

^{178}Au ε decay $^{1999}\text{Da18}$

| Type | Author | History | Citation | Literature Cutoff Date |
|-----------------|---|---------|----------------------|------------------------|
| Full Evaluation | E. Achterberg, O. A. Capurro, G. V. Marti | | NDS 110, 1473 (2009) | 31-May-2008 |

Parent: ^{178}Au : $E=0.0$; $T_{1/2}=2.6$ s 5; $Q(\varepsilon)=9670$ 60; $\% \varepsilon + \% \beta^+$ decay ≤ 60.0

^{178}Au -Q from [2003Au03](#). T, B from [2003Au02](#).

1998Da18: Low-lying states in ^{178}Pt were populated by ε decay of the parent gold nucleus, obtained from the reaction $^{144}\text{Sm}(^{37}\text{Cl},3n)$, $E=170$ MeV; beam chopped in intervals of 1 s. Measured $E\gamma$, $I\gamma$, $\gamma\gamma$ coincidences, and γ -ray angular correlations using CAESAR array configured with six Compton-suppressed HPGe detectors. Also measured singles γ and conversion electrons, and e- γ coincidences employing a Compton-suppressed Ge and a cooled Si(Li) detectors.

 ^{178}Pt Levels

| E(level) | J^π [†] | Comments |
|------------------------|----------------------|--|
| 0.0 [‡] | 0 ⁺ | |
| 170.3 [‡] 7 | 2 ⁺ | |
| 421.0 [#] 7 | 0 ⁺ | |
| 427.7 [‡] 10 | 4 ⁺ | |
| 653.3 [#] 7 | 2 ⁺ | J^π : Based on the electron conversion coefficient values for the 483.0 keV transition. This assignment is also supported by the angular correlation measurements of the 483.0-170.4 keV cascade. |
| 765.4 [‡] 11 | 6 ⁺ | |
| 1001.2 13 | (3) | J^π : Assignment suggested by the angular correlation of the 830.9-170.4 keV cascade; however, an E0 component is also possible for the 830.9 keV transition, which would indicate a $J^\pi=2^+$ for the 1001.3-keV level. |
| 1058.4 [#] 10 | (4 ⁺) | J^π : Assignment supported by the angular correlation measurements of the 630.6-257.3 keV cascade. |
| 1178.8 [‡] 15 | 8 ⁺ | |
| 1345.3 14 | | |
| 1426.2 11 | | |
| 1476.9 [#] 11 | (6 ⁺) | J^π : Based on the K electron conversion coefficient for the 711.5 keV transition which indicates an M1 or E0 component. |
| 1573.3 12 | | |
| 1581.8 14 | | |
| 1633.3 15 | | |
| 1747.1 14 | | |
| 1810.1 15 | | |
| 1814.8 18 | (7) | |
| 2028.7 15 | | |
| 2138.0 21 | (9) | |
| 2197.3 [#] 13 | (8 ⁺) | |
| 2345.0 21 | | |

[†] Based on γ - γ angular correlations and internal conversion coefficients.

[‡] Band(A): Band 1 g.s. (yrast) rotational band.

[#] Band(B): Band 2 Non-yrast even spin, positive parity band.

 $\gamma(^{178}\text{Pt})$

| E_γ [†] | I_γ | $E_i(\text{level})$ | J_i^π | E_f | J_f^π | Comments |
|-------------------------|---------------|---------------------|----------------|-------|----------------|--|
| 170.4 | 100 3 | 170.3 | 2 ⁺ | 0.0 | 0 ⁺ | |
| 232.1 | ≈ 2.5 | 653.3 | 2 ⁺ | 421.0 | 0 ⁺ | |
| 250.6 | 6.2 22 | 421.0 | 0 ⁺ | 170.3 | 2 ⁺ | Mult.: $A_2=+0.25$ 23, $A_4=+0.54$ 23. |
| 257.3 | 69.2 21 | 427.7 | 4 ⁺ | 170.3 | 2 ⁺ | Mult.: $A_2=+0.15$ 5, $A_4=-0.01$ 5. |

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^{178}Au ε decay **1999Da18** (continued) $\gamma(^{178}\text{Pt})$ (continued)

| E_γ^\dagger | I_γ | $E_i(\text{level})$ | J_i^π | E_f | J_f^π | Mult. ‡ | δ | $\alpha^\#$ | Comments |
|---------------------|----------------|---------------------|-------------------|--------|-------------------|-------------------|----------|-----------------|--|
| 323.2 | | 2138.0 | (9) | 1814.8 | (7) | | | | Not listed in the 1999Da18 γ -ray table, but shown on their proposed level scheme. |
| 337.9 | 32.6 <i>17</i> | 765.4 | 6 ⁺ | 427.7 | 4 ⁺ | | | | |
| 405.0 | 3.6 <i>9</i> | 1058.4 | (4 ⁺) | 653.3 | 2 ⁺ | | | | |
| 413.4 | 13.5 <i>10</i> | 1178.8 | 8 ⁺ | 765.4 | 6 ⁺ | | | | |
| 418.3 | 2.5 <i>10</i> | 1476.9 | (6 ⁺) | 1058.4 | (4 ⁺) | | | | |
| 421.0 | | 421.0 | 0 ⁺ | 0.0 | 0 ⁺ | E0 | | | E_γ : from energies of cross-over γ cascade: 170.4+250.6 keV. Mult.: Strong electron transition without corresponding γ -ray, $X(\text{E0/E2})=0.010$ 4. $\alpha_K(\text{exp})=1.0$ 2, $\alpha_L(\text{exp})=0.18$ 5. Theory: $\alpha_K(\text{M1})=0.1015$, $\alpha_L(\text{M1})=0.0164$, and $\alpha_K(\text{E2})=0.0270$, $\alpha_L(\text{E2})=0.00854$. |
| 483.0 | 14.6 <i>12</i> | 653.3 | 2 ⁺ | 170.3 | 2 ⁺ | E0+(M1)+E2 | 4.2 | 0.0301 | Mult.: $A_2=-0.01$ 9, $A_4=+0.27$ 11; unknown sign for δ . $\alpha_K(\text{exp})=0.11$ 1, $\alpha_L(\text{exp})=0.010$ 2, $\alpha_M(\text{exp})=0.0025$ 4. Theory: $\alpha_K(\text{M1})=0.0743$, $\alpha_L(\text{M1})=0.0120$, $\alpha_M(\text{M1})=0.00276$, and $\alpha_K(\text{E2})=0.0199$, $\alpha_L(\text{E2})=0.00555$, $\alpha_M(\text{E2})=0.00137$. |
| 530.2 | 2.2 <i>6</i> | 2345.0 | | 1814.8 | (7) | | | | |
| 573.7 [@] | | 1001.2 | (3) | 427.7 | 4 ⁺ | | | | |
| 580.0 [@] | ≈ 0.5 | 1345.3 | | 765.4 | 6 ⁺ | | | | |
| 630.6 | 8.0 <i>20</i> | 1058.4 | (4 ⁺) | 427.7 | 4 ⁺ | (E0+M1+E2) | | 0.028 <i>14</i> | Mult.: $\alpha_K(\text{exp}) < 0.09$ (electron line contaminated by a strong K electron line from the 624 keV transition in ^{178}Os). Theory: $\alpha_K(\text{M1})=0.0352$, $\alpha_K(\text{E2})=0.0111$. |
| 636.0 | 6.5 <i>11</i> | 1814.8 | (7) | 1178.8 | 8 ⁺ | | | | |
| 653.2 | 8.0 <i>22</i> | 653.3 | 2 ⁺ | 0.0 | 0 ⁺ | (E2) | | 0.01330 | Mult.: $\alpha_K(\text{exp}) < 0.04$. Theory: $\alpha_K(\text{M1})=0.0322$, $\alpha_K(\text{E2})=0.0103$. |
| 711.5 | 3.2 <i>8</i> | 1476.9 | (6 ⁺) | 765.4 | 6 ⁺ | (E0+M1+E2) | | 0.021 <i>10</i> | Mult.: $\alpha_K(\text{exp})=0.020$ 9. Theory: $\alpha_K(\text{M1})=0.0258$, $\alpha_K(\text{E2})=0.00865$. |
| 720.2 | 3.0 <i>11</i> | 2197.3 | (8 ⁺) | 1476.9 | (6 ⁺) | | | | |
| 807.8 | 4.0 <i>8</i> | 1573.3 | | 765.4 | 6 ⁺ | | | | |
| 830.9 | 6.8 <i>20</i> | 1001.2 | (3) | 170.3 | 2 ⁺ | (M1) | | 0.0210 | Mult.: $A_2=-0.14$ 13, $A_4=-0.20$ 17. $\alpha_K(\text{exp})=0.06$ 4. Theory: $\alpha_K(\text{M1})=0.0174$, $\alpha_K(\text{E2})=0.00634$. |
| 867.9 | 3.0 <i>15</i> | 1633.3 | | 765.4 | 6 ⁺ | | | | |
| 888.1 [@] | ≈ 4.0 | 1058.4 | (4 ⁺) | 170.3 | 2 ⁺ | | | | |
| 917.6 | 5.0 <i>16</i> | 1345.3 | | 427.7 | 4 ⁺ | | | | |
| 998.4 | 1.6 <i>9</i> | 1426.2 | | 427.7 | 4 ⁺ | | | | |
| 1018.3 [@] | ≈ 1.0 | 2197.3 | (8 ⁺) | 1178.8 | 8 ⁺ | | | | |
| 1044.7 | 4.0 <i>21</i> | 1810.1 | | 765.4 | 6 ⁺ | | | | |
| 1049.3 | 3.4 <i>16</i> | 1476.9 | (6 ⁺) | 427.7 | 4 ⁺ | | | | |
| 1145.7 | 2.0 <i>9</i> | 1573.3 | | 427.7 | 4 ⁺ | | | | |
| 1154.1 | 3.3 <i>10</i> | 1581.8 | | 427.7 | 4 ⁺ | | | | |
| 1256.1 | 2.5 <i>11</i> | 1426.2 | | 170.3 | 2 ⁺ | | | | |
| 1263.3 | 4.0 <i>14</i> | 2028.7 | | 765.4 | 6 ⁺ | | | | |
| 1319.4 | 4.1 <i>11</i> | 1747.1 | | 427.7 | 4 ⁺ | | | | |
| 1432.0 | 5.0 <i>19</i> | 2197.3 | (8 ⁺) | 765.4 | 6 ⁺ | | | | |

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^{178}Au ε decay **1999Da18** (continued)

$\gamma(^{178}\text{Pt})$ (continued)

† No uncertainties of γ -ray energies are reported by [1999Da18](#).

‡ Mixing ratios $\delta(E2/M1)$ from angular correlations (in cascade with 170.4 keV transition).

Total theoretical internal conversion coefficients, calculated using the BrIcc code ([2008Ki07](#)) with Frozen orbital approximation based on γ -ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

@ Placement of transition in the level scheme is uncertain.

^{178}Au ϵ decay **1999Da18**

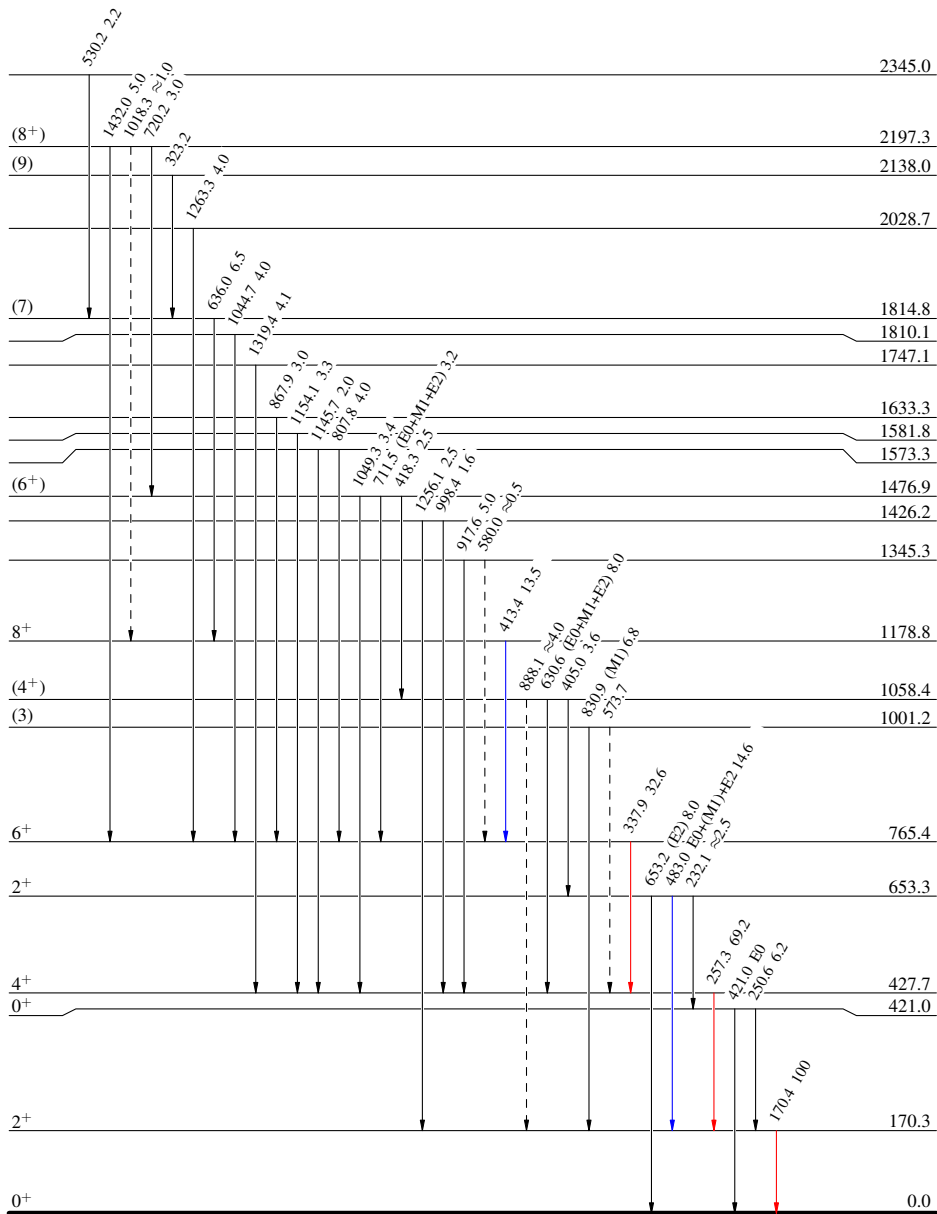
Decay Scheme

Legend

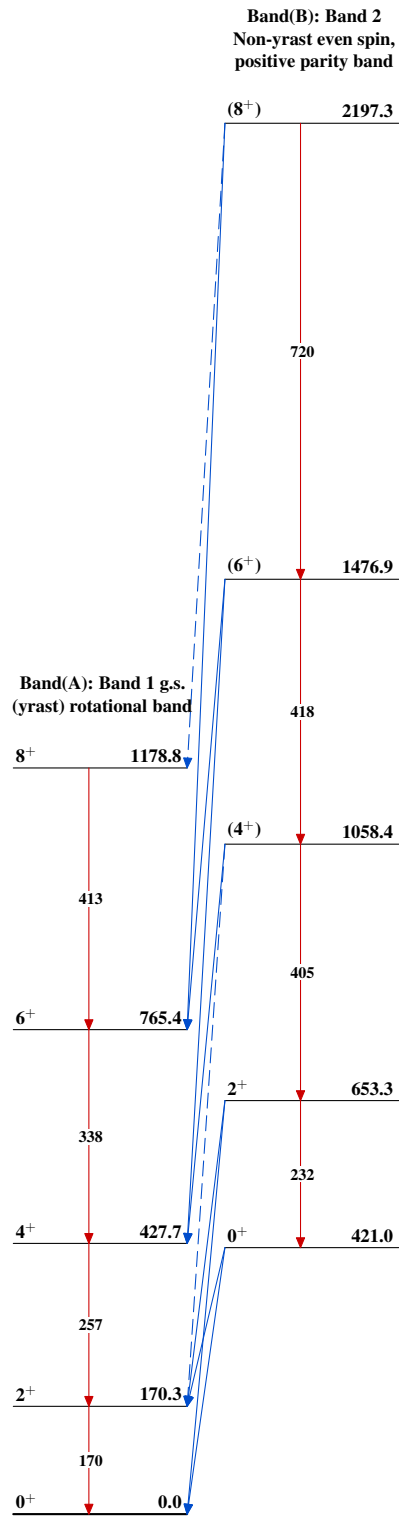
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- - - γ Decay (Uncertain)

Intensities: Relative I_γ

$^{178}_{79}\text{Au}_{99}$ $Q_\epsilon = 9670.60$ $2.6\text{ s } 5$
 $\% \epsilon + \% \beta^+ < 60.0$



$^{178}_{78}\text{Pt}_{100}$

^{178}Au ϵ decay 1999Da18 $^{178}_{78}\text{Pt}_{100}$