

Adopted Levels, Gammas

| Type            | Author       | History<br>Citation  | Literature Cutoff Date |
|-----------------|--------------|----------------------|------------------------|
| Full Evaluation | M. J. Martin | NDS 114, 1497 (2013) | 31-Aug-2013            |

$Q(\beta^-) = -8.78 \times 10^3$  5; S(n)=10305 19; S(p)=4167 12;  $Q(\alpha) = 4934.3$  16 2017Wa10

$Q(\varepsilon) = 3104$  10; S(2n)=18812 19; S(2p)=5769 12;  $Q(\varepsilon p) = 963$  9 2017Wa10

[Additional information 1.](#)

Calculations:

Gamow-Teller  $\beta^+$  decay: 1988Ku20, 1988Su16.

g.s. properties: 1996La03.

 $^{152}\text{Er}$  Levels

The level scheme is that proposed by 1992Ku13 from (HI,xn $\gamma$ ) and agrees, in general, with those proposed by earlier investigators.

Cross Reference (XREF) Flags

|   |                                               |   |                                  |
|---|-----------------------------------------------|---|----------------------------------|
| A | $^{152}\text{Tm}$ $\varepsilon$ decay (8.0 s) | D | $^{156}\text{Yb}$ $\alpha$ decay |
| B | $^{152}\text{Tm}$ $\varepsilon$ decay (5.2 s) | E | (HI,xn $\gamma$ )                |
| C | $^{153}\text{Yb}$ $\beta^+$ p decay           |   |                                  |

| E(level) <sup>†</sup>     | J $\pi$ <sup>‡</sup> | T <sub>1/2</sub> <sup>#</sup> | XREF  | Comments                                                                                                                                                                                                                                                           |
|---------------------------|----------------------|-------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.0 <sup>@</sup>          | 0 <sup>+</sup>       | 10.3 s 1                      | ABCDE | $\% \varepsilon + \% \beta^+ = 10$ 4; $\% \alpha = 90$ 4<br>T <sub>1/2</sub> from 1982Bo04. Others: 10 s 1 (1982To14), 9.8 s 3 (1981HoZM,1970To16),<br>10.1 s 2 (1977Ha48).<br>$\% \alpha$ : From 1987To02.<br>$\langle r^2 \rangle^{1/2} = 5.07$ fm 3 (2004An14). |
| 808.3 <sup>@</sup> 1      | 2 <sup>+</sup>       |                               | ABC E | J $\pi$ : E2 $\gamma$ to 0 <sup>+</sup> .<br>Predicted B(E2) $\uparrow = 0.59$ 10 (1989Ra16, best fit global syst). this corresponds to<br>T <sub>1/2</sub> = 1.39 ps +29-20.                                                                                      |
| 1480.9 <sup>@</sup> 2     | 4 <sup>+</sup>       |                               | ABC E |                                                                                                                                                                                                                                                                    |
| 1524.2 3                  | (3 <sup>-</sup> )    |                               | A     | J $\pi$ : based on syst for N=84 nuclei.                                                                                                                                                                                                                           |
| 1715.4 2                  | (2 <sup>+</sup> )    |                               | A     | J $\pi$ : based on syst for N=84 nuclei.                                                                                                                                                                                                                           |
| 1903.4 <sup>@</sup> 2     | 6 <sup>+</sup>       |                               | B E   |                                                                                                                                                                                                                                                                    |
| 2183.3 2                  | 8 <sup>+</sup>       | 1.8 ns 3                      | B E   | $\mu = -0.56$ 64 (2005St24,1984AdZZ)<br>Configuration=( $\nu, f_{7/2}$ )( $\nu, h_{9/2}$ ).                                                                                                                                                                        |
| 2947.6 3                  | 10 <sup>+</sup>      |                               | E     | Configuration=( $\pi, h_{11/2}$ ) <sup>+2</sup> .                                                                                                                                                                                                                  |
| $\approx 3730$ ?          |                      |                               | A     | E(level): possible multiplet with J $\pi$ =1 <sup>-</sup> ,2 <sup>-</sup> ,3 <sup>-</sup> ; deduced from $^{152}\text{Tm}$ $\varepsilon$ decay (8.0 s).                                                                                                            |
| 3735.0 <sup>&amp;</sup> 3 | 12 <sup>+</sup>      |                               | E     |                                                                                                                                                                                                                                                                    |
| 4289.2 <sup>&amp;</sup> 3 | 14 <sup>+</sup>      |                               | E     |                                                                                                                                                                                                                                                                    |
| 4519.3 <sup>&amp;</sup> 3 | 16 <sup>+</sup>      | 1.2 ns 3                      | E     | $\mu = +4.6$ 21 (2005St24,1984AdZZ)                                                                                                                                                                                                                                |
| 4536.1 4                  | (15) <sup>+</sup>    |                               | E     |                                                                                                                                                                                                                                                                    |
| 4685.0 4                  | 16 <sup>+</sup>      | 4.6 ns 14                     | E     |                                                                                                                                                                                                                                                                    |
| 5080.4 3                  | 18 <sup>+</sup>      |                               | E     | Configuration=( $\pi, h_{11/2}$ ) <sup>+2</sup> <sub>10+</sub> ( $\nu, f_{7/2}$ )( $\nu, h_{9/2}$ ).                                                                                                                                                               |
| 5414.8 4                  |                      |                               | E     |                                                                                                                                                                                                                                                                    |
| 5459.9 4                  | (17) <sup>-</sup>    |                               | E     |                                                                                                                                                                                                                                                                    |
| 5635.3 4                  | (18) <sup>-</sup>    |                               | E     |                                                                                                                                                                                                                                                                    |
| 5810.9 4                  | (19) <sup>-</sup>    |                               | E     |                                                                                                                                                                                                                                                                    |
| 5966.7 4                  |                      |                               | E     |                                                                                                                                                                                                                                                                    |
| 6036.8 4                  | (19) <sup>-</sup>    |                               | E     |                                                                                                                                                                                                                                                                    |
| 6176.4 4                  | (20) <sup>-</sup>    |                               | E     |                                                                                                                                                                                                                                                                    |
| 6407.4 4                  |                      |                               | E     |                                                                                                                                                                                                                                                                    |

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**Adopted Levels, Gammas (continued)** $^{152}\text{Er}$  Levels (continued)

| E(level) <sup>†</sup> | J <sup>π</sup> <sup>‡</sup> | XREF | E(level) <sup>†</sup> | J <sup>π</sup> <sup>‡</sup> | T <sub>1/2</sub> <sup>#</sup> | XREF |
|-----------------------|-----------------------------|------|-----------------------|-----------------------------|-------------------------------|------|
| 6477.4 5              | (20 <sup>-</sup> )          | E    | 8691.0 7              |                             |                               | E    |
| 6486.9 4              | (21 <sup>-</sup> )          | E    | 8863.4 5              |                             |                               | E    |
| 6555.0 4              | (21 <sup>-</sup> )          | E    | 9679.8 7              |                             |                               | E    |
| 6734.3 11             |                             | E    | 9711.8 5              | 28 <sup>+</sup>             | 35 ns 4                       | E    |
| 6756.8?               |                             | E    | 9725.3 7              |                             |                               | E    |
| 6837.6 4              | (22 <sup>-</sup> )          | E    | 10083.2 7             |                             |                               | E    |
| 7011.8 4              | (22 <sup>-</sup> )          | E    | 10306.5 6             |                             |                               | E    |
| 7118.8 4              | (23 <sup>-</sup> )          | E    | 10394.3 6             |                             |                               | E    |
| 7448.7 4              | (24 <sup>-</sup> )          | E    | 10548.3 6             |                             |                               | E    |
| 8113.0 5              |                             | E    | 11121.4 6             |                             |                               | E    |
| 8233.3 4              | (26 <sup>-</sup> )          | E    | 11400.0 7             |                             |                               | E    |
| 8350.3 5              |                             | E    | 12121.4 7             |                             |                               | E    |
| 8489.8 6              |                             | E    | 13029.7 7             |                             |                               | E    |
| 8514.7 7              | (25)                        | E    | 13386.9 9             |                             | 11 ns 1                       | E    |
| 8527.9 5              | (27)                        | E    | 14944.6 12            |                             |                               | E    |
| 8659.9 6              | (26 <sup>-</sup> )          | E    |                       |                             |                               |      |

<sup>†</sup> From a least-squares fit to the E<sub>γ</sub> data, and rounded off by the evaluator to one decimal digit.

<sup>‡</sup> From (HI,xn<sub>γ</sub>), unless otherwise noted. Assignments in (HI,xn<sub>γ</sub>) are based on angular correlation and conversion coefficient measurements.

<sup>#</sup> From (HI,xn<sub>γ</sub>), unless otherwise noted.

@ Band(A): Band - α Configuration=(ν,f<sub>7/2</sub>)<sup>+2</sup>.

& Band(B): Band - β Configuration=(π,h<sub>11/2</sub>)<sub>10+</sub><sup>+2</sup> (ν,f<sub>7/2</sub>)<sup>+2</sup>.

 $\gamma(^{152}\text{Er})$ 

| E <sub>i</sub> (level) | J <sub>i</sub> <sup>π</sup> | E <sub>γ</sub> <sup>‡</sup> | I <sub>γ</sub> <sup>‡</sup> | E <sub>f</sub> | J <sub>f</sub> <sup>π</sup>          | Mult. <sup>#</sup> | α <sup>†</sup> | Comments                                                                                                                                                                                              |
|------------------------|-----------------------------|-----------------------------|-----------------------------|----------------|--------------------------------------|--------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 808.3                  | 2 <sup>+</sup>              | 808.2 & 1                   |                             | 0.0            | 0 <sup>+</sup>                       | E2                 | 0.00528        | α(K)=0.00437 7; α(L)=0.000708 10;<br>α(M)=0.0001586 23; α(N+..)=4.22×10 <sup>-5</sup> 6<br>α(N)=3.68×10 <sup>-5</sup> 6; α(O)=5.16×10 <sup>-6</sup> 8;<br>α(P)=2.48×10 <sup>-7</sup> 4                |
| 1480.9                 | 4 <sup>+</sup>              | 672.6 & 1                   |                             | 808.3          | 2 <sup>+</sup>                       | E2                 | 0.00797        | α(K)=0.00652 10; α(L)=0.001129 16;<br>α(M)=0.000254 4; α(N+..)=6.74×10 <sup>-5</sup> 10<br>α(N)=5.89×10 <sup>-5</sup> 9; α(O)=8.16×10 <sup>-6</sup> 12;<br>α(P)=3.68×10 <sup>-7</sup> 6               |
| 1524.2                 | (3 <sup>-</sup> )           | 715.9 & 2                   |                             | 808.3          | 2 <sup>+</sup>                       | [E1]               | 0.00261        | α(K)=0.00222 4; α(L)=0.000305 5;<br>α(M)=6.69×10 <sup>-5</sup> 10; α(N+..)=1.79×10 <sup>-5</sup> 3<br>α(N)=1.554×10 <sup>-5</sup> 22; α(O)=2.23×10 <sup>-6</sup> 4;<br>α(P)=1.208×10 <sup>-7</sup> 17 |
| 1715.4                 | (2 <sup>+</sup> )           | 906.8 & 2<br>1716.0 & 3     | 100 & 17<br>33 & 10         | 808.3          | 2 <sup>+</sup><br>0.0 0 <sup>+</sup> |                    |                |                                                                                                                                                                                                       |
| 1903.4                 | 6 <sup>+</sup>              | 422.5 & 1                   |                             | 1480.9         | 4 <sup>+</sup>                       | E2                 | 0.0257         | α(K)=0.0200 3; α(L)=0.00440 7; α(M)=0.001011 15;<br>α(N+..)=0.000265 4<br>α(N)=0.000233 4; α(O)=3.10×10 <sup>-5</sup> 5;<br>α(P)=1.089×10 <sup>-6</sup> 16                                            |
| 2183.3                 | 8 <sup>+</sup>              | 279.9 & 1                   |                             | 1903.4         | 6 <sup>+</sup>                       | E2                 | 0.0854         | α(K)=0.0615 9; α(L)=0.0185 3; α(M)=0.00433 6;<br>α(N+..)=0.001121 16<br>α(N)=0.000991 14; α(O)=0.0001264 18;<br>α(P)=3.12×10 <sup>-6</sup> 5<br>B(E2)(W.u.)=3.5 6                                     |

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**Adopted Levels, Gammas (continued)**

| $\gamma(^{152}\text{Er})$ (continued) |                   |            |            |        |                   |         |            |                  |                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------|-------------------|------------|------------|--------|-------------------|---------|------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $E_i(\text{level})$                   | $J_i^\pi$         | $E_\gamma$ | $I_\gamma$ | $E_f$  | $J_f^\pi$         | Mult. # | $\delta^@$ | $\alpha^\dagger$ | Comments                                                                                                                                                                                                                                                                                                                           |
| 2947.6                                | 10 <sup>+</sup>   | 764.3 1    |            | 2183.3 | 8 <sup>+</sup>    | E2      |            | 0.00597          | $\alpha(\text{K})=0.00492$ 7; $\alpha(\text{L})=0.000813$ 12;<br>$\alpha(\text{M})=0.000182$ 3; $\alpha(\text{N}+..)=4.84\times 10^{-5}$ 7<br>$\alpha(\text{N})=4.23\times 10^{-5}$ 6; $\alpha(\text{O})=5.91\times 10^{-6}$ 9;<br>$\alpha(\text{P})=2.79\times 10^{-7}$ 4                                                         |
| 3735.0                                | 12 <sup>+</sup>   | 787.4 1    |            | 2947.6 | 10 <sup>+</sup>   | E2      |            | 0.00558          | $\alpha(\text{K})=0.00461$ 7; $\alpha(\text{L})=0.000755$ 11;<br>$\alpha(\text{M})=0.0001692$ 24; $\alpha(\text{N}+..)=4.50\times 10^{-5}$ 7<br>$\alpha(\text{N})=3.92\times 10^{-5}$ 6; $\alpha(\text{O})=5.49\times 10^{-6}$ 8;<br>$\alpha(\text{P})=2.62\times 10^{-7}$ 4                                                       |
| 4289.2                                | 14 <sup>+</sup>   | 554.2 1    |            | 3735.0 | 12 <sup>+</sup>   | E2      |            | 0.01267          | $\alpha(\text{K})=0.01020$ 15; $\alpha(\text{L})=0.00192$ 3;<br>$\alpha(\text{M})=0.000437$ 7; $\alpha(\text{N}+..)=0.0001152$ 17<br>$\alpha(\text{N})=0.0001008$ 15; $\alpha(\text{O})=1.377\times 10^{-5}$ 20;<br>$\alpha(\text{P})=5.69\times 10^{-7}$ 8                                                                        |
| 4519.3                                | 16 <sup>+</sup>   | 230.1 1    |            | 4289.2 | 14 <sup>+</sup>   | E2      |            | 0.1586           | $\alpha(\text{K})=0.1078$ 16; $\alpha(\text{L})=0.0392$ 6;<br>$\alpha(\text{M})=0.00927$ 14; $\alpha(\text{N}+..)=0.00239$ 4<br>$\alpha(\text{N})=0.00212$ 4; $\alpha(\text{O})=0.000265$ 4;<br>$\alpha(\text{P})=5.25\times 10^{-6}$ 8                                                                                            |
| 4536.1                                | (15) <sup>+</sup> | 247.0 3    |            | 4289.2 | 14 <sup>+</sup>   | M1      |            | 0.225            | B(E2)(W.u.)=13 4<br>$\alpha(\text{K})=0.189$ 3; $\alpha(\text{L})=0.0280$ 5;<br>$\alpha(\text{M})=0.00620$ 10; $\alpha(\text{N}+..)=0.00167$ 3<br>$\alpha(\text{N})=0.001445$ 24; $\alpha(\text{O})=0.000209$ 4;<br>$\alpha(\text{P})=1.159\times 10^{-5}$ 19                                                                      |
| 4685.0                                | 16 <sup>+</sup>   | 149.1 3    | 36 4       | 4536.1 | (15) <sup>+</sup> | M1      |            | 0.911 18         | $\alpha(\text{K})=0.765$ 15; $\alpha(\text{L})=0.1141$ 23;<br>$\alpha(\text{M})=0.0253$ 5; $\alpha(\text{N}+..)=0.00680$ 14<br>$\alpha(\text{N})=0.00590$ 12; $\alpha(\text{O})=0.000854$ 17;<br>$\alpha(\text{P})=4.71\times 10^{-5}$ 10<br>B(M1)(W.u.)=0.00025 9                                                                 |
|                                       |                   | 165.8 3    | 22 2       | 4519.3 | 16 <sup>+</sup>   | M1+E2   | 2.0        | 0.515 11         | $\alpha(\text{K})=0.336$ 7; $\alpha(\text{L})=0.137$ 3; $\alpha(\text{M})=0.0327$ 8;<br>$\alpha(\text{N}+..)=0.00839$ 19<br>$\alpha(\text{N})=0.00744$ 17; $\alpha(\text{O})=0.000924$ 21;<br>$\alpha(\text{P})=1.70\times 10^{-5}$ 3                                                                                              |
|                                       |                   | 395.3      | 100 10     | 4289.2 | 14 <sup>+</sup>   | E2      |            | 0.0309           | B(M1)(W.u.)=2.2 $\times 10^{-5}$ ; B(E2)(W.u.)=1.7<br>$\alpha(\text{K})=0.0238$ 4; $\alpha(\text{L})=0.00546$ 9;<br>$\alpha(\text{M})=0.001259$ 21; $\alpha(\text{N}+..)=0.000329$ 6<br>$\alpha(\text{N})=0.000290$ 5; $\alpha(\text{O})=3.83\times 10^{-5}$ 7;<br>$\alpha(\text{P})=1.283\times 10^{-6}$ 20<br>B(E2)(W.u.)=0.13 5 |
| 5080.4                                | 18 <sup>+</sup>   | 395.9      | 12.2 12    | 4685.0 | 16 <sup>+</sup>   | E2      |            | 0.0307           | $E_\gamma$ : Doublet.<br>$\alpha(\text{K})=0.0237$ 4; $\alpha(\text{L})=0.00543$ 9;<br>$\alpha(\text{M})=0.001253$ 21; $\alpha(\text{N}+..)=0.000327$ 6<br>$\alpha(\text{N})=0.000288$ 5; $\alpha(\text{O})=3.81\times 10^{-5}$ 7;<br>$\alpha(\text{P})=1.278\times 10^{-6}$ 20                                                    |
|                                       |                   | 561.1 1    | 100 5      | 4519.3 | 16 <sup>+</sup>   | E2      |            | 0.01229          | $E_\gamma$ : Doublet.<br>$\alpha(\text{K})=0.00990$ 14; $\alpha(\text{L})=0.00186$ 3;<br>$\alpha(\text{M})=0.000421$ 6; $\alpha(\text{N}+..)=0.0001111$ 16<br>$\alpha(\text{N})=9.73\times 10^{-5}$ 14; $\alpha(\text{O})=1.330\times 10^{-5}$ 19;<br>$\alpha(\text{P})=5.53\times 10^{-7}$ 8                                      |
| 5414.8                                |                   | 334.3 3    |            | 5080.4 | 18 <sup>+</sup>   |         |            |                  |                                                                                                                                                                                                                                                                                                                                    |
| 5459.9                                | (17) <sup>-</sup> | 774.9 2    | 49 5       | 4685.0 | 16 <sup>+</sup>   | E1      |            | 0.00223          | $\alpha(\text{K})=0.00190$ 3; $\alpha(\text{L})=0.000259$ 4;<br>$\alpha(\text{M})=5.69\times 10^{-5}$ 8; $\alpha(\text{N}+..)=1.521\times 10^{-5}$ 22                                                                                                                                                                              |

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**Adopted Levels, Gammas (continued)**

| $\gamma(^{152}\text{Er})$ (continued) |                   |                     |                     |        |                   |         |            |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------|-------------------|---------------------|---------------------|--------|-------------------|---------|------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $E_i(\text{level})$                   | $J_i^\pi$         | $E_\gamma^\ddagger$ | $I_\gamma^\ddagger$ | $E_f$  | $J_f^\pi$         | Mult. # | $\delta^@$ | $\alpha^\dagger$      | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 5459.9                                | (17) <sup>-</sup> | 940.7 2             | 100 5               | 4519.3 | 16 <sup>+</sup>   | E1      |            | 1.53×10 <sup>-3</sup> | $\alpha(\text{N})=1.321\times 10^{-5}$ 19;<br>$\alpha(\text{O})=1.90\times 10^{-6}$ 3;<br>$\alpha(\text{P})=1.034\times 10^{-7}$ 15<br>$\alpha(\text{K})=0.001308$ 19;<br>$\alpha(\text{L})=0.0001769$ 25;<br>$\alpha(\text{M})=3.88\times 10^{-5}$ 6;<br>$\alpha(\text{N}+..)=1.038\times 10^{-5}$ 15<br>$\alpha(\text{N})=9.01\times 10^{-6}$ 13;<br>$\alpha(\text{O})=1.298\times 10^{-6}$ 19;<br>$\alpha(\text{P})=7.16\times 10^{-8}$ 10 |
| 5635.3                                | (18) <sup>-</sup> | 175.5 2             |                     | 5459.9 | (17) <sup>-</sup> | M1+E2   | +0.2       | 0.570 10              | $\alpha(\text{K})=0.475$ 8; $\alpha(\text{L})=0.0739$ 12;<br>$\alpha(\text{M})=0.0165$ 3; $\alpha(\text{N}+..)=0.00441$ 8<br>$\alpha(\text{N})=0.00383$ 7; $\alpha(\text{O})=0.000549$ 9;<br>$\alpha(\text{P})=2.91\times 10^{-5}$ 5                                                                                                                                                                                                          |
| 5810.9                                | (19) <sup>-</sup> | 176.3 3             | 15.6 16             | 5635.3 | (18) <sup>-</sup> | M1      |            | 0.570 11              | $\alpha(\text{K})=0.479$ 9; $\alpha(\text{L})=0.0712$ 13;<br>$\alpha(\text{M})=0.0158$ 3; $\alpha(\text{N}+..)=0.00424$ 8<br>$\alpha(\text{N})=0.00368$ 7; $\alpha(\text{O})=0.000533$ 10; $\alpha(\text{P})=2.94\times 10^{-5}$ 6                                                                                                                                                                                                            |
|                                       |                   | 730.4 2             | 100 5               | 5080.4 | 18 <sup>+</sup>   | E1      |            | 0.00251               | $\alpha(\text{K})=0.00214$ 3; $\alpha(\text{L})=0.000293$ 5;<br>$\alpha(\text{M})=6.42\times 10^{-5}$ 9;<br>$\alpha(\text{N}+..)=1.716\times 10^{-5}$ 25<br>$\alpha(\text{N})=1.490\times 10^{-5}$ 21;<br>$\alpha(\text{O})=2.14\times 10^{-6}$ 3;<br>$\alpha(\text{P})=1.161\times 10^{-7}$ 17                                                                                                                                               |
| 5966.7                                | (19) <sup>-</sup> | 331.3 3             |                     | 5635.3 | (18) <sup>-</sup> | M1+E2   | 1.0        | 0.227                 | $\alpha(\text{K})=0.177$ 3; $\alpha(\text{L})=0.0388$ 7;<br>$\alpha(\text{M})=0.00891$ 16;<br>$\alpha(\text{N}+..)=0.00234$ 5                                                                                                                                                                                                                                                                                                                 |
| 6036.8                                |                   | 226.2 3             | 55 6                | 5810.9 | (19) <sup>-</sup> |         |            |                       | $\alpha(\text{N})=0.00205$ 4; $\alpha(\text{O})=0.000275$ 5;<br>$\alpha(\text{P})=1.012\times 10^{-5}$ 17                                                                                                                                                                                                                                                                                                                                     |
|                                       |                   | 401.4 2             | 100 10              | 5635.3 | (18) <sup>-</sup> | M1      |            | 0.0616                | $\alpha(\text{K})=0.0519$ 8; $\alpha(\text{L})=0.00756$ 11;<br>$\alpha(\text{M})=0.001673$ 25;<br>$\alpha(\text{N}+..)=0.000450$ 7<br>$\alpha(\text{N})=0.000390$ 6; $\alpha(\text{O})=5.66\times 10^{-5}$ 9; $\alpha(\text{P})=3.15\times 10^{-6}$ 5                                                                                                                                                                                         |
|                                       |                   | 577.0 3             | 50 5                | 5459.9 | (17) <sup>-</sup> | E2      |            | 0.01148               | $\alpha(\text{K})=0.00927$ 14; $\alpha(\text{L})=0.001714$ 25; $\alpha(\text{M})=0.000389$ 6;<br>$\alpha(\text{N}+..)=0.0001026$ 15<br>$\alpha(\text{N})=8.98\times 10^{-5}$ 13;<br>$\alpha(\text{O})=1.230\times 10^{-5}$ 18;<br>$\alpha(\text{P})=5.19\times 10^{-7}$ 8                                                                                                                                                                     |
| 6176.4                                | (20) <sup>-</sup> | 140.4 4             | 4 2                 | 6036.8 | (19) <sup>-</sup> | M1      |            | 1.080 24              | $\alpha(\text{K})=0.906$ 20; $\alpha(\text{L})=0.135$ 3;<br>$\alpha(\text{M})=0.0300$ 7; $\alpha(\text{N}+..)=0.00807$ 18<br>$\alpha(\text{N})=0.00700$ 15; $\alpha(\text{O})=0.001012$ 22; $\alpha(\text{P})=5.58\times 10^{-5}$ 12                                                                                                                                                                                                          |
|                                       |                   | 209.6 3             | 30 3                | 5966.7 |                   | M1+E2   | +4.0       | 0.0409                | $\alpha(\text{K})=0.0315$ 5; $\alpha(\text{L})=0.00725$ 11;<br>$\alpha(\text{M})=0.00167$ 3;<br>$\alpha(\text{N}+..)=0.000438$ 7                                                                                                                                                                                                                                                                                                              |
|                                       |                   | 365.5 2             | 100 5               | 5810.9 | (19) <sup>-</sup> |         |            |                       | $\alpha(\text{N})=0.000385$ 6; $\alpha(\text{O})=5.09\times 10^{-5}$ 8; $\alpha(\text{P})=1.709\times 10^{-6}$ 25                                                                                                                                                                                                                                                                                                                             |

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**Adopted Levels, Gammas (continued)**

| $\gamma(^{152}\text{Er})$ (continued) |                   |                     |                     |                  |                   |         |                 |                  |                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------------|-------------------|---------------------|---------------------|------------------|-------------------|---------|-----------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $E_i(\text{level})$                   | $J_i^\pi$         | $E_\gamma^\ddagger$ | $I_\gamma^\ddagger$ | $E_f$            | $J_f^\pi$         | Mult. # | $\delta^\oplus$ | $\alpha^\dagger$ | Comments                                                                                                                                                                                                                                                                                                                                       |
| 6407.4                                |                   | 596.4 3             |                     | 5810.9           | (19) <sup>-</sup> |         |                 |                  |                                                                                                                                                                                                                                                                                                                                                |
| 6477.4                                | (20) <sup>-</sup> | 1395.3              |                     | 5080.4           | 18 <sup>+</sup>   | (M2)    |                 | 0.00650          | $\alpha(\text{K})=0.00545$ 8; $\alpha(\text{L})=0.000804$ 12;<br>$\alpha(\text{M})=0.000178$ 3; $\alpha(\text{N}+..)=6.37\times 10^{-5}$ 9<br>$\alpha(\text{N})=4.16\times 10^{-5}$ 6; $\alpha(\text{O})=6.04\times 10^{-6}$ 9;<br>$\alpha(\text{P})=3.38\times 10^{-7}$ 5; $\alpha(\text{IPF})=1.58\times 10^{-5}$ 3<br>E $\gamma$ : Doublet. |
| 6486.9                                | (21) <sup>-</sup> | 310.7 2             |                     | 6176.4           | (20) <sup>-</sup> | M1      |                 | 0.1213           | $\alpha(\text{K})=0.1021$ 16; $\alpha(\text{L})=0.01499$ 23;<br>$\alpha(\text{M})=0.00332$ 5; $\alpha(\text{N}+..)=0.000892$ 14<br>$\alpha(\text{N})=0.000774$ 12; $\alpha(\text{O})=0.0001121$ 17;<br>$\alpha(\text{P})=6.23\times 10^{-6}$ 10                                                                                                |
| 6555.0                                | (21) <sup>-</sup> | 68.6 3              | 6 2                 | 6486.9           | (21) <sup>-</sup> | M1      |                 | 8.4 3            | $\alpha(\text{K})=7.03$ 24; $\alpha(\text{L})=1.06$ 4; $\alpha(\text{M})=0.236$ 8;<br>$\alpha(\text{N}+..)=0.0635$ 22<br>$\alpha(\text{N})=0.0551$ 19; $\alpha(\text{O})=0.0080$ 3;<br>$\alpha(\text{P})=0.000437$ 15                                                                                                                          |
|                                       |                   | 147.5 4<br>378.7 3  | 1.8 6<br>29 3       | 6407.4<br>6176.4 | (20) <sup>-</sup> | M1      |                 | 0.0718           | $\alpha(\text{K})=0.0605$ 9; $\alpha(\text{L})=0.00882$ 13;<br>$\alpha(\text{M})=0.00195$ 3; $\alpha(\text{N}+..)=0.000525$ 8<br>$\alpha(\text{N})=0.000455$ 7; $\alpha(\text{O})=6.60\times 10^{-5}$ 10;<br>$\alpha(\text{P})=3.68\times 10^{-6}$ 6                                                                                           |
|                                       |                   | 518.1 2             | 100 5               | 6036.8           | (19) <sup>-</sup> | E2      |                 | 0.01501          | $\alpha(\text{K})=0.01200$ 17; $\alpha(\text{L})=0.00234$ 4;<br>$\alpha(\text{M})=0.000533$ 8; $\alpha(\text{N}+..)=0.0001403$ 20<br>$\alpha(\text{N})=0.0001230$ 18; $\alpha(\text{O})=1.669\times 10^{-5}$ 24;<br>$\alpha(\text{P})=6.66\times 10^{-7}$ 10                                                                                   |
|                                       |                   | 744.2 2             | 38 4                | 5810.9           | (19) <sup>-</sup> | E2      |                 | 0.00633          | $\alpha(\text{K})=0.00521$ 8; $\alpha(\text{L})=0.000869$ 13;<br>$\alpha(\text{M})=0.000195$ 3; $\alpha(\text{N}+..)=5.18\times 10^{-5}$ 8<br>$\alpha(\text{N})=4.52\times 10^{-5}$ 7; $\alpha(\text{O})=6.31\times 10^{-6}$ 9;<br>$\alpha(\text{P})=2.95\times 10^{-7}$ 5<br>E $\gamma$ : Doublet.                                            |
| 6734.3                                |                   | 256.9               |                     | 6477.4           | (20) <sup>-</sup> |         |                 |                  |                                                                                                                                                                                                                                                                                                                                                |
| 6756.8?                               |                   | 278.9 <sup>b</sup>  |                     | 6477.4           | (20) <sup>-</sup> |         |                 |                  |                                                                                                                                                                                                                                                                                                                                                |
| 6837.6                                | (22) <sup>-</sup> | 661.3 3             |                     | 6176.4           | (20) <sup>-</sup> | (E2)    |                 | 0.00829          | E $\gamma$ : Multiplet.<br>$\alpha(\text{K})=0.00677$ 10; $\alpha(\text{L})=0.001180$ 17;<br>$\alpha(\text{M})=0.000266$ 4; $\alpha(\text{N}+..)=7.05\times 10^{-5}$ 10<br>$\alpha(\text{N})=6.16\times 10^{-5}$ 9; $\alpha(\text{O})=8.53\times 10^{-6}$ 13;<br>$\alpha(\text{P})=3.82\times 10^{-7}$ 6                                       |
| 7011.8                                | (22) <sup>-</sup> | 456.9 3             | 100 10              | 6555.0           | (21) <sup>-</sup> | M1      |                 | 0.0440           | $\alpha(\text{K})=0.0371$ 6; $\alpha(\text{L})=0.00538$ 8;<br>$\alpha(\text{M})=0.001190$ 18; $\alpha(\text{N}+..)=0.000320$ 5<br>$\alpha(\text{N})=0.000277$ 4; $\alpha(\text{O})=4.02\times 10^{-5}$ 6;<br>$\alpha(\text{P})=2.25\times 10^{-6}$ 4                                                                                           |
|                                       |                   | 524.8 3             | 71 7                | 6486.9           | (21) <sup>-</sup> | M1+E2   | +1.0            | 0.0227           | $\alpha(\text{K})=0.0188$ 3; $\alpha(\text{L})=0.00300$ 5;<br>$\alpha(\text{M})=0.000671$ 10; $\alpha(\text{N}+..)=0.000179$ 3<br>$\alpha(\text{N})=0.0001558$ 23; $\alpha(\text{O})=2.21\times 10^{-5}$ 4;<br>$\alpha(\text{P})=1.108\times 10^{-6}$ 16                                                                                       |
|                                       |                   | 534.3 3             | 59 6                | 6477.4           | (20) <sup>-</sup> | E2      |                 | 0.01388          | $\alpha(\text{K})=0.01113$ 16; $\alpha(\text{L})=0.00214$ 4;<br>$\alpha(\text{M})=0.000486$ 7; $\alpha(\text{N}+..)=0.0001281$ 19<br>$\alpha(\text{N})=0.0001122$ 17; $\alpha(\text{O})=1.527\times 10^{-5}$ 23;<br>$\alpha(\text{P})=6.19\times 10^{-7}$ 9                                                                                    |
|                                       |                   | 1596.5 7            | 20 7                | 5414.8           |                   |         |                 |                  |                                                                                                                                                                                                                                                                                                                                                |

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**Adopted Levels, Gammas (continued)**

| $\gamma(^{152}\text{Er})$ (continued) |                   |                     |                     |        |                   |                    |                 |                  |                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------|-------------------|---------------------|---------------------|--------|-------------------|--------------------|-----------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $E_i(\text{level})$                   | $J_i^\pi$         | $E_\gamma^\ddagger$ | $I_\gamma^\ddagger$ | $E_f$  | $J_f^\pi$         | Mult. <sup>#</sup> | $\delta^\oplus$ | $\alpha^\dagger$ | Comments                                                                                                                                                                                                                                                                                                                               |
| 7118.8                                | (23) <sup>-</sup> | 281.3 3             | 12.0 12             | 6837.6 | (22) <sup>-</sup> | M1                 |                 | 0.1584 25        | $\alpha(\text{K})=0.1333$ 21; $\alpha(\text{L})=0.0196$ 3;<br>$\alpha(\text{M})=0.00434$ 7; $\alpha(\text{N}+..)=0.001168$ 19<br>$\alpha(\text{N})=0.001013$ 16; $\alpha(\text{O})=0.0001467$ 23; $\alpha(\text{P})=8.14\times 10^{-6}$ 13                                                                                             |
|                                       |                   | 563.8 1             | 100 5               | 6555.0 | (21) <sup>-</sup> | E2                 |                 | 0.01215          | $\alpha(\text{K})=0.00979$ 14; $\alpha(\text{L})=0.00183$ 3;<br>$\alpha(\text{M})=0.000415$ 6; $\alpha(\text{N}+..)=0.0001096$ 16<br>$\alpha(\text{N})=9.60\times 10^{-5}$ 14; $\alpha(\text{O})=1.312\times 10^{-5}$ 19; $\alpha(\text{P})=5.47\times 10^{-7}$ 8                                                                      |
|                                       |                   | 631.8 2             | 29 3                | 6486.9 | (21) <sup>-</sup> | E2                 |                 | 0.00923          | $\alpha(\text{K})=0.00751$ 11; $\alpha(\text{L})=0.001334$ 19;<br>$\alpha(\text{M})=0.000301$ 5; $\alpha(\text{N}+..)=7.97\times 10^{-5}$ 12<br>$\alpha(\text{N})=6.97\times 10^{-5}$ 10; $\alpha(\text{O})=9.62\times 10^{-6}$ 14; $\alpha(\text{P})=4.23\times 10^{-7}$ 6                                                            |
| 7448.7                                | (24) <sup>-</sup> | 329.9 1             | 100 5               | 7118.8 | (23) <sup>-</sup> | (M1)               |                 | 0.1034           | $\alpha(\text{K})=0.0871$ 13; $\alpha(\text{L})=0.01275$ 19;<br>$\alpha(\text{M})=0.00282$ 4; $\alpha(\text{N}+..)=0.000759$ 11<br>$\alpha(\text{N})=0.000658$ 10; $\alpha(\text{O})=9.54\times 10^{-5}$ 14; $\alpha(\text{P})=5.30\times 10^{-6}$ 8                                                                                   |
|                                       |                   | 436.7 3             | 20.6 21             | 7011.8 | (22) <sup>-</sup> | E2                 |                 | 0.0235           | $\alpha(\text{K})=0.0184$ 3; $\alpha(\text{L})=0.00395$ 6;<br>$\alpha(\text{M})=0.000907$ 14; $\alpha(\text{N}+..)=0.000238$ 4<br>$\alpha(\text{N})=0.000209$ 4; $\alpha(\text{O})=2.79\times 10^{-5}$ 5;<br>$\alpha(\text{P})=1.003\times 10^{-6}$ 15                                                                                 |
| 8113.0                                |                   | 664.4 3             |                     | 7448.7 | (24) <sup>-</sup> |                    |                 |                  |                                                                                                                                                                                                                                                                                                                                        |
| 8233.3                                | (26) <sup>-</sup> | 120.4 3             | 6 2                 | 8113.0 |                   |                    |                 |                  |                                                                                                                                                                                                                                                                                                                                        |
|                                       |                   | 784.6 2             | 100 10              | 7448.7 | (24) <sup>-</sup> | E2                 |                 | 0.00563          | $\alpha(\text{K})=0.00465$ 7; $\alpha(\text{L})=0.000762$ 11;<br>$\alpha(\text{M})=0.0001707$ 24;<br>$\alpha(\text{N}+..)=4.54\times 10^{-5}$ 7<br>$\alpha(\text{N})=3.96\times 10^{-5}$ 6; $\alpha(\text{O})=5.54\times 10^{-6}$ 8;<br>$\alpha(\text{P})=2.64\times 10^{-7}$ 4                                                        |
| 8350.3                                |                   | 901.6 3             |                     | 7448.7 | (24) <sup>-</sup> |                    |                 |                  |                                                                                                                                                                                                                                                                                                                                        |
| 8489.8                                |                   | 256.5               |                     | 8233.3 | (26) <sup>-</sup> |                    |                 |                  | $E_\gamma$ : Doublet.                                                                                                                                                                                                                                                                                                                  |
| 8514.7                                | (25)              | 1066.5 7            |                     | 7448.7 | (24) <sup>-</sup> | D                  |                 |                  |                                                                                                                                                                                                                                                                                                                                        |
|                                       |                   | 1394.9              |                     | 7118.8 | (23) <sup>-</sup> | Q                  |                 |                  | $E_\gamma$ : Doublet.                                                                                                                                                                                                                                                                                                                  |
| 8527.9                                | (27)              | 177.4 4             | 4 2                 | 8350.3 |                   |                    |                 |                  |                                                                                                                                                                                                                                                                                                                                        |
|                                       |                   | 294.6 2             | 100 5               | 8233.3 | (26) <sup>-</sup> |                    |                 |                  |                                                                                                                                                                                                                                                                                                                                        |
| 8659.9                                | (26) <sup>-</sup> | 1211.2 6            |                     | 7448.7 | (24) <sup>-</sup> | E2                 |                 | 0.00229          | $\alpha(\text{K})=0.00192$ 3; $\alpha(\text{L})=0.000283$ 4;<br>$\alpha(\text{M})=6.26\times 10^{-5}$ 9;<br>$\alpha(\text{N}+..)=2.31\times 10^{-5}$ 4<br>$\alpha(\text{N})=1.455\times 10^{-5}$ 21; $\alpha(\text{O})=2.08\times 10^{-6}$ 3; $\alpha(\text{P})=1.096\times 10^{-7}$ 16;<br>$\alpha(\text{IPF})=6.33\times 10^{-6}$ 12 |
| 8691.0                                |                   | 1242.6 7            |                     | 7448.7 | (24) <sup>-</sup> |                    |                 |                  |                                                                                                                                                                                                                                                                                                                                        |
| 8863.4                                |                   | 335.5 3             | 100 10              | 8527.9 | (27)              |                    |                 |                  |                                                                                                                                                                                                                                                                                                                                        |
|                                       |                   | 373.6 3             | 90 9                | 8489.8 |                   |                    |                 |                  |                                                                                                                                                                                                                                                                                                                                        |
| 9679.8                                |                   | 1152.6 7            |                     | 8527.9 | (27)              |                    |                 |                  |                                                                                                                                                                                                                                                                                                                                        |
| 9711.8                                | 28 <sup>+</sup>   | 848.3 3             | 40 4                | 8863.4 |                   |                    |                 |                  |                                                                                                                                                                                                                                                                                                                                        |
|                                       |                   | 1021.0 7            | 11 3                | 8691.0 |                   |                    |                 |                  |                                                                                                                                                                                                                                                                                                                                        |
|                                       |                   | 1051.9 6            | 100 10              | 8659.9 | (26) <sup>-</sup> | M2+E3              | -1.5            | 0.00864 13       | $\alpha(\text{K})=0.00711$ 10; $\alpha(\text{L})=0.001190$ 17;<br>$\alpha(\text{M})=0.000268$ 4; $\alpha(\text{N}+..)=7.15\times 10^{-5}$ 10<br>$\alpha(\text{N})=6.23\times 10^{-5}$ 9; $\alpha(\text{O})=8.82\times 10^{-6}$ 13; $\alpha(\text{P})=4.40\times 10^{-7}$ 7                                                             |

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**Adopted Levels, Gammas (continued)** $\gamma(^{152}\text{Er})$  (continued)

| $E_i(\text{level})$ | $J_i^\pi$       | $E_\gamma^\ddagger$ | $I_\gamma^\ddagger$ | $E_f$   | $J_f^\pi$       | Comments                                                       |
|---------------------|-----------------|---------------------|---------------------|---------|-----------------|----------------------------------------------------------------|
| 9711.8              | 28 <sup>+</sup> | 1184.1 6            | 59 6                | 8527.9  | (27)            |                                                                |
| 9725.3              |                 | (13.3)              |                     | 9711.8  | 28 <sup>+</sup> | $E_\gamma$ : Not observed. $E_\gamma$ taken from level scheme. |
| 10083.2             |                 | 358.2 3             |                     | 9725.3  |                 |                                                                |
| 10306.5             |                 | 626.8 3             | 100 30              | 9679.8  |                 |                                                                |
|                     |                 | 1777.9 7            | 63 20               | 8527.9  | (27)            |                                                                |
| 10394.3             |                 | 682.7 3             |                     | 9711.8  | 28 <sup>+</sup> |                                                                |
| 10548.3             |                 | 154.2 3             | 100 10              | 10394.3 |                 | Mult.: $\Delta J=1$ (HI,xn $\gamma$ ).                         |
|                     |                 | 465.6 3             | 90 9                | 10083.2 |                 |                                                                |
|                     |                 | 822.6 3             | 61 6                | 9725.3  |                 |                                                                |
| 11121.4             |                 | 814.9 3             | 84 8                | 10306.5 |                 |                                                                |
|                     |                 | 1409.6 7            | 100 10              | 9711.8  | 28 <sup>+</sup> |                                                                |
| 11400.0             |                 | 278.4               |                     | 11121.4 |                 | $E_\gamma$ : Multiplet.                                        |
|                     |                 | 852.0 3             | 100 10              | 10548.3 |                 | Mult.: $\Delta J=2$ (HI,xn $\gamma$ ).                         |
|                     |                 | 1316.1 7            | 25 3                | 10083.2 |                 |                                                                |
|                     |                 | 1687.1 7            | 24 3                | 9711.8  | 28 <sup>+</sup> |                                                                |
| 12121.4             |                 | 721.4 2             |                     | 11400.0 |                 | Mult.: $\Delta J=2$ (HI,xn $\gamma$ ).                         |
| 13029.7             |                 | 908.3 3             |                     | 12121.4 |                 |                                                                |
| 13386.9             |                 | 357.9               |                     | 13029.7 |                 | $E_\gamma$ : Doublet.                                          |
|                     |                 | 1265.5 6            |                     | 12121.4 |                 | Mult.: $\Delta J=3$ (HI,xn $\gamma$ ).                         |
| 14944.6             |                 | 1557.7 8            |                     | 13386.9 |                 |                                                                |

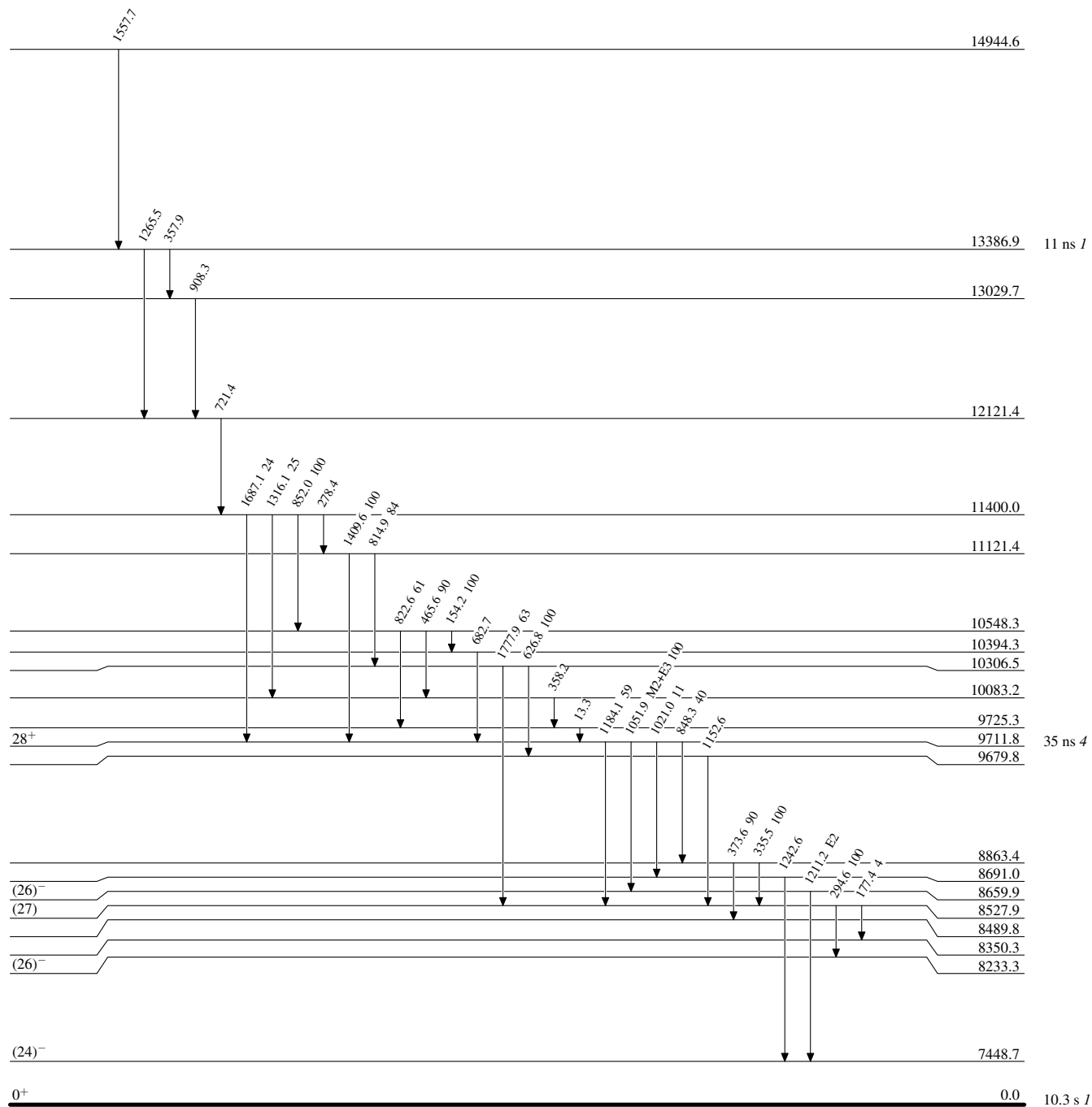
<sup>†</sup> Additional information 2.<sup>‡</sup> From (HI,xn $\gamma$ ), unless otherwise noted.# From (HI,xn $\gamma$ ), based on angular correlation and conversion coefficient measurements, unless otherwise noted.@ From  $\gamma\gamma(\theta)$  in (HI,xn $\gamma$ ).& From  $^{152}\text{Tm}$   $\varepsilon$  decay (5.2 s).<sup>a</sup> From  $^{152}\text{Tm}$   $\varepsilon$  decay (8.0 s).<sup>b</sup> Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

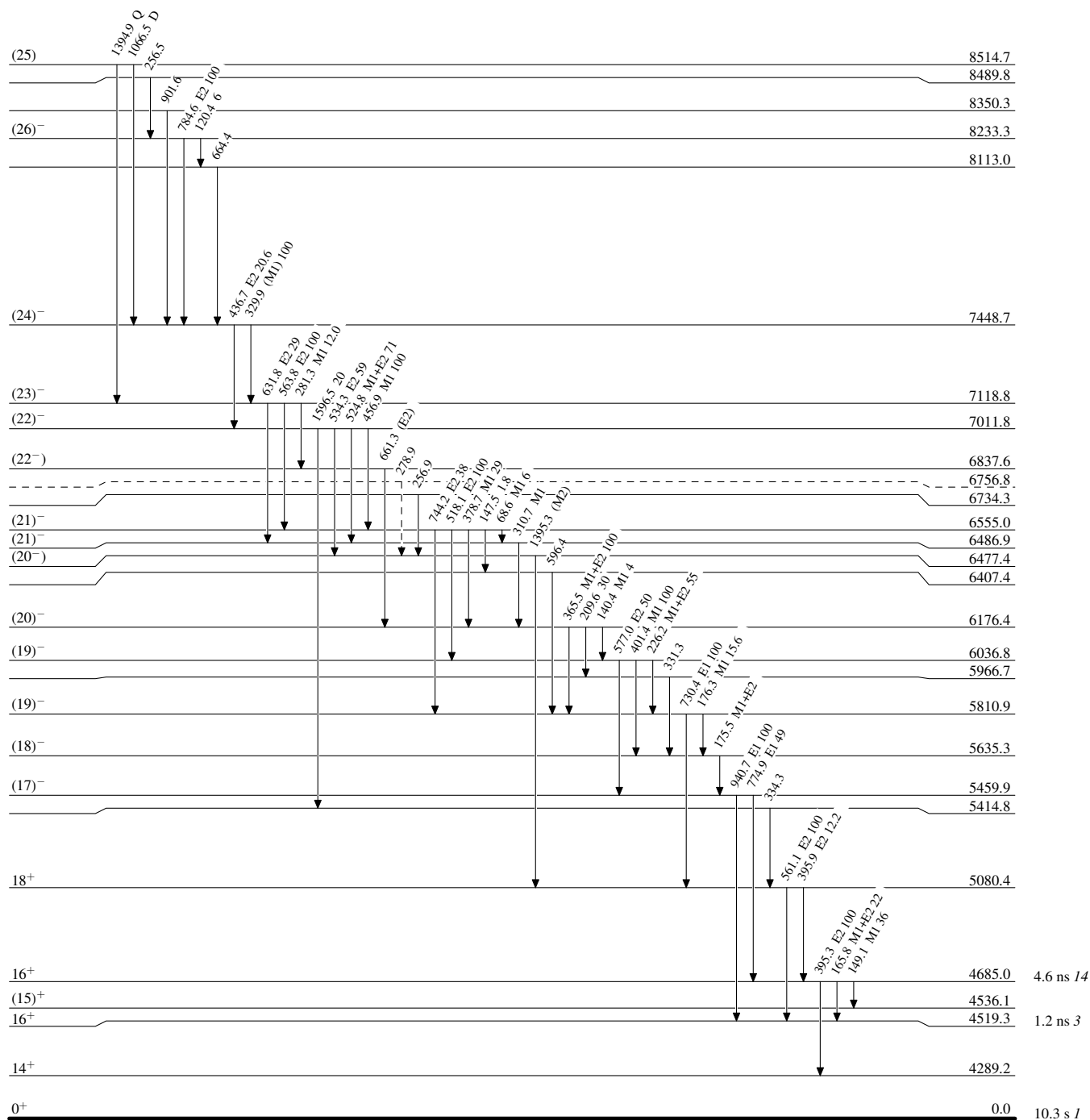
-----►  $\gamma$  Decay (Uncertain)

**Adopted Levels, Gammas**

Legend

**Level Scheme (continued)**

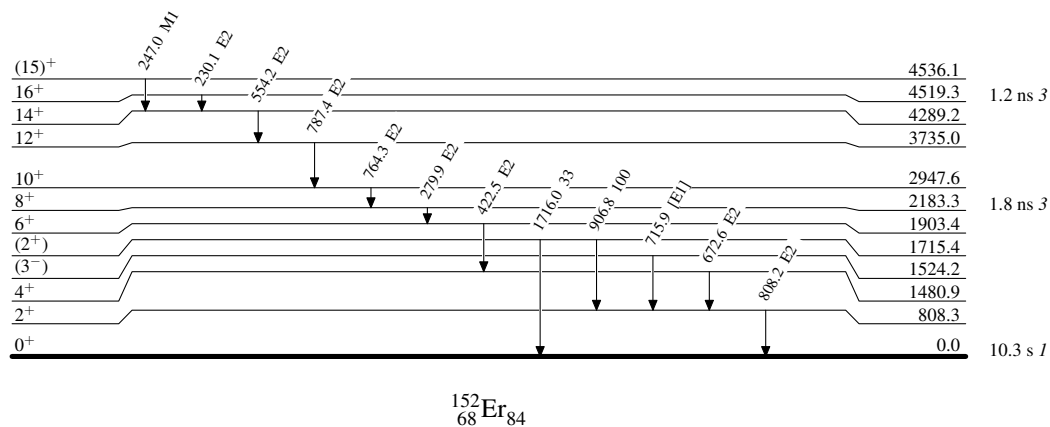
Intensities: Relative photon branching from each level

-----►  $\gamma$  Decay (Uncertain)

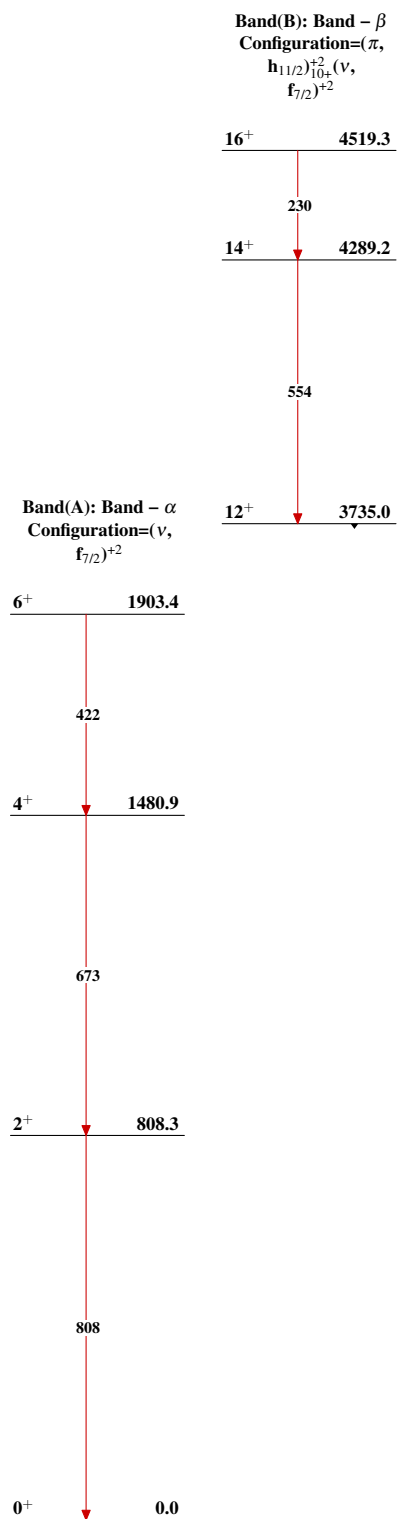
# Adopted Levels, Gammas

## Level Scheme (continued)

Intensities: Relative photon branching from each level



# Adopted Levels, Gammas


 $^{152}_{68}\text{Er}_{84}$