## $^{69}$Ge ε decay 1969Zo01,1976Ho09

| Type | Author | History Citation | Literature Cutoff Date |
|---|---|---|---|
| Full Evaluation | C. D. Nesaraja | NDS 115, 1 (2014) | 31-Jul-2013 |

Parent: $^{69}$Ge: E=0; $J^\pi=5/2^-$; $T_{1/2}$=39.05 h *10*; Q(ε)=2227.1 *5*; %ε+%$β^+$ decay=100.0

1969Zo01: measured Eγ, Iγ, γγ coincidences, and $^{69}$Ge $T_{1/2}$, Ge(Li) and NaI detectors.

1976Ho09: Eγ, Iγ and γγ(θ) for θ(γ)=90°−180°, Ge(Li) and NaI detectors.

1951Hu38: Eγ, Iγ, Eβ+, I$β^+$, β+γ coincidences and $^{69}$Ge $T_{1/2}$, γ-ray measurements from photoelectrons of Pb and U radiators, magnetic spectrograph.

1963Sc27: Eγ, Iγ, Eβ+, I$β^+$ and γγ and β+γ coincidences, scintillation detectors.

1969Kh10: level lifetimes by β+γ and γγ delayed coincidences, γγ(θ) for θ(γ)=90°−270°, scintillators.

1970Dz05: internal conversion spectra, α(exp) measured from Ice and Ice/Iγ(872), β spectrometer.

1975Pa22: γγ(θ) for θ(γ)=92°−246°, Ge(Li) and NaI detectors.

Data are mainly taken from 1969Zo01 and 1976Ho09, also from 1951Hu38, 1963Sc27, 1969Kh10, 1970Dz05 and 1975Pa22.

1992Be57: measured K-capture probabilities for β transitions to 574, 872, and 1106-keV levels.

### $^{69}$Ga Levels

| E(level)[†] | $J^\pi$[‡] | $T_{1/2}$[#] | Comments |
|---|---|---|---|
| 0.0 | $3/2^-$ | | |
| 318.64 *7* | $1/2^-$ | ≤0.15 ns | $J^\pi$: 1/2 from γγ(θ) (1976Ho09); 1/2, 3/2 from γγ(θ) (1969Kh10). |
| 574.12 *6* | $5/2^-$ | ≤0.15 ns | $J^\pi$: 3/2 from γγ(θ) (1969Kh10).<br>K-capture probability for β transition =0.880 *31* (1992Be57). |
| 872.00 *6* | $3/2^-$ | ≤0.15 ns | $J^\pi$: 3/2 from γγ(θ) (1976Ho09).<br>K-capture probability for β transition =0.878 *30* (1992Be57). |
| 1106.78 *6* | $5/2^-$ | | $J^\pi$: 3/2 or 5/2 from γγ(θ); 5/2 preferred from transition rate of 235γ (1975Pa22). 3/2 from γγ(θ) (1976Ho09).<br>K-capture probability for β transition =0.876 *27* (1992Be57). |
| 1336.61 *8* | $7/2^-$ | | $J^\pi$: 3/2 or 7/2 from γγ(θ) (1975Pa22). |
| 1487.96 *10* | $7/2^-$ | | $J^\pi$: 3/2 or 7/2 from γγ(θ) (1975Pa22). |
| 1525.86 *6* | $3/2^-$ | | |
| 1723.35 *22* | $5/2^-$ | | |
| 1891.51 *8* | $3/2^-$ | | $J^\pi$: 3/2, 5/2 from γγ(θ) (1969Kh10). |
| 1924.02 *8* | $7/2^-$ | | $J^\pi$: 5/2,7/2 from γγ(θ) (1975Pa22), 7/2 preferred; 7/2 from γγ(θ) (1969Kh10); 5/2 from γγ(θ) (1976Ho09). |
| 2023.68 *10* | $5/2^-$ | | |
| 2044.9 *4* | $5/2^-$ | | |

[†] From least squares fit to Eγ data.
[‡] From Adopted Levels.
[#] By β+γ and γγ delayed coincidences (1969Kh10).

### ε,$β^+$ radiations

| E(decay)[†] | E(level) | Iε[‡@] | Log *ft* | I(ε+$β^+$)[#@] | Comments |
|---|---|---|---|---|---|
| (182.2 *7*) | 2044.9 | 0.047 *8* | 6.61 *8* | 0.047 *8* | εK=0.8734; εL=0.10697 *4*; εM+=0.019637 *8* |
| (203.4 *5*) | 2023.68 | 0.63 *8* | 5.58 *6* | 0.63 *8* | εK=0.8746; εL=0.10595 *3*; εM+=0.019424 *5* |
| (303.1 *5*) | 1924.02 | 1.26 *16* | 5.64 *6* | 1.26 *16* | εK=0.8780; εL=0.1031; εM+=0.018838 *2* |
| (335.6 *5*) | 1891.51 | 0.71 *9* | 5.98 *6* | 0.71 *9* | εK=0.8787; εL=0.1026; εM+=0.01873 |
| (503.8 *6*) | 1723.35 | 0.079 *11* | 7.30 *6* | 0.079 *11* | εK=0.8807; εL=0.1009; εM+=0.01838 |
| (701.2 *5*) | 1525.86 | 0.77 *10* | 6.60 *6* | 0.77 *10* | εK=0.8818; εL=0.1000; εM+=0.01819 |
| (739.1 *5*) | 1487.96 | 0.18 *3* | 7.28 *8* | 0.18 *3* | εK=0.8819; εL=0.09990; εM+=0.01817 |
| (890.5 *5*) | 1336.61 | 4.4 *7* | 6.05 *7* | 4.4 *7* | εK=0.8824; εL=0.09953; εM+=0.01809 |

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## $^{69}$Ge ε decay 1969Zo01,1976Ho09 (continued)

### ε,β+ radiations (continued)

| E(decay)† | E(level) | Iβ+ @ | Iε‡@ | Log *ft* | I(ε+β+)#@ | Comments |
|---|---|---|---|---|---|---|
| (1120.3 *5*) | 1106.78 | 0.0055 *6* | 37 *4* | 5.33 *5* | 37 *4* | av Eβ=46.64 *22*; εK=0.8827; εL=0.09914; εM+=0.01801 |
| (1355.1 *5*) | 872.00 | 0.26 *4* | 11.5 *16* | 6.00 *6* | 11.8 *16* | av Eβ=145.69 *21*; εK=0.8634 *2*; εL=0.09670 *2*; εM+=0.017560 *3* |
| (1653.0 *5*) | 574.12 | 2.3 *3* | 10.0 *15* | 6.24 *7* | 12.3 *18* | av Eβ=271.45 *22*; εK=0.7155 *4*; εL=0.07995 *5*; εM+=0.014513 *8* |
| (2227.1 *5*) | 0.0 | 21 *5* | 10 *3* | 6.49 *12* | 31 *8* | av Eβ=522.10 *23*; εK=0.2893 *3*; εL=0.03223 *3*; εM+=0.005849 *6* |
| | | | | | | I(γ+ce): from measured Iβ ratios (1951Hu38), I(γ+ce) for 574 level and calculated β+/ε ratios. |

† From β+ end point energies (1951Hu38,1963Sc27). ε decay placement by 1963Sc27.
‡ From I(γ+ce) and theoretical β+/ε ratios.
# From intensity balance at each level. ε+β+ feeding to the g.s. calculated using the ratio Iβ+(g.s.)/Iβ+(574 level) of 1951Hu38 and theoretical ε/β+ ratios. Uncertainty on Iβ+(g.s.)/Iβ+(574) ratio not given by 1951Hu38 and estimated as≈10% by the evaluator.
@ Absolute intensity per 100 decays.

### γ($^{69}$Ga)

Iγ normalization: from Iβ+(g.s.)/Iβ+(574)=8.8 (1951Hu38) and theoretical ε/β+ ratios; uncertainty of experimental ratio not given by 1951Hu38 and estimated as≈10% by the evaluator. This ratio remeasured by 1963Sc27 who obtained essentially identical result.
γγ coincidences are taken from 1969Zo01.
α(exp): : α(exp) are calculated by the evaluator using I(ce) data of 1970Dz05 and the adopted I(γ) in this dataset. I(ce) and I(γ) scales are normalized to α(exp)(662γ in $^{137}$Cs decay)= 0.0915 *13*.

| Eγ‡ | Iγ‡a | Ei(level) | $J_i^\pi$ | Ef | $J_f^\pi$ | Mult.# | δ@ | α† | Comments |
|---|---|---|---|---|---|---|---|---|---|
| x200.0 *10* | 0.07 *1* | | | | | | | | Eγ: Placed by 1969Zo01 from the 1723 level; however, it is a poor fit to level energy differences and the transition is not seen in other reactions. |
| 234.79 *10* | 1.02 *8* | 1106.78 | 5/2− | 872.00 | 3/2− | M1+E2 | −0.12 *6* | 0.0079 *4* | α=0.0079 *4*; α(K)=0.0070 *4*; α(L)=0.00073 *4*; α(M)=0.000107 *6*; α(N+..)=5.7×10−6 *3* α(N)=5.7×10−6 *3* δ: From γγ(θ) (1975Pa22) with δ(872γ) taken as −0.11. |
| 255.4 *5* | 0.07 *2* | 574.12 | 5/2− | 318.64 | 1/2− | | | | |
| 298.3 *5* | 0.07 *2* | 872.00 | 3/2− | 574.12 | 5/2− | | | | |
| 318.63 *20* | 4.3 *3* | 318.64 | 1/2− | 0.0 | 3/2− | M1+E2 | 0.53 *10* | 0.0049 *4* | α=0.0049 *4*; α(K)=0.0044 *4*; α(L)=0.00046 *4*; α(M)=6.7×10−5 *6*; α(N+..)=3.5×10−6 *3* α(N)=3.5×10−6 *3* α(exp): 4.9×10−3 *5* (1970Dz05) E. δ: from α(exp) (1970Dz05). |
| 380.9 *10* | 0.07 *4* | 1487.96 | 7/2− | 1106.78 | 5/2− | (M1(+E2)) | −0.03 *3* | 0.00234 *4* | α=0.00234 *4*; α(K)=0.00209 *4*; α(L)=0.000214 *4*; |

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## $^{69}$Ge ε decay 1969Zo01,1976Ho09 (continued)

### γ($^{69}$Ga) (continued)

| $E_\gamma$[‡] | $I_\gamma$[‡a] | $E_i$(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ | Mult.[#] | δ[@] | α[†] | Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | α(M)=3.13×10$^{-5}$ *5*; α(N+..)=1.69×10$^{-6}$ *3* |
| | | | | | | | | | α(N)=1.69×10$^{-6}$ *3* |
| 419.07 *10* | 0.20 *2* | 1525.86 | 3/2$^-$ | 1106.78 | 5/2$^-$ | (M1(+E2)) | +0.05 *7* | 0.00187 *4* | α=0.00187 *4*; α(K)=0.00167 *3*; α(L)=0.000171 *4*; α(M)=2.50×10$^{-5}$ *5*; α(N+..)=1.352×10$^{-6}$ *25* |
| | | | | | | | | | α(N)=1.352×10$^{-6}$ *25* |
| 532.66 *10* | 0.75 *6* | 1106.78 | 5/2$^-$ | 574.12 | 5/2$^-$ | (M1+E2) | | 0.0014 *4* | α=0.0014 *4*; α(K)=0.0013 *4*; α(L)=0.00013 *4*; α(M)=1.9×10$^{-5}$ *5*; α(N+..)=1.02×10$^{-6}$ *25* |
| | | | | | | | | | α(N)=1.02×10$^{-6}$ *25* |
| | | | | | | | | | δ: −1.65 *20* or 0.00 *5* from analysis of γγ(θ) (1975Pa22) with δ(574γ) taken as −0.04. |
| 553.35 *10* | 1.91 *14* | 872.00 | 3/2$^-$ | 318.64 | 1/2$^-$ | (M1(+E2)) | +0.00 *3* | 0.000990 *14* | α=0.000990 *14*; α(K)=0.000886 *13*; α(L)=9.00×10$^{-5}$ *13*; α(M)=1.317×10$^{-5}$ *19*; α(N+..)=7.13×10$^{-7}$ |
| | | | | | | | | | α(N)=7.13×10$^{-7}$ *10* |
| 574.11 *10* | 37 *3* | 574.12 | 5/2$^-$ | 0.0 | 3/2$^-$ | M1+E2 | −0.06 *1* | 0.000914 *13* | α=0.000914 *13*; α(K)=0.000818 *12*; α(L)=8.31×10$^{-5}$ *12*; α(M)=1.215×10$^{-5}$ *17*; α(N+..)=6.58×10$^{-7}$ |
| | | | | | | | | | α(N)=6.58×10$^{-7}$ *10* |
| | | | | | | | | | α(N)=7.5×10$^{-7}$ *9* |
| | | | | | | | | | α(exp): 10.6×10$^{-4}$ *11* (1970Dz05). |
| | | | | | | | | | δ: 0.6 +4-3 from α(exp) (1970Dz05). |
| 587.40 *20* | 0.90 *2* | 1924.02 | 7/2$^-$ | 1336.61 | 7/2$^-$ | (M1(+E2)) | +0.00 *7* | 0.000866 *13* | α=0.000866 *13*; α(K)=0.000776 *11*; α(L)=7.87×10$^{-5}$ *12*; α(M)=1.152×10$^{-5}$ *17*; α(N+..)=6.24×10$^{-7}$ |
| | | | | | | | | | α(N)=6.24×10$^{-7}$ *9* |
| | | | | | | | | | δ: −0.025 *75* or −1.0 *+1-2* from γγ(θ) (1975Pa22). |
| 762.49 *10* | 0.64 *6* | 1336.61 | 7/2$^-$ | 574.12 | 5/2$^-$ | M1+E2 | −2.2 *2* | 0.000614 *10* | α=0.000614 *10*; α(K)=0.000549 *9*; α(L)=5.60×10$^{-5}$ *9*; α(M)=8.18×10$^{-6}$ *13*; α(N+..)=4.38×10$^{-7}$ *7* |
| | | | | | | | | | α(N)=4.38×10$^{-7}$ *7* |
| | | | | | | | | | δ: −0.68 *+9-10* or −2.0 *+3-6* from γγ(θ)(1975Pa22) with δ(574γ) taken as −0.04. |
| 788.14 *10* | 0.95 *8* | 1106.78 | 5/2$^-$ | 318.64 | 1/2$^-$ | | | | |
| 816.9 *10* | 0.10 *1* | 1924.02 | 7/2$^-$ | 1106.78 | 5/2$^-$ | | | | |
| 871.98 *10* | 33.0 *25* | 872.00 | 3/2$^-$ | 0.0 | 3/2$^-$ | M1+E2 | −0.13 *4* | 0.000371 *6* | α=0.000371 *6*; α(K)=0.000333 |

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## $^{69}$Ge ε decay 1969Zo01,1976Ho09 (continued)

### γ($^{69}$Ga) (continued)

| $E_\gamma$[‡] | $I_\gamma$[‡a] | $E_i$(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ | Mult.[#] | δ[@] | α[†] | Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 5; α(L)=3.36×10$^{-5}$ 5; α(M)=4.91×10$^{-6}$ 7; α(N+..)=2.66×10$^{-7}$ 4 |
| | | | | | | | | | α(N)=2.66×10$^{-7}$ 4 |
| | | | | | | | | | α(N)=2.73×10$^{-7}$ 9 |
| | | | | | | | | | α(exp): 3.9×10$^{-4}$ 4 (1970Dz05). |
| | | | | | | | | | δ: <1.2 from α(exp) (1970Dz05). |
| 912.7 9 | 0.17 4 | 1487.96 | 7/2$^-$ | 574.12 | 5/2$^-$ | M1+E2 | −2.54 10 | 0.000394 6 | α=0.000394 6; α(K)=0.000353 5; α(L)=3.58×10$^{-5}$ 6; α(M)=5.23×10$^{-6}$ 8; α(N+..)=2.81×10$^{-7}$ 4 |
| | | | | | | | | | α(N)=2.81×10$^{-7}$ 4 |
| | | | | | | | | | δ: −0.75 25 or −1.8 +8-12 (1975Pa22) with δ(574γ) taken as −0.04. |
| 951.73 10 | 0.11 4 | 1525.86 | 3/2$^-$ | 574.12 | 5/2$^-$ | (M1(+E2)) | +0.3 3 | 0.000313 11 | α=0.000313 11; α(K)=0.000280 10; α(L)=2.83×10$^{-5}$ 11; α(M)=4.14×10$^{-6}$ 15; α(N+..)=2.24×10$^{-7}$ 8 |
| | | | | | | | | | α(N)=2.24×10$^{-7}$ 8 |
| 1052.02 10 | 1.19 9 | 1924.02 | 7/2$^-$ | 872.00 | 3/2$^-$ | (E2) | | 0.000287 4 | α=0.000287 4; α(K)=0.000257 4; α(L)=2.60×10$^{-5}$ 4; α(M)=3.80×10$^{-6}$ 6; α(N+..)=2.04×10$^{-7}$ 3 |
| | | | | | | | | | α(N)=2.04×10$^{-7}$ 3 |
| 1106.77 10 | 100 | 1106.78 | 5/2$^-$ | 0.0 | 3/2$^-$ | M1+E2 | +0.32 2 | 0.000230 4 | α=0.000230 4; α(K)=0.000206 3; α(L)=2.07×10$^{-5}$ 3; α(M)=3.03×10$^{-6}$ 5; α(N+..)=8.84×10$^{-7}$ 13 |
| | | | | | | | | | α(N)=1.645×10$^{-7}$ 24; α(IPF)=7.19×10$^{-7}$ 11 |
| | | | | | | | | | α(exp): 2.5×10$^{-4}$ 1 (1970Dz05). |
| 1151.67 10 | 0.12 2 | 2023.68 | 5/2$^-$ | 872.00 | 3/2$^-$ | | | | $E_\gamma$: From 1976Ho09 with uncertainty assigned by the evaluator. Shown in authors spectrum and decay scheme but not in their Table. $I_\gamma$: From 1967Zo01. |
| 1207.21 10 | 1.09 8 | 1525.86 | 3/2$^-$ | 318.64 | 1/2$^-$ | (M1(+E2)) | +0.14 2 | 0.000199 3 | α=0.000199 3; α(K)=0.0001715 24; α(L)=1.724×10$^{-5}$ 25; α(M)=2.52×10$^{-6}$ 4; α(N+..)=7.23×10$^{-6}$ 1 |
| | | | | | | | | | α(N)=1.371×10$^{-7}$ 20; α(IPF)=7.09×10$^{-6}$ 11 |
| | | | | | | | | | α(exp): 1.8×10$^{-4}$ 5 (1970Dz05). |
| | | | | | | | | | $E_\gamma$: given as 120.6 by 1970Dz05; a typographical error. |

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## $^{69}$Ge ε decay 1969Zo01,1976Ho09 (continued)

### γ($^{69}$Ga) (continued)

| $E_\gamma$ ‡ | $I_\gamma$ ‡ a | $E_i$(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ | Mult. # | δ @ | α † | Comments |
|---|---|---|---|---|---|---|---|---|---|
| 1317.1 *10* | 0.008 *4* | 1891.51 | 3/2− | 574.12 | 5/2− | | | | |
| 1336.60 *10* | 12.5 *10* | 1336.61 | 7/2− | 0.0 | 3/2− | E2(+M3) | +0.00 *2* | 0.000205 *3* | α=0.000205 *3*; α(K)=0.0001511 *22*; α(L)=1.523×10$^{-5}$ *22*; α(M)=2.23×10$^{-6}$ *4*; α(N+..)=3.69×10$^{-5}$ *6* α(N)=1.203×10$^{-7}$ *17*; α(IPF)=3.68×10$^{-5}$ *6* α(exp): 1.4×10$^{-4}$ *3* (1970Dz05). |
| 1349.89 *10* | 0.90 *12* | 1924.02 | 7/2− | 574.12 | 5/2− | (M1+E2) | −2.6 *4* | 0.000203 *3* | α=0.000203 *3*; α(K)=0.0001466 *21*; α(L)=1.477×10$^{-5}$ *22*; α(M)=2.16×10$^{-6}$ *3*; α(N+..)=3.89×10$^{-5}$ *7* α(N)=1.168×10$^{-7}$ *17*; α(IPF)=3.88×10$^{-5}$ *7* δ: −0.30 *4* or −6.5 +*14*-21 from γγ(θ) (1975Pa22) with δ(574γ) taken as −0.04. |
| 1404.70 *30* | 0.05 *1* | 1723.35 | 5/2− | 318.64 | 1/2− | E2(+M3) | −0.05 *7* | 0.000207 *5* | α=0.000207 *5*; α(K)=0.000137 *5*; α(L)=1.38×10$^{-5}$ *5*; α(M)=2.02×10$^{-6}$ *7*; α(N+..)=5.47×10$^{-5}$ *10* α(N)=1.09×10$^{-7}$ *4*; α(IPF)=5.45×10$^{-5}$ *10* |
| 1449.54 *30* | 0.13 *1* | 2023.68 | 5/2− | 574.12 | 5/2− | | | | |
| 1470.3 *10* | 0.03 *1* | 2044.9 | 5/2− | 574.12 | 5/2− | M1+E2 | +0.17 *14* | 0.000189 *3* | α=0.000189 *3*; α(K)=0.0001171 *17*; α(L)=1.174×10$^{-5}$ *18*; α(M)=1.72×10$^{-6}$ *3*; α(N+..)=5.88×10$^{-5}$ *1* α(N)=9.34×10$^{-8}$ *14*; α(IPF)=5.87×10$^{-5}$ *14* |
| 1487.96 *10* | 0.27 *2* | 1487.96 | 7/2− | 0.0 | 3/2− | E2(+M3) | +0.00 *3* | 0.000217 *3* | α=0.000217 *3*; α(K)=0.0001210 *18*; α(L)=1.218×10$^{-5}$ *18*; α(M)=1.78×10$^{-6}$ *3*; α(N+..)=8.19×10$^{-5}$ *1* α(N)=9.63×10$^{-8}$ *14*; α(IPF)=8.18×10$^{-5}$ *12* |
| 1525.84 *10* | 0.74 *6* | 1525.86 | 3/2− | 0.0 | 3/2− | (M1+E2) | −0.38 *7* | 0.000200 *3* | α=0.000200 *3*; α(K)=0.0001097 *16*; α(L)=1.101×10$^{-5}$ *16*; α(M)=1.609×10$^{-6}$ *23* α(N)=8.75×10$^{-8}$ *13*; α(IPF)=7.76×10$^{-5}$ *14* |
| 1572.85 *10* | 0.64 *5* | 1891.51 | 3/2− | 318.64 | 1/2− | (M1(+E2)) | −0.09 *9* | 0.000206 *3* | α=0.000206 *3*; α(K)=0.0001030 *15*; α(L)=1.032×10$^{-5}$ *15*; α(M)=1.509×10$^{-6}$ *22* α(N)=8.22×10$^{-8}$ *12*; α(IPF)=9.07×10$^{-5}$ *14* |
| x1615.1 *10* | 0.03 *1* | | | | | | | | |

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## $^{69}$Ge ε decay 1969Zo01,1976Ho09 (continued)

### γ($^{69}$Ga) (continued)

| $E_\gamma$ ‡ | $I_\gamma$ ‡ a | $E_i$(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ | Mult. # | δ @ | α † | Comments |
|---|---|---|---|---|---|---|---|---|---|
| 1723.33 *30* | 0.17 & *1* | 1723.35 | 5/2− | 0.0 | 3/2− | M1+E2 | −0.75 *15* | 0.000256 *6* | α=0.000256 *6*; α(K)=8.82×10$^{-5}$ *13*; α(L)=8.84×10$^{-6}$ *13*; α(M)=1.292×10$^{-6}$ *19*; α(N+..)=0.000158 *4* α(N)=7.03×10$^{-8}$ *11*; α(IPF)=0.000158 *4* |
| 1891.48 *10* | 1.33 *10* | 1891.51 | 3/2− | 0.0 | 3/2− | M1+E2 | −0.15 *6* | 0.000295 *5* | α=0.000295 *5*; α(K)=7.34×10$^{-5}$ *11*; α(L)=7.34×10$^{-6}$ *11*; α(M)=1.073×10$^{-6}$ *15*; α(N+..)=0.000213 *4* α(N)=5.85×10$^{-8}$ *9*; α(IPF)=0.000213 *4* |
| 1924.00 *20* | 0.42 *3* | 1924.02 | 7/2− | 0.0 | 3/2− | | | | |
| 2023.65 *20* | 1.50 *11* | 2023.68 | 5/2− | 0.0 | 3/2− | M1+E2 | +0.16 *3* | 0.000343 *5* | α=0.000343 *5*; α(K)=6.50×10$^{-5}$ *10*; α(L)=6.50×10$^{-6}$ *10*; α(M)=9.50×10$^{-7}$ *14*; α(N+..)=0.000271 *4* α(N)=5.18×10$^{-8}$ *8*; α(IPF)=0.000271 *4* |
| 2044.9 *4* | 0.10 *1* | 2044.9 | 5/2− | 0.0 | 3/2− | M1+E2 | +0.26 *12* | 0.000353 *6* | α=0.000353 *6*; α(K)=6.39×10$^{-5}$ *9*; α(L)=6.39×10$^{-6}$ *9*; α(M)=9.34×10$^{-7}$ *14*; α(N+..)=0.000282 *6* α(N)=5.09×10$^{-8}$ *8*; α(IPF)=0.000282 *6* |

† Additional information 1.
‡ Energies quoted to two decimal digits, and the corresponding Iγ values are from 1976Ho09. Other Eγ and Iγ are from 1969Zo01.
# From adopted gammas.
@ From adopted gammas, unless stated otherwise.
& On the basis of γγ, 1969Zo01 suggest placing part of Iγ (1723γ) with the 2044 level; however, a comparison with Iγ (1723γ)/ Iγ(1404γ) from (p,γ) and (n,n′γ) suggests that all the intensity belongs to the 1723 level.
a For absolute intensity per 100 decays, multiply by 0.36 *4*.
x γ ray not placed in level scheme.

## $^{69}$Ge ε decay 1969Zo01,1976Ho09

### Decay Scheme

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