## $^{92}$Mo($^{34}$S,p2nγ),$^{52}$Cr($^{74}$Se,p2nγ) 1989Wy02

| Type | Author | History Citation | Literature Cutoff Date |
|---|---|---|---|
| Full Evaluation | Jun Chen | NDS 174, 1 (2021) | 15-Apr-2021 |

1989Wy02: two measurements were performed at the Daresbury Nuclear Structure Facility. In the measurement of $^{92}$Mo($^{34}$S,p2nγ), E=150 and 155 MeV $^{34}$S beam was incident on a stacked target of two 0.4 mg/cm$^2$ self-supporting foil of $^{92}$Mo. γ rays were detected with the TESSA3 spectrometer. Measured γγ-coin, γγ(DCO). In the measurement of $^{52}$Cr($^{74}$Se,p2nγ), E=290 MeV $^{74}$Se beam was incident on a $^{52}$Cr target. Reaction products were separated using the Daresbury Recoil Separator and γ rays were detected with an array of 14 BGO-suppressed Ge detectors. Measured Eγ, Iγ. Deduced levels, J, π, band structures. Comparisons with shell-model calculations.

All data are from 1989Wy02.

### $^{123}$La Levels

| E(level)[†] | $J^{\pi}$[#] | Comments |
|---|---|---|
| 0+x[‡] | (5/2$^+$) | Additional information 1. |
| 0+y[b] | (9/2$^+$) | Additional information 2. |
| 0+z[@] | (11/2$^-$) | Additional information 3. |
| 35.7+x[&] *3* | (3/2$^+$) | |
| 209.50+y[a] *18* | (11/2$^+$) | |
| 224.90+x[&] *20* | (7/2$^+$) | |
| 230.80+z[@] *20* | (15/2$^-$) | |
| 448.73+y[b] *20* | (13/2$^+$) | |
| 549.7+x[&] *3* | (11/2$^+$) | |
| 634.1+z[@] *4* | (19/2$^-$) | |
| 715.73+y[a] *24* | (15/2$^+$) | |
| 988.0+x[&] *5* | (15/2$^+$) | |
| 1008.1+y[b] *3* | (17/2$^+$) | |
| 1184.2+z[@] *5* | (23/2$^-$) | |
| 1322.2+y[a] *4* | (19/2$^+$) | |
| 1488.0+x[&] *5* | (19/2$^+$) | |
| 1655.8+y[b] *4* | (21/2$^+$) | |
| 1854.5+z[@] *7* | (27/2$^-$) | |
| 1979.9+x[&] *6* | (23/2$^+$) | |
| 2005.4+y[a] *4* | (23/2$^+$) | |
| 2365.3+y[b] *5* | (25/2$^+$) | |
| 2519.5+x[&] *7* | (27/2$^+$) | |
| 2621.9+z[@] *8* | (31/2$^-$) | |
| 2725.2+y[a] *5* | (27/2$^+$) | |
| 3153.1+x[&] *8* | (31/2$^+$) | |
| 3471.8+z[@] *9* | (35/2$^-$) | |
| 3883.0+x[&] *9* | (35/2$^+$) | |
| 4397.5+z[@] *11* | (39/2$^-$) | |
| 4703.4+x[&] *10* | (39/2$^+$) | |
| 5398.4+z[@] *12* | (43/2$^-$) | |
| 5606.9+x[&] *12* | (43/2$^+$) | |
| 6471.8+z[@] *13* | (47/2$^-$) | |
| 6587.6+x[&] *13* | (47/2$^+$) | |
| 7612.3+z[@] *15* | (51/2$^-$) | |

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## $^{92}Mo(^{34}S,p2n\gamma),^{52}Cr(^{74}Se,p2n\gamma)$ 1989Wy02 (continued)

### $^{123}La$ Levels (continued)

| E(level)[†] | $J^{\pi}$[#] |
|---|---|
| 7647.1+x[&] 14 | (51/2⁺) |
| 8787.8+x[&] 16 | (55/2⁺) |
| 8796.6+z?[@] 17 | (55/2⁻) |
| 10007.1+z?[@] 19 | (59/2⁻) |

[†] From a least-squares fit to γ-ray energies. The bandhead energies are not determined (1989Wy02).
[‡] This level may correspond to the g.s., but it is not established from $^{123}La$ ε decay study.
[#] As given in 2003Pa41 based on measured γ(DCO) and proposed band structures, with parentheses added by the evaluator.
[@] Band(A): Band 1: π1/2[550], α=−1/2.
[&] Band(B): Band 2: π3/2[422], α=−1/2. Configuration=π1/2[420] with α=+1/2 cannot be excluded (1989Wy02).
[a] Band(C): Band 3: π9/2[404], α=−1/2.
[b] Band(c): Band 4: π9/2[404], α=+1/2.

### $\gamma(^{123}La)$

Measured DCO ratios from 1989Wy02 are given under comments. Expected DCO ratios are ≈1.0 for pure dipole transitions (ΔJ=1) and ≈2.0 for pure quadrupole transitions (ΔJ=2).

| $E_\gamma$ | $I_\gamma$[#] | $E_i$(level) | $J^\pi_i$ | $E_f$ | $J^\pi_f$ | Mult.[@] | Comments |
|---|---|---|---|---|---|---|---|
| 189.2 2 | 6 2 | 224.90+x | (7/2⁺) | 35.7+x | (3/2⁺) | Q | DCO=2.05 31 |
| 209.6 2 | 15 3 | 209.50+y | (11/2⁺) | 0+y | (9/2⁺) | D | DCO=1.27 17 |
| 224.9 2 | 4 2 | 224.90+x | (7/2⁺) | 0+x | (5/2⁺) | | |
| 230.8 2 | 71 2 | 230.80+z | (15/2⁻) | 0+z | (11/2⁻) | Q | DCO=1.98 14 |
| 239.4 2 | 11 3 | 448.73+y | (13/2⁺) | 209.50+y | (11/2⁺) | D | DCO=1.07 11 |
| 267.0 2 | 11 3 | 715.73+y | (15/2⁺) | 448.73+y | (13/2⁺) | D | DCO=0.87 14 |
| 292.4 2 | 6 2 | 1008.1+y | (17/2⁺) | 715.73+y | (15/2⁺) | | |
| 314.2 2 | 4 2 | 1322.2+y | (19/2⁺) | 1008.1+y | (17/2⁺) | | |
| 324.8 2 | 14 3 | 549.7+x | (11/2⁺) | 224.90+x | (7/2⁺) | Q | DCO=2.03 26 |
| 333.5 2 | 3 2 | 1655.8+y | (21/2⁺) | 1322.2+y | (19/2⁺) | | |
| 349.5 3 | 5 2 | 2005.4+y | (23/2⁺) | 1655.8+y | (21/2⁺) | | |
| 359.8[&] 3 | 5[&] 2 | 2365.3+y | (25/2⁺) | 2005.4+y | (23/2⁺) | | |
| 359.8[&] 3 | 5[&] 2 | 2725.2+y | (27/2⁺) | 2365.3+y | (25/2⁺) | | |
| 403.3 3 | 60 2 | 634.1+z | (19/2⁻) | 230.80+z | (15/2⁻) | Q | DCO=2.11 18 |
| 438.3 3 | 15 3 | 988.0+x | (15/2⁺) | 549.7+x | (11/2⁺) | Q | DCO=2.11 39 |
| 448.5 3 | 2 1 | 448.73+y | (13/2⁺) | 0+y | (9/2⁺) | | |
| 491.9 3 | 16 3 | 1979.9+x | (23/2⁺) | 1488.0+x | (19/2⁺) | Q | DCO=1.66 31 |
| 500.0 3 | 18 3 | 1488.0+x | (19/2⁺) | 988.0+x | (15/2⁺) | Q | DCO=1.71 23 |
| 506.1 3 | 6 2 | 715.73+y | (15/2⁺) | 209.50+y | (11/2⁺) | | |
| 539.6 3 | 17 4 | 2519.5+x | (27/2⁺) | 1979.9+x | (23/2⁺) | Q | DCO=2.06 37 |
| 550.1 3 | 57 3 | 1184.2+z | (23/2⁻) | 634.1+z | (19/2⁻) | Q | DCO=2.20 26 |
| 559.6 4 | 5 2 | 1008.1+y | (17/2⁺) | 448.73+y | (13/2⁺) | | |
| 606.2 4 | 4 2 | 1322.2+y | (19/2⁺) | 715.73+y | (15/2⁺) | | |
| 633.6 4 | 16 4 | 3153.1+x | (31/2⁺) | 2519.5+x | (27/2⁺) | Q | DCO=2.08 37 |
| 647.6 4 | 6 2 | 1655.8+y | (21/2⁺) | 1008.1+y | (17/2⁺) | | |
| 670.3 4 | 44 3 | 1854.5+z | (27/2⁻) | 1184.2+z | (23/2⁻) | Q | DCO=2.07 25 |
| 683.4 4 | 6 2 | 2005.4+y | (23/2⁺) | 1322.2+y | (19/2⁺) | | |
| 709.4 4 | 5 2 | 2365.3+y | (25/2⁺) | 1655.8+y | (21/2⁺) | | |
| 720.0 4 | 5 2 | 2725.2+y | (27/2⁺) | 2005.4+y | (23/2⁺) | | |

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**$^{92}$Mo($^{34}$S,p2nγ),$^{52}$Cr($^{74}$Se,p2nγ) 1989Wy02 (continued)**

γ($^{123}$La) (continued)

| $E_\gamma$ | $I_\gamma$[#] | $E_i$(level) | $J^\pi_i$ | $E_f$ | $J^\pi_f$ | Mult.[@] | Comments |
|---|---|---|---|---|---|---|---|
| 729.9 *4* | 18 *4* | 3883.0+x | (35/2$^+$) | 3153.1+x | (31/2$^+$) | Q | DCO=2.11 *35* |
| 767.4 *4* | 39 *3* | 2621.9+z | (31/2$^-$) | 1854.5+z | (27/2$^-$) | | |
| 820.4 *5* | 12 *4* | 4703.4+x | (39/2$^+$) | 3883.0+x | (35/2$^+$) | | |
| 849.9 *5* | 30 *4* | 3471.8+z | (35/2$^-$) | 2621.9+z | (31/2$^-$) | Q | DCO=2.16 *27* |
| 903.5 *5* | 8 *3* | 5606.9+x | (43/2$^+$) | 4703.4+x | (39/2$^+$) | | |
| 925.7 *5* | 14 *3* | 4397.5+z | (39/2$^-$) | 3471.8+z | (35/2$^-$) | Q | DCO=1.51 *33* |
| 980.7 *5* | 8 *3* | 6587.6+x | (47/2$^+$) | 5606.9+x | (43/2$^+$) | | |
| 1000.9 *5* | 9 *2* | 5398.4+z | (43/2$^-$) | 4397.5+z | (39/2$^-$) | | |
| 1059.5 *6* | 5 *2* | 7647.1+x | (51/2$^+$) | 6587.6+x | (47/2$^+$) | | |
| 1073.4 *6* | 11 *3* | 6471.8+z | (47/2$^-$) | 5398.4+z | (43/2$^-$) | | |
| 1140.5 *7* | 11 *3* | 7612.3+z | (51/2$^-$) | 6471.8+z | (47/2$^-$) | | |
| 1140.7 *8* | 5 *2* | 8787.8+x | (55/2$^+$) | 7647.1+x | (51/2$^+$) | | |
| 1184.3[‡a] *8* | 5 *2* | 8796.6+z? | (55/2$^-$) | 7612.3+z | (51/2$^-$) | | |
| 1210.5[†a] *9* | 4 *2* | 10007.1+z? | (59/2$^-$) | 8796.6+z? | (55/2$^-$) | | |

[†] Placed from a 8863.5+x, (55/2$^-$) level by 2003Pa41 in $^{92}$Mo($^{40}$Ca,2αpγ).

[‡] A 1182.3γ placed from a 1855.9+x, (23/2$^-$) level by 2003Pa41 in $^{92}$Mo($^{40}$Ca,2αpγ).

[#] Relative to I(209.6γ)+I(230.8γ)+I(324.8γ)=100 (1989Wy02).

[@] From measured DCO ratios in 1989Wy02.

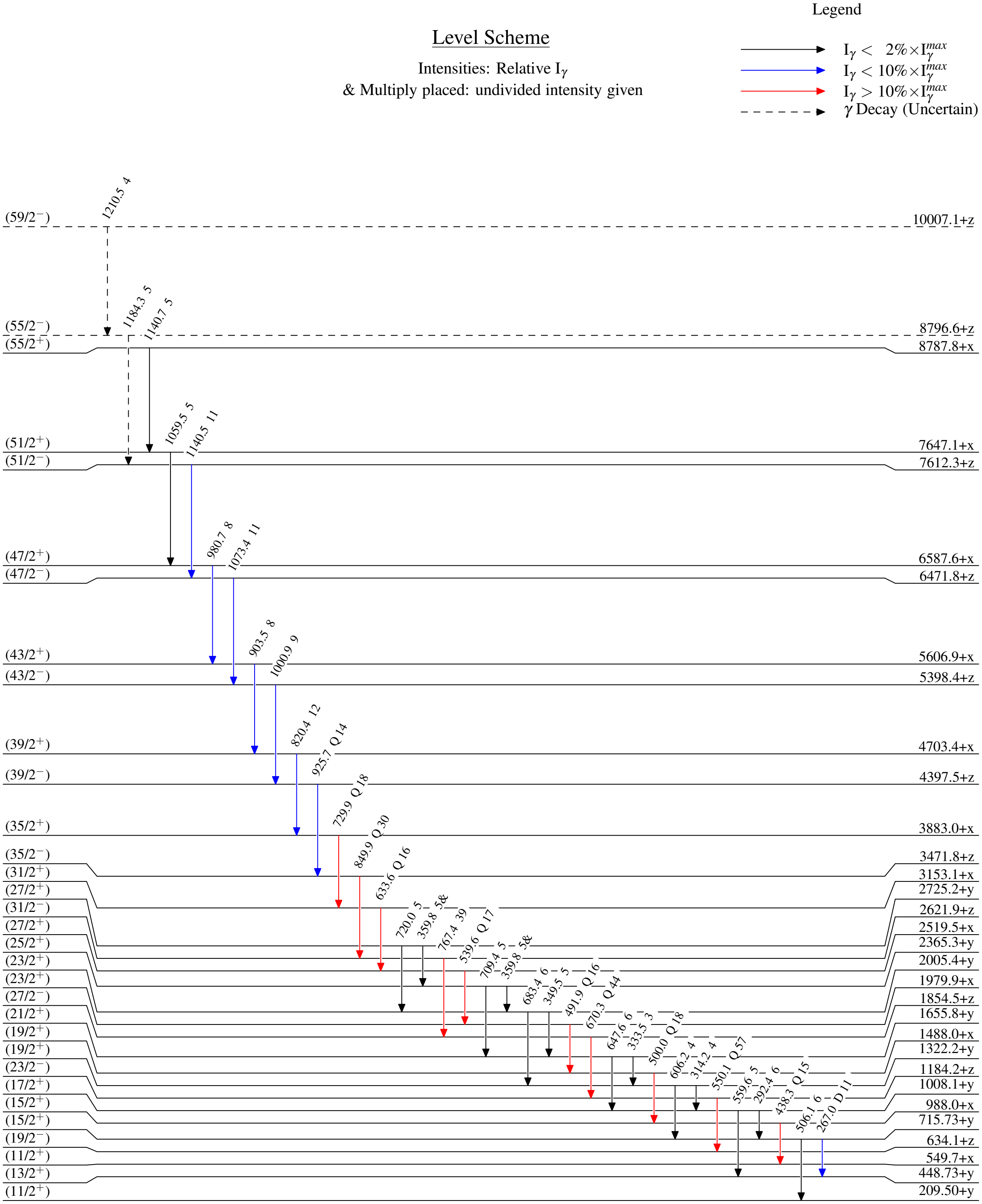
[&] Multiply placed with undivided intensity.

[a] Placement of transition in the level scheme is uncertain.

## $^{92}Mo(^{34}S,p2n\gamma),^{52}Cr(^{74}Se,p2n\gamma)$ 1989Wy02

### Level Scheme

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




$^{123}_{57}La_{66}$

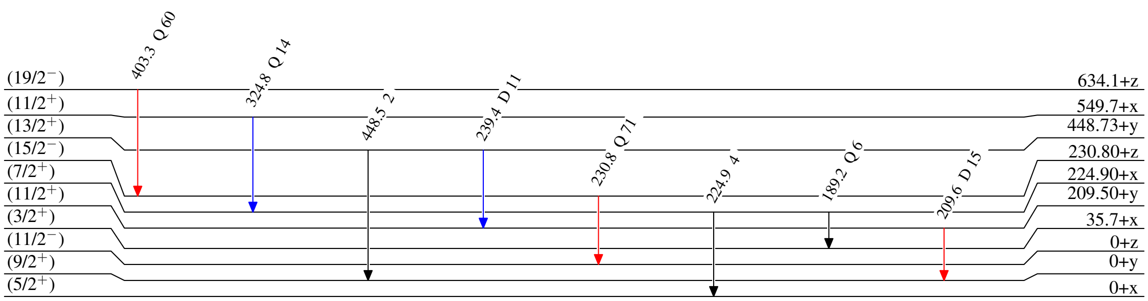
## $^{92}Mo(^{34}S,p2n\gamma),^{52}Cr(^{74}Se,p2n\gamma)$ 1989Wy02

### Level Scheme (continued)

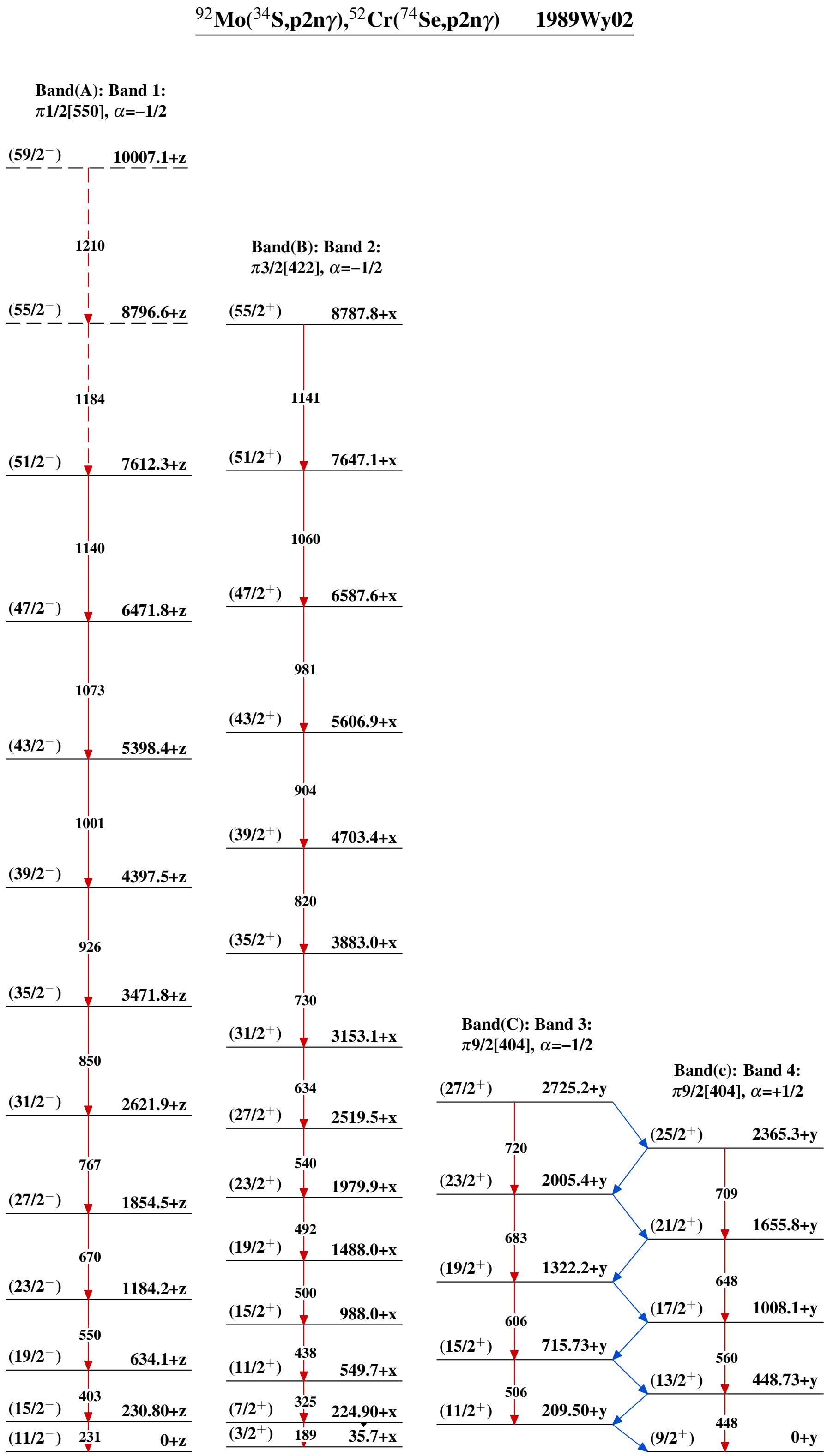
Intensities: Relative $I_\gamma$
& Multiply placed: undivided intensity given

Legend

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




$^{123}_{57}La_{66}$


$^{92}$Mo($^{34}$S,p2nγ),$^{52}$Cr($^{74}$Se,p2nγ) 1989Wy02
Band(A): Band 1:
π1/2[550], α=−1/2
(59/2−) 10007.1+z
1210
(55/2−) 8796.6+z
1184
(51/2−) 7612.3+z
1140
(47/2−) 6471.8+z
1073
(43/2−) 5398.4+z
1001
(39/2−) 4397.5+z
926
(35/2−) 3471.8+z
850
(31/2−) 2621.9+z
767
(27/2−) 1854.5+z
670
(23/2−) 1184.2+z
550
(19/2−) 634.1+z
403
(15/2−) 230.80+z
231
(11/2−) 0+z
Band(B): Band 2:
π3/2[422], α=−1/2
(55/2+) 8787.8+x
1141
(51/2+) 7647.1+x
1060
(47/2+) 6587.6+x
981
(43/2+) 5606.9+x
904
(39/2+) 4703.4+x
820
(35/2+) 3883.0+x
730
(31/2+) 3153.1+x
634
(27/2+) 2519.5+x
540
(23/2+) 1979.9+x
492
(19/2+) 1488.0+x
500
(15/2+) 988.0+x
438
(11/2+) 549.7+x
325
(7/2+) 224.90+x
189
(3/2+) 35.7+x
Band(C): Band 3:
π9/2[404], α=−1/2
(27/2+) 2725.2+y
720
(23/2+) 2005.4+y
683
(19/2+) 1322.2+y
606
(15/2+) 715.73+y
506
(11/2+) 209.50+y
Band(c): Band 4:
π9/2[404], α=+1/2
(25/2+) 2365.3+y
709
(21/2+) 1655.8+y
648
(17/2+) 1008.1+y
560
(13/2+) 448.73+y
448
(9/2+) 0+y

$^{123}_{57}La_{66}$