^{215}Ac α decay 2004Ku24,2000He17

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	A. Sonzogni, G. Mukherjee, H. Huang, A. Tarazaga, J. Wang	NDS 114, 661 (2013)	28-Feb-2013

Parent: ^{215}Ac: E=0.0; $J^{\pi}=9/2^{-}$; $T_{1/2}=0.17$ s *1*; Q(α)=7746 *3*; %α decay=99.91 *2*

^{215}Ac-J^{π},$T_{1/2}$: From ^{215}Ac ENSDF Adopted Levels dataset.

^{215}Ac-Q(α): From 2012Wa38.

^{215}Ac-%α decay: From ^{215}At ENSDF Adopted Levels dataset.

2004Ku24:^{215}Ac isotope produced in the reaction ^{209}Bi(^{12}C,6n) at E=7.1, 8.6 and 9.1 MeV/nucleon. Evaporation residues separated from ^{12}C beam by SHIP velocity filter. Measured Eγ, Eα, Iγ, Iα, $\gamma\alpha$ coin with a position-sensitive 16-strip PIPS Si detector and an HPGe detector. In a later experiment, the latter was replaced by a Ge Clover detector consisting of four crystals to measure γ-ray multiplicity. The Si detector had FWHM=22 keV at 8 MeV.

2000He17: ^{215}Ac recoils from ^{12}C on ^{209}Bi (E=100 MeV) were separated from the beam using a velocity filter and implanted into a position-sensitive semiconductor detector. Measured Eα, $\alpha\gamma$ coin (2000He17). Data in this Ref. will not be used since it is superseded by 2004Ku24 (same group).

^{211}Fr Levels

E(level)	J^{π}[†]
0.0	$9/2^{-}$
395.82 *9*	$(7/2^{-})$
505.90 *18*	$(5/2^{-})$
583.20 *10*	$(11/2^{-})$
633.09 *18*	$(5/2^{-})$
652.60 *20*	$(13/2^{-})$
738.9 *3*	$(7/2^{-})$

[†] Assignments based upon the tentative multipolarity assignment for the 110 γ-ray, comparison with isotones ^{207}Bi and ^{209}At, hindrance factors, and on the $(11/2^{-})$ and $(13/2^{-})$ spin-parity assignments to 583 and 653 levels, respectively (from literature).

α radiations

Eα	E(level)	Iα[‡@]	HF[†#]	Comments
6877 *7*	738.9	0.026 *14*	13 *7*	HF: 13 (2004Ku24).
6959 *5*	652.60	0.07 *1*	10.0 *16*	HF: 10 (2004Ku24).
6979 *6*	633.09	0.007 *4*	118 *68*	HF: 120 (2004Ku24).
7029 *5*	583.20	0.12 *1*	10.5 *11*	HF: 11 (2004Ku24).
7108 *7*	505.90	0.007 *4*	3.4×10^{2} *20*	HF: 350 (2004Ku24).
7211 *5*	395.82	0.20 *2*	29 *4*	HF: 30 (2004Ku24).
7600 *4*	0.0	99.57 *7*	1.22 *8*	HF: 1.3 (2004Ku24).

[†] Using $r_0(^{211}Fr)$=1.4606 *41*; interpolated value deduced from $r_0(^{212}Ra)$=1.466 *6*, and $r_0(^{210}Rn)$=1.4552 *21* (1998Ak04).

[‡] 2004Ku24 indicate that α-intensities are probably underestimated as losses due to electron summing were not taken into account.

[#] Deduced using ALPHAD computer code. Values from 2004Ku24 are given under comments.

[@] For absolute intensity per 100 decays, multiply by 0.9991 *2*.

^{215}Ac α decay 2004Ku24,2000He17 (continued)

γ(^{211}Fr)

E_γ	I_γ[†][#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	α[@]	Comments
110.1 *4*	0.0009 *7*	505.90	(5/2$^-$)	395.82	(7/2$^-$)	(M1)		10.88 *19*	α(K)exp=14 *7* α(K)=8.74 *16*; α(L)=1.62 *3*; α(M)=0.386 *7*; α(N)=0.1013 *18*; α(O)=0.0227 *4*; α(P)=0.00363 *7* α(Q)=0.000203 *4* Mult.: from α(K)exp (deduced from αγ coincidences); M1+E2 admixture is not completely excluded.
237.2 *4*	0.002 *2*	633.09	(5/2$^-$)	395.82	(7/2$^-$)				
342.6 *5*	0.015 *10*	738.9	(7/2$^-$)	395.82	(7/2$^-$)				
395.8 *1*	0.22 *2*	395.82	(7/2$^-$)	0.0	9/2$^-$				
505.9 *2*	0.006 *4*	505.90	(5/2$^-$)	0.0	9/2$^-$				
583.2 *1*	0.12 *1*	583.20	(11/2$^-$)	0.0	9/2$^-$	M1+E2	0.84 *32*	0.074 *17*	α(K)=0.059 *14*; α(L)=0.0116 *20*; α(M)=0.0028 *5*; α(N)=0.00073 *12*; α(O)=0.00016 *3* α(P)=2.6×10^{-5} *5*; α(Q)=1.3×10^{-6} *4*
633.1 *2*	0.005 *3*	633.09	(5/2$^-$)	0.0	9/2$^-$				
652.6 *2*	0.07 *1*	652.60	(13/2$^-$)	0.0	9/2$^-$	E2		0.0202	α(K)=0.01459 *21*; α(L)=0.00424 *6*; α(M)=0.001061 *15*; α(N)=0.000278 *4*; α(O)=6.03×10^{-5} *9* α(P)=8.96×10^{-6} *13*; α(Q)=3.23×10^{-7} *5*
739.2 *4*	0.011 *8*	738.9	(7/2$^-$)	0.0	9/2$^-$				

[†] Branching ratios given in 2004Ku24 converted to absolute Iγ.
[‡] From Adopted Gammas.
[#] For absolute intensity per 100 decays, multiply by 0.9991 *2*.
[@] 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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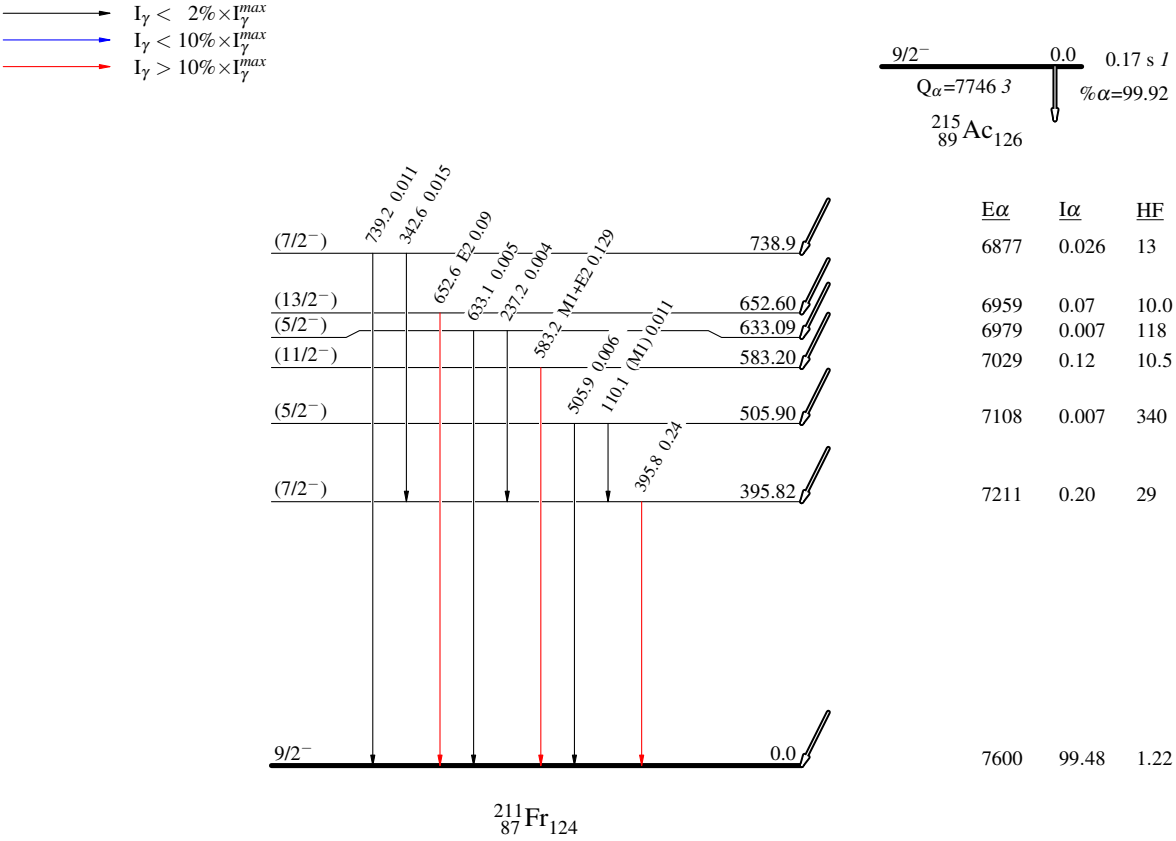
Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



Eα	Iα	HF
6877	0.026	13
6959	0.07	10.0
6979	0.007	118
7029	0.12	10.5
7108	0.007	340
7211	0.20	29
7600	99.48	1.22