^{141}Ce β^- decay 1979Ha09

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 187,1 (2023)	12-Oct-2022

Parent: ^{141}Ce: E=0.0; J$^\pi$=7/2$^-$; T$_{1/2}$=32.504 d *13*; Q(β^-)=583.5 *12*; %β^- decay=100
^{141}Ce-Q(β^-): From 2021Wa16.
Measured: γ, K x ray, β^-, ce (1979Ha09,1975Le09,1972Sa34,1968Le03,1967Wh01,1967Is04,1967Bl03, 1965Wa13,1964Ha20).
1979Ha09: measured 4$\pi\beta\gamma$-coin for determination of disintegration rate and Xce-coin for total internal conversion coefficient (ICC). Used Si(Li) and intrinsic Ge detectors to measure K X-ray and γ-ray emission rates. Deduced Iγ, I(X), subshell ICC ratios.
2000Ke02: reanalyzed published Internal Bremsstrahlung data.
1994Mo48: Moss spectrum.
1994Fu16: ^{141}Ce as calibration source.

^{141}Pr Levels

E(level)	J$^\pi$ †	T$_{1/2}$	Comments
0.0	5/2$^+$		
145.4434 *14*	7/2$^+$	1.85 ns *3*	T$_{1/2}$: from 1966Bl08. Others: 1.82 ns *4* (1972Ga39), 1.91 ns *6* (1968Ra02), 1.83 ns *4* (1967Ba27).

† Adopted values.

β^- radiations

$\beta\gamma(\theta)$: 1970Wo07, 1965Ra08, 1961De27, 1960Ru03.
$\beta\gamma$(CP): 1972Sc02, 1971Va15, 1969Ra10, 1961De27.
β(long pol): (1972Po15).
Shape of β spectra: (1979Ha09,1971Bo19,1968Be06).
β matrix elements: 1992Ch09, 1977Na07, 1976Ba29, 1973Ci01.

E(decay)	E(level)	Iβ^- †	Log *ft*	Comments
(438.1 *12*)	145.4434	70.0 *6*	6.978 *6*	av Eβ=130.78 *41* E(decay): 436.7 *46* (1979Ha09), 432 *5* (1961De27), 440 *9* (1958Jo22), 432 *2* (1955Jo02), 444 *2* (1952Ko27), 442 *3* (1950Fr58). Iβ^-: from Iγ(145γ)=100, α(145γ)=0.449 *6* and normalization factor, 0.483 *3*. Other value: 70.2% *8* (1979Ha09).
(583.5 *12*)	0.0	30.0 *6*	7.767 *10*	av Eβ=181.90 *44* E(decay): 582.2 *26* (1979Ha09), 580 *5* (1958Jo22), 574 *3* (1955Jo02), 582 *2* (1952Ko27), 581 *3* (1950Fr58). Iβ^-: 100% − Iβ(145 keV)=100% − 70.0% *6*=30.0% *6* Other value: 28.8% *8* (1979Ha09).

† Absolute intensity per 100 decays.

γ(^{141}Pr)

Iγ normalization: weighted average of the following measured absolute emission probabilities of the 145-keV gamma ray: 48.44 *41* (1975El09), 48.2 *3* (1979Ha09), 48.5 *4* (1980RuZY), and 48.0 *5* (1992Sc24). Others: 48.9 *4* (1980Sc07), 46.6 *21* (1968Be06), 49.3 *6* (1966El02), 45.4 *23* (1964Cr03).
Double K-shell ionization with K internal conversion of 146γ (1985Na09).
Total K-shell ionization probability after β^- decay to 145 level=0.000179 *11* (1986Na07), 0.000168 *21* (1992BeZB).
For measured Iγ for 145γ and K x ray and L x ray see 1993BeZV, 1992Sc24, 1987Me17, 1985Me18.

$^{141}Ce\ \beta^-$ decay 1979Ha09 (continued)

$\gamma(^{141}Pr)$ (continued)

The ratio I(K x ray)/Iγ(145γ)=0.346 *5*, deduced from gamma-ray and K-electron conversion data in this evaluation, agrees with 0.342 *3*, which is a weighted average of the following experimental values: 0.338 *5* and 0.347 *12* (1961Ne12); 0.342 *9* (1972Ca07); 0.334 *9* (1971Ca49); 0.349 *5* (1979Ha09); 0.339 *5* (1992Sc24). This agreement confirms the self consistency of the decay scheme.

E_γ	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.†	δ	α #	Comments
145.4433 *14*	100	145.4434	7/2$^+$	0.0	5/2$^+$	M1+E2	+0.069 *7*	0.449 *6*	%Iγ=48.3 *3* E_γ: from 2000He14. Others: 145.440 *3* (1970Gr13), 145.444 *20* (1979Bo26). Mult.: α(K)exp=0.376 *8*, α=0.438 *10* (weighted average of 0.439 *13*, 0.436 *17*), K/L=7.29 *24*, K/L+=5.78 *18* (1979Ha09), L1:L2:L3=1000:78.0 *11*:19.68 *23* (1968Ge02); 1000:81 *4*:17.2 25 (1965Ge04). Others: α(K)exp=0.359 *16* (1975Le09), 0.375 *9* (1966Di02), 0.376 *7* (1966Pa09); see also 1972Ca07, 1961Ne12, 1961Co04 α=0.452 *8*,0.435 *7* (1992Sc24), 0.439 *13*, 0.436 *17* (1979Ha09), 0.421 *21* (1975Le09), 0.441 *9* (1966Pa09), 0.440 *11* (1966Di02). α: weighted average of 0.452 *8*, 0.435 *7* (1992Sc24), 0.439 *13*, 0.436 *17* (1979Ha09), 0.421 *21* (1975Le09), 0.441 *9* (1966Pa09), 0.440 *11* (1966Di02). α(calculated)=0.449 *6*. δ: from 1979Ha21 from ICC measurement determining penetration parameter and mixing ratio (graphical analysis). Others: +0.068 *8* (1962Sc11), +0.066 *22* (1963Ha07). Penetration parameter=1.2 *6* (1979Ha21). Other: 1973Ra41.

† α(K)exp from K x ray-ce coin and K x ray/I(145γ) (1979Ha09).
‡ For absolute intensity per 100 decays, multiply by 0.483 *3*.
# 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.

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Decay Scheme

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