^{140}Eu IT decay 1991Fi03,2006Ta08

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 154, 1 (2018)	20-Nov-2018

Parent: ^{140}Eu: E=0+x; J^π=(5$^-$); $T_{1/2}$=125 ms *2*; %IT decay=100.0

^{140}Eu-E,J^π,$T_{1/2}$: adopted values.

1991Fi03: 97% enriched ^{92}Mo(HI,xpyn), HI= 312 MeV ^{54}Fe and 244 MeV ^{52}Cr at LBL SuperHILAC with OASIS mass separator and tape transport. Detector array: Si ΔE-E, HPGe, 2 n-type Ge, 1-mm plastic scintillator Measured γ, $\gamma\gamma$, K x ray; I(K x ray)=50 *5* relative to 174.6γ.

2006Ta08: 98.7% enriched 1 mg/cm^2 ^{92}Mo(^{54}Fe,n5p) reaction at 315 MeV at Oak Ridge HRIBF. The recoil products were separated in mass/charge ratio by recoil-mass separator (RMS). Measured Eγ, Iγ, $\gamma\gamma$, conversion electrons using two segmented Ge Clover detectors for γ rays and Si(Li) conversion electron spectrometer (BESCA).

^{140}Eu Levels

E(level)	J^π[†]	$T_{1/2}$	Comments
0.0	1$^+$	1.51 s *2*	%ε+%β^+=100 $T_{1/2}$,%ε+%β^+: From Adopted Levels. Configuration=$\pi d_{5/2}\otimes\nu d_{3/2}$ (2006Ta08).
174.6 *9*	2$^+$		
185.3 *9*	3$^+$		
0+x	(5$^-$)	125 ms *2*	%IT=100; %ε+%β^+<1 (1991Fi03) Additional information 1. E(level): x=210 *25*, ≈50 keV above 185.3 level; the measured K x rays are from the conversion of 174.6γ and 185.3γ only, which implies that this isomeric state is at less than Eu K binding energy of 48.5 keV above 185.3 level. J^π: deduced by 1991Fi03 based on M2 γ to 3$^+$, and E3 γ to 2$^+$; confirmed by 2006Ta08 from isotone systematics, particularly ^{142}Tb (^{142}Tb studied by 2006Ta08). $T_{1/2}$: from 1991Fi03. Configuration=$\pi h_{11/2}\otimes\nu s_{1/2}$, $\pi h_{11/2}\otimes\nu d_{3/2}$ (2006Ta08).

[†] From Adopted Levels.

γ(^{140}Eu)

Normalization based on I(γ+ce)(174.6γ)+I(γ+ce)(185.3γ)=100.

E_γ[†]	I_γ[‡&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[a]	Comments
(10.7)		185.3	3$^+$	174.6	2$^+$	[M1]	207	α(L)=162.0 *23*; α(M)=35.3 *5*; α(N+..)=9.47 *14* α(N)=8.07 *12*; α(O)=1.274 *18*; α(P)=0.1245 *18* γ deduced by 1991Fi03 based on estimated B(E3) of transition feeding the 174.6 level that substantially exceeds 1 W.u., contrary to expectations based on systematics of E3; this indicates that most of the observed intensity of 174.6γ is due to a 10.7-keV, M1 transition (not observed).
<49[#b]		0+x	(5$^-$)			(M2)[@]		
<59[#b]		0+x	(5$^-$)			(E3)[@]		
174.6	100 *4*	174.6	2$^+$	0.0	1$^+$	M1	0.383	α(K)=0.324 *5*; α(L)=0.0460 *7*; α(M)=0.00992 *14*; α(N+..)=0.00267 *4* α(N)=0.00227 *4*; α(O)=0.000361 *5*; α(P)=3.57×10^{-5} *5* Mult.: from ^{140}Gd ε decay (1988Tu05).
185.3	92 *4*	185.3	3$^+$	0.0	1$^+$	E2	0.278	α(K)exp=0.19 *4* (1991Fi03)

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^{140}Eu IT decay 1991Fi03,2006Ta08 (continued)

$\gamma(^{140}Eu)$ (continued)

E_γ [†]	E_i(level)	Comments
		α(K)=0.193 *3*; α(L)=0.0666 *10*; α(M)=0.01525 *22*; α(N+..)=0.00391 *6* α(N)=0.00341 *5*; α(O)=0.000482 *7*; α(P)=1.618×10^{-5} *23* Mult.: from measured K x ray minus contribution from electronic conversion of 174.6γ; deduced α(K)exp matches E2.

[†] From 1991Fi03 and confirmed by 2006Ta08.
[‡] From 1991Fi03.
[#] Upper limit for Eγ established by 1991Fi03 from nonobservation of K x-ray intensity associated with isomeric decay.
[@] Deduced by 1991Fi03 from transition strength (RUL) arguments (1991Fi03 quote 1981En06 for RUL);
[&] For absolute intensity per 100 decays, multiply by 0.391 *12*.
[a] 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.
[b] Placement of transition in the level scheme is uncertain.