## $^{252}$Cf SF decay 2009Lu04,2007Wa20

History

| Type | Author | Citation | Literature Cutoff Date |
|---|---|---|---|
| Full Evaluation | E. Browne, J. K. Tuli | NDS 113, 715 (2012) | 31-May-2011 |

Parent: $^{252}$Cf: E=0; $J^\pi=0^+$; $T_{1/2}$=2.645 y *8*; %SF decay=3.09
Measured Eγ, Iγ, γγ-coin using GAMMASPHERE array (2009Lu04).

### $^{143}$La Levels

The observed E1, M1, and E2 γl rays between band members suggest mixing of quadrupole and octupole collectivity.

| E(level)† | Jπ‡ | E(level)† | Jπ‡ | E(level)† | Jπ‡ | E(level)† | Jπ‡ |
|---|---|---|---|---|---|---|---|
| 0 | $(7/2)^+$ | 789.4# *3* | $(9/2^+)$ | 1778.8& *4* | $(15/2^+)$ | 3118.4@ *5* | $(23/2^-)$ |
| 29.8 *4* | $(3/2)^+$ | 924.98 *20* | $(5/2)^-$ | 1857.6@ *4* | $(15/2^-)$ | 3217.6a *6* | $(25/2^-)$ |
| 211.54 *19* | $(5/2)^+$ | 1010.1 *3* | $(5/2)^-$ | 2143.2# *4* | $(17/2^+)$ | 3628.8& *6* | $(27/2^+)$ |
| 291.27# *20* | $(5/2)^+$ | 1324.9& *4* | $(11/2^+)$ | 2373.9& *5* | $(19/2^+)$ | 3832.0a *7* | $(29/2^-)$ |
| 424.8 *3* | | 1359.2@ *4* | $(11/2^-)$ | 2472.8@ *4* | $(19/2^-)$ | 4350.0a *8* | $(33/2^-)$ |
| 465.92 *21* | $(5/2)^+$ | 1407.92 *24* | $(5/2)^-$ | 2798.4# *5* | $(21/2^+)$ | | |
| 642.91 *21* | $5/2^+$ | 1453.0# *4* | $(13/2^+)$ | 3014.9& *6* | $(23/2^+)$ | | |

† Deduced by evaluators from least-squares fit to γ-ray energies, assuming an uncertainty of 0.3 keV for each γ ray.
‡ Jπ values for levels with J<9/2 are from Adopted Levels, Gammas. For levels with J≥9/2 the assignments are from $^{252}$Cf SF decay, based on band structure and systematics of B(E1)/B(E2) ratios of γ-ray reduced transition probabilities.
# Band(A): Band based on $(5/2)^+$.
@ Band(B): Band based on $(11/2^-)$.
& Band(C): Band based on $(11/2^+)$.
a Band(D): Band based on $(25/2^-)$.

### γ($^{143}$La)

| $E_i$(level) | $J^\pi_i$ | $E_\gamma$† | $I_\gamma$† | $E_f$ | $J^\pi_f$ |
|---|---|---|---|---|---|
| 211.54 | $(5/2)^+$ | 211.5 | | 0 | $(7/2)^+$ |
| 291.27 | $(5/2)^+$ | 261.5 | 19.9 | 29.8 | $(3/2)^+$ |
| | | 291.3 | 100 | 0 | $(7/2)^+$ |
| 424.8 | | 424.8 | | 0 | $(7/2)^+$ |
| 465.92 | $(5/2)^+$ | 254.4 | | 211.54 | $(5/2)^+$ |
| | | 465.9 | | 0 | $(7/2)^+$ |
| 642.91 | $5/2^+$ | 177.0 | | 465.92 | $(5/2)^+$ |
| | | 351.7 | | 291.27 | $(5/2)^+$ |
| | | 431.4 | | 211.54 | $(5/2)^+$ |
| 789.4 | $(9/2^+)$ | 364.6 | 12 | 424.8 | |
| | | 498.1 | 100 | 291.27 | $(5/2)^+$ |
| 924.98 | $(5/2)^-$ | 633.7 | | 291.27 | $(5/2)^+$ |
| | | 713.3 | | 211.54 | $(5/2)^+$ |
| | | 925.0 | | 0 | $(7/2)^+$ |
| 1010.1 | $(5/2)^-$ | 367.2 | | 642.91 | $5/2^+$ |
| | | 544.2 | | 465.92 | $(5/2)^+$ |
| 1324.9 | $(11/2^+)$ | 535.5 | 100 | 789.4 | $(9/2^+)$ |
| 1359.2 | $(11/2^-)$ | 569.8 | 100 | 789.4 | $(9/2^+)$ |
| 1407.92 | $(5/2)^-$ | 482.8 | | 924.98 | $(5/2)^-$ |
| | | 765.1 | | 642.91 | $5/2^+$ |
| | | 1196.4 | | 211.54 | $(5/2)^+$ |

Continued on next page (footnotes at end of table)

## $^{252}$Cf SF decay 2009Lu04,2007Wa20 (continued)

### γ($^{143}$La) (continued)

| $E_i$(level) | $J_i^\pi$ | $E_\gamma$[†] | $I_\gamma$[†] | $E_f$ | $J_f^\pi$ | Mult. | Comments |
|---|---|---|---|---|---|---|---|
| 1453.0 | (13/2$^+$) | 93.9[‡] | <1 | 1359.2 | (11/2$^-$) | | |
| | | 128.1 | 3.3 | 1324.9 | (11/2$^+$) | (M1+E2) | Mult.: Based on $\alpha$=0.5 *2*, measured in a $\gamma\gamma$ coin experiment (2009Lu09). This multipolarity assignment supersedes that of E1 in 2007Wa20. |
| | | 663.6 | 100 | 789.4 | (9/2$^+$) | | |
| 1778.8 | (15/2$^+$) | 325.8 | 100 | 1453.0 | (13/2$^+$) | | |
| | | 453.9 | 49.0 | 1324.9 | (11/2$^+$) | | |
| 1857.6 | (15/2$^-$) | 404.7 | 70.2 | 1453.0 | (13/2$^+$) | | |
| | | 498.4 | 100 | 1359.2 | (11/2$^-$) | | |
| 2143.2 | (17/2$^+$) | 285.5[‡] | <1 | 1857.6 | (15/2$^-$) | | |
| | | 364.5 | 1.3 | 1778.8 | (15/2$^+$) | | |
| | | 690.2 | 100 | 1453.0 | (13/2$^+$) | | |
| 2373.9 | (19/2$^+$) | 230.6 | 8.2 | 2143.2 | (17/2$^+$) | | |
| | | 595.1 | 100 | 1778.8 | (15/2$^+$) | | |
| 2472.8 | (19/2$^-$) | 329.5 | 25.9 | 2143.2 | (17/2$^+$) | | |
| | | 615.2 | 100 | 1857.6 | (15/2$^-$) | | |
| 2798.4 | (21/2$^+$) | 325.7 | 26.5 | 2472.8 | (19/2$^-$) | | |
| | | 424.4 | 25.5 | 2373.9 | (19/2$^+$) | | |
| | | 655.3 | 100 | 2143.2 | (17/2$^+$) | | |
| 3014.9 | (23/2$^+$) | 641.0 | 100 | 2373.9 | (19/2$^+$) | | |
| 3118.4 | (23/2$^-$) | 645.6 | 100 | 2472.8 | (19/2$^-$) | | |
| 3217.6 | (25/2$^-$) | 202.7 | 100 | 3014.9 | (23/2$^+$) | | |
| 3628.8 | (27/2$^+$) | 613.9 | 100 | 3014.9 | (23/2$^+$) | | |
| 3832.0 | (29/2$^-$) | 614.4 | 100 | 3217.6 | (25/2$^-$) | | |
| 4350.0 | (33/2$^-$) | 518.0 | 100 | 3832.0 | (29/2$^-$) | | |

[†] From 2009Lu04.
[‡] Placement of transition in the level scheme is uncertain.

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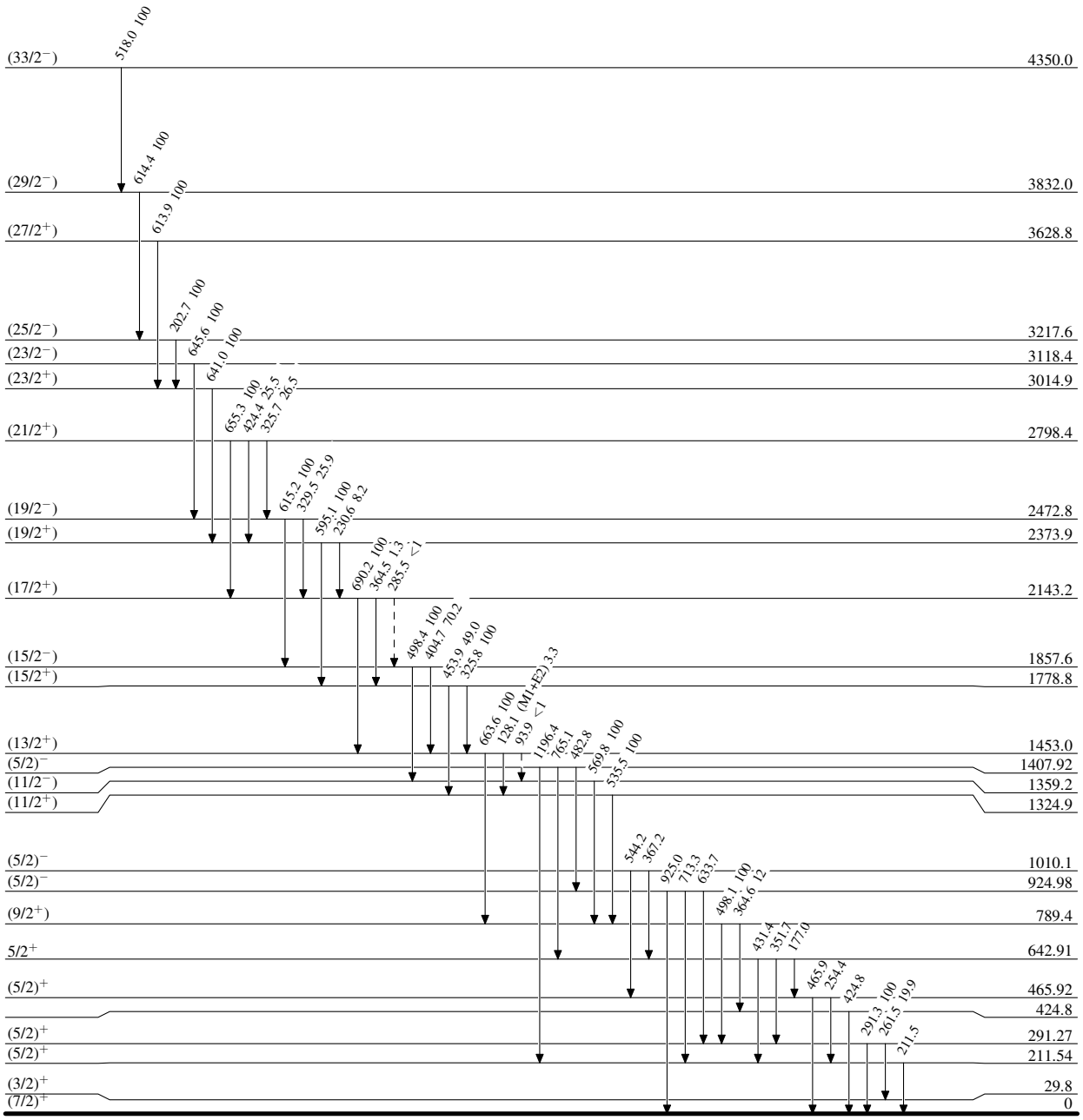
Legend

## Level Scheme

Intensities: Relative photon branching from each level

$\gamma$ Decay (Uncertain)




$^{143}_{57}La_{86}$

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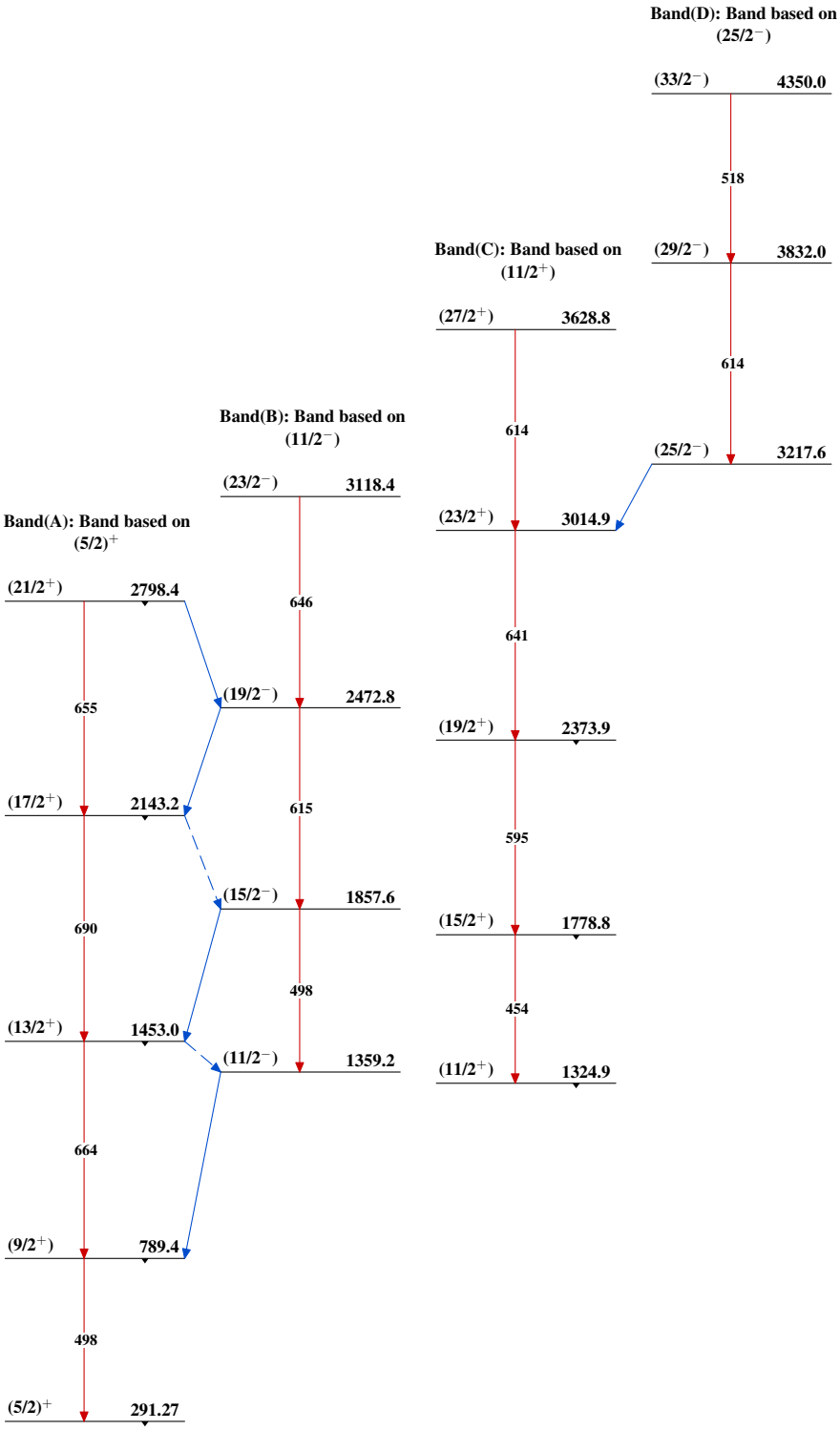


$^{143}_{57}La_{86}$