Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	S. -c. Wu	NDS 108,1057 (2007)	1-Mar-2007

Q(β^-)=−4853 *14*; S(n)=7314 *12*; S(p)=4316 *12*; Q(α)=9526 *9* 2012Wa38
Note: Current evaluation has used the following Q record −4832 28 *7314* 11 *4316* 11 *9526* 8 2003Au03.

Calculations, compilations, systematics:
Cluster model for α decay, Geiger-Nuttall plot: 1991Bu05.
Equilibrium deformation energy: 1988So08.
Octupole deformation: 1989Eg02.
Proton-neutron interaction energy: 1990Mo11.
Quasi-bands in even-even nuclei: 1984Sa37.
Super- and hyperdeformed configurations: 1995We02.

^{216}Ra Levels

For proposed configurations for ^{216}Ra levels, see 1983It01, 1985Ad09, 1990Sc29 and 1991Dr08.
See (HI,xnγ) for a tabulation of α branches from excited states of ^{216}Ra.

Cross Reference (XREF) Flags

A ^{220}Th α decay
B (HI,xnγ)

E(level)†	J$^\pi$‡	T$_{1/2}$#	XREF	Comments
0	0$^+$	182 ns *10*	AB	%α=100; %ε<1×10^{-8} T$_{1/2}$: from 1973No09. Other: <1 ms (1961Gr43). %ε: from log *ft*>3.6, %ε<1.2×10^{-8} for the g.s. branch, and is smaller for possible branches to the excited states.
688.20 *20*	2$^+$		B	
1164.1 *3*	4$^+$		B	%α=0.23
1507.6 *3*	6$^+$	<0.2 ns	B	%α=0.58
1711.1 *4*	8$^+$	1.42 ns *20*	B	%α=1.86 μ=+3.2 *32* (2005St24)
2026.0 *4*	10$^+$	0.6 ns *1*	B	%α=0.12 μ=+1.0 *20* μ: from g−factor=+0.1 *2* (1990Sc29).
2335.2 *4*	11$^-$		B	
2679.4 *4*	13$^-$	0.96 ns *20*	B	μ=−1.3 *26* μ: from g-factor=−0.1 *2* (1990Sc29).
3292.7 *5*	14$^+$		B	
3412.7? *5*			B	
3491.6 *5*	16$^+$		B	
3580.7?			B	
3582.1 *5*	16$^+$		B	
3712.1 *5*	18$^+$		B	
3763.5 *5*	19$^-$	5.34 ns *15*	B	μ=9.7 (2005St24,1985Ad09) J$^\pi$: stretched E1 γ to 18$^+$. No γ to 16$^+$. μ: from g-factor=0.51 *3* (1985Ad09); other: g-factor=0.49 *5* (1990Sc29).
4320.4 *6*	(20)$^-$		B	J$^\pi$: M1+E2 γ to 19$^-$. No γ to ≤18$^+$.
4719.0 *6*	(21)$^-$		B	J$^\pi$: M1+E2 γ to (20)$^-$. No γ to ≤19$^-$.
4977.0 *7*	(23)$^-$		B	J$^\pi$: stretched E2 γ to (21)$^-$.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{216}Ra Levels (continued)

E(level)[†]	$T_{1/2}$[#]	XREF	Comments
5170.5 *7*	6.6 ns *3*	B	g-factor=0.63 *6* (2005St24,1985Ad09); other: 0.7 *2* (1990Sc29). J^π: 1983It01 suggest 25^- on the basis of theoretical estimates of the expected energy of the configuration=$((^{214}Ra\ 17^-)(\nu\ 2g_{9/2})^{+2}_{8+})$. Measured g-factor agrees with this assignment (1985Ad09). g-factor also agrees with $J^\pi=24^+$, but not with 24^- (see 1985Ad09). $T_{1/2}$: from 557γ(t) (1983It01). The 399, 258 and 194γ's are also delayed with this half-life.
5471.3 *8*		B	
5832.5 *8*		B	
6266.1 *9*		B	

[†] From a least-squares fit to the Eγ in (HI,xnγ).
[‡] From $\gamma(\theta)$ and γ multipolarities, the transitions up to the 3712 level are stretched E2's (except E1 for the 309γ and 613γ from the 2335 and 3292 levels, respectively).
[#] From (HI,xnγ), except as noted.

$\gamma(^{216}Ra)$

All γ data are from (HI,xnγ).

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.	α[†]	Comments
688.20	2^+	688.2 *2*	100	0	0^+	E2	0.0190	
1164.1	4^+	475.9 *2*	100	688.20	2^+	E2	0.0435	
1507.6	6^+	343.5 *1*	100	1164.1	4^+	E2	0.1023	B(E2)(W.u.)>7.0
1711.1	8^+	203.5 *1*	100	1507.6	6^+	E2	0.549	B(E2)(W.u.)=9.6 *14*
2026.0	10^+	314.9 *1*	100	1711.1	8^+	E2	0.1316	B(E2)(W.u.)=3.5 *6*
2335.2	11^-	309.2 *1*	100	2026.0	10^+	E1	0.0329	
2679.4	13^-	344.2 *1*	100	2335.2	11^-	E2	0.1017	B(E2)(W.u.)=1.4 *3*
3292.7	14^+	613.3 *2*	100	2679.4	13^-	E1	0.00787	
3412.7?		120.1[‡] *2*	100	3292.7	14^+	D		
3491.6	16^+	198.9 *1*	100	3292.7	14^+	E2	0.597	
3580.7?		168[‡]	100	3412.7?				
3582.1	16^+	289.5 *2*	100	3292.7	14^+	E2	0.1696	
3712.1	18^+	130.4 *5*	23 *6*	3582.1	16^+			
		220.4 *2*	100 *13*	3491.6	16^+	E2	0.415	
3763.5	19^-	51.4 *1*	100	3712.1	18^+	E1	0.650	B(E1)(W.u.)=0.000156 *5*
4320.4	$(20)^-$	556.9 *3*	100	3763.5	19^-	M1+E2	0.08 *6*	
4719.0	$(21)^-$	398.6 *2*	100	4320.4	$(20)^-$	M1+E2	0.20 *13*	
4977.0	$(23)^-$	258.0 *2*	100	4719.0	$(21)^-$	E2	0.244	
5170.5		193.5 *2*	100	4977.0	$(23)^-$	[E2]	0.660	B(E2)(W.u.)=2.47 *12*
5471.3		300.8 *3*	100	5170.5		(D+Q)		
5832.5		361.2 *2*	100	5471.3		(D+Q)		
6266.1		433.6 *5*	100	5832.5		(D+Q)		

[†] 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.

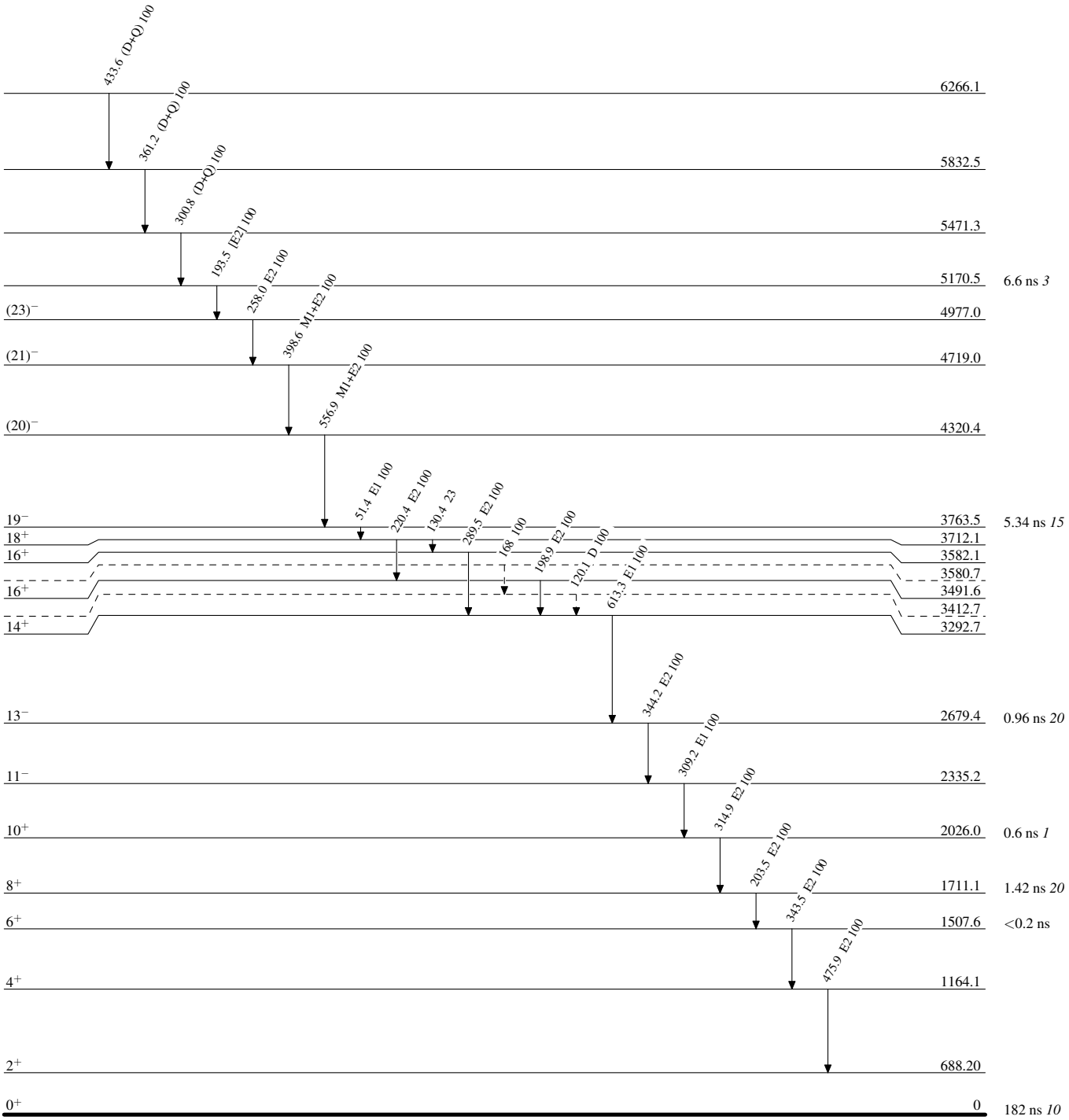
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{216}_{88}Ra_{128}$