## $^{86}$Zr ε decay (16.5 h) 1977LaZN,1966Hy01

History

| Type | Author | Citation | Literature Cutoff Date |
|---|---|---|---|
| Full Evaluation | Alexandru Negret, Balraj Singh | NDS 124, 1 (2015) | 30-Nov-2014 |

Parent: $^{86}$Zr: E=0.0; $J^\pi=0^+$; $T_{1/2}$=16.5 h *1*; Q(ε)=1315 *15*; %ε+%$β^+$ decay=100.0
$^{86}$Zr-Q(ε): From 2012Wa38.
1977LaZN (also 1975LaYR): Assignment to $^{86}$Zr from lifetime observations. Used chemically and mass-separated isotopes.
1966Hy01: measured Eγ, Iγ, γγ, γγ(t), (x ray)γ(t) using Ge(Li), Si and NaI(Tl) gamma detectors.
1964Aw02: measured Eγ, Iγ, $T_{1/2}$.
1968Tr11: measured γγ(t), g factor by γ(θ,H,t).

### $^{86}$Y Levels

| E(level) | $J^\pi$[†] | $T_{1/2}$ | Comments |
|---|---|---|---|
| 0.0 | $4^-$ | | |
| 242.80 *10* | $2^-$ | 28.5 ns *21* | g=−0.53 *3* (1968Tr11)<br>$T_{1/2}$,g: from time-differential perturbed angular correlation (1968Tr11). Other: 29 ns *3* from γγ(t) (1966Hy01). |
| 271.90 *13* | $1^+$ | <10 ns | $T_{1/2}$: from ε x-ray/29-keV decay γ-ray coincidence measurements (1966Hy01). |
| 883.90 *13* | $1^+$ | | |

[†] From Adopted Levels.

### ε,$β^+$ radiations

| E(decay) | E(level) | Iε[†] | Log *ft* | I(ε+$β^+$)[†] | Comments |
|---|---|---|---|---|---|
| (431 *15*) | 883.90 | 5.7 *3* | 5.28 *4* | 5.7 *3* | εK=0.8669 *3*; εL=0.10880 *25*; εM+=0.02428 *7* |
| (1043 *15*) | 271.90 | 95 *8* | 4.84 *4* | 95 *8* | εK=0.8717; εL=0.10499 *4*; εM+=0.02331 *1* |
| (1072[‡] *15*) | 242.80 | <0.16 | >8.3[1u] | <0.16 | εK=0.8675 *2*; εL=0.1083 *1*; εM+=0.02416 *3*<br>I(ε+$β^+$): from log $f^{1u}t$>8.5. |

[†] Absolute intensity per 100 decays.
[‡] Existence of this branch is questionable.

### γ($^{86}$Y)

Iγ normalization: from Ti(242.8γ)=100; ε+$β^+$ feeding to g.s. is highly forbidden.

| $E_\gamma$[‡] | $I_\gamma$[‡@] | $E_i$(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ | Mult.[†] | δ | α[&] | Comments |
|---|---|---|---|---|---|---|---|---|---|
| 29.1 *1* | 22.5 *16* | 271.90 | $1^+$ | 242.80 | $2^-$ | E1 | | 3.70 *7* | α(K)=3.22 *6*; α(L)=0.403 *7*; α(M)=0.0677 *12*<br>α(N)=0.00853 *15*; α(O)=0.000438 *8*<br>α(K)exp=3.2 *3* (1977LaZN)<br>α(K)exp: other: 3.3 *3* (1966Hy01). |
| [x]94.2 *1* | 0.048 *3* | | | | | M1+E2 | 0.6 *3* | 0.51 *21* | α(K)=0.43 *17*; α(L)=0.07 *4*; α(M)=0.011 *6*<br>α(N)=0.0014 *7*; α(O)=6.8×10$^{-5}$ *24*<br>α(K)exp=0.42 *16* |
| [x]127.7[#] *1* | 0.073 *9* | | | | | M1+E2 | | 0.26 *18* | α(K)exp=0.19 *4*<br>α(K)=0.23 *15*; α(L)=0.032 *24*; α(M)=0.006 *4* |

Continued on next page (footnotes at end of table)

## $^{86}$Zr ε decay (16.5 h) 1977LaZN,1966Hy01 (continued)

### γ($^{86}$Y) (continued)

| $E_\gamma$[‡] | $I_\gamma$[‡@] | $E_i$(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ | Mult.[†] | α[&] | Comments |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | α(K)=0.23 *15*; α(L)=0.032 *24*; α(M)=0.006 *4*<br>α(N)=0.0007 *5*; α(O)=3.6×10$^{-5}$ *21*<br>α: overlaps M1 and E2. |
| [x]135.6[#] *1* | 0.49 *5* | | | | | M1 | 0.0788 | α(K)exp=0.089 *14*<br>α(K)=0.0693 *10*; α(L)=0.00794 *12*; α(M)=0.001359 *20*<br>α(N)=0.000182 *3*; α(O)=1.246×10$^{-5}$ *18* |
| [x]160.7 *1* | 0.10 *1* | | | | | M1 | 0.0500 | α(K)exp=0.061 *16*<br>α(K)=0.0440 *7*; α(L)=0.00501 *7*; α(M)=0.000858 *12*<br>α(N)=0.0001151 *17*; α(O)=7.89×10$^{-6}$ *12* |
| [x]173.7 *1* | 0.073 *9* | | | | | M1 | 0.0407 | α(K)exp=0.049 *14*<br>α(K)=0.0358 *5*; α(L)=0.00407 *6*; α(M)=0.000696 *10*<br>α(N)=9.34×10$^{-5}$ *14*; α(O)=6.42×10$^{-6}$ *9* |
| [x]207.9 *2* | 0.086 *9* | | | | | E2 | 0.0741 | α(K)=0.0642 *10*; α(L)=0.00833 *12*; α(M)=0.001425 *21*<br>α(N)=0.000184 *3*; α(O)=1.036×10$^{-5}$ *15*<br>α(K)exp=0.067 *11* |
| [x]214.9 *1* | 0.086 *9* | | | | | D | | α(K)exp=0.017 *5* |
| 242.8 *1* | 100.0 | 242.80 | 2$^-$ | 0.0 | 4$^-$ | E2 | 0.0427 | α(K)=0.0371 *6*; α(L)=0.00467 *7*; α(M)=0.000799 *12*<br>α(N)=0.0001040 *15*; α(O)=6.07×10$^{-6}$ *9*<br>α(K)exp=0.035 *3* (1966Hy01) |
| 612.0 *1* | 6.0 *3* | 883.90 | 1$^+$ | 271.90 | 1$^+$ | | | |
| [x]620.6[#] *2* | 0.28 *4* | | | | | D,E2 | | α(K)exp<0.002 |
| 641.1[#] *1* | | 883.90 | 1$^+$ | 242.80 | 2$^-$ | | | |

[†] From α(K)exp of 1977LaZN, unless indicated otherwise.
[‡] From 1977LaZN.
[#] A possible cascade of 620.6γ, 135.6γ and 127.7γ which adds to 883.9, could possibly decay from 883.9 level. Since the γ rays involved are very weak, additional information is required to verify such a placement.
[@] For absolute intensity per 100 decays, multiply by 0.9584 *20*.
[&] 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