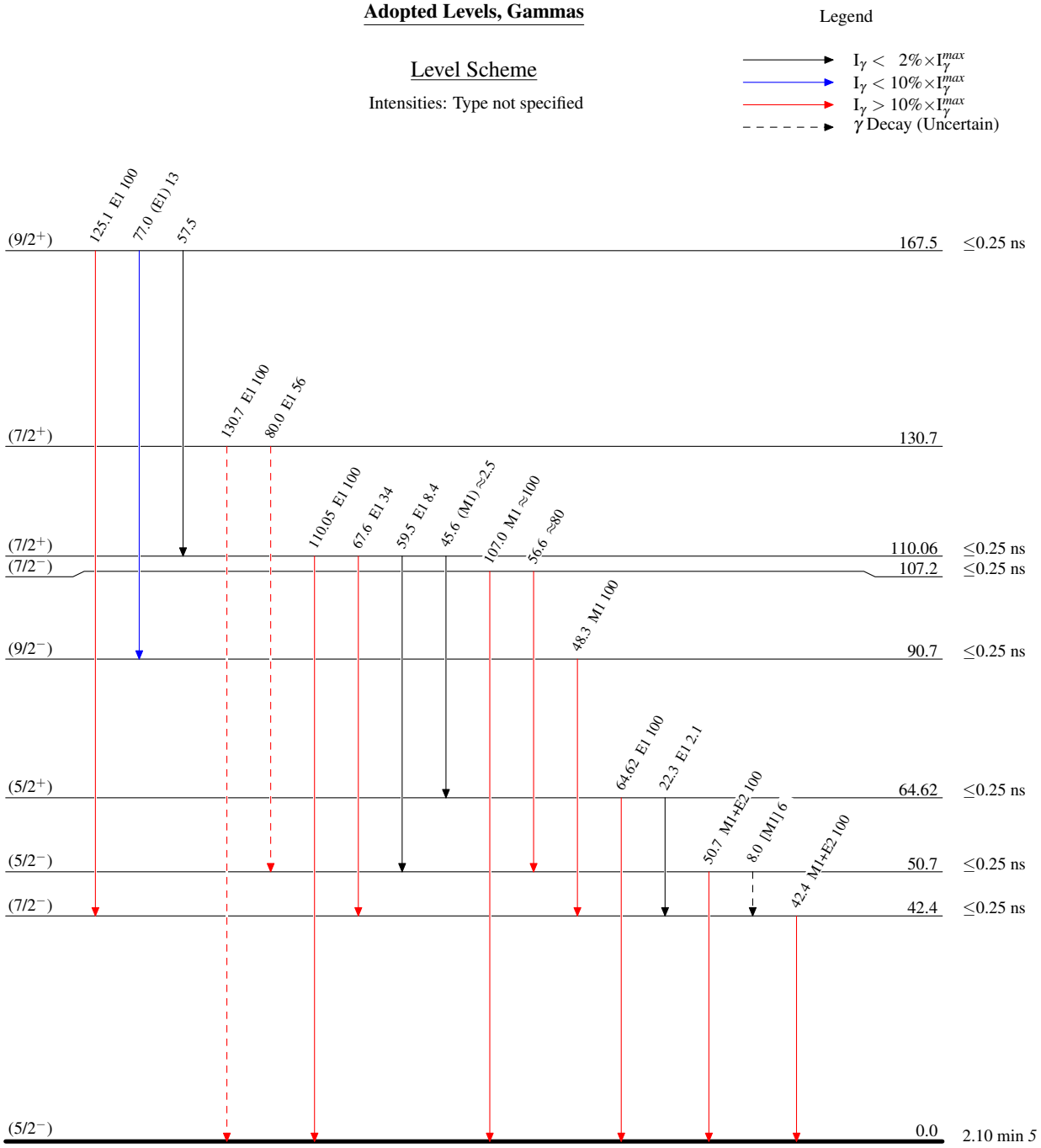
E_i(level)	J_i^π	E_γ†	I_γ†	E_f	J_f^π	Mult.†	δ†	α‡
42.4	(7/2$^-$)	42.4 *1*	100	0.0	(5/2$^-$)	M1+E2	0.63 *1*	214
50.7	(5/2$^-$)	(8.0)	6	42.4	(7/2$^-$)	[M1]		1542
		50.7 *1*	100	0.0	(5/2$^-$)	M1+E2	0.26 *1*	41.9 *11*
64.62	(5/2$^+$)	22.3 *1*	2.1 *6*	42.4	(7/2$^-$)	E1		6.17
		64.62 *5*	100	0.0	(5/2$^-$)	E1		0.369
90.7	(9/2$^-$)	48.3 *1*	100	42.4	(7/2$^-$)	M1		30.3
107.2	(7/2$^-$)	56.6 *2*	≈80	50.7	(5/2$^-$)			
		107.0 *5*	≈100	0.0	(5/2$^-$)	M1		7.17
110.06	(7/2$^+$)	45.6 *2*	≈2.5	64.62	(5/2$^+$)	(M1)		36.0
		59.5 *2*	8.4 *20*	50.7	(5/2$^-$)	E1		0.459
		67.6 *1*	34 *4*	42.4	(7/2$^-$)	E1		0.327
		110.05 *5*	100 *7*	0.0	(5/2$^-$)	E1		0.393
130.7	(7/2$^+$)	80.0# *1*	56 *9*	50.7	(5/2$^-$)	E1		0.209
		130.7# *1*	100 *23*	0.0	(5/2$^-$)	E1		0.259
167.5	(9/2$^+$)	57.5		110.06	(7/2$^+$)			
		77.0 *2*	13 *7*	90.7	(9/2$^-$)	(E1)		0.231
		125.1 *1*	100 *15*	42.4	(7/2$^-$)	E1		0.288

† From ^{227}Pa α decay.
‡ 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.
# Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

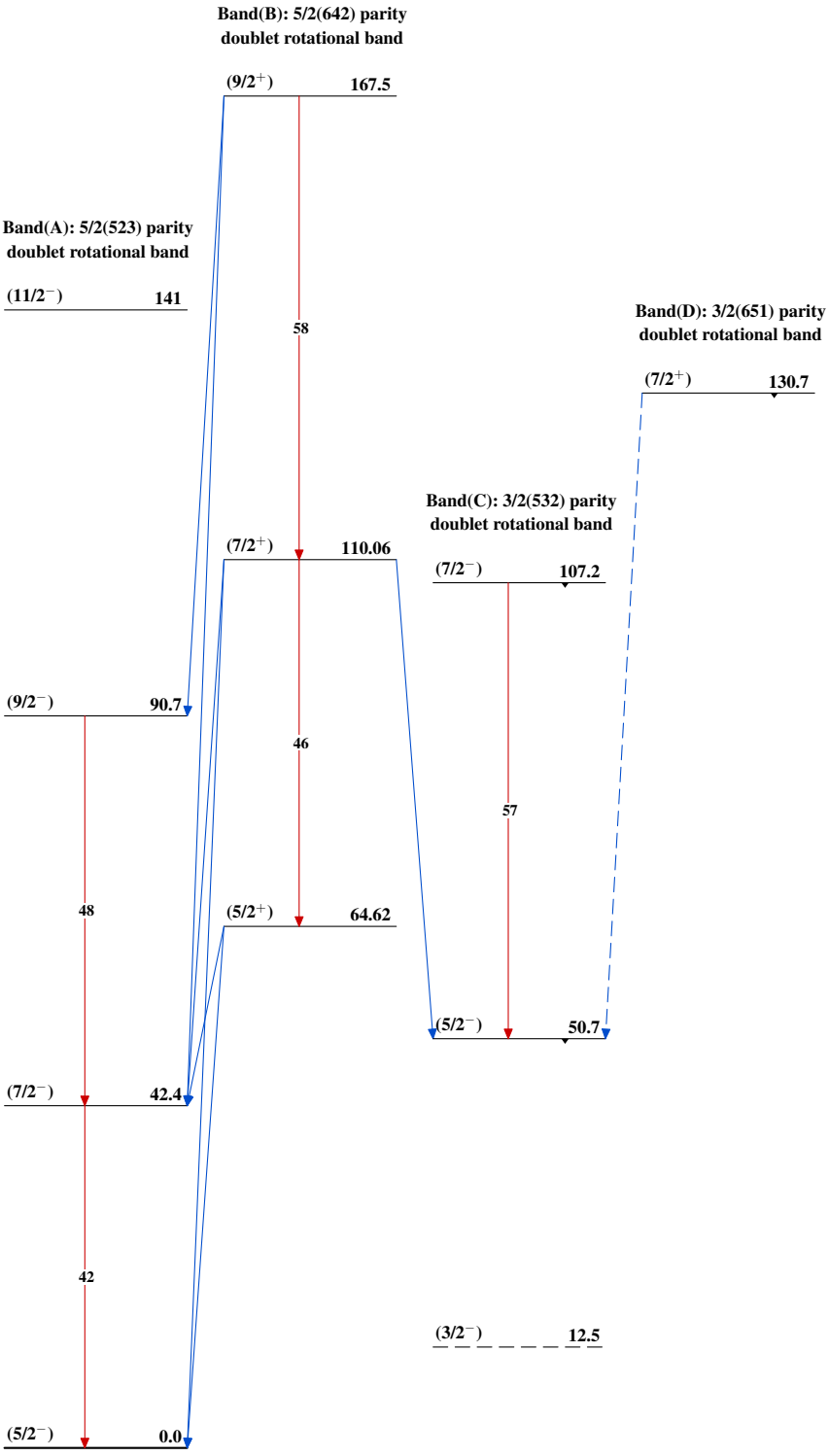
Level Scheme

Intensities: Type not specified



$^{223}_{89}Ac_{134}$

Adopted Levels, Gammas



$^{223}_{89}Ac_{134}$