^{228}Ra β^- decay 1995So11

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Khalifeh Abusaleem	NDS 116, 163 (2014)	31-Dec-2012

Parent: ^{228}Ra: E=0; $J^\pi=0^+$; $T_{1/2}$=5.75 y *3*; Q(β^-)=45.8 *7*; %β^- decay=100.0
^{228}Ra-Q(β^-): From 2012Wa38.
Other: 1961To10.

^{228}Ac Levels

E(level)‡	J^π†	Comments
0.0	3^+	Configuration=((π 3/2[651])(ν 3/2[631])), K=3.
6.28 *3*	1^-	Configuration=((π 3/2[532])(ν 3/2[631])), K=0. E(level): Based on observing M2 γ to g.s. *logft* also is consistent with the assignment.
6.670 *20*	1^+	Configuration=((π 3/2[651])(ν 3/2[631])), K=0.
20.19 *3*	1^-	Configuration=((π 3/2[532])(ν 5/2[633])), K=1.
33.07 *11*	1^+	Configuration=((π 3/2[651])(ν 5/2[633])), K=1.

† All configurations are from 1995So11.
‡ From least squares fit to Eγ.

β^- radiations

E(decay)	E(level)	Iβ^-†#	Log *ft*	Comments
(12.7 *7*)	33.07	30	5.12 *18*	av Eβ=3.22 *23* Eβ=14.0 *15* (1995So11).
(25.6 *7*)	20.19	20	6.20 *14*	av Eβ=6.48 *23* Eβ=26.0 *15* (1995So11).
(39.1 *7*)	6.670	≈40‡	≈6.5	av Eβ=9.94 *25* Eβ=39.0 *10* (1995So11), 40 (1961To10).
(39.5 *7*)	6.28	≈10‡	≈7.1	av Eβ=10.04 *25*

† From β^- spectra of 1995So11, unless otherwise noted.
‡ Iβ(6.28 level)+Iβ(6.67 level)=50% *3* (1995So11), 70% (1961To10). Division of intensity based on γ data.
# Absolute intensity per 100 decays.

$\gamma(^{228}Ac)$

I(γ+ce) normalization: From absolute ce/β and deduced multipolarities.
Iγ normalization: Relative Iγ normalized to absolute I(ce) through α(13.52γ).

Eγ‡	E$_i$(level)	J_i^π	E$_f$	J_f^π	Mult.@	α†a	I$_{(\gamma+ce)}$&d	Comments
6.28 *3*	6.28	1^-	0.0	3^+	(M2)	6.68×10^6 *19*	≈10	ce(M)/(γ+ce)=0.738 *15*; ce(N+)/(γ+ce)=0.262 *9* ce(N)/(γ+ce)=0.206 *8*; ce(O)/(γ+ce)=0.0470 *18*; ce(P)/(γ+ce)=0.0081 *4*; ce(Q)/(γ+ce)=0.000513 *20* Mult.: Due to Coriolis mixing of $i_{13/2}$ ν-orbitals. Data also consistent with M1+E2 with δ≈0.03, but not consistent with pure E2 or higher multipolarities.
6.67 *2*	6.670	1^+	0.0	3^+	E2	1.56×10^6 *4*	≈50	ce(M)/(γ+ce)=0.750 *11*; ce(N+)/(γ+ce)=0.250 *7* ce(N)/(γ+ce)=0.200 *6*; ce(O)/(γ+ce)=0.0432 *13*;

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^{228}Ra β^- decay 1995So11 (continued)

$\gamma(^{228}Ac)$ (continued)

E_γ[‡]	I_γ[#c]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	δ	α[†a]	$I_{(\gamma+ce)}$[&d]	Comments
										ce(P)/(γ+ce)=0.00665 *20*; ce(Q)/(γ+ce)=6.18×10^{-6} *18*
12.75[e] *5*	19 *4*	33.07	1$^+$	20.19	1$^-$	(E1(+M2))		1.0×10^5 *11*	≈3	ce(M)/(γ+ce)=0.7 *6*; ce(N+)/(γ+ce)=0.3 *4* ce(N)/(γ+ce)=0.2 *3*; ce(O)/(γ+ce)=0.05 *7*; ce(P)/(γ+ce)=0.008 *12*; ce(Q)/(γ+ce)=0.0005 *8* Observed in both electron and γ spectra. α: from I(γ+ce) and Iγ; theory: α(E1)=6.86, α(M2)=2.09×10^5, α(E1+M2)=1.0×10^5.
13.52 *2*	100	20.19	1$^-$	6.670	1$^+$	E1		5.86	≈11	ce(M)/(γ+ce)=0.653 *7*; ce(N+)/(γ+ce)=0.201 *4* ce(N)/(γ+ce)=0.165 *3*; ce(O)/(γ+ce)=0.0317 *6*; ce(P)/(γ+ce)=0.00380 *8*; ce(Q)/(γ+ce)=9.19×10^{-5} *18* The only γ-ray unambiguously assigned from γγ due to large overleaping with ^{228}Th X-rays (1995So11). Justified by the Coriolis mixing of K$^\pi$=0$^+$ and 1$^+$ bands.
[x]15.15 *8*						[b]			≈3	M1, M2 and M3 lines observed in the ce-spectrum only.
[x]15.5 *2*	10 *2*					(E1)[b]		4.07 *16*	≈1	ce(M)/(γ+ce)=0.613 *15*; ce(N+)/(γ+ce)=0.190 *8* ce(N)/(γ+ce)=0.156 *7*; ce(O)/(γ+ce)=0.0305 *15*; ce(P)/(γ+ce)=0.00380 *17*; ce(Q)/(γ+ce)=9.8×10^{-5} *4* This γ seen only in the photon spectrum may be the same as the 15.15-keV transition observed in the ce-spectrum.
[x]16.2 *1*	45 *5*					(E1)		3.62 *7*	≈9	ce(M)/(γ+ce)=0.75
26.4 *1*		33.07	1$^+$	6.670	1$^+$	M1+E2	≈0.07	≈201	≈3	ce(L)/(γ+ce)≈0.749; ce(M)/(γ+ce)≈0.184; ce(N+)/(γ+ce)≈0.0622 ce(N)/(γ+ce)≈0.0488; ce(O)/(γ+ce)≈0.0112; ce(P)/(γ+ce)≈0.00202; ce(Q)/(γ+ce)≈0.000156 δ: from 1995So11 with no details.
[x]30.6 *1*										From ce data one has mult=M1 giving

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^{228}Ra β^- decay 1995So11 (continued)

$\gamma(^{228}Ac)$ (continued)

E_γ [‡]	E_i(level)	Comments
		I(γ+ce)≈1, or M1+E2 with δ=0.4 giving I(γ+ce)≈6.

[†] Additional information 1.
[‡] From ce-spectrum, unless otherwise noted.
[#] Relative Iγ; some could contain contributions from L x ray components present in this energy range.
[@] From M- and N-subshell ce ratios and M-subshell conversion coefficients.
[&] Experimental I(γ+ce) deduced from ΣIce + Iγ.
[a] Uncertainty given is due to ΔE only.
[b] E1 mult. For the 15.5-keV γ deduced from absence of ce-lines. If the 15.15-keV ce-lines belong to this transition, then α(exp)≈19; theory: α(E1)=4.5, α(M1)=230, α(E2)=27200.
[c] For absolute intensity per 100 decays, multiply by ≈0.016.
[d] Absolute intensity per 100 decays.
[e] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

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Decay Scheme

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