^{144}Ce β^- decay 1960Ge05,1984Da13

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	A. A. Sonzogni	NDS 93, 599 (2001)	1-Dec-2000

Parent: ^{144}Ce: E=0.0; $J^\pi=0^+$; $T_{1/2}$=284.91 d *5*; Q(β^-)=318.7 *8*; %β^- decay=100.0

Measured γ, x ray (1984Da13) HPGe; ce (1960Ge05,1969Ge01) s; γ, Xγ (1970An15) semi, semi-scin; x ray, γ (1976Ch33) semi; $\beta\gamma$ (1956Pu24,1957Pa51,1959Fr54,1960Sa22,1962Fo04,1963Fu16); $\gamma\gamma$ (1959Fr54,1960Sa22,1961Ge09,1962Fo04,1963Az02,1963Iw02,1969Ma24).

Measured Eβ=315.6 *15*, Iβ=76%, shape not statistical (1966Da04) s. For other β measurements see 1954Co60, 1954Em09, 1956Pu24, 1957Pa51, 1958Hi76, 1959Fr54, 1959Se57, 1960Sa22, 1963Fu16 or see 1967Ra40.

For $\beta\gamma(\theta)$ see 1963Co18, 1963Cr11, 1964Az02, 1965Co19, 1965Re13, 1968Da12.

For $\beta\gamma$(circular polarization) see 1963Co18, 1963Kn05, 1968Da12.

For β^-Ce(transverse polarization) see 1962Bi05, 1963Si10.

Other measurements: 1969Gu15, 1970Fa03, 1970Po09, 1971Sa20, 1976Ra22; see also references cited in 1967Ra40.

Decay scheme is as given by 1960Ge05. Many other transitions have been suggested to belong to this decay (see 1967Ra40); however, these assignments seem very doubtful and are not confirmed in the semi spectrum of 1970An15, 1976Ch33.

^{144}Pr Levels

E(level)	J^π[†]	$T_{1/2}$[†]
0.0	0^-	17.28 min *5*
59.03 *3*	3^-	7.2 min *3*
80.120 *4*	1^-	
99.952 *9*	2^-	
133.5152 *20*	1^-	

[†] From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-[†]	Log *ft*	Comments
184.7 *20*	133.5152	19.6 *4*	7.26 *2*	av Eβ= 50.2 *6*
238.1 *20*	80.120	3.9 *2*	8.31 *3*	av Eβ= 66.1 *6*
318.2 *20*	0.0	76.5 *5*	7.43 *1*	av Eβ= 91.1 *7*

[†] Absolute intensity per 100 decays.

$\gamma(^{144}Pr)$

Iγ normalization: from %Iγ(133γ)=11.1 *6* (1975De17) 4$\pi\beta\gamma$.

x-rays (1984Da13):

E(x ray)	I(x ray) (Iγ(133γ)=100.0 10)	identification
5.012 50	5.4 9	Pr Lα_1 x ray + Lα_2 x ray
5.486 50	5.3 9	Pr Lβ_1 x ray + Lβ_3 x ray+Lβ_4 x ray
5.851 50	1.6 3	Pr Lβ_{215} x ray
6.297 50	0.8 2	Pr Lγ_1 x ray
6.594 50	0.6 2	Pr Lγ_2 x ray + Lγ_3 x ray
35.547 10	20.0 10	Pr Kα_2 x ray
36.026 10	37.0 18	Pr Kα_1 x ray
40.739 20	13 8	Pr Kβ_1 x ray′
41.778 10	2.93 23	Pr Kβ_2 x ray′

E$_\gamma$[†]	I$_\gamma$[†‡]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.	δ	α[#]	I$_{(\gamma+ce)}$[‡]	Comments
33.568 *10*	1.8 *2*	133.5152	1$^-$	99.952	2$^-$	M1		4.79		α(L)= 3.74 *8*; α(M)=785×10^{-3} *18* Mult.: α(L)exp=4.5 *12* (1970An15); L1:L2:L3:M1:N=100:6.4 *49*:<4.7: 18.2 *21*:3 *3* (1960Ge05). δ: −0.006 *20* from $\gamma\gamma(\theta)$ (1963Bh11,1963Iw02,1967Gu17).
40.98 *10*	2.32 *14*	99.952	2$^-$	59.03	3$^-$	M1+E2	0.042 *18*	2.79 *11*		α(L)= 2.18 *9*; α(M)=458×10^{-3} *20* I$_\gamma$: from intensity balance as no direct β^- feeding is expected, ΔJ=3. Measured Iγ: 1.38 *20* (1984Da13), 3.6 *4* (1976Ch33), 4.6 *23* (1970Fa03), 4.4 *15* (1970An15), 5 *4* (1970Po09). Mult.: α(L)exp=1.8 *6* (1970An15) L1:L2:L3:M1:M2:N= 100:8.5 *33*:<4:21 *4*:3 *3*:4.3 *22* (1960Ge05). δ: from $\gamma\gamma(\theta)$ (1968Ma24).
53.395 *5*	0.90 *7*	133.5152	1$^-$	80.120	1$^-$	M1		8.09		α(K)= 6.875 *23*; α(L)= 96×10^{-2} *18*; α(M)= 20×10^{-2} *4*; α(N+..)= 55×10^{-3} *11* Mult.: α(K)exp=6.6 *5* (1970An15) (K x ray)/Iγ, α(L)exp=0.98 *10* (1970An15); L1:L2:L3:M1=100:7.9 *53*:<5:24 *10* (1960Ge05). δ: 0.052 *80* (1975Ba32) $\gamma\gamma(\theta)$.
59.03 *3*	0.0088 *6*	59.03	3$^-$	0.0	0$^-$	M3		1258	11.1 *6*	α(K)= 421; α(L)= 632; α(M)= 157.1; α(N+..)= 48.3 E$_\gamma$: from 1960Ge05. I$_\gamma$,I$_{(\gamma+ce)}$: from I(ce) of 1960Ge05 and α(L)/(1+α). Others: Iγ≈0.01 (1970An15), 0.03 *1*(1976Ra22),≤0.01 (1984Da13). Mult.: L1/L2=6.43 *32*, L1/L3=0.662 *8* (1969Ge01) s; L1:M1:M3:N= 100:29 *3*:42 *4*:16.7 *18* (1960Ge05) s; α(L)exp≈610 (1970An15).

From ENSDF

^{144}Ce β^- decay 1960Ge05,1984Da13 (continued)

$\gamma(^{144}Pr)$ (continued)

E_γ [†]	I_γ [†‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α [#]	Comments
80.120 *5*	12.3 *5*	80.120	1^-	0.0	0^-	M1	2.488	α(K)= 2.118; α(L)=293×10^{-3}; α(M)=614×10^{-4}; α(N+..)=1683×10^{-5} Mult.: α(K)exp=2.5 *5* (1970An15) (K x ray)/Iγ, α(L)exp=0.31 *4* (1970An15); L1/L2=12.2 *3*, L1/L3=59.6 *30* (1969Ge01) s; L1:M1:N=100:22 *8*:7.2 *25* (1960Ge05) s.
99.961 *15*	0.36 *4*	99.952	2^-	0.0	0^-	E2	2.144	α(K)= 1.227; α(L)=716×10^{-3}; α(M)=1602×10^{-4}; α(N+..)=417×10^{-4} Mult.: α(K)exp=1.4 *5* (1970An15); α(L)exp=0.82 *30* (1970An15); L1:L2:L3:M= 100:183 *87*:192 *90*:<333 (1960Ge05).
133.515 *2*	100 *1*	133.5152	1^-	0.0	0^-	M1	0.579	α(K)=493×10^{-3}; α(L)=677×10^{-4}; α(M)=1419×10^{-5}; α(N+..)=388×10^{-5} E_γ: others: 133.528 *13* (1979Bo26), 133.515 *5* (1978Mo22). Mult.: α(K)exp=0.54 *12*, α(L)exp=0.075 *15* (1970An15); L1/L2=13.4 *2*, L1/L3=64.3 *17* (1969Ge01).

† From 1984Da13 HPGE.
‡ For absolute intensity per 100 decays, multiply by 0.1109 *16*.
# 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.

From ENSDF

$^{144}_{59}Pr_{85}$-3

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Decay Scheme

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