

$^{232}\text{Th}(^{136}\text{Xe}, X\gamma)$  1999Co02, 1999Am04, 2008BuZY

| Type            | Author             | History                         | Literature Cutoff Date |
|-----------------|--------------------|---------------------------------|------------------------|
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1999Co02, 1999Am04, and 2008BuZY are from one group of research. They report the results of one experiment carried at LBNL 88 inch cyclotron.

E= 833 MeV. Measured  $E_\gamma$ ,  $I_\gamma$ , and  $\gamma\gamma\gamma$  using GAMMASPHERE array of 73 HPGe detectors.

 $^{228}\text{Th}$  Levels

| $E(\text{level})^\dagger$ | $J^\pi^\ddagger$ | $E(\text{level})^\dagger$ | $J^\pi^\ddagger$ | $E(\text{level})^\dagger$ | $J^\pi^\ddagger$ | $E(\text{level})^\dagger$ | $J^\pi^\ddagger$   |
|---------------------------|------------------|---------------------------|------------------|---------------------------|------------------|---------------------------|--------------------|
| 0.0 <sup>#</sup>          | 0 <sup>+</sup>   | 396.1 <sup>@</sup>        | 3 <sup>-</sup>   | 920.9 <sup>@</sup> 6      | 9 <sup>-</sup>   | 1838.1 <sup>@</sup> 7     | 15 <sup>-</sup>    |
| 57.8 <sup>#</sup>         | 2 <sup>+</sup>   | 519.2 <sup>@</sup>        | 5 <sup>-</sup>   | 1189.7 <sup>@</sup> 6     | 11 <sup>-</sup>  | 1987.8 <sup>#</sup> 9     | 16 <sup>+</sup>    |
| 186.7 <sup>#</sup> 2      | 4 <sup>+</sup>   | 622.5 <sup>#</sup> 4      | 8 <sup>+</sup>   | 1239.3 <sup>#</sup> 6     | 12 <sup>+</sup>  | 2209.4 <sup>@</sup> 9     | 17 <sup>-</sup>    |
| 328.0 <sup>@</sup>        | 1 <sup>-</sup>   | 695.4 <sup>@</sup>        | 7 <sup>-</sup>   | 1497.1 <sup>@</sup> 6     | 13 <sup>-</sup>  | 2400.4 <sup>#</sup> 10    | 18 <sup>+</sup>    |
| 378.0 <sup>#</sup> 3      | 6 <sup>+</sup>   | 911.8 <sup>#</sup> 4      | 10 <sup>+</sup>  | 1599.5 <sup>#</sup> 7     | 14 <sup>+</sup>  | 2834.4 <sup>?</sup> 15    | (20 <sup>+</sup> ) |

<sup>†</sup> From least squares fit to  $E_\gamma$ .

<sup>‡</sup> All states up to 17<sup>-</sup> are from  $^{226}\text{Ra}(\alpha, 2n)$ .

<sup>#</sup> Band(A): g.s. band.

<sup>@</sup> Band(B): octupole band.

 $\gamma(^{228}\text{Th})$ 

| $E_\gamma^\dagger$   | $E_i(\text{level})$ | $J_i^\pi$       | $E_f$  | $J_f^\pi$       | $E_\gamma^\dagger$ | $E_i(\text{level})$ | $J_i^\pi$          | $E_f$  | $J_f^\pi$       |
|----------------------|---------------------|-----------------|--------|-----------------|--------------------|---------------------|--------------------|--------|-----------------|
| 128.9 2              | 186.7               | 4 <sup>+</sup>  | 57.8   | 2 <sup>+</sup>  | 298.4 5            | 920.9               | 9 <sup>-</sup>     | 622.5  | 8 <sup>+</sup>  |
| 191.3 2              | 378.0               | 6 <sup>+</sup>  | 186.7  | 4 <sup>+</sup>  | 307.4 5            | 1497.1              | 13 <sup>-</sup>    | 1189.7 | 11 <sup>-</sup> |
| 225.6 <sup>‡</sup> 5 | 920.9               | 9 <sup>-</sup>  | 695.4  | 7 <sup>-</sup>  | 327.5 5            | 1239.3              | 12 <sup>+</sup>    | 911.8  | 10 <sup>+</sup> |
| 238.6 5              | 1838.1              | 15 <sup>-</sup> | 1599.5 | 14 <sup>+</sup> | 341.0 5            | 1838.1              | 15 <sup>-</sup>    | 1497.1 | 13 <sup>-</sup> |
| 244.5 2              | 622.5               | 8 <sup>+</sup>  | 378.0  | 6 <sup>+</sup>  | 360.1 5            | 1599.5              | 14 <sup>+</sup>    | 1239.3 | 12 <sup>+</sup> |
| 257.8 5              | 1497.1              | 13 <sup>-</sup> | 1239.3 | 12 <sup>+</sup> | 371.3 5            | 2209.4              | 17 <sup>-</sup>    | 1838.1 | 15 <sup>-</sup> |
| 268.8 5              | 1189.7              | 11 <sup>-</sup> | 920.9  | 9 <sup>-</sup>  | 388.3 5            | 1987.8              | 16 <sup>+</sup>    | 1599.5 | 14 <sup>+</sup> |
| 277.9 5              | 1189.7              | 11 <sup>-</sup> | 911.8  | 10 <sup>+</sup> | 412.6 5            | 2400.4              | 18 <sup>+</sup>    | 1987.8 | 16 <sup>+</sup> |
| 289.3 2              | 911.8               | 10 <sup>+</sup> | 622.5  | 8 <sup>+</sup>  | 434 <sup>‡</sup> 1 | 2834.4?             | (20 <sup>+</sup> ) | 2400.4 | 18 <sup>+</sup> |

<sup>†</sup> Uncertainty based on typical values of GAMMASPHERE: 0.2 keV for strong  $\gamma$ s and 0.5 keV for weak  $\gamma$ s (evaluator).

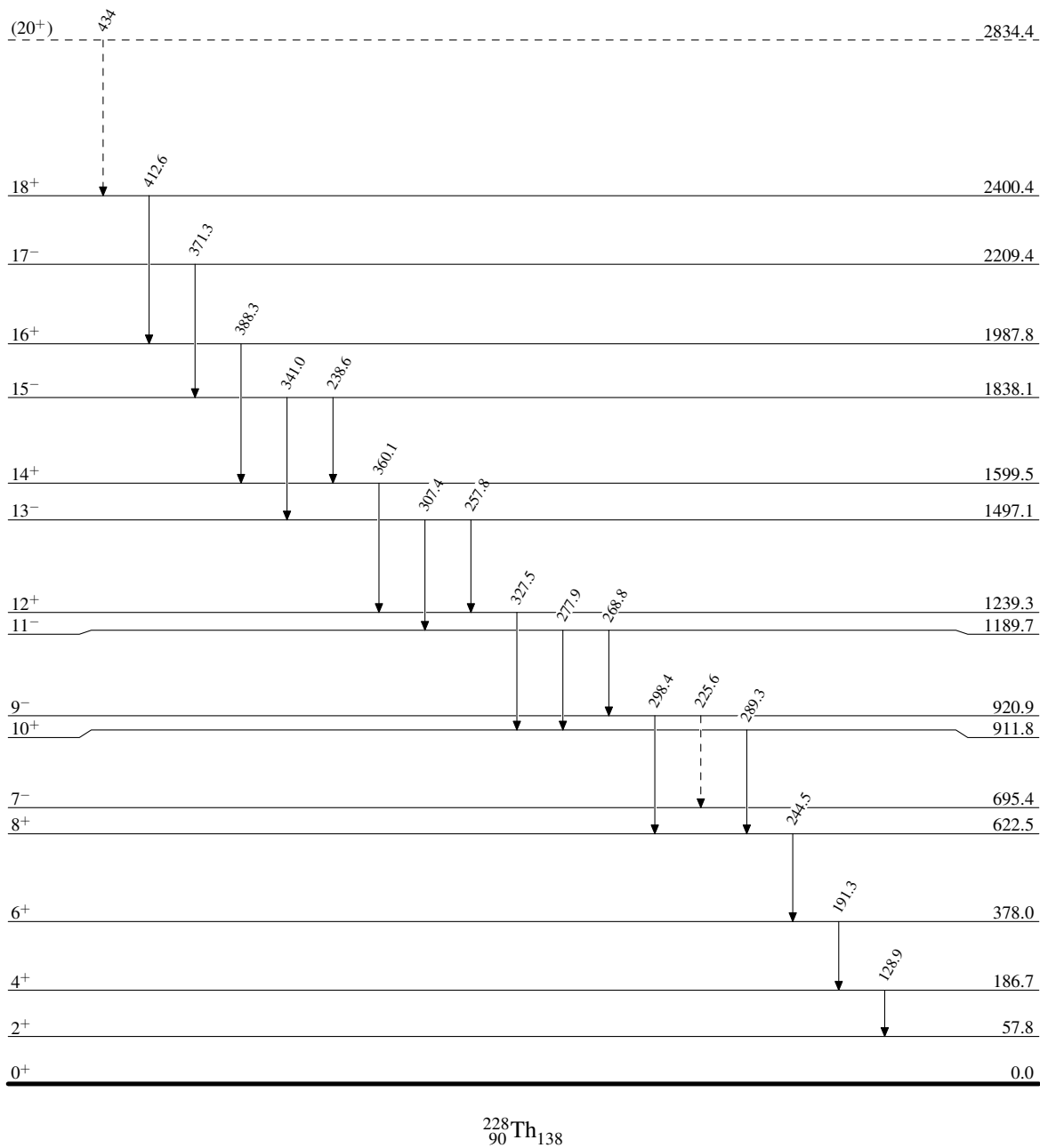
<sup>‡</sup> Placement of transition in the level scheme is uncertain.

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Legend

Level Scheme

-----►  $\gamma$  Decay (Uncertain)



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