^{64}Cu β^- decay (12.7006 h) 2012Be24,1983Ch47,2002We02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 178, 41 (2021).	12-Nov-2021

Parent: ^{64}Cu: E=0.0; $J^\pi=1^+$; $T_{1/2}$=12.7006 h *20*; Q(β^-)=579.6 *6*; %β^- decay=38.48 *26*

^{64}Cu-J^π,$T_{1/2}$: From ^{64}Cu Adopted Levels.

^{64}Cu-Q(β^-): From 2021Wa16.

^{64}Cu-%β^- decay: From 2012Be24 measurement and evaluation. Others: 1983Ch47 give %ε=43.1 *5*, %β^+=17.86 *14*, %β^-=39.0 *3*, %(1346γ)=0.471 *11*, Iβ^-/Iβ^+=2.187 *7*. Corresponding values from 1986Ka03 are: %ε=43.7 *5*, %β^+=17.93 *20*, %β^-=38.3 *6*, %(1346γ)=0.487 *20*. 2002We02 determine %β^-=38.06 *30* by analyzing ^{64}Zn and ^{64}Ni atoms using isotope dilution method combined with thermal ionization mass spectrometry. In 2007Si04 evaluation, %β^-=38.5 *3* was adopted as weighted average of %β^-=38.06 *30* (2002We02), 38.3 *6* (1986Ka03) and 39.0 *3* (1983Ch47), which agrees with the newly evaluated value of 38.48% *26* (2012Be24). Others: 1959Sc27, 1952Vl03, 1951Hi88, 1950Ku51, 1947Pe10, 1947De07.

2012Be24: EURAMET 1085 measurements for spectroscopic properties of ^{64}Cu decay made at five different laboratories: LNE-LNHB (France), PTB (Germany), CMI (Czech Republic), NPL (UK), and IFIN-HH (Romania). Results were evaluated for emission probabilities and half-life of ^{64}Cu decay as follows: %β^-=38.48 *26*; %β^+=17.52 *15*; %ε(to ^{64}Ni g.s.)=43.53 *20*; I(ε)/[I(β^+)+I(β^-)]=0.786 *10*; photon emission probability of 1345.7-keV γ ray=0.4748% *34*; and $T_{1/2}$=12.7004 h *20*. See also DDEP evaluation 2011BeZW by M.M. Be and R.G. Helmer.

2018Be13: measured absolute activity at NIST by 4$\pi\beta\gamma$ live-timed anticoincidence method using liquid scintillator for β and NaI(Tl) detector for γ activity. Comparison with standards from other laboratories, based on which authors concluded that improved data are needed for determination of consistent I(β^+)/I(β^-) branching ratios.

2018Ya06: measured photon emission probability of 1345.7-keV γ ray at the IPEN metrology lab in Sao Paulo as 0.472% *10* by 4$\pi\beta\gamma$-coin method using proportional counter for β detection.

2017Pi09: measured photon emission probability of 1345.7-keV γ ray as 0.4721% *26*, and half-life of ^{64}Cu decay at NIST using four different methods for half-life.

2012Am05: measured photon emission probability of 1345.7-keV γ ray, intensity of Kα- and Kβ-x rays, and half-life of ^{64}Cu decay at CEA, LISt, Saclay as a part of EURAMET 1085 project. Following values were determined: 0.472% *12* for emission probability of 1345.7-keV γ, I(511 radiation)=35.1% *3*, I(Kα x rays)=14.41% *15*, I(Kβ x rays)=2.01% *3*.

2012Lu14: measurement of emission probabilities of 1345.7-keV γ ray and 511-keV radiation, together with half-life of ^{64}Cu decay at IFIN-HH, Bucharest as part of EURAMET project 1085. Values obtained were: 0.481% *17* for photon emission probability of 1345.7-keV γ ray, 35.3% *12* for 511-keV radiation, and $T_{1/2}$=12.696 h *12*.

2010Wa46: measurement of emission probabilities of 1345.7-keV γ ray and 511-keV radiation, together with half-life of ^{64}Cu decay at PTB, Germany as part of EURAMET project 1085. Values obtained were: 0.474% *5* for photon emission probability of 1345.7-keV γ ray, 35.12% *22* for 511-keV radiation, and $T_{1/2}$=12.704 h *5*.

2011InZZ: measured KLL-Auger spectrum.

2008Fa12: measured temperature dependence of half-life.

2007Qa02: measurement of emission probabilities of 1345.7-keV γ ray, I(β^-), I(β^+), and I(ε) at Julich, Germany. Values obtained were: 0.54% *3* for photon emission probability of 1345.7-keV γ ray, 38.4% *12* for I(β^-), 17.8% *4* for I(β^+), 43.8% *14* for I(ε).

2006Fe11: measured near-zero-energy electron yields as a function of source thickness.

1986Ka03, 1983Ch47: Measured β^+, β^-, γ, 4$\pi\beta\gamma$, $T_{1/2}$.

2002We02: measured %β^- from analysis of ^{64}Zn and ^{64}Ni atoms.

2005QaZY: positron branching measured, but no results available.

Others:

$T_{1/2}$(^{64}Cu decay): see ^{64}Cu Adopted Levels, Gammas dataset for detailed comments about half-life measurements.

β^-: 1984Co12, 1983Sc31 (search for massive neutrinos), 1959Sc27, 1959Sc71, 1949Bo16, 1949Ow06, 1949La24, 1948Co02, 1946Br03, 1941To01, 1939Ty01. Theory: 1972Ma72.

β longitudinal polarization: 1957Vi21, 1957Ha17.

K-shell ionization (calculation): 1988Ba78.

^{64}Cu β^- decay (12.7006 h) 2012Be24,1983Ch47,2002We02 (continued)

^{64}Zn Levels

E(level)	J^π
0.0	0^+

β^- radiations

E(decay)	E(level)	Iβ^-[†]	Log *ft*	Comments
(579.6 *6*)	0.0	38.48 *26*	5.302 *5*	av Eβ=190.74 *24* E(decay): measured end-point energy=577.8 *10* (1983Ch47). Others: 1959Sc71, 1951Hi88, 1949Ow06, 1948Co02, 1947Pe10, 1946Br03, 1941To01, 1939Ty01. Iβ^-: from 2012Be24 evaluation. Others: 1983Ch47 give %ε=43.1 *5*, %β^+=17.86 *14*, %β^-=39.0 *3*, %(1346γ)=0.471 *11*, Iβ^-/Iβ^+=2.187 *7*. Corresponding values from 1986Ka03 are: %ε=43.7 *5*, %β^+=17.93 *20*, %β^-=38.3 *6*, %(1346γ)=0.487 *20*. 2002We02 determine %β^-=38.06 *30* by analyzing ^{64}Zn and ^{64}Ni atoms using isotope dilution method combined with thermal ionization mass spectrometry. In 2007Si04 evaluation, %β^-=38.5 *3* was adopted as weighted average of %β^-=38.06 *30* (2002We02), 38.3 *6* (1986Ka03) and 39.0 *3* (1983Ch47), which agrees with the newly evaluated value of 38.48% *26* (2012Be24). Others: 1959Sc27, 1952Vl03, 1951Hi88, 1950Ku51, 1947Pe10, 1947De07.

[†] Absolute intensity per 100 decays.