^{136}Eu ε decay:mixed source 1989Vi04

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. A. Mccutchan	NDS 152, 331 (2018)	1-Apr-2018

Parent: ^{136}Eu: E=x; $J^\pi=(7^+)$; $T_{1/2}$=3.3 s *3*; Q(ε)=1.057×10^4 *SY*; %ε+%β^+ decay=?

Parent: ^{136}Eu: E=y; $J^\pi=(3^+)$; $T_{1/2}$=3.8 s *3*; Q(ε)=1.057×10^4 *SY*; %ε+%β^+ decay=?

1989Vi04: ^{136}Eu activity from ^{92}Mo(^{46}Ti,pn) with E(^{46}Ti)=192 MeV followed by mass separation. Measured: Eγ, Iγ, β^+p, K x ray, Xγ, γγ, $\gamma^\pm$, γ(t) using Si(Au) ΔE-E telescope, thin planar HPGe x-ray detector, thick plastic scintillator and n-type Ge detector.

1987Ke05: ^{136}Eu activity from ^{92}Mo(^{48}Ti,p3n) with E(^{48}Ti)=220 MeV followed by mass separation. Measured Eγ, Iγ using two Ge detectors.

Others: 1988BeYG, 1986MlZZ.

From strong feeding of 2^+ and 8^+ levels in ε decay 1989Vi04 conclude that the decay is due to both a high- and a low-spin isomer measuring $T_{1/2}$(255.1γ)=3.7 s *3*, $T_{1/2}$(431.7γ)=3.3 s *3*. Similarly 1987Ke05 observe strong population in ε decay of the yrast band up to $J^\pi=6^+$ and the 714-keV, 2^+ level.

1989Vi04 provide I(β^++ε) feedings and log *ft* values based upon I($\gamma^\pm$), I(K x ray) measurements and estimated Q(ε)=10.4 MeV. To correct I(K x ray) due to internal conversion, γ′s of unknown multipolarity were assumed M1. The low and high spin decays of ^{136}Eu were estimated as 85% and 15%, respectively, based on an analogy with ^{134}Pm. As several assumptions are involved in these calculations, they are not adopted here.

^{136}Sm Levels

E(level)[†]	J^π[‡]
0.0	0^+
255.08 *16*	2^+
686.84 *23*	4^+
713.02 *16*	(2^+)
1170.50 *24*	(4^+)
1221.5 *3*	6^+
1490.92 *20*	(2^+)
1797.1 *4*	8^+

† From a least-squares fit to Eγ, by evaluator.
‡ From the Adopted Levels.

γ(^{136}Sm)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[#]	Comments
x109.1 *4*	1.0 *5*							
x211.8 *4*	2.5 *5*							
x234.0 *5*	0.4 *2*							
255.1 *2*	100 *10*	255.08	2^+	0.0	0^+	E2	0.0938	α(K)=0.0712 *11*; α(L)=0.0177 *3*; α(M)=0.00396 *6*; α(N)=0.000880 *13*; α(O)=0.0001194 *17* α(P)=3.71×10^{-6} *6*
x284.0 *5*	0.3 *1*							
320.1 *3*	2.0 *5*	1490.92	(2^+)	1170.50	(4^+)	[E2]	0.0460	α(K)=0.0362 *6*; α(L)=0.00771 *11*; α(M)=0.001715 *25*; α(N)=0.000382 *6*; α(O)=5.28×10^{-5} *8* α(P)=1.97×10^{-6} *3*
x384.0 *5*	0.4 *2*							
431.7 *2*	34 *5*	686.84	4^+	255.08	2^+	E2	0.0192	α(K)=0.01555 *22*; α(L)=0.00283 *4*; α(M)=0.000622 *9*; α(N)=0.0001393 *20*; α(O)=1.97×10^{-5} *3* α(P)=8.81×10^{-7} *13*
457.3 *3*	3 *1*	1170.50	(4^+)	713.02	(2^+)	(E2)	0.01633	α(K)=0.01331 *19*; α(L)=0.00236 *4*; α(M)=0.000518

Continued on next page (footnotes at end of table)

^{136}Eu ε decay:mixed source 1989Vi04 (continued)

γ(^{136}Sm) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[#]	Comments
								8; α(N)=0.0001161 *17* α(O)=1.652×10^{-5} *24*; α(P)=7.59×10^{-7} *11*
458.0 *2*	20 *5*	713.02	(2$^+$)	255.08	2$^+$			
483.5 *3*	3 *1*	1170.50	(4$^+$)	686.84	4$^+$			
534.7 *2*	10 *3*	1221.5	6$^+$	686.84	4$^+$	E2	0.01075	α(K)=0.00887 *13*; α(L)=0.001478 *21*; α(M)=0.000322 *5*; α(N)=7.24×10^{-5} *11* α(O)=1.041×10^{-5} *15*; α(P)=5.13×10^{-7} *8*
[x]540.0 *4*	0.9 *3*							
[x]544.0 *3*	3 *1*							
575.6 *2*	7 *3*	1797.1	8$^+$	1221.5	6$^+$	E2	0.00890	α(K)=0.00737 *11*; α(L)=0.001197 *17*; α(M)=0.000260 *4*; α(N)=5.85×10^{-5} *9*; α(O)=8.46×10^{-6} *12* α(P)=4.29×10^{-7} *6*
[x]583.9 *3*	7 *2*							
[x]592.7 *3*	7 *2*							
[x]660.6 *5*	≈3							
[x]668.5 *5*	≈4							
[x]696.0 *3*	4 *2*							
713.0 *2*	17 *5*	713.02	(2$^+$)	0.0	0$^+$	[E2]	0.00528	α(K)=0.00442 *7*; α(L)=0.000672 *10*; α(M)=0.0001454 *21*; α(N)=3.27×10^{-5} *5*; α(O)=4.79×10^{-6} *7* α(P)=2.60×10^{-7} *4*
778.0 *2*	17 *5*	1490.92	(2$^+$)	713.02	(2$^+$)			
[x]815.0 *4*	4 *1*							
[x]1001.0 *3*	10 *5*							
1236.0 *4*	3.0 *5*	1490.92	(2$^+$)	255.08	2$^+$			
1490.9 *5*	3.0 *5*	1490.92	(2$^+$)	0.0	0$^+$	[E2]	1.19×10^{-3}	α(K)=0.000953 *14*; α(L)=0.0001272 *18*; α(M)=2.72×10^{-5} *4*; α(N)=6.15×10^{-6} *9* α(O)=9.19×10^{-7} *13*; α(P)=5.68×10^{-8} *8*

[†] From 1989Vi04.
[‡] From the Adopted Gammas.
[#] 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.
[x] γ ray not placed in level scheme.

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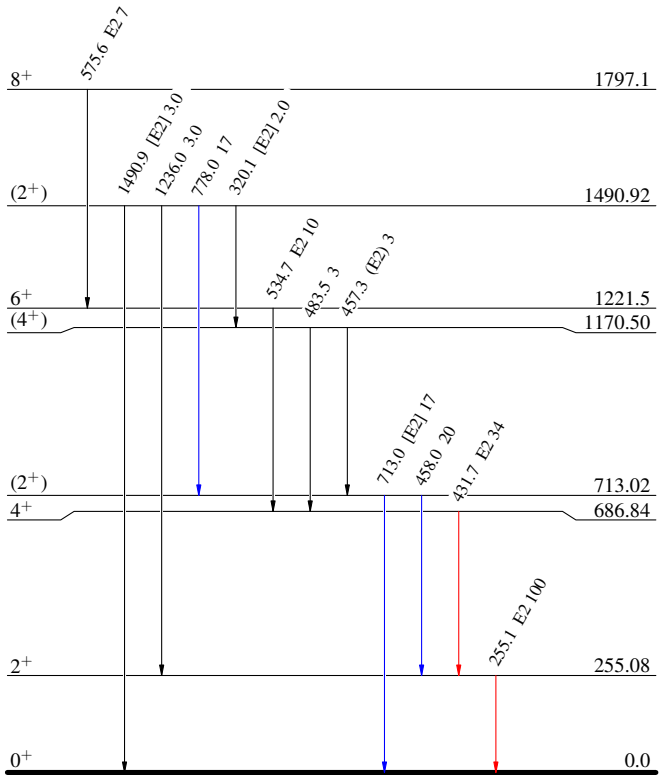
Decay Scheme

Intensities: Relative I_γ

Legend

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

(3^+) y 3.8 s *3*
%ε + %β⁺=? Qε=1.057×10⁴ *SY*
(7^+) x 3.3 s *3*
%ε + %β⁺=? Qε=1.057×10⁴ *SY*
$^{136}_{63}Eu_{73}$



$^{136}_{62}Sm_{74}$