# $^{161}$Er IT decay (7.5 μs) 1970Bo02

| History | | | |
|---|---|---|---|
| Type | Author | Citation | Literature Cutoff Date |
| Full Evaluation | C. W. Reich | NDS 112,2497 (2011) | 1-Jun-2011 |

Parent: $^{161}$Er: E=397; $J^\pi=11/2^-$; $T_{1/2}=7.5$ μs *7*; %IT decay=100

Additional information 1.

All data are from 1970Bo02, unless otherwise noted. $^{161}$Er isomer produced by $^{161}$Dy($^3$He,3n) on enriched (80.7%) target. γ's measured with Ge detectors and ce's with magnetic spectrometer. γce coincidences measured.

## $^{161}$Er Levels

Additional information 2.

| E(level) | $J^\pi$[†] | $T_{1/2}$ | Comments |
|---|---|---|---|
| 0[‡] | $3/2^-$ | 3.21 h *3* | $T_{1/2}$: from $^{161}$Er Adopted Levels. |
| 59[‡] | $5/2^-$ | | |
| 144[‡] | $7/2^-$ | | |
| 189? | $9/2^+$ | | E(level): level proposed (1970Bo02) to allow decay of 267- and 297-keV levels; existence of level is established in ε decay of $^{161}$Tm.<br>$J^\pi$: from Adopted Levels. |
| 217 | $7/2^+$ | | |
| 250[‡] | $9/2^-$ | | |
| 267 | $13/2^+$ | | E(level): level proposed (1970Bo02) to allow decay of 397-keV level by an observed γ; existence of level is established in ε decay of $^{161}$Tm and in-beam studies.<br>$J^\pi$: from Adopted Levels. |
| 297 | $11/2^+$ | | E(level): level proposed (1970Bo02) to allow decay of 397-keV level by an observed γ; existence of level is established in ε decay of $^{161}$Tm.<br>$J^\pi$: from Adopted Levels. |
| 397[#] | $11/2^-$ | 7.5 μs *7* | $T_{1/2}$: from 1970Bo02 from γ(t) and ce(t). |

[†] $J^\pi$ and band assignments are those of 1970Bo02, except as noted. They agree with those in the $^{161}$Er Adopted Levels.
[‡] Band(A): 3/2[521] band.
[#] Band(B): Bandhead of 11/2[505].

## γ($^{161}$Er)

Iγ normalization: calculated by evaluator to give 100% decays from the 397-keV isomer. The calculated ground-state feeding is then 95% *10*.

| $E_\gamma$ | $I_\gamma$[e] | $E_i$(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ | Mult.[†] | δ[†] | α[‡] | Comments |
|---|---|---|---|---|---|---|---|---|---|
| (27.9) | 0.12[d] | 217 | $7/2^+$ | 189? | $9/2^+$ | M1+E2 | 0.10 | 28.0 | α(L)=21.7 *4*; α(M)=4.96 *8*; α(N+..)=1.301 *19*<br>α(N)=1.142 *17*; α(O)=0.1536 *23*; α(P)=0.00612 *9* |
| (29.26[#]) | 0.27[&] | 297 | $11/2^+$ | 267 | $13/2^+$ | M1+E2 | 0.07 | 20.2 | α(L)=15.72 *23*; α(M)=3.54 *5*; α(N+..)=0.939 *14*<br>α(N)=0.820 *12*; α(O)=0.1140 *17*; α(P)=0.00535 *8* |
| (45.54[#]) | 23[b] | 189? | $9/2^+$ | 144 | $7/2^-$ | E1 | | 0.495 | α(L)=0.387 *6*; α(M)=0.0864 *13*; α(N+..)=0.0220 *4*<br>α(N)=0.0195 *3*; α(O)=0.00243 *4*; |

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## $^{161}$Er IT decay (7.5 μs) 1970Bo02 (continued)

### γ($^{161}$Er) (continued)

| $E_\gamma$ | $I_\gamma$[e] | $E_i$(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ | Mult.[†] | δ[†] | α[‡] | Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | α(P)=8.11×10$^{-5}$ *12*<br>Mult.: α(L1)(exp)/α(L2)(exp)/α(L3)(exp)= 100 *10*/47 *5*/57 *6* (1980Ab18); other: 1975Ad08.<br>δ: <0.05 (1980Ab18). |
| (46.86[#]) | 3.9[&] | 297 | 11/2$^+$ | 250 | 9/2$^-$ | E1 | | 0.457 | α(L)=0.357 *6*; α(M)=0.0798 *12*; α(N+..)=0.0203 *3*<br>α(N)=0.0180 *3*; α(O)=0.00225 *4*; α(P)=7.59×10$^{-5}$ *11* |
| 59 | 7.1[c] | 59 | 5/2$^-$ | 0 | 3/2$^-$ | M1+E2 | 0.14 | 12.82 | α(K)=10.37 *15*; α(L)=1.91 *3*; α(M)=0.431 *6*; α(N+..)=0.1144 *17*<br>α(N)=0.0998 *14*; α(O)=0.01390 *20*; α(P)=0.000654 *10* |
| (73.4) | 0.045[d] | 217 | 7/2$^+$ | 144 | 7/2$^-$ | E1 | | 0.732 | α(K)=0.601 *9*; α(L)=0.1020 *15*; α(M)=0.0226 *4*; α(N+..)=0.00585 *9*<br>α(N)=0.00515 *8*; α(O)=0.000674 *10*; α(P)=2.60×10$^{-5}$ *4* |
| (78.07[#]) | 2.8[@] | 267 | 13/2$^+$ | 189? | 9/2$^+$ | E2 | | 7.69 | α(K)=1.758 *25*; α(L)=4.54 *7*; α(M)=1.107 *16*; α(N+..)=0.279 *4*<br>α(N)=0.250 *4*; α(O)=0.0291 *5*; α(P)=7.80×10$^{-5}$ *11* |
| (79.35[#]) | 0.49[&] | 297 | 11/2$^+$ | 217 | 7/2$^+$ | E2 | | 7.21 | α(K)=1.714 *24*; α(L)=4.21 *6*; α(M)=1.025 *15*; α(N+..)=0.259 *4*<br>α(N)=0.232 *4*; α(O)=0.0270 *4*; α(P)=7.54×10$^{-5}$ *11* |
| 85 | 16 *3* | 144 | 7/2$^-$ | 59 | 5/2$^-$ | M1+E2 | 0.23 | 4.69 | α(K)=3.77 *6*; α(L)=0.714 *10*; α(M)=0.1618 *23*; α(N+..)=0.0428 *6*<br>α(N)=0.0375 *6*; α(O)=0.00517 *8*; α(P)=0.000232 *4* |
| 100 | 16 *3* | 397 | 11/2$^-$ | 297 | 11/2$^+$ | E1 | | 0.327 | α(K)=0.272 *4*; α(L)=0.0434 *6*; α(M)=0.00963 *14*; α(N+..)=0.00251 *4*<br>α(N)=0.00220 *3*; α(O)=0.000294 *5*; α(P)=1.224×10$^{-5}$ *18* |
| 106 | 14 *3* | 250 | 9/2$^-$ | 144 | 7/2$^-$ | M1+E2 | 0.23 | 2.41 | α(K)=1.97 *3*; α(L)=0.344 *5*; α(M)=0.0774 *11*; α(N+..)=0.0206 *3*<br>α(N)=0.0180 *3*; α(O)=0.00252 *4*; α(P)=0.0001207 *17* |
| (107.22[#]) | 2.1[&] | 297 | 11/2$^+$ | 189? | 9/2$^+$ | M1+E2 | 1.2 | 2.29 | α(K)=1.338 *19*; α(L)=0.733 *11*; α(M)=0.1754 *25*; α(N+..)=0.0448 *7*<br>α(N)=0.0399 *6*; α(O)=0.00487 *7*; α(P)=7.18×10$^{-5}$ *10* |
| 131 | 16 *2* | 397 | 11/2$^-$ | 267 | 13/2$^+$ | E1 | | 0.1657 | α(K)=0.1383 *20*; α(L)=0.0214 *3*; α(M)=0.00473 *7*; α(N+..)=0.001239 *18*<br>α(N)=0.001085 *16*; α(O)=0.0001473 *21*; α(P)=6.47×10$^{-6}$ *9* |
| 144 | 2.5 *13* | 144 | 7/2$^-$ | 0 | 3/2$^-$ | E2 | | 0.779 | α(K)=0.416 *6*; α(L)=0.278 *4*; α(M)=0.0670 *10*; α(N+..)=0.01706 *25*<br>α(N)=0.01522 *22*; α(O)=0.00183 *3*; α(P)=1.82×10$^{-5}$ *3* |
| 147 | 24 *4* | 397 | 11/2$^-$ | 250 | 9/2$^-$ | M1+E2 | 0.23 | 0.945 | α(K)=0.783 *11*; α(L)=0.1267 *18*; |

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## $^{161}$Er IT decay (7.5 μs) 1970Bo02 (continued)

### γ($^{161}$Er) (continued)

| $E_\gamma$ | $I_\gamma$[e] | $E_i$(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ | Mult.[†] | α[‡] | Comments |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | α(M)=0.0284 *4*; α(N+..)=0.00758 *11*<br>α(N)=0.00659 *10*; α(O)=0.000936 *14*; α(P)=4.78×10$^{-5}$ *7* |
| (157.8) | 0.52[d] | 217 | 7/2$^+$ | 59 | 5/2$^-$ | E1 | 0.0969 | α(K)=0.0812 *12*; α(L)=0.01228 *18*; α(M)=0.00271 *4*; α(N+..)=0.000714 *10*<br>α(N)=0.000624 *9*; α(O)=8.56×10$^{-5}$ *12*; α(P)=3.90×10$^{-6}$ *6* |
| 191 | ≤4 | 250 | 9/2$^-$ | 59 | 5/2$^-$ | E2 | 0.298 | α(K)=0.187 *3*; α(L)=0.0847 *12*; α(M)=0.0202 *3*; α(N+..)=0.00518 *8*<br>α(N)=0.00460 *7*; α(O)=0.000565 *8*; α(P)=8.72×10$^{-6}$ *13* |
| 207.12[#] | 12[a] *3* | 397 | 11/2$^-$ | 189? | 9/2$^+$ | E1 | 0.0475 | α(K)=0.0399 *6*; α(L)=0.00590 *9*; α(M)=0.001304 *19*; α(N+..)=0.000344 *5*<br>α(N)=0.000301 *5*; α(O)=4.17×10$^{-5}$ *6*; α(P)=1.98×10$^{-6}$ *3* |
| 253 | 7 *2* | 397 | 11/2$^-$ | 144 | 7/2$^-$ | E2 | 0.1179 | α(K)=0.0825 *12*; α(L)=0.0273 *4*; α(M)=0.00644 *9*; α(N+..)=0.001660 *24*<br>α(N)=0.001470 *21*; α(O)=0.000186 *3*; α(P)=4.10×10$^{-6}$ *6* |

[†] Multipolarity assignments and δ values are from the $^{161}$Er Adopted γ's and are consistent with those of 1970Bo02.
[‡] Values were computed for the more precise γ energies given in the $^{161}$Er Adopted γ's.
[#] Although not observed in the IT decay, this γ is observed to depopulate this level in the ε decay of $^{161}$Tm.
[@] Value computed by evaluator to give intensity balance at 267 level [i.e., I(γ+ce)(78)=I(γ+ce)(131)+I(γ+ce)(29)].
[&] Value computed from Iγ's from $^{161}$Tm ε decay and scaled to give intensity balance at 297 level [i.e., I(γ+ce)(29)+I(γ+ce)(46) + I(γ+ce)(79)+I(γ+ce)(107)=I(γ+ce)(100)].
[a] Value computed from Iγ(207)/Iγ(147) from $^{161}$Tm ε decay. The in-beam study 1970Hj02 gives a value that is larger by a factor of 1.8.
[b] Value computed to give intensity balance at 189 level.
[c] Value computed to give intensity balance at 59 level.
[d] Value computed to give intensity balance at 217 level.
[e] For absolute intensity per 100 decays, multiply by 0.93 *9*.

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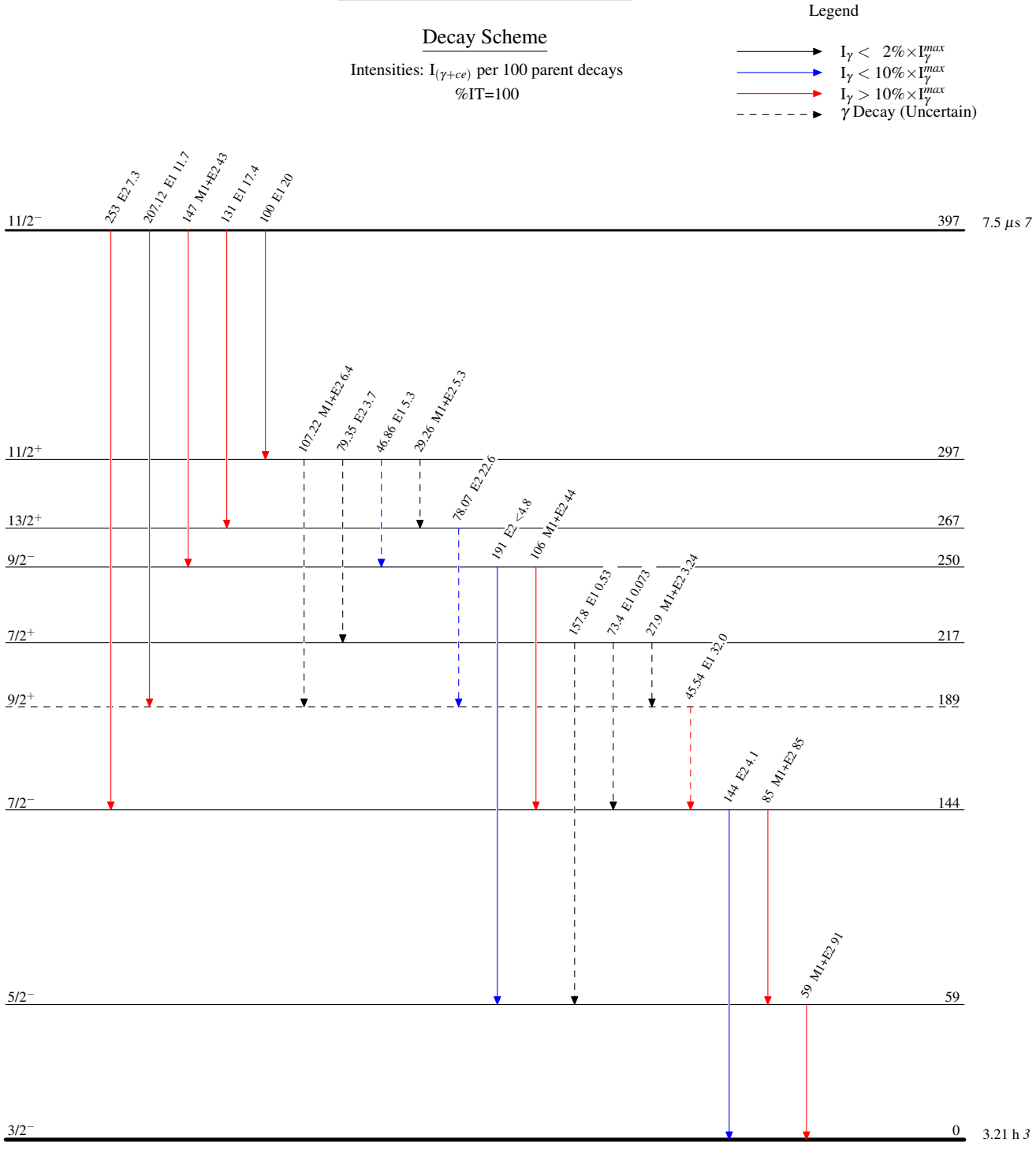
### Decay Scheme

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

%IT=100




$^{161}_{68}Er_{93}$

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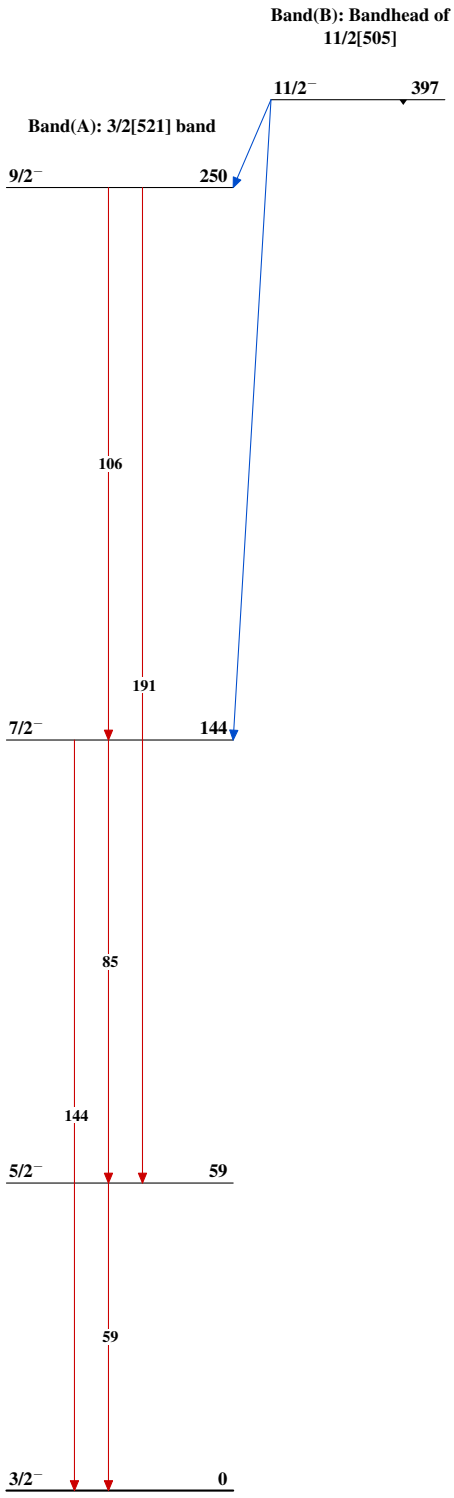


$^{161}_{68}Er_{93}$