Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation		NDS 114, 2023 (2013)	23-Sep-2013

Q(β^-)=−4891 *15*; S(n)=8485 *20*; S(p)=1351 *13*; Q(α)=7746 *3* 2012Wa38
S(2n)=16270 *50*, S(2p)=4994 *13* (2012Wa38).

^{215}Ac evaluated by A.K. Jain, S. Singh, B. Singh, N. Kaur, S. Lakshami, B. Maheshwari.

States in ^{215}Ac have been interpreted in terms of the shell model configurations $h_{9/2}$, $f_{7/2}$, and $i_{13/2}$ available for the seven protons beyond closed shell (Z=82) (1983De08).

2003Ca21: large-scale shell model calculations were performed for ^{215}Ac employing the computer code NATHAN with using modified Kuo-Herling interaction. Additional low-lying levels are predicted in these calculations which have not been observed experimentally.

2013Ba29: measured experimental isomer production ratio in ^{9}Be(^{238}U,X) reaction at E=1 GeV/nucleon (2013Ba29) using the FRS, RISING gamma detector array, and TOF arrangement at GSI facility.

^{215}Ac Levels

Cross Reference (XREF) Flags

A ^{219}Pa α decay (53 ns)
B ^{204}Pb(^{15}N,4nγ)

E(level)†	J$^\pi$‡	$T_{1/2}$#	XREF	Comments
0.0	9/2$^-$	0.17 s *1*	AB	%α=99.91 *2*; %ε+%β^+=0.09 *2* (1968Va04) %ε+%β^+: from observation of an 8.70 MeV *2* α group assigned to ^{215}Ra (1968Va04). $T_{1/2}$: from 1968Va04. J$^\pi$: favored α decay (HF=1.3) to ^{211}Fr (J$^\pi$=9/2$^-$).
1317.0 *5*	(13/2$^-$)		B	Configuration=$\pi 1h^7_{9/2}$.
1621.0 *7*	(17/2$^-$)	30 ns *10*	B	μ=7.82 *16* (1983De08,1989Ra17) μ: 7.74 *9* from g factor=0.910 *10* (TDPAD,1983De08). 1989Ra17 (also 2011StZZ) compilation lists 7.82 *16*. It appears that 1989Ra17 applied upward correction of 1% and doubled the uncertainty, probably based on estimated diamagnetism and Knight shift of 0±1% by 1983De08. Configuration=$\pi 1h^7_{9/2}$.
1796.0@ *9*	(21/2$^-$)	185 ns *30*	B	μ=9.66 *20* (1983De08,1989Ra17) Configuration=$\pi 1h^7_{9/2}$. μ: 9.56 *11* from g factor=0.910 *10* (TDPAD,1983De08). 1989Ra17 (also 2011StZZ) compilation lists 9.66 *20*. It appears that 1989Ra17 applied upward correction of 1% and doubled the uncertainty, probably based on estimated diamagnetism and Knight shift of 0±1% by 1983De08.
1796.0+x	(23/2$^-$)		B	E(level): x=50 *50*, extrapolated from Eγ=511 keV in ^{211}At, and Eγ=265 keV in ^{213}Fr. Configuration=$\pi 1h^6_{9/2}\otimes\pi 2f^1_{7/2}$.
2438+x@	(29/2$^+$)	335 ns *10*	B	μ=15.13 *30* (1983De08,1989Ra17) J$^\pi$: B(E3)(W.u.)=24.7 *9* is similar to that of the corresponding E3 transition in ^{213}Fr, and typical of fast E3 transitions in this region. The strength enhancement of such transitions is due to the coupling with octupole vibrations in the even core nucleus. μ: 14.98 *15* from g factor=1.033 *10* (TDPAD,1983De08). 1989Ra17 (also 2011StZZ) compilation lists 15.13 *30*. It appears that 1989Ra17 applied upward correction of 1% and doubled the uncertainty, probably based on estimated

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{215}Ac Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$[#]	XREF	Comments
				diamagnetism and Knight shift of 0±1% by 1983De08. Configuration=$\pi 1h^{6}_{9/2}\otimes\pi 1i^{1}_{13/2}$.

[†] From γ-ray energies.
[‡] Assignments are based on $\gamma(\theta)$ data, the analogy with the corresponding levels in the N=126 isotones ^{211}At and ^{213}Fr, and also on the agreement of experimental g-factors with shell-model predictions (*i.e.* constant values for $h_{9/2}$ states).
[#] From γ(t) in ^{204}Pb(^{15}N,4nγ).
[@] Measured isomer yield ratio: R_{exp}=20 *4* for 1796, 21/2$^-$ level and 20 *5* for 2438+x, (29/2$^+$) level (2013Ba29) in ^{9}Be(^{238}U,X) reaction at 1 GeV/nucleon, where $R_{exp}=Y/(N_{imp}FG)$, N_{imp} is number of implanted ions, Y is the isomeric yield, F and G are correction factors for in-flight isomer decay losses and the finite detection time of the γ radiation, respectively. Comparison of measured yield ratios with theoretical values calculated by using ABRABLA Monte-Carlo code.

$\gamma(^{215}Ac)$

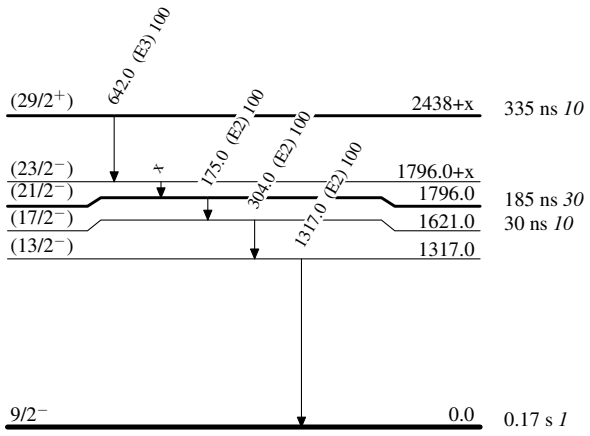
E$_i$(level)	J$_i^{\pi}$	E$_{\gamma}$[‡]	I$_{\gamma}$[‡]	E$_f$	J$_f^{\pi}$	Mult.[#]	α[†]	Comments
1317.0	(13/2$^-$)	1317.0 *5*	100	0.0	9/2$^-$	(E2)	0.00567	α(K)=0.00446 *7*; α(L)=0.000895 *13*; α(M)=0.000217 *3* α(N)=5.74×10^{-5} *8*; α(O)=1.321×10^{-5} *19*; α(P)=2.39×10^{-6} *4*; α(Q)=1.86×10^{-7} *3*; α(IPF)=1.647×10^{-5} *25*
1621.0	(17/2$^-$)	304.0 *5*	100	1317.0	(13/2$^-$)	(E2)	0.1538	B(E2)(W.u.)=0.08 *3* α(K)=0.0700 *10*; α(L)=0.0618 *10*; α(M)=0.0165 *3* α(N)=0.00438 *7*; α(O)=0.000970 *15*; α(P)=0.0001585 *25*; α(Q)=3.59×10^{-6} *6*
1796.0	(21/2$^-$)	175.0 *5*	100	1621.0	(17/2$^-$)	(E2)	1.021 *19*	B(E2)(W.u.)=0.119 *20* α(K)=0.202 *3*; α(L)=0.601 *12*; α(M)=0.164 *3* α(N)=0.0435 *9*; α(O)=0.00953 *18*; α(P)=0.00151 *3*; α(Q)=1.397×10^{-5} *23*
1796.0+x	(23/2$^-$)	x		1796.0	(21/2$^-$)			E$_{\gamma}$: x=50 *50* (1983De08).
2438+x	(29/2$^+$)	642.0 *5*	100	1796.0+x	(23/2$^-$)	(E3)	0.0702	B(E3)(W.u.)=27.4 *9* α(K)=0.0389 *6*; α(L)=0.0231 *4*; α(M)=0.00613 *9* α(N)=0.001637 *24*; α(O)=0.000367 *6*; α(P)=6.23×10^{-5} *9*; α(Q)=2.43×10^{-6} *4*

[†] Additional information 1.
[‡] From ^{204}Pb(^{15}N,4nγ).
[#] From $\gamma(\theta)$, and comparison with the corresponding transitions in N=126 isotones ^{211}At and ^{213}Fr. All multipolarities are assumed as stretched.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{215}_{89}Ac_{126}$