

$^{170}\text{Er}(^7\text{Li},3n\gamma)$  1987Br31

| Type            | Author               | History | Citation          | Literature Cutoff Date |
|-----------------|----------------------|---------|-------------------|------------------------|
| Full Evaluation | E. Browne, Huo Junde |         | NDS 87, 15 (1999) | 1-Nov-1998             |

96.9% enriched  $^{170}\text{Er}$ .  $E(^7\text{Li})=27.0, 28.8, 31.0, 34.2$  MeV. Detectors: Ge.

 $^{174}\text{Lu}$  Levels

| E(level)                    | $J^{\pi i}$       | $T_{1/2}^j$ | Comments                                            |  |
|-----------------------------|-------------------|-------------|-----------------------------------------------------|--|
| 0.0 <sup>†</sup>            | 1 <sup>-</sup>    | 3.31 y 5    |                                                     |  |
| 44.6542 <sup>†</sup> 14     | 2 <sup>-</sup>    |             |                                                     |  |
| 111.653 <sup>†</sup> 24     | 3 <sup>-</sup>    |             |                                                     |  |
| 170.72 <sup>#</sup> 3       | 6 <sup>-</sup>    | 142 d 2     | $T_{1/2}$ : from 1991Br01.                          |  |
| 200.238 <sup>†</sup> 4      | 4 <sup>-</sup>    |             |                                                     |  |
| 240.710 <sup>b</sup> 3      | 3 <sup>+</sup>    | 395 ns 15   |                                                     |  |
| 259.326 <sup>b</sup> 7      | 4 <sup>+</sup>    |             |                                                     |  |
| 281.161 <sup>&amp;</sup> 13 | 0 <sup>+</sup>    |             |                                                     |  |
| 302.548 <sup>b</sup> 22     | 5 <sup>+</sup>    |             |                                                     |  |
| 311.346 <sup>†</sup> 6      | 5 <sup>-</sup>    |             |                                                     |  |
| 320.109 <sup>&amp;</sup> 6  | 2 <sup>+</sup>    |             |                                                     |  |
| 320.21 <sup>#</sup> 3       | 7 <sup>-</sup>    |             |                                                     |  |
| 365.075 <sup>‡</sup> 5      | 4 <sup>-</sup>    | 145 ns 3    |                                                     |  |
| 367.73 <sup>b</sup> 3       | 6 <sup>+</sup>    |             |                                                     |  |
| 382.876 <sup>&amp;</sup> 17 | 1 <sup>+</sup>    |             |                                                     |  |
| 414.270 <sup>c</sup> 8      | 3 <sup>+</sup>    |             |                                                     |  |
| 420.666 <sup>&amp;</sup> 7  | 4 <sup>+</sup>    |             |                                                     |  |
| 431.30 <sup>@</sup> 3       | 7 <sup>+</sup>    | <1.5 ns     | $T_{1/2}$ : other value: $\approx 2$ ns (1973AnYG). |  |
| 432.87 <sup>a</sup> 15      | 3 <sup>-</sup>    |             |                                                     |  |
| 442.063 <sup>†</sup> 9      | 6 <sup>-</sup>    |             |                                                     |  |
| 445.429 <sup>&amp;</sup> 15 | 3 <sup>+</sup>    |             |                                                     |  |
| 453.97 <sup>b</sup> 3       | 7 <sup>+</sup>    |             |                                                     |  |
| 480.995 <sup>‡</sup> 10     | 5 <sup>-</sup>    |             |                                                     |  |
| 491.23 <sup>#</sup> 3       | 8 <sup>-</sup>    |             |                                                     |  |
| 507.66 3                    | (7)               |             |                                                     |  |
| 522.43 <sup>d</sup> 4       | 1 <sup>-</sup>    |             |                                                     |  |
| 531.02 <sup>a</sup> 3       | 4 <sup>-</sup>    |             |                                                     |  |
| 537.30 <sup>@</sup> 3       | 8 <sup>+</sup>    |             |                                                     |  |
| 561.33 <sup>b</sup> 3       | 8 <sup>+</sup>    |             |                                                     |  |
| 575.665 <sup>&amp;</sup> 10 | 5 <sup>+</sup>    |             |                                                     |  |
| 594.250 <sup>&amp;</sup> 12 | 6 <sup>+</sup>    |             |                                                     |  |
| 595.615 <sup>†</sup> 11     | 7 <sup>-</sup>    |             |                                                     |  |
| 619.162 <sup>‡</sup> 14     | 6 <sup>-</sup>    |             |                                                     |  |
| 621.11 <sup>d</sup> 5       | 2 <sup>-</sup>    |             |                                                     |  |
| 630.123 19                  | (1 <sup>+</sup> ) |             |                                                     |  |
| 652.313 19                  | (2,3,4)           |             |                                                     |  |
| 654.48 <sup>a</sup> 3       | 5 <sup>-</sup>    |             |                                                     |  |
| 659.01 <sup>e</sup> 3       | 8 <sup>+</sup>    |             |                                                     |  |

E(level): 659 level is deexcited by 121-,128-,151- and 161-keV  $\gamma$  rays in  $^{176}\text{Yb}(p,3n\gamma)$  and "ONLY" by 121- and 151-keV  $\gamma$  rays in  $^{170}\text{Yb}(^7\text{Li},3n\gamma)$ . Note, however, that the 128 $\gamma$  is a member of a triplet, resolved with a crystal spectrometer in 1987Br12. In

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$^{170}\text{Er}(^7\text{Li},3n\gamma)$  **1987Br31** (continued) $^{174}\text{Lu}$  Levels (continued)

| E(level)                                                                                                  | $J^\pi$           | Comments                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| $^{170}\text{Er}(^7\text{Li},3n\gamma)$ 161 $\gamma$ could have been masked by a 166.48-keV $\gamma$ ray. |                   |                                                                                                                                                      |
| 676.60@ 3                                                                                                 | 9 <sup>+</sup>    |                                                                                                                                                      |
| 683.33# 3                                                                                                 | 9 <sup>-</sup>    |                                                                                                                                                      |
| 689.24 <sup>g</sup> 4                                                                                     | 3 <sup>+</sup>    |                                                                                                                                                      |
| 766.415 <sup>†</sup> 13                                                                                   | 8 <sup>-</sup>    |                                                                                                                                                      |
| 771.95 <sup>f</sup> 3                                                                                     | (8)               |                                                                                                                                                      |
| 772.50 <sup>g</sup> 4                                                                                     | 4 <sup>+</sup>    |                                                                                                                                                      |
| 779.112 <sup>‡</sup> 24                                                                                   | 7 <sup>-</sup>    |                                                                                                                                                      |
| 782.129& 21                                                                                               | 7 <sup>+</sup>    |                                                                                                                                                      |
| 800.49 <sup>a</sup> 4                                                                                     | 6 <sup>-</sup>    |                                                                                                                                                      |
| 838.03 <sup>b</sup> 4                                                                                     | 10 <sup>+</sup>   |                                                                                                                                                      |
| 842.77?& 9                                                                                                | 8 <sup>+</sup>    |                                                                                                                                                      |
| 843.09@ 4                                                                                                 | 10 <sup>+</sup>   |                                                                                                                                                      |
| 859.90 <sup>h</sup> 15                                                                                    | (6 <sup>+</sup> ) |                                                                                                                                                      |
| 868.94 <sup>f</sup> 3                                                                                     | (9)               |                                                                                                                                                      |
| 876.62 <sup>g</sup> 4                                                                                     | 5 <sup>+</sup>    | <b>1987Br31</b> reported that the 5 <sup>+</sup> member of the $K^\pi=2^+$ band decays by 104.5 and 187.5 keV transitions.                           |
| 895.07# 23                                                                                                | 10 <sup>-</sup>   |                                                                                                                                                      |
| 960.67 <sup>‡</sup> 4                                                                                     | 8 <sup>-</sup>    |                                                                                                                                                      |
| 961.20 <sup>†</sup> 3                                                                                     | 9 <sup>-</sup>    |                                                                                                                                                      |
| 979.64 <sup>h</sup> 15                                                                                    | (7 <sup>+</sup> ) |                                                                                                                                                      |
| 1005.46 <sup>g</sup> 4                                                                                    | 6 <sup>+</sup>    | <b>1987Br31</b> reported that the 6 <sup>+</sup> member of the $K^\pi=2^+$ band decays by 119.73 and 224.4 keV transitions, thus E(level)=998.2 keV. |
| 1007.01 <sup>b</sup> 4                                                                                    | 11 <sup>+</sup>   |                                                                                                                                                      |
| 1012.48 <sup>f</sup> 4                                                                                    | (10)              |                                                                                                                                                      |
| 1033.71@ 8                                                                                                | 11 <sup>+</sup>   |                                                                                                                                                      |
| 1063.46 4                                                                                                 | 9 <sup>+</sup>    |                                                                                                                                                      |
| 1126.04 4                                                                                                 | 11 <sup>-</sup>   |                                                                                                                                                      |
| 1169.59 <sup>†</sup> 4                                                                                    | 10 <sup>-</sup>   |                                                                                                                                                      |
| 1186.11 <sup>f</sup> 5                                                                                    | (11)              |                                                                                                                                                      |
| 1196.66 <sup>b</sup> 18                                                                                   | 12 <sup>+</sup>   |                                                                                                                                                      |
| 1246.7@ 4                                                                                                 | 12 <sup>+</sup>   |                                                                                                                                                      |
| 1370.4# 3                                                                                                 | 12 <sup>-</sup>   |                                                                                                                                                      |
| 1403.90? <sup>†</sup> 5                                                                                   | 11 <sup>-</sup>   |                                                                                                                                                      |
| 1405.71 <sup>b</sup> 8                                                                                    | 13 <sup>+</sup>   |                                                                                                                                                      |
| 1481.7@ 3                                                                                                 | 13 <sup>+</sup>   |                                                                                                                                                      |
| 1634.96 <sup>b</sup> 19                                                                                   | 14 <sup>+</sup>   |                                                                                                                                                      |
| 1882.81 <sup>b</sup> 17                                                                                   | 15 <sup>+</sup>   |                                                                                                                                                      |

<sup>†</sup> Band(A):  $K^\pi=1^-$  g.s. rotational band. Configuration= $((\pi 7/2[704])-(\nu 5/2[512]))$ .

<sup>‡</sup> Band(B):  $K^\pi=4^-$  rotational band. Configuration= $((\pi 7/2(404))+(\nu 1/2(521)))$ .

# Band(C):  $K^\pi=6^-$  rotational band. Configuration= $((\pi 7/2(404))+(\nu 5/2(512)))$ .

@ Band(D):  $K^\pi=7^+$  rotational band. Configuration= $((\pi 7/2(404))+(\nu 7/2(633)))$ .

& Band(E):  $K^\pi=0^+$  rotational band. Configuration= $((\pi 7/2(404))-(\nu 7/2(633)))$ .

<sup>a</sup> Band(F):  $K^\pi=3^-$  rotational band. Configuration= $((\pi 7/2(404))-(\nu 1/2(521)))$ .

<sup>b</sup> Band(G):  $K^\pi=2^+$  rotational band. Configuration= $((\pi 1/2(541))-(\nu 5/2(512)))$ .

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$^{170}\text{Er}(^7\text{Li}, 3n\gamma)$  **1987Br31** (continued) $^{174}\text{Lu}$  Levels (continued)

<sup>c</sup> Band(H):  $K^\pi=3^+$  rotational band. Configuration= $((\pi 1/2(541))+(\nu 5/2(512)))$ .

<sup>d</sup> Band(I):  $K^\pi=1^-$  rotational band. Configuration= $((\pi 5/2(402))-(\nu 5/2(512)))$ .

<sup>e</sup> Band(J):  $K^\pi=7^+$  rotational band. Configuration= $((\pi 9/2(514))+(\nu 5/2(512)))$ .

<sup>f</sup> Band(K):  $K=(8)$ . Possible Configuration= $((\pi 9/2(514))+(\nu 7/2(633)))$ .

<sup>g</sup> Band(L):  $K^\pi=2^+$  rotational band. Configuration= $((\pi 9/2(514))-(\nu 5/2(512)))$ .

<sup>h</sup> Band(M):  $K^\pi=(4^+)$ . Possible Configuration= $((\pi 3/2(532))+(\nu 5/2(512)))$ .

<sup>i</sup>  $J^\pi$  assignments are based on  $\gamma(\theta)$  and rotational structure.

<sup>j</sup> From Adopted Levels, gammas.

| $\gamma(^{174}\text{Lu})$ |                          |                     |                   |         |                   | Comments                                                                                                                                                                                                                                                                        |
|---------------------------|--------------------------|---------------------|-------------------|---------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $E_\gamma$                | $I_\gamma$               | $E_i(\text{level})$ | $J^\pi_i$         | $E_f$   | $J^\pi_f$         |                                                                                                                                                                                                                                                                                 |
| 18.72 <sup>#</sup>        |                          | 259.326             | 4 <sup>+</sup>    | 240.710 | 3 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |
| 43.16 3                   | 7.8 25                   | 302.548             | 5 <sup>+</sup>    | 259.326 | 4 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |
| 44.73 3                   | 14 3                     | 44.6542             | 2 <sup>-</sup>    | 0.0     | 1 <sup>-</sup>    |                                                                                                                                                                                                                                                                                 |
| 60.8 <sup>@</sup>         |                          | 842.77?             | 8 <sup>+</sup>    | 782.129 | 7 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |
| 65.09 2                   | 3.9 10                   | 367.73              | 6 <sup>+</sup>    | 302.548 | 5 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |
| 67.07 2                   | 15.0 10                  | 111.653             | 3 <sup>-</sup>    | 44.6542 | 2 <sup>-</sup>    |                                                                                                                                                                                                                                                                                 |
| 67.7 <sup>†</sup> 2       |                          | 432.87              | 3 <sup>-</sup>    | 365.075 | 4 <sup>-</sup>    |                                                                                                                                                                                                                                                                                 |
| 76.34 1                   | 3.3 6                    | 507.66              | (7)               | 431.30  | 7 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |
| 83.3 <sup>‡</sup> 1       | 7.7 10                   | 772.50              | 4 <sup>+</sup>    | 689.24  | 3 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |
| 86.27 2                   | 8.6 8                    | 453.97              | 7 <sup>+</sup>    | 367.73  | 6 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |
| 88.54 1                   | 7.2 5                    | 200.238             | 4 <sup>-</sup>    | 111.653 | 3 <sup>-</sup>    |                                                                                                                                                                                                                                                                                 |
| 97.04 3                   | 3.7 5                    | 868.94              | (9)               | 771.95  | (8)               |                                                                                                                                                                                                                                                                                 |
| 98.72 4                   | 1.1 3                    | 621.11              | 2 <sup>-</sup>    | 522.43  | 1 <sup>-</sup>    |                                                                                                                                                                                                                                                                                 |
| 99.70 2                   | 2.4 5                    | 531.02              | 4 <sup>-</sup>    | 431.30  | 7 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |
| 100.65 <sup>‡</sup> 10    | 6.5 5                    | 420.666             | 4 <sup>+</sup>    | 320.109 | 2 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |
| 101.81 5                  | 6.5 6                    | 382.876             | 1 <sup>+</sup>    | 281.161 | 0 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |
| 104.5 2                   | 1.8 5                    | 876.62              | 5 <sup>+</sup>    | 771.95  | (8)               |                                                                                                                                                                                                                                                                                 |
| 105.97 1                  | 10.5 8                   | 537.30              | 8 <sup>+</sup>    | 431.30  | 7 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |
| 107.39 2                  | 7.8 6                    | 561.33              | 8 <sup>+</sup>    | 453.97  | 7 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |
| 109.60 10                 | 3.3 8                    | 420.666             | 4 <sup>+</sup>    | 311.346 | 5 <sup>-</sup>    |                                                                                                                                                                                                                                                                                 |
| 111.08 <sup>&amp;</sup> 1 | 30.1 <sup>&amp;</sup> 10 | 311.346             | 5 <sup>-</sup>    | 200.238 | 4 <sup>-</sup>    |                                                                                                                                                                                                                                                                                 |
| 111.08 <sup>&amp;</sup> 1 | 30.1 <sup>&amp;</sup> 10 | 431.30              | 7 <sup>+</sup>    | 320.21  | 7 <sup>-</sup>    |                                                                                                                                                                                                                                                                                 |
| 111.62 <sup>‡</sup> 1     | 0.73 19                  | 111.653             | 3 <sup>-</sup>    | 0.0     | 1 <sup>-</sup>    | $I_\gamma$ : from $I_\gamma(67\gamma)/I_\gamma(111.7)=25:1.2$ in (p,3n $\gamma$ ) ( <b>1987Br12</b> ) and $I_\gamma(67\gamma)=15.0$ 10 in ( $^7\text{Li}, 3n\gamma$ ) ( <b>1987Br31</b> ) because <b>1987Br31</b> reported $I_\gamma(111.6\gamma)=99.0$ was mainly an impurity. |
| 112.98 2                  | 3.3 4                    | 771.95              | (8)               | 659.01  | 8 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |
| 115.79 5                  | 2.7 7                    | 480.995             | 5 <sup>-</sup>    | 365.075 | 4 <sup>-</sup>    |                                                                                                                                                                                                                                                                                 |
| 119.73 3                  | 7.3 10                   | 979.64              | (7 <sup>+</sup> ) | 859.90  | (6 <sup>+</sup> ) |                                                                                                                                                                                                                                                                                 |
| 121.70 5                  | 2.5 5                    | 659.01              | 8 <sup>+</sup>    | 537.30  | 8 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |
| 123.3 <sup>†</sup> 2      |                          | 654.48              | 5 <sup>-</sup>    | 531.02  | 4 <sup>-</sup>    |                                                                                                                                                                                                                                                                                 |
| 125.3 1                   |                          | 445.429             | 3 <sup>+</sup>    | 320.109 | 2 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |
| 127.90 5                  | 5.6 8                    | 689.24              | 3 <sup>+</sup>    | 561.33  | 8 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |
| 129.06 1                  | 100.0 20                 | 240.710             | 3 <sup>+</sup>    | 111.653 | 3 <sup>-</sup>    |                                                                                                                                                                                                                                                                                 |
| 130.8 1                   |                          | 442.063             | 6 <sup>-</sup>    | 311.346 | 5 <sup>-</sup>    |                                                                                                                                                                                                                                                                                 |
| 138.1 <sup>†</sup> 1      |                          | 619.162             | 6 <sup>-</sup>    | 480.995 | 5 <sup>-</sup>    |                                                                                                                                                                                                                                                                                 |
| 139.5 <sup>‡</sup> 2      | 9.5 7                    | 676.60              | 9 <sup>+</sup>    | 537.30  | 8 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |
| 143.54 2                  | 6.5 7                    | 1012.48             | (10)              | 868.94  | (9)               |                                                                                                                                                                                                                                                                                 |
| 148.87 4                  | 5.2 8                    | 838.03              | 10 <sup>+</sup>   | 689.24  | 3 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |
| 149.46 1                  | 34.0 8                   | 320.21              | 7 <sup>-</sup>    | 170.72  | 6 <sup>-</sup>    |                                                                                                                                                                                                                                                                                 |
| 151.45 10                 | 8.4 10                   | 453.97              | 7 <sup>+</sup>    | 302.548 | 5 <sup>+</sup>    |                                                                                                                                                                                                                                                                                 |

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$^{170}\text{Er}(^7\text{Li}, 3\text{n}\gamma)$  **1987Br31** (continued) $\gamma(^{174}\text{Lu})$  (continued)

| $E_\gamma$                                 | $I_\gamma$                | $E_i(\text{level})$ | $J_i^\pi$ | $E_f$   | $J_f^\pi$ |
|--------------------------------------------|---------------------------|---------------------|-----------|---------|-----------|
| 151.45 $10$                                | 8.4 $10$                  | 659.01              | $8^+$     | 507.66  | (7)       |
| 153.55 $2$                                 | 4.8 $3$                   | 595.615             | $7^-$     | 442.063 | $6^-$     |
| 155.01 $5$                                 | 7.0 $20$                  | 414.270             | $3^+$     | 259.326 | $4^+$     |
| 155.01 $5$                                 | 7.0 $20$                  | 575.665             | $5^+$     | 420.666 | $4^+$     |
| 159.8 $\frac{1}{2}^+$                      | 13.5 $10$                 | 779.112             | $7^-$     | 619.162 | $6^-$     |
| 164.9 $2$                                  | 5.9 $15$                  | 365.075             | $4^-$     | 200.238 | $4^-$     |
| 166.48 $4$                                 | 1.9 $3$                   | 843.09              | $10^+$    | 676.60  | $9^+$     |
| 169.01 $3$                                 | 3.4 $6$                   | 1007.01             | $11^+$    | 838.03  | $10^+$    |
| 170.66 $10$                                | 3.6 $6$                   | 766.415             | $8^-$     | 595.615 | $7^-$     |
| 171.13 $\frac{3}{2}^+$                     | 7.1 $8$                   | 491.23              | $8^-$     | 320.109 | $2^+$     |
| $^{172.56} 5$                              | 2.3 $4$                   |                     |           |         |           |
| 173.63 $\frac{1}{2}^+$ $4$                 | 5.5 $\frac{1}{2}^+$ $5$   | 414.270             | $3^+$     | 240.710 | $3^+$     |
| 173.63 $\frac{1}{2}^+$ $4$                 | 5.5 $\frac{1}{2}^+$ $5$   | 594.250             | $6^+$     | 420.666 | $4^+$     |
| 173.63 $\frac{1}{2}^+$ $4$                 | 5.5 $\frac{1}{2}^+$ $5$   | 1186.11             | (11)      | 1012.48 | (10)      |
| 181.56 $3$                                 | 73 $5$                    | 960.67              | $8^-$     | 779.112 | $7^-$     |
| 187.5 $\frac{1}{2}^+$ $2$                  |                           | 876.62              | $5^+$     | 689.24  | $3^+$     |
| 187.88 $\frac{3}{2}^+$ $3$                 | 14.2 $13$                 | 782.129             | $7^+$     | 594.250 | $6^+$     |
| 189.6 $\frac{1}{2}^+$ $3$                  |                           | 1196.66             | $12^+$    | 1007.01 | $11^+$    |
| 190.94 $\frac{1}{2}^+$ $7$                 | 5.7 $2$                   | 1033.71             | $11^+$    | 842.77? | $8^+$     |
| 192.1 $\frac{1}{2}^+$ $3$                  |                           | 683.33              | $9^-$     | 491.23  | $8^-$     |
| 193.54 $5$                                 | 5.0 $5$                   | 561.33              | $8^+$     | 367.73  | $6^+$     |
| 194.7 $\frac{1}{2}^+$ $2$                  |                           | 961.20              | $9^-$     | 766.415 | $8^-$     |
| 196.11 $2$                                 | 32.0 $15$                 | 240.710             | $3^+$     | 44.6542 | $2^-$     |
| 199.78 $\frac{3}{2}^+$ $3$                 |                           | 311.346             | $5^-$     | 111.653 | $3^-$     |
| 208.39 $2$                                 | 13.1 $6$                  | 320.109             | $2^+$     | 111.653 | $3^-$     |
| 208.39 $\frac{1}{2}^+$ $2$                 | 13.1 $\frac{1}{2}^+$ $6$  | 1169.59             | $10^-$    | 961.20  | $9^-$     |
| 209.0 $\frac{1}{2}^+$ $4$                  |                           | 1405.71             | $13^+$    | 1196.66 | $12^+$    |
| 211.7 $\frac{1}{2}^+$ $4$                  |                           | 895.07              | $10^-$    | 683.33  | $9^-$     |
| 213.45 $\frac{1}{2}^+$ $a$ $8$             | 3.0 $5$                   | 1246.7              | $12^+$    | 1033.71 | $11^+$    |
| 220.51 $5$                                 | 5.2 $6$                   | 1063.46             | $9^+$     | 843.09  | $10^+$    |
| 223.22 $\frac{1}{2}^+$ $1$                 | 3.4 $6$                   | 654.48              | $5^-$     | 431.30  | $7^+$     |
| 234.4 $\frac{1}{2}^+$ $a$ $3$              |                           | 1403.90?            | $11^-$    | 1169.59 | $10^-$    |
| 235.38 $3$                                 | 5.6 $7$                   | 689.24              | $3^+$     | 453.97  | $7^+$     |
| 237.92 $6$                                 | 3.6 $6$                   | 652.313             | (2,3,4)   | 414.270 | $3^+$     |
| 241.86 $\frac{1}{2}^+$ $2$                 | 5.8 $3$                   | 442.063             | $6^-$     | 200.238 | $4^-$     |
| 245.23 $3$                                 | 7.0 $5$                   | 676.60              | $9^+$     | 431.30  | $7^+$     |
| 247.2 $\frac{1}{2}^+$ $2$                  |                           | 630.123             | (1 $^+$ ) | 382.876 | $1^+$     |
| 253.42 $2$                                 | 14.5 $8$                  | 365.075             | $4^-$     | 111.653 | $3^-$     |
| 260.59 $2$                                 | 62 $3$                    | 431.30              | $7^+$     | 170.72  | $6^-$     |
| 264.30 $\frac{1}{2}^+$ $4$                 | 6.5 $7$                   | 771.95              | (8)       | 507.66  | (7)       |
| 269.57 $6$                                 | 4.2 $5$                   | 800.49              | $6^-$     | 531.02  | $4^-$     |
| 277.12 $\frac{1}{2}^+$ $10$                | 9.0 $10$                  | 838.03              | $10^+$    | 561.33  | $8^+$     |
| 281.06 $\frac{1}{2}^+$ $\frac{1}{2}^+$ $6$ | 10.0 $\frac{1}{2}^+$ $10$ | 281.161             | $0^+$     | 0.0     | $1^-$     |
| 281.06 $\frac{1}{2}^+$ $6$                 | 10.0 $\frac{1}{2}^+$ $10$ | 1063.46             | $9^+$     | 782.129 | $7^+$     |
| 284.48 $10$                                | 1.7 $3$                   | 595.615             | $7^-$     | 311.346 | $5^-$     |
| 298.3 $\frac{1}{2}^+$ $1$                  | 7.3 $10$                  | 779.112             | $7^-$     | 480.995 | $5^-$     |
| 305.9 $\frac{1}{2}^+$ $2$                  |                           | 843.09              | $10^+$    | 537.30  | $8^+$     |
| 308.9 $\frac{1}{2}^+$ $2$                  |                           | 420.666             | $4^+$     | 111.653 | $3^-$     |
| 310.0 $\frac{1}{2}^+$ $2$                  |                           | 630.123             | (1 $^+$ ) | 320.109 | $2^+$     |

Continued on next page (footnotes at end of table)

$^{170}\text{Er}(^7\text{Li},3\text{n}\gamma)$  **1987Br31** (continued) $\gamma(^{174}\text{Lu})$  (continued)

| $E_\gamma$                | $I_\gamma$               | $E_i(\text{level})$ | $J_i^\pi$       | $E_f$   | $J_f^\pi$       | Comments                                                     |
|---------------------------|--------------------------|---------------------|-----------------|---------|-----------------|--------------------------------------------------------------|
| 317.80 5                  | 7.4 10                   | 1007.01             | 11 <sup>+</sup> | 689.24  | 3 <sup>+</sup>  |                                                              |
| 320.48 3                  | 16.5 5                   | 491.23              | 8 <sup>-</sup>  | 170.72  | 6 <sup>-</sup>  |                                                              |
| 324.35 8                  | 2.0 4                    | 766.415             | 8 <sup>-</sup>  | 442.063 | 6 <sup>-</sup>  |                                                              |
| 340.75 <sup>‡</sup> 10    | 10.8 10                  | 771.95              | (8)             | 431.30  | 7 <sup>+</sup>  |                                                              |
| 357.1 <sup>‡</sup> 1      | 42.0 20                  | 1033.71             | 11 <sup>+</sup> | 676.60  | 9 <sup>+</sup>  |                                                              |
| 358.7 1                   | 9.0 15                   | 1196.66             | 12 <sup>+</sup> | 838.03  | 10 <sup>+</sup> |                                                              |
| 363.07 4                  | 12.0 10                  | 683.33              | 9 <sup>-</sup>  | 320.21  | 7 <sup>-</sup>  |                                                              |
| 365.5 1                   | 4.7 6                    | 961.20              | 9 <sup>-</sup>  | 595.615 | 7 <sup>-</sup>  |                                                              |
| 398.70 <sup>‡</sup> 10    | 12.5 13                  | 1405.71             | 13 <sup>+</sup> | 1007.01 | 11 <sup>+</sup> |                                                              |
| 403.2 <sup>†</sup> 3      |                          | 1169.59             | 10 <sup>-</sup> | 766.415 | 8 <sup>-</sup>  |                                                              |
| 403.9 <sup>&amp;‡</sup> 5 | 15.7 <sup>&amp;</sup> 13 | 895.07              | 10 <sup>-</sup> |         |                 |                                                              |
| 403.9 <sup>&amp;</sup> 5  | 15.7 <sup>&amp;</sup> 3  | 1246.7              | 12 <sup>+</sup> | 843.09  | 10 <sup>+</sup> |                                                              |
| 411.5 1                   | 4.7 10                   | 652.313             | (2,3,4)         | 240.710 | 3 <sup>+</sup>  |                                                              |
| <sup>x</sup> 431.2 2      | 3.6 10                   |                     |                 |         |                 | This $\gamma$ ray may be placed de-exciting the 672.0 level. |
| 438.3 <sup>‡</sup> 1      | 5.5 10                   | 1634.96             | 14 <sup>+</sup> | 1196.66 | 12 <sup>+</sup> |                                                              |
| 442.70 <sup>&amp;</sup> 4 | 7.2 <sup>&amp;</sup> 10  | 1126.04             | 11 <sup>-</sup> | 683.33  | 9 <sup>-</sup>  |                                                              |
| 442.70 <sup>&amp;</sup> 4 | 7.2 <sup>&amp;</sup> 10  | 1403.90?            | 11 <sup>-</sup> | 961.20  | 9 <sup>-</sup>  |                                                              |
| 448.0 <sup>†</sup> 4      |                          | 1481.7              | 13 <sup>+</sup> | 1033.71 | 11 <sup>+</sup> |                                                              |
| 475.3 <sup>†</sup> 2      |                          | 1370.4              | 12 <sup>-</sup> | 895.07  | 10 <sup>-</sup> |                                                              |
| 477.1 2                   | 5.7 15                   | 1882.81             | 15 <sup>+</sup> | 1405.71 | 13 <sup>+</sup> |                                                              |
| 522.7 <sup>‡</sup> 2      | 4.4 14                   | 522.43              | 1 <sup>-</sup>  | 0.0     | 1 <sup>-</sup>  |                                                              |

<sup>†</sup> Observed in  $\gamma\gamma$  coin only.<sup>‡</sup> Contaminated by another reaction.# Not seen, but required by  $\gamma\gamma$ . Value is rounded-off from E(level) difference.

@ From E(level) difference. Not observed but required by level scheme.

&amp; Multiply placed with undivided intensity.

<sup>a</sup> Placement of transition in the level scheme is uncertain.<sup>x</sup>  $\gamma$  ray not placed in level scheme.

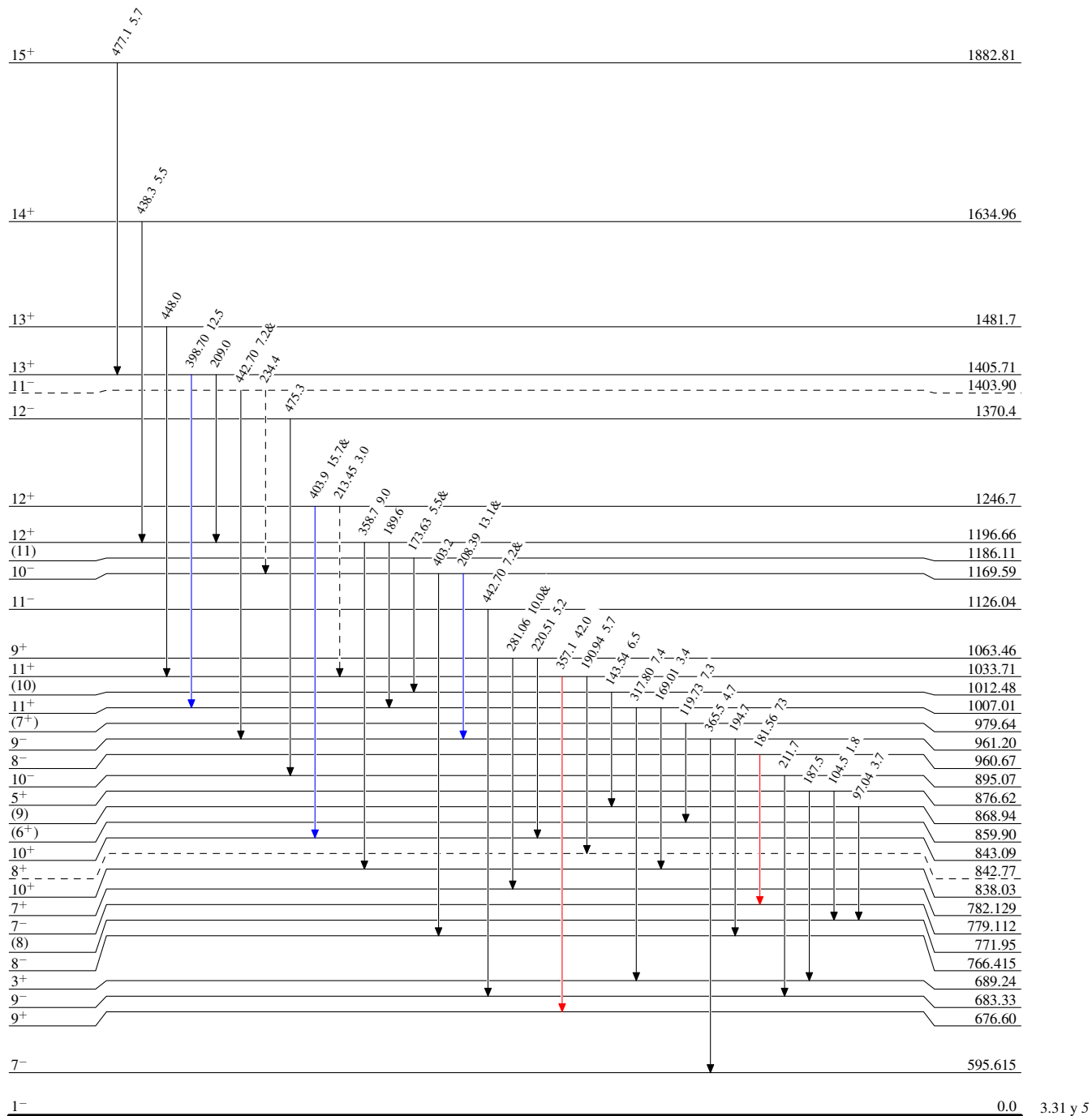
$^{170}\text{Er}(^7\text{Li},3\text{n}\gamma)$  1987Br31

## Level Scheme

Intensities: Relative  $I_\gamma$   
& Multiply placed: undivided intensity given

## Legend

- $\longrightarrow$   $I_\gamma < 2\% \times I_\gamma^{\max}$   
 $\longrightarrow$   $I_\gamma < 10\% \times I_\gamma^{\max}$   
 $\longrightarrow$   $I_\gamma > 10\% \times I_\gamma^{\max}$   
 $-\cdots-\cdots$   $\gamma$  Decay (Uncertain)



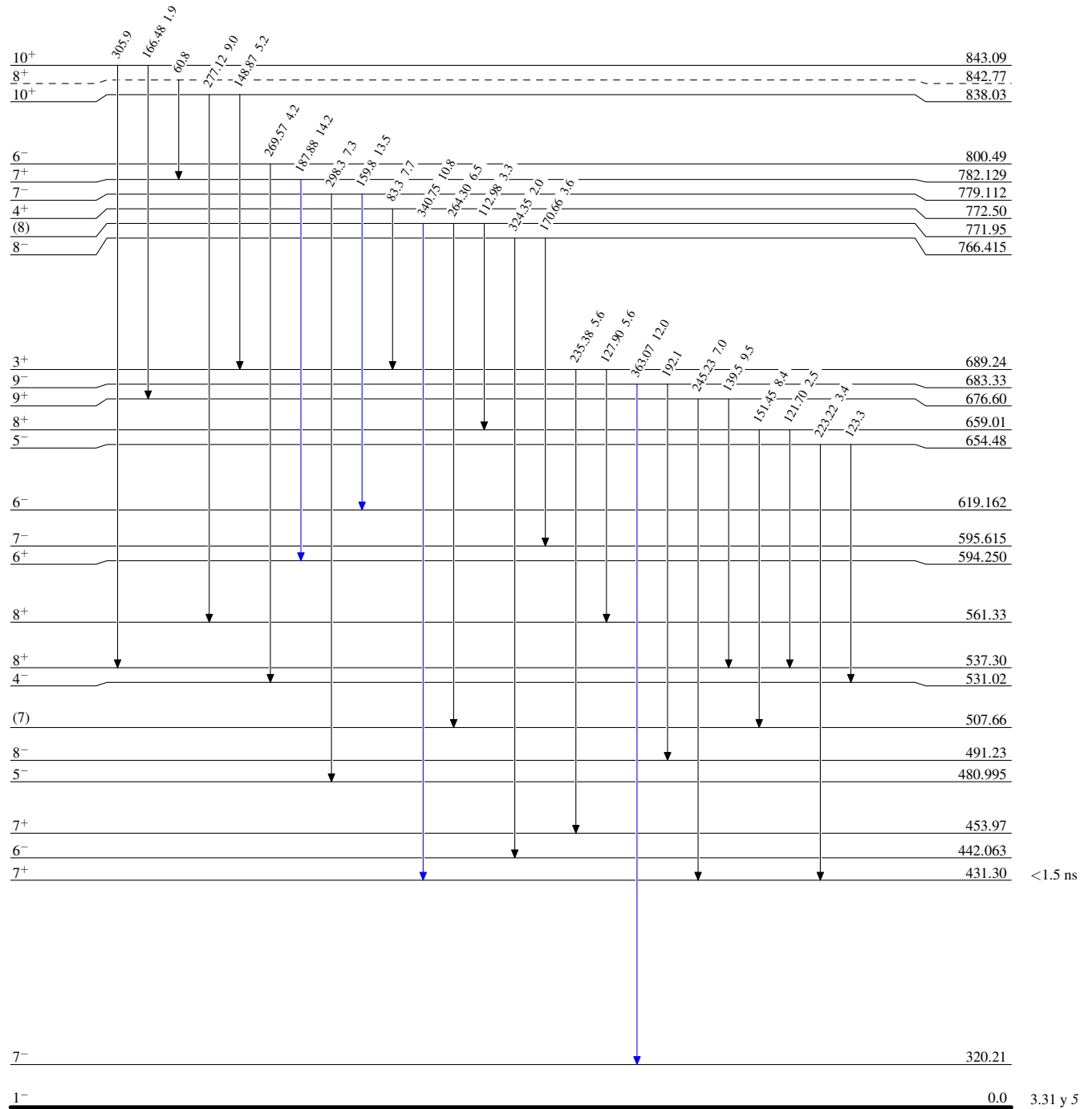
$^{170}\text{Er}(^7\text{Li}, 3\text{n}\gamma)$  1987Br31

## Level Scheme (continued)

Intensities: Relative  $I_\gamma$   
& Multiply placed: undivided intensity given

## Legend

- $\longrightarrow$   $I_\gamma < 2\% \times I_\gamma^{\max}$   
 $\longrightarrow$   $I_\gamma < 10\% \times I_\gamma^{\max}$   
 $\longrightarrow$   $I_\gamma > 10\% \times I_\gamma^{\max}$



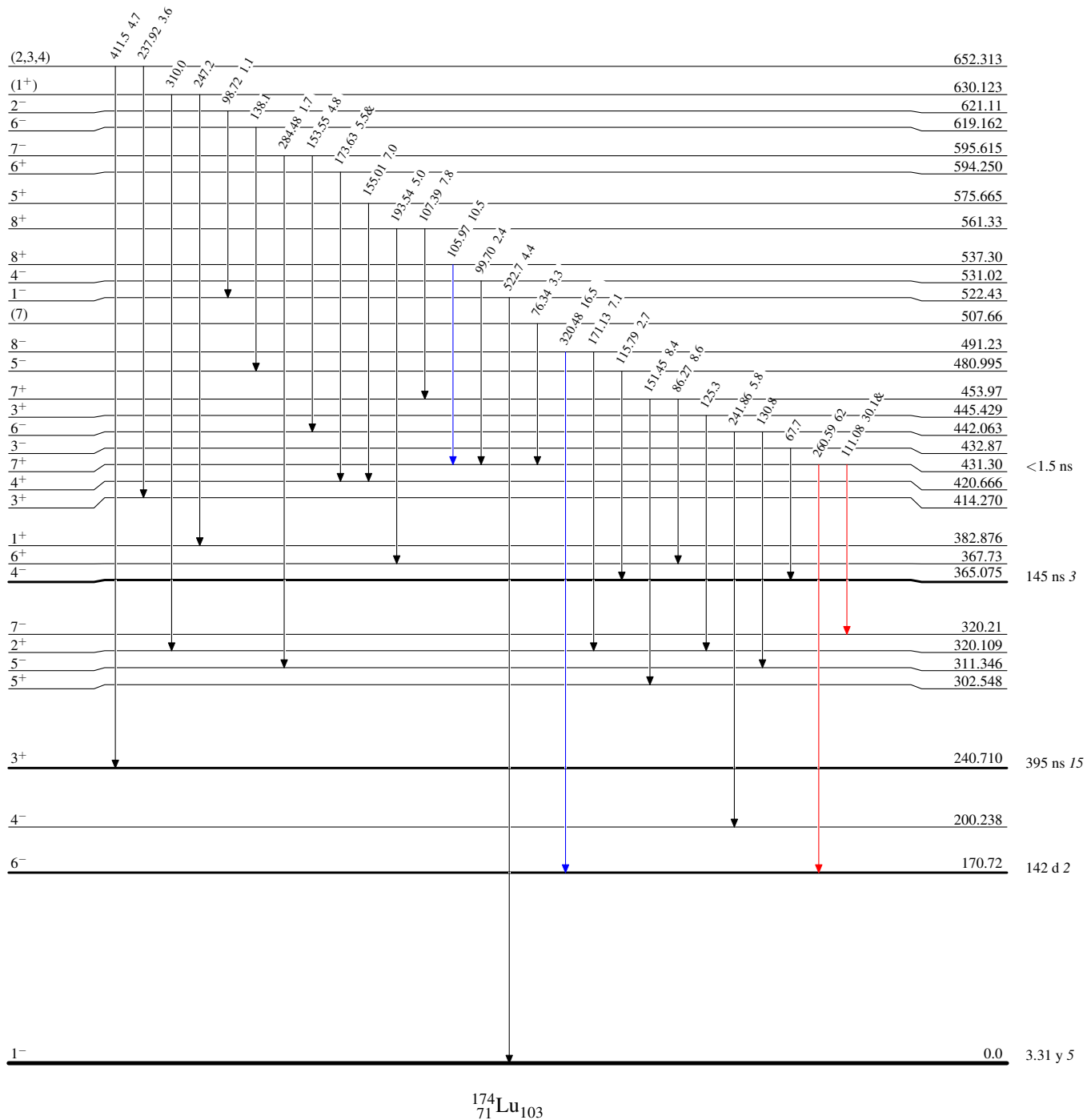
$^{170}\text{Er}(^7\text{Li}, 3n\gamma)$  1987Br31

## Level Scheme (continued)

Intensities: Relative  $I_\gamma$   
& Multiply placed: undivided intensity given

## Legend

—  $I_\gamma < 2\% \times I_\gamma^{\text{max}}$   
—  $I_\gamma < 10\% \times I_\gamma^{\text{max}}$   
—  $I_\gamma > 10\% \times I_\gamma^{\text{max}}$





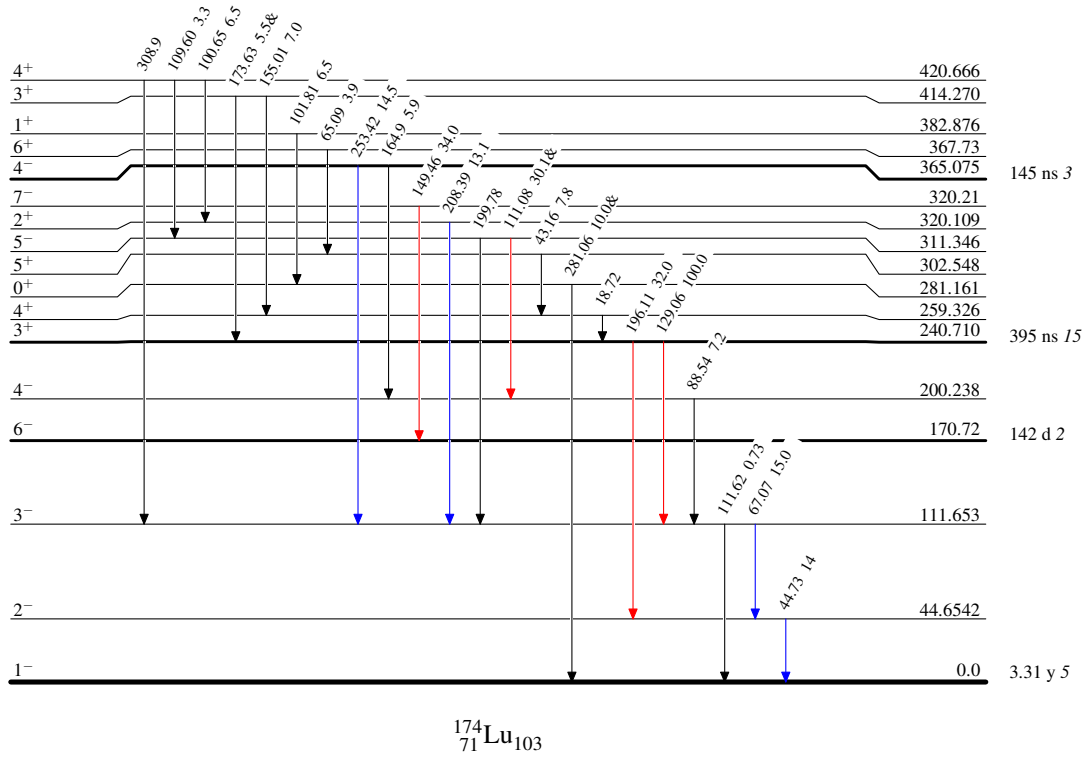
$^{170}\text{Er}(^7\text{Li},3n\gamma)$  1987Br31

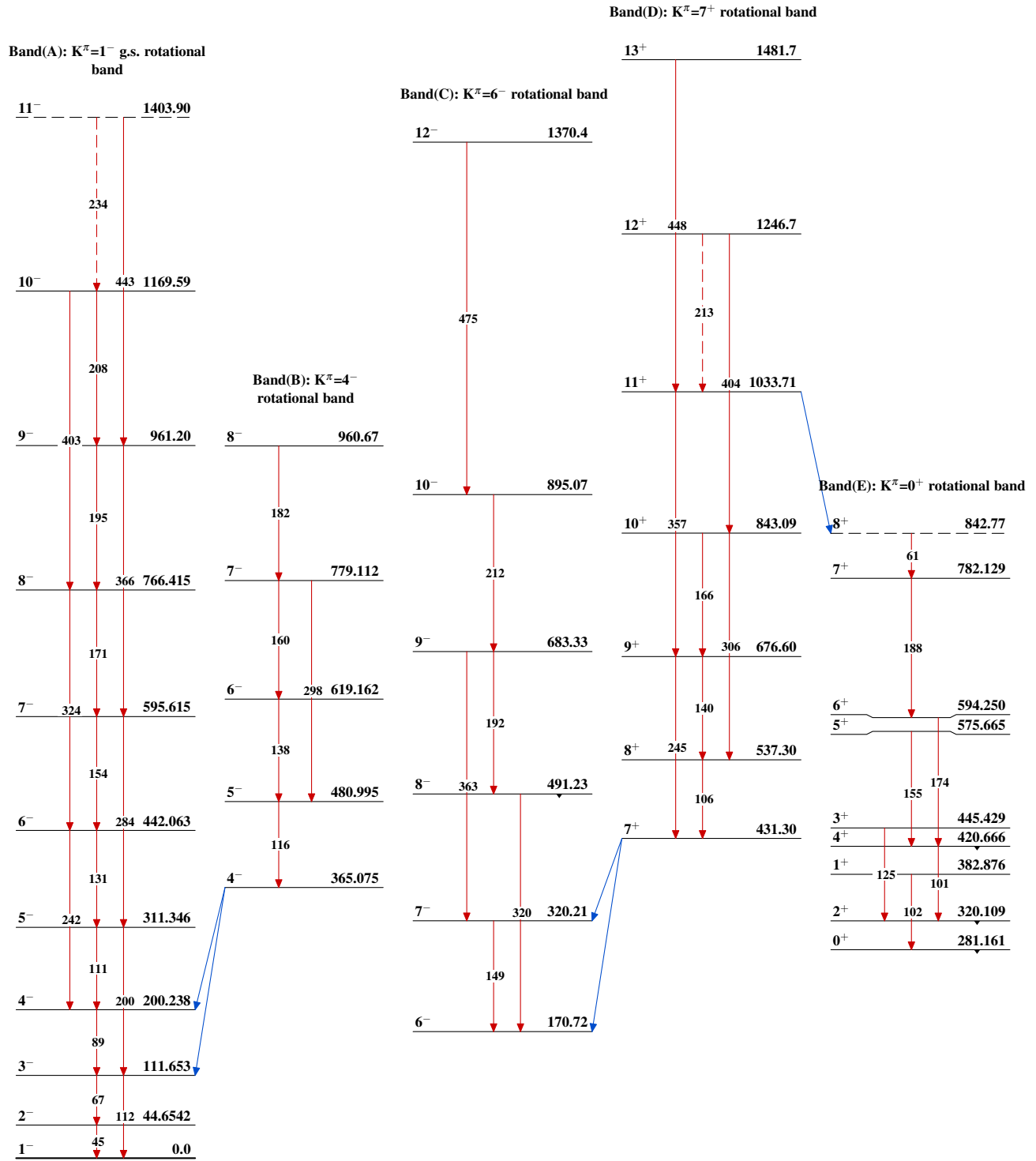
## Level Scheme (continued)

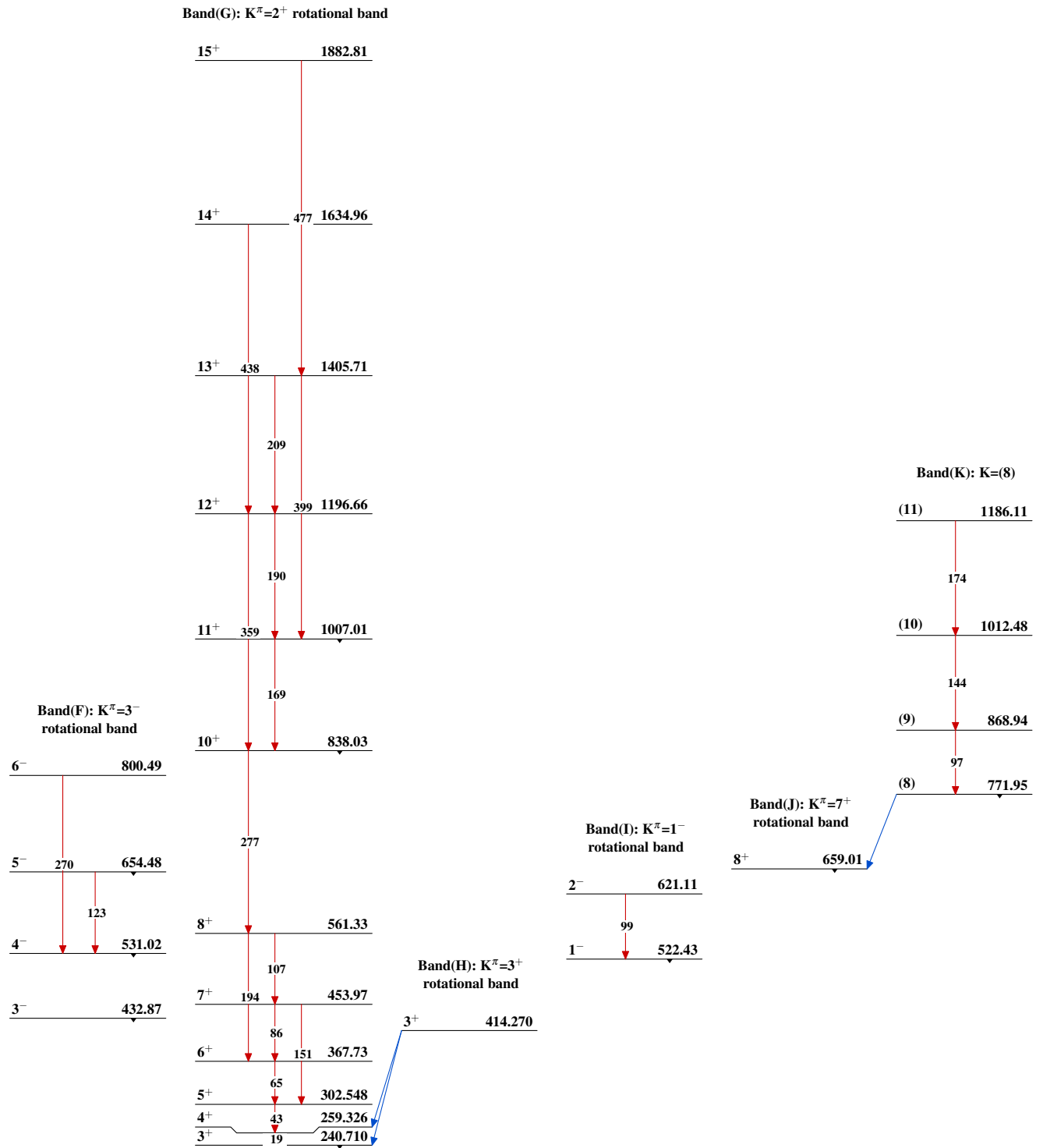
Intensities: Relative  $I_\gamma$   
& Multiply placed: undivided intensity given

## Legend

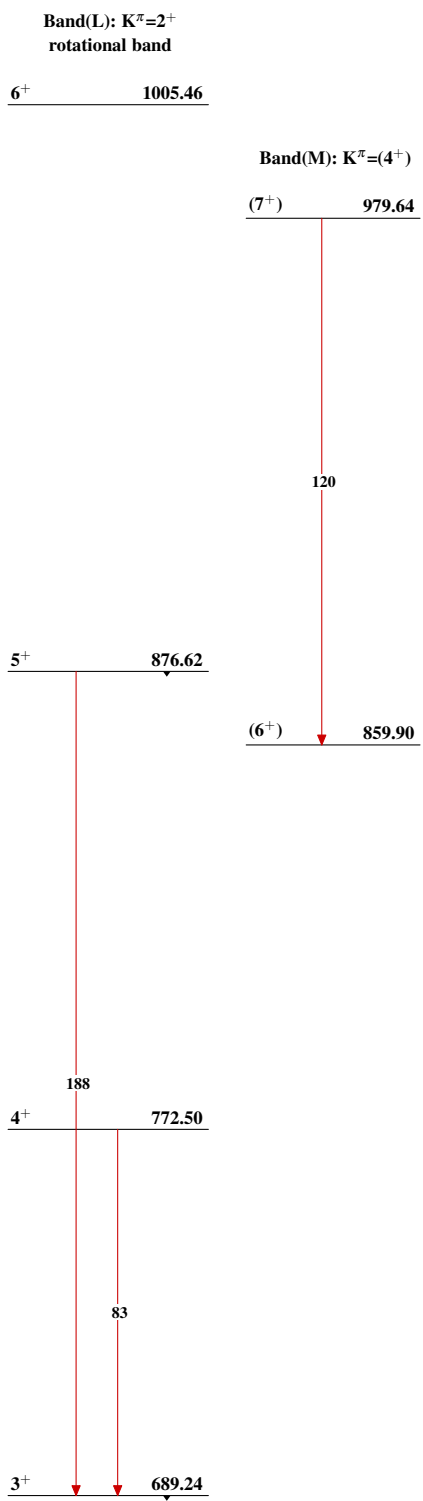
—→  $I_\gamma < 2\% \times I_\gamma^{\max}$   
 —→  $I_\gamma < 10\% \times I_\gamma^{\max}$   
 —→  $I_\gamma > 10\% \times I_\gamma^{\max}$



$^{170}\text{Er}(^7\text{Li},3n\gamma) \quad 1987\text{Br31}$ 

$^{170}\text{Er}(^7\text{Li},3\text{n}\gamma)$  1987Br31 (continued)

$^{170}\text{Er}(^7\text{Li},3\text{n}\gamma)$  **1987Br31 (continued)**



$^{174}_{71}\text{Lu}_{103}$