^{89}Ru ε decay (1.32 s) 2019Pa16

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	30-Nov-2021

Parent: ^{89}Ru: E=0.0; J^π=(9/2$^+$); $T_{1/2}$=1.32 s *3*; Q(ε)=9025 *25*; %ε+%β^+ decay=100.0

^{89}Ru-J^π,$T_{1/2}$: From ^{89}Ru Adopted Levels, where J^π was from 1997He24 and $T_{1/2}$ from 2019Pa16. Note that 2019Pa16 favored J^π=(7/2$^+$) based on predicted %ε+%β^+ feeding of ^{89}Tc g.s. (J^π=(9/2$^+$) of 8% for J^π(^{89}Ru g.s.)=7/2$^+$ and 66% for J^π(^{89}Ru g.s.)=9/2$^+$; and strong observed feeding of the 179-keV, (7/2$^+$) state of ^{89}Tc through the observation of 179γ. However, the decay scheme of ^{89}Ru ε+β^+ decay is poorly known, and in the opinion of evaluator, no firm conclusion can be drawn for preference of (7/2$^+$) over (9/2$^+$) for g.s. of ^{89}Ru, the latter proposed by 1997He24 based on band assignment.

^{89}Ru-Q(ε): From 2021Wa16.

Dataset adapted from compiled dataset in the XUNDL database from 2019Pa16 by E.A. McCutchan (NNDC,BNL), August 16, 2019.

2019Pa16: ^{89}Ru produced in ^{9}Be(^{124}Xe,X),E=345 MeV/nucleon reaction followed by separation of fragments of interest using BigRIPS and ZeroDegree spectrometers, and separated ions implanted in WAS3ABi stopper and detector system consisting of three double-sided silicon strip detectors and ten single-sided silicon strip detectors at RIBF-RIKEN. The γ rays from the decay of ^{89}Ru were detected using the EURICA array consisting 84 HPGe detectors in 12 clusters. Measured Eγ, Iγ, β spectra, E(p), I(p), $\beta^+\gamma$-, β^+p- and γβ^+p-coin, half-life and β^+-delayed proton emission probability of ^{89}Ru decay.

^{89}Ru was found to decay by β^+p decay mode to ^{88}Mo through the observation of 741-keV γ ray, a transition between the first 2$^+$ state and the g.s. of ^{88}Mo.

^{89}Tc Levels

E(level)[†]	J^π[‡]
0.0	(9/2$^+$)
179.2 *1*	(7/2$^+$)
401.6 *4*	(5/2$^+$)
1014.6 *4*	(7/2$^+$)
1518.2 *5*	(5/2$^+$)

[†] From Eγ values.

[‡] From the Adopted Levels, where J^π assignments for 401.6, 1014.6, and 1518.2 levels are from 2019Pa16.

γ(^{89}Tc)

Iγ normalization: 2019Pa16 report absolute intensities.

E_γ	I_γ[†‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[#]	$I_{(\gamma+ce)}$[‡]	Comments
179.2 *1*	61.2 *38*	179.2	(7/2$^+$)	0.0	(9/2$^+$)	[M1]	0.0567	64.7 *40*	α(K)=0.0496 *7*; α(L)=0.00585 *9*; α(M)=0.001063 *15*; α(N)=0.0001689 *24* α(O)=1.119×10^{-5} *16* $I_{(\gamma+ce)}$: per 100 decays from 2019Pa16. I_γ: from I(γ+ce) and α for assumed mult(179.2γ)=M1. Relative Iγ=100 *25*.
401.6 *4*	13.4 *24*	401.6	(5/2$^+$)	0.0	(9/2$^+$)				Iγ=20.7 *39* relative to 100 for 179.2γ.
[x]604.6 *5*	4.7 *16*								Iγ=7.3 *25* relative to 100 for 179.2γ.
[x]686.6 *4*	3.9 *22*								Iγ=6.0 *34* relative to 100 for 179.2γ.
835.4 *4*	2.9 *21*	1014.6	(7/2$^+$)	179.2	(7/2$^+$)				Iγ=4.5 *33* relative to 100 for 179.2γ.
[x]1140.0 *5*	3.4 *20*								Iγ=5.3 *31* relative to 100 for 179.2γ.
1339.0 *5*	8.6 *19*	1518.2	(5/2$^+$)	179.2	(7/2$^+$)				Iγ=13.3 *30* relative to 100 for 179.2γ.

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$\gamma(^{89}Tc)$ (continued)

† Absolute (per 100 decays of ^{89}Ru) γ-intensities given by 2019Pa16. Authors also reported relative intensities which are listed here in comments.
‡ Absolute intensity per 100 decays.
# 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: $I_{(\gamma+ce)}$ per 100 parent decays