^{248}Cm SF decay 2009Rz02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	30-Apr-2010

Parent: ^{248}Cm: E=0; $J^\pi=0^+$; $T_{1/2}=3.48\times10^5$ y *6*; %SF decay=?

Includes ^{235}U(n,F) and ^{242}Am(n,F).

Measured Eγ, Iγ, γγ, γγ(θ), ce, ce(γ) coin, ce(fragment) coin, γ(fragment) coin, half-lives by delayed timing method using EUROGAM2 and Gammasphere arrays for prompt γ rays from ^{248}Cm SF decay. Delayed γ rays following induced fission of ^{235}U and ^{242}Am were measured using the Lohengrin mass spectrometer at the ILL reactor in Grenoble. Comparisons with quasiparticle rotor model and deformed model calculations.

The 42.8 and 92.2 levels and associated γ rays are from delayed γ-ray study in ^{235}U(n,F). The prompt 108-115-263-404-474-535-565 γ cascade is from ^{248}Cm SF decay.

Level scheme is established through double gating of γ rays in the cascade.

^{144}Cs Levels

E(level)[†]	J^π	$T_{1/2}$	Comments
0.0[‡]	(1^-)		
42.8[‡] *3*	(2^-)		
92.2[‡] *5*	(4^-)	1.1 μs *1*	$T_{1/2}$: from 2009Rz02, measurement of delayed γ rays from fission of ^{242}Am by neutrons at Lohengrin facility.
0+x[#]	J		E(level): this level may be the same as 92.2, (4^-), in which case x=92.2 Quasiparticle-rotor model calculations (see figure 13 in 2009Rz02) suggest a low-lying 4^- with configuration=$\pi(3/2[411]+3/2[422])\otimes\nu(3/2[523]+3/2[521])$, $K^\pi=3^-$. This configuration also reproduces a 5^- state at 200 keV and 6^- just above this energy.
107.9+x[#] *6*	J+1	≤8 ns	E(level): 200.1 if x=92.2. J^π: possible (5^-) from model calculations. $T_{1/2}$: from 2009Rz02, time spectra for 107.9γ and 404.7γ from ^{248}Cm SF decay. Presence of a nanosecond isomer is also confirmed in measurement of delayed γ rays following ^{235}U(n,F) at Lohengrin facility, and from ionic charge distribution measured in the decay of ^{144}Cs (2009Rz02).
222.5+x[#@] *6*	J+2		E(level): 314.7 if x=92.2. J^π: possible (6^-) bandhead of configuration=$\pi d_{5/2}\nu f_{7/2}$.
485.8+x[#@] *7*	J+4		E(level): 578.0 if x=92.2. J^π: possible (8^-) band member.
890.5+x[#@] *8*	J+6		E(level): 982.7 if x=92.2. J^π: possible (10^-) band member.
1364.3+x[#@] *8*			E(level): 1456.5 if x=92.2.
1899.4+x[#@] *9*			E(level): 1991.6 if x=92.2. Level not included in Adopted Levels since 535γ is placed from 1426.0+x level, as in ^{252}Cf SF decay.
2464.4+x?[#@] *9*			E(level): not included in the Adopted Levels due to tentative nature of 565γ. E(level): 2556.6 if x=92.2.

[†] From Eγ's, assuming Δ(Eγ)=0.3 keV (evaluator).

[‡] Possible member of $\pi3/2[422]\otimes\nu5/2[523]$ multiplet. Level observed in ^{235}U(n,F).

[#] Level observed in prompt γ study of ^{248}Cm SF decay.

[@] Band(A): Band based on (6^-) (?).

^{248}Cm SF decay 2009Rz02 (continued)

$\gamma(^{144}Cs)$

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[&]	Comments
42.8[†]		42.8	(2$^-$)	0.0	(1$^-$)	(M1+E2)	27 *17*	α(K)=8.91 *14*; α(L)=14 *13*; α(M)=3 *3*; α(N+..)=0.7 *7* α(N)=0.6 *6*; α(O)=0.07 *7*; α(P)=0.00031 *5* Mult.: M1 or E2 from I(x ray)/I$\gamma \approx 7$, when gated on L-conversion line of 49-keV transition, but pure E2 assignment is excluded from intensity balance considerations, thus M1+E2 is most likely.
49.4[†]		92.2	(4$^-$)	42.8	(2$^-$)	(E2)	24.7	α(L)exp=10 *4* (2009Rz02) α(K)=7.47 *11*; α(L)=13.57 *19*; α(M)=2.97 *5*; α(N+..)=0.664 *10* α(N)=0.597 *9*; α(O)=0.0673 *10*; α(P)=0.000205 *3*
107.9[‡]	100 *5*	107.9+x	J+1	0+x	J	(M1+E2)[#]	1.1 *4*	α(K)=0.79 *17*; α(L)=0.23 *15*; α(M)=0.05 *4*; α(N+..)=0.011 *7* α(N)=0.010 *7*; α(O)=0.0012 *8*; α(P)=2.57×10^{-5} *13*
114.6[‡]	99 *6*	222.5+x	J+2	107.9+x	J+1	(M1+E2)[#]	0.9 *3*	α(K)=0.66 *14*; α(L)=0.18 *11*; α(M)=0.038 *24*; α(N+..)=0.009 *6* α(N)=0.008 *5*; α(O)=0.0010 *6*; α(P)=2.16×10^{-5} *10*
263.3[‡]	48 *4*	485.8+x	J+4	222.5+x	J+2	Q[@]		
404.7[‡]	39 *3*	890.5+x	J+6	485.8+x	J+4	Q[@]		
473.8[‡]	35 *4*	1364.3+x		890.5+x	J+6			
535.1[‡]	12 *2*	1899.4+x		1364.3+x				
565.0[‡*a*]	5 *1*	2464.4+x?		1899.4+x				E_γ: not included in the Adopted Gammas due to its tentative nature.

[†] From delayed γ-ray study in ^{235}U(n,F).
[‡] From prompt γ study in ^{248}Cm SF decay. Identification of γ rays in ^{144}Cs is based on coincidence with known γ rays from complementary fission fragments of ^{101}Nb and ^{103}Nb.
[#] ΔJ=1, D+Q transition from (114.6γ)(107.9γ)(θ); intensity balance supports M1+E2.
[@] ΔJ=2, Q transition from (404.7γ)(263.3γ)(θ).
[&] 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.
[*a*] Placement of transition in the level scheme is uncertain.

^{248}**Cm SF decay 2009Rz02**

Level Scheme

Intensities: Relative I_γ

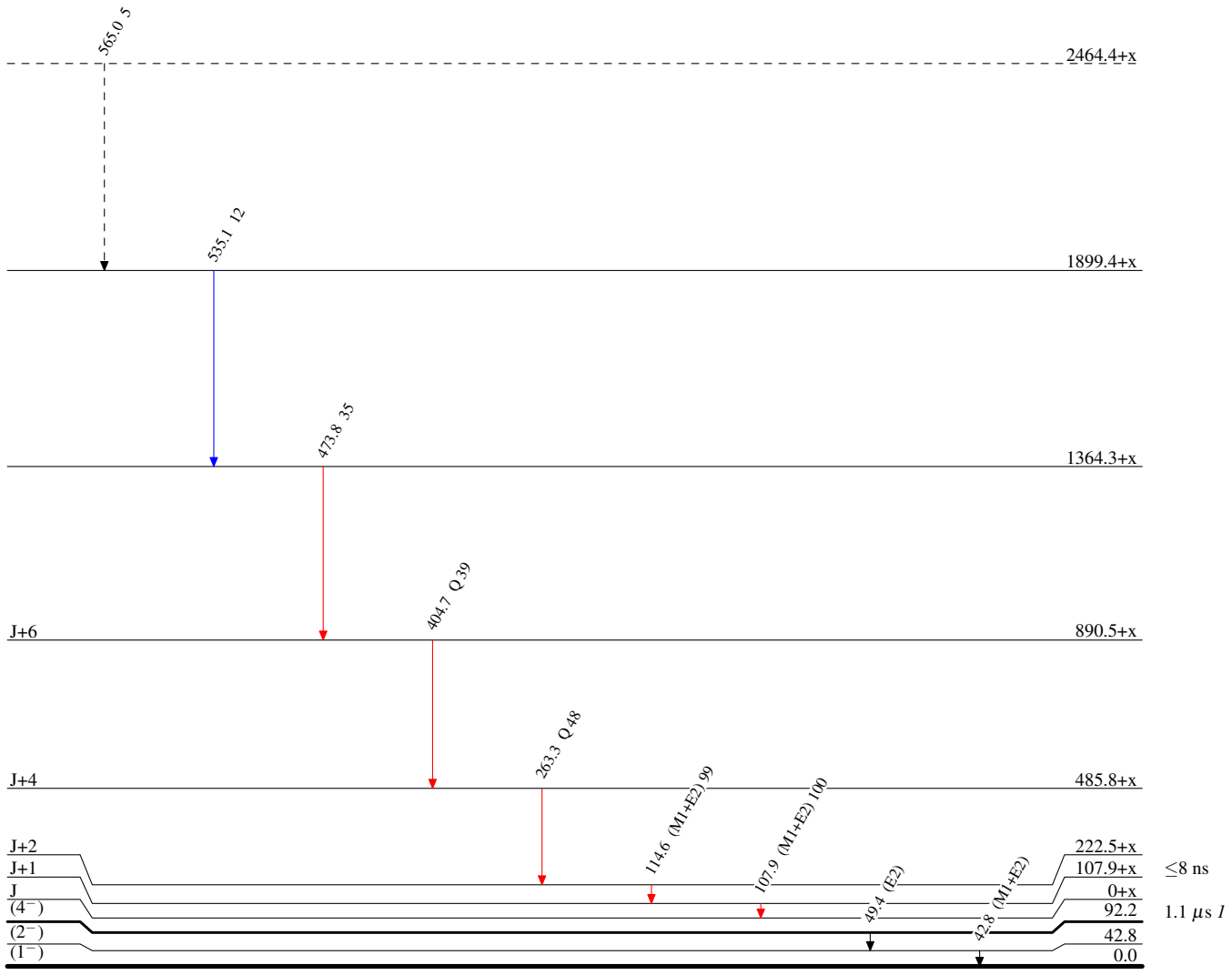
Legend

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

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

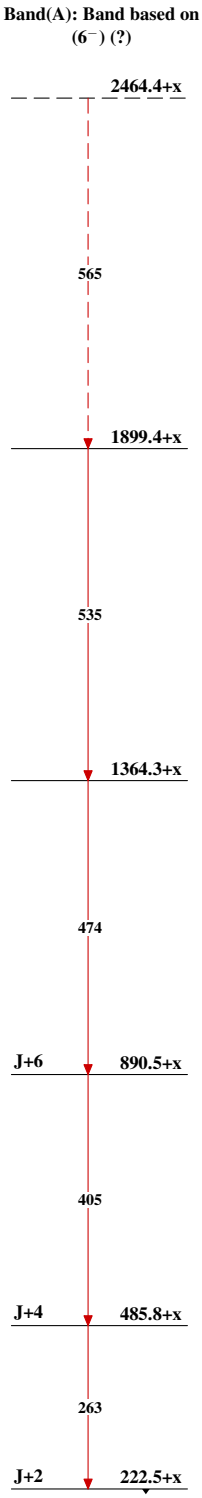
$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)



$^{144}_{55}Cs_{89}$

^{248}Cm SF decay 2009Rz02



$^{144}_{55}Cs_{89}$