^{139}Nd ε decay (29.7 min) 1975Vy02,1971Bu22,1969Be64

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	P. K. Joshi, B. Singh, S. Singh, A. K. Jain	NDS 138, 1 (2016)	15-Oct-2016

Parent: ^{139}Nd: E=0.0; $J^\pi=3/2^+$; $T_{1/2}$=29.7 min *5*; Q(ε)=2806 *28*; %ε+%$β^+$ decay=100.0
^{139}Nd-J^π,$T_{1/2}$: From ^{139}Nd Adopted Levels.
^{139}Nd-Q(ε): From 2012Wa38.
1969Be64 measured γ′s, prompt and delayed γγ-coincidences (Ge(Li),NaI), and γ(t) (NaI).
1971Bu22 measured γ′s and ce′s and $β^+$′s; chem.
1975Vy02 measured γ′s and $β^+$′s (mag spect; Si(Li)); chem.
All data and decay scheme are from 1971Bu22, except as noted. Other: 1988IsZX.

^{139}Pr Levels

E(level)	J^π †	Comments
0.0	$5/2^+$	
113.86 *5*	$7/2^+$	g=0.34 *6* (1983AkZY) g: from γγ(θ,H,t) with $T_{1/2}$=2.6 ns.
405.04 *9*	$3/2^+$	
588.82 *15*	$5/2^+$	
916.90 *23*	$(1/2^+,3/2^+,5/2^+)$	
1074.03 *22*	$(1/2^+,3/2,5/2)$	
1311.8 *4*	$(1/2^+,3/2,5/2)$	
1328.40 *22*	$(3/2^+,5/2)$	
1405.5 *5*	$(1/2^+,3/2,5/2)$	
1449.0 *10*	$(1/2^+,3/2,5/2)$	
1501.2 *4*	$(1/2^+,3/2,5/2)$	
1532.0 *10*	$(1/2^+,3/2,5/2)$	

† From the Adopted Levels.

ε,$β^+$ radiations

E(decay)	E(level)	Iβ+ ‡	Iε‡	Log *ft*	I(ε+β+)†‡	Comments
(1.27×10³ *3*)	1532.0		0.13 *6*	7.1 *2*	0.13 *6*	εK=0.84291 *9*; εL=0.12208 *15*; εM+=0.03475 *5*
(1.30×10³ *3*)	1501.2		0.63 *14*	6.4 *1*	0.63 *14*	εK=0.8429; εL=0.12192 *15*; εM+=0.03470 *5*
(1.36×10³ *3*)	1449.0		0.15 *6*	7.1 *2*	0.15 *6*	εK=0.8428 *2*; εL=0.12165 *16*; εM+=0.03461 *5*
(1.40×10³ *3*)	1405.5	0.0009 *4*	0.61 *13*	6.5 *1*	0.61 *13*	av Eβ=182 *13*; εK=0.8426 *3*; εL=0.12141 *17*; εM+=0.03453 *6*
(1.48×10³ *3*)	1328.40	0.0066 *22*	2.1 *4*	6.0 *1*	2.1 *4*	av Eβ=216 *13*; εK=0.8415 *6*; εL=0.12093 *20*; εM+=0.03438 *6*
(1.49×10³ *3*)	1311.8	0.0011 *4*	0.30 *9*	6.9 *2*	0.30 *9*	av Eβ=223 *13*; εK=0.8412 *7*; εL=0.12081 *21*; εM+=0.03435 *7*
(1.73×10³ *3*)	1074.03	0.077 *18*	4.4 *8*	5.8 *1*	4.5 *8*	av Eβ=327 *13*; εK=0.8307 *21*; εL=0.1185 *4*; εM+=0.03366 *11*
(1.89×10³ *3*)	916.90	0.049 *12*	1.4 *3*	6.4 *1*	1.4 *3*	av Eβ=396 *13*; εK=0.816 *4*; εL=0.1161 *6*; εM+=0.03295 *16*
(2.22×10³ *3*)	588.82	0.26 *5*	2.3 *5*	6.3 *1*	2.6 *5*	av Eβ=540 *13*; εK=0.763 *6*; εL=0.1079 *9*; εM+=0.0306 *3*
(2.40×10³ *3*)	405.04	0.43 *8*	2.5 *4*	6.4 *1*	2.9 *5*	av Eβ=622 *13*; εK=0.720 *8*; εL=0.1016 *11*; εM+=0.0288 *3*
(2.81×10³ *3*)	0.0	24 *1*	61 *2*	5.13 *2*	85 *2*	av Eβ=803 *13*; εK=0.604 *9*; εL=0.0848 *13*; εM+=0.0240 *4* E(decay): 2792 *50* from measured E$β^+$ (1975Vy02).

Continued on next page (footnotes at end of table)

^{139}Nd ε decay (29.7 min) 1975Vy02,1971Bu22,1969Be64 (continued)

ε,β+ radiations (continued)

E(decay)	E(level)	Comments
		I(ε+β+): 100-summed ε+β+ feeding to the excited states. See also comment for Iγ normalization. Other: I(β+)=16.6% *28* from Iβ+=2.38% *40* of the 5.5-h decay and IT branching ratio of 14.3% *14* (1971Bu22,1975Vy02). Value of ε/β+(for g.s.)=2.51 *20* (theory), 2.5 (1969Be64), and 2.3 *2* (1971Bu22).

† From γ-transition intensity balances for excited states.
‡ Absolute intensity per 100 decays.

^{139}Nd ε decay (29.7 min) 1975Vy02,1971Bu22,1969Be64 (continued)

γ(^{139}Pr)

Iγ normalization, I(γ+ce) normalization: from I($\gamma^{\pm}$)=260 *40* relative to Iγ(405γ)=36.4, decay scheme, and theoretical ε/β^+ ratios for ε,β^+ transition to the ground state.
Coincidences shown on drawing are from 1969Be64. See 1969Be64 for possible coincidences.
α(K)exp: normalized to α(K)(231γ ^{139}Nd; M4)=9.5.
See 5.5-h ε decay for other gammas with $T_{1/2}$=29.7 min or 5.5 h observed but not assigned by 1975Vy02.

E_γ	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	δ	α[#]	$I_{(\gamma+ce)}$[‡]	Comments
113.87 *5*	4.6 *CA*	113.86	7/2$^+$	0.0	5/2$^+$	M1+E2	0.16 *10*	0.906 *22*	8.7 *8*	ce(K)/(γ+ce)=0.402 *4*; ce(L)/(γ+ce)=0.0554 *9*; ce(M)/(γ+ce)=0.01168 *18*; ce(N+)/(γ+ce)=0.00306 *5* ce(N)/(γ+ce)=0.00261 *4*; ce(O)/(γ+ce)=0.000420 *7*; ce(P)/(γ+ce)=3.09×10^{-5} *5* E_γ: from 5.5-h ε decay. I_γ: other: 3.7 *3* from I(γ+ce) and α. $I_{(\gamma+ce)}$: from intensity balancing. Level not expected to be fed directly in ε decay (ΔJ^π=2,no).
183.5 *2*	4.0 *4*	588.82	5/2$^+$	405.04	3/2$^+$	M1		0.245 *10*		α(K)=0.194 *8*; α(L)=0.040 *13*; α(M)=0.009 *3* α(N)=0.0019 *7*; α(O)=0.00029 *8*; α(P)=1.32×10^{-5} *22* α(K)exp=0.45 *18*
[x]220.9 *3*	0.4 *1*									
[x]368.0 *3*	0.7 *2*									
405.0 *1*	36.4	405.04	3/2$^+$	0.0	5/2$^+$	M1		0.0288		α(K)exp=0.025 *7* α(K)=0.0246 *4*; α(L)=0.00328 *5*; α(M)=0.000689 *10* α(N)=0.0001542 *22*; α(O)=2.49×10^{-5} *4*; α(P)=1.86×10^{-6} *3*
411.5 *2*	0.8 *2*	1328.40	(3/2$^+$,5/2)	916.90	(1/2$^+$,3/2$^+$,5/2$^+$)					
475.5 *3*	6.9 *6*	588.82	5/2$^+$	113.86	7/2$^+$	M1		0.0191		α(K)=0.01639 *23*; α(L)=0.00217 *3*; α(M)=0.000456 *7* α(N)=0.0001020 *15*; α(O)=1.648×10^{-5} *24*; α(P)=1.236×10^{-6} *18*
485.0 *4*	2.4 *4*	1074.03	(1/2$^+$,3/2,5/2)	588.82	5/2$^+$					
588.8 *3*	4.2 *6*	588.82	5/2$^+$	0.0	5/2$^+$					
[x]621.7 *3*	6.4 *7*									
669.0 *3*	8.0 *10*	1074.03	(1/2$^+$,3/2,5/2)	405.04	3/2$^+$					

$^{139}_{59}Pr_{80}$-3

^{139}Nd ε decay (29.7 min) 1975Vy02,1971Bu22,1969Be64 (continued)

γ(^{139}Pr) (continued)

E_γ	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π	Comments
x696.2@ 3	2.0 4					
916.9 3	8.0 8	916.90	(1/2+,3/2+,5/2+)	0.0	5/2+	α(K)exp≈0.0047
923.4 3	7.0 7	1328.40	(3/2+,5/2)	405.04	3/2+	α(K)exp≈0.0054
1074.2 4	13.3 14	1074.03	(1/2+,3/2,5/2)	0.0	5/2+	
1096.5 4	2.0 4	1501.2	(1/2+,3/2,5/2)	405.04	3/2+	
1213.4 8	1.7 5	1328.40	(3/2+,5/2)	113.86	7/2+	
x1221.2 8	1.5 5					
x1233.3@ 8	0.7 3					
x1246.7 8	1.0 4					
1311.8 4	1.6 4	1311.8	(1/2+,3/2,5/2)	0.0	5/2+	
1328.8 6	1.5 4	1328.40	(3/2+,5/2)	0.0	5/2+	
1405.5 5	3.2 5	1405.5	(1/2+,3/2,5/2)	0.0	5/2+	
1449 1	0.8 3	1449.0	(1/2+,3/2,5/2)	0.0	5/2+	
x1463.4 6	1.7 4					
1500.5 6	1.3 4	1501.2	(1/2+,3/2,5/2)	0.0	5/2+	
1532 1	0.7 3	1532.0	(1/2+,3/2,5/2)	0.0	5/2+	

† From Adopted Gammas, mainly based on α(K)exp in the present dataset, except as noted. The α(K)exp: normalized to α(K)(231γ ^{139}Nd; M4)=9.4.

‡ For absolute intensity per 100 decays, multiply by 0.190 *27*.

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.

@ Placement of transition in the level scheme is uncertain.

x γ ray not placed in level scheme.

$^{139}_{59}Pr_{80}$-4

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Decay Scheme

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