

**Adopted Levels, Gammas**

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli		NDS 109,2657 (2008)	1-Jun-2008

Q( $\beta^-$ )=1111 12; S(n)=6269 12; S(p)=5533 12; Q( $\alpha$ )=4452 17    [2012Wa38](#)  
 Note: Current evaluation has used the following Q record 1170    306210    305480    304510    40    [2003Au03](#).

<sup>229</sup>Ac Levels

Cross Reference (XREF) Flags

- A    <sup>229</sup>Ra  $\beta^-$  decay
- B    <sup>232</sup>Th(p, $\alpha$ )
- C    <sup>230</sup>Th(t, $\alpha$ )

E(level) <sup>†</sup>	J $\pi$ <sup>@</sup>	T <sub>1/2</sub>	XREF	Comments
0.0 <sup>&amp;</sup>	(3/2 <sup>+</sup> )	62.7 min 5	A C	% $\beta^-$ =100 T <sub>1/2</sub> : From <a href="#">1973Ch24</a> . Other value: 66 min 5 ( <a href="#">1952De01</a> ).
7.0 <sup>&amp;</sup> 5	(5/2 <sup>+</sup> )		A C	
21.4 <sup>&amp;</sup> 5	(7/2 <sup>+</sup> )		AB	
25.9 <sup>&amp;</sup> 5	(9/2 <sup>+</sup> )		A C	
69.8 <sup>d</sup> 4	(5/2 <sup>-</sup> )		A C	
91 <sup>#&amp;</sup> 5	(13/2 <sup>+</sup> )		C	J $\pi$ : L=6 in <sup>232</sup> Th(p, $\alpha$ ).
104.3 <sup>a</sup> 4	(3/2 <sup>-</sup> )		A C	
119.8 <sup>d</sup> 5	(7/2 <sup>-</sup> )		A C	
141.5 5			A	
151 <sup>#b</sup> 5	1/2 <sup>+</sup>		BC	J $\pi$ : L=0 in <sup>232</sup> Th(p, $\alpha$ ).
164.0 <sup>a</sup> 5	(7/2 <sup>-</sup> )		ABC	J $\pi$ : L=3+5 in <sup>232</sup> Th(p, $\alpha$ ).
174.8 6			A	
189.0 <sup>b</sup> 7	(3/2 <sup>+</sup> )		ABC	J $\pi$ : L=2 in <sup>232</sup> Th(p, $\alpha$ ).
222.0 7			A	
280.9 6			A C	
293 <sup>‡</sup> 3			BC	
335.5 <sup>c</sup> 7	(3/2 <sup>+</sup> )		ABC	J $\pi$ : L=2 in <sup>232</sup> Th(p, $\alpha$ ).
368 <sup>‡c</sup> 3	(5/2 <sup>+</sup> )		BC	
422 <sup>#</sup> 4			C	
464 <sup>#</sup> 4			C	
489 <sup>#</sup> 4			C	
595 <sup>‡</sup> 3			BC	
629 <sup>‡</sup> 4			BC	
654 <sup>#</sup> 4			C	
720 60			A	E(level): From $\beta$ energy in <sup>229</sup> Ra $\beta^-$ decay and Q( $\beta^-$ )=1810 30.
825 <sup>#</sup> 6			C	
850 <sup>‡</sup> 6			B	
930 <sup>#e</sup> 4	(11/2 <sup>-</sup> )		BC	
1004 <sup>#f</sup> 4	(5/2 <sup>-</sup> )		BC	
1021 <sup>#</sup> 8			C	
1044 <sup>‡</sup> 5			B	
1111 <sup>‡</sup> 6			BC	

Continued on next page (footnotes at end of table)

**Adopted Levels, Gammas (continued)** $^{229}\text{Ac}$  Levels (continued)

<u>E(level)<sup>†</sup></u>	<u>XREF</u>
1173 <sup>‡</sup> 6	BC
1245 <sup>‡</sup> 6	BC

<sup>†</sup> Deduced by evaluators from least-squares fit to adopted  $\gamma$ -ray energies, unless otherwise specified.

<sup>‡</sup> From  $^{232}\text{Th}(p,\alpha)$ .

# From  $^{230}\text{Th}(t,\alpha)$ .

@ Spin, parity, and Nilsson-state assignments are based on comparison of experimental (t, $\alpha$ ) cross-sections with calculated values (1977Th04), and on measured angular momentum transfer values (L) in (p, $\alpha$ ) reactions. The assigned spins/parities are consistent with the  $\gamma$ -ray decay pattern observed in  $^{229}\text{Ra}$   $\beta^-$  decay.

& Band(A): 3/2[651] band.

<sup>a</sup> Band(B): 1/2[530] band.

<sup>b</sup> Band(C): 1/2[400] band.

<sup>c</sup> Band(D): 3/2[402] band.

<sup>d</sup> Band(E): 5/2[532] band?

<sup>e</sup> Band(F): 9/2[514] band?

<sup>f</sup> Band(G): 1/2[541] band?

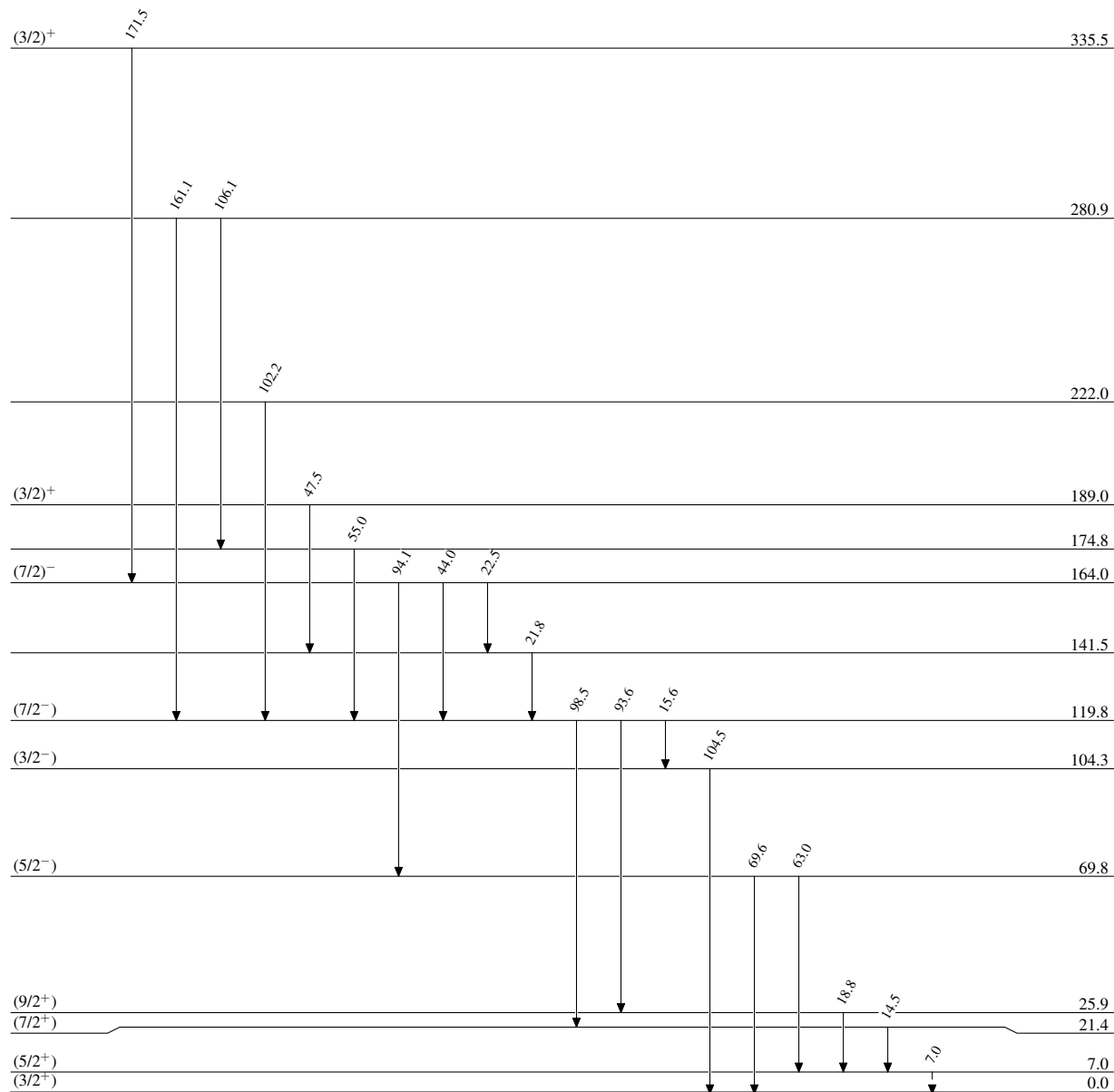
 $\gamma(^{229}\text{Ac})$ 

<u><math>E_i(\text{level})</math></u>	<u><math>J_i^\pi</math></u>	<u><math>E_\gamma^\dagger</math></u>	<u><math>E_f</math></u>	<u><math>J_f^\pi</math></u>	<u><math>E_i(\text{level})</math></u>	<u><math>J_i^\pi</math></u>	<u><math>E_\gamma^\dagger</math></u>	<u><math>E_f</math></u>	<u><math>J_f^\pi</math></u>
7.0	(5/2 <sup>+</sup> )	(7.0)	0.0	(3/2 <sup>+</sup> )	164.0	(7/2 <sup>-</sup> )	22.5 3	141.5	
21.4	(7/2 <sup>+</sup> )	14.5 3	7.0	(5/2 <sup>+</sup> )			44.0 5	119.8	(7/2 <sup>-</sup> )
25.9	(9/2 <sup>+</sup> )	18.8 3	7.0	(5/2 <sup>+</sup> )			94.1 5	69.8	(5/2 <sup>-</sup> )
69.8	(5/2 <sup>-</sup> )	63.0 5	7.0	(5/2 <sup>+</sup> )	174.8		55.0 5	119.8	(7/2 <sup>-</sup> )
		69.6 5	0.0	(3/2 <sup>+</sup> )	189.0	(3/2 <sup>+</sup> )	47.5 5	141.5	
104.3	(3/2 <sup>-</sup> )	104.5 5	0.0	(3/2 <sup>+</sup> )	222.0		102.2 5	119.8	(7/2 <sup>-</sup> )
119.8	(7/2 <sup>-</sup> )	15.6 3	104.3	(3/2 <sup>-</sup> )	280.9		106.1 5	174.8	
		93.6 5	25.9	(9/2 <sup>+</sup> )			161.1 5	119.8	(7/2 <sup>-</sup> )
		98.5 5	21.4	(7/2 <sup>+</sup> )	335.5	(3/2 <sup>+</sup> )	171.5 5	164.0	(7/2 <sup>-</sup> )
141.5		21.8 3	119.8	(7/2 <sup>-</sup> )					

<sup>†</sup> From  $^{229}\text{Ra}$   $\beta^-$  decay.

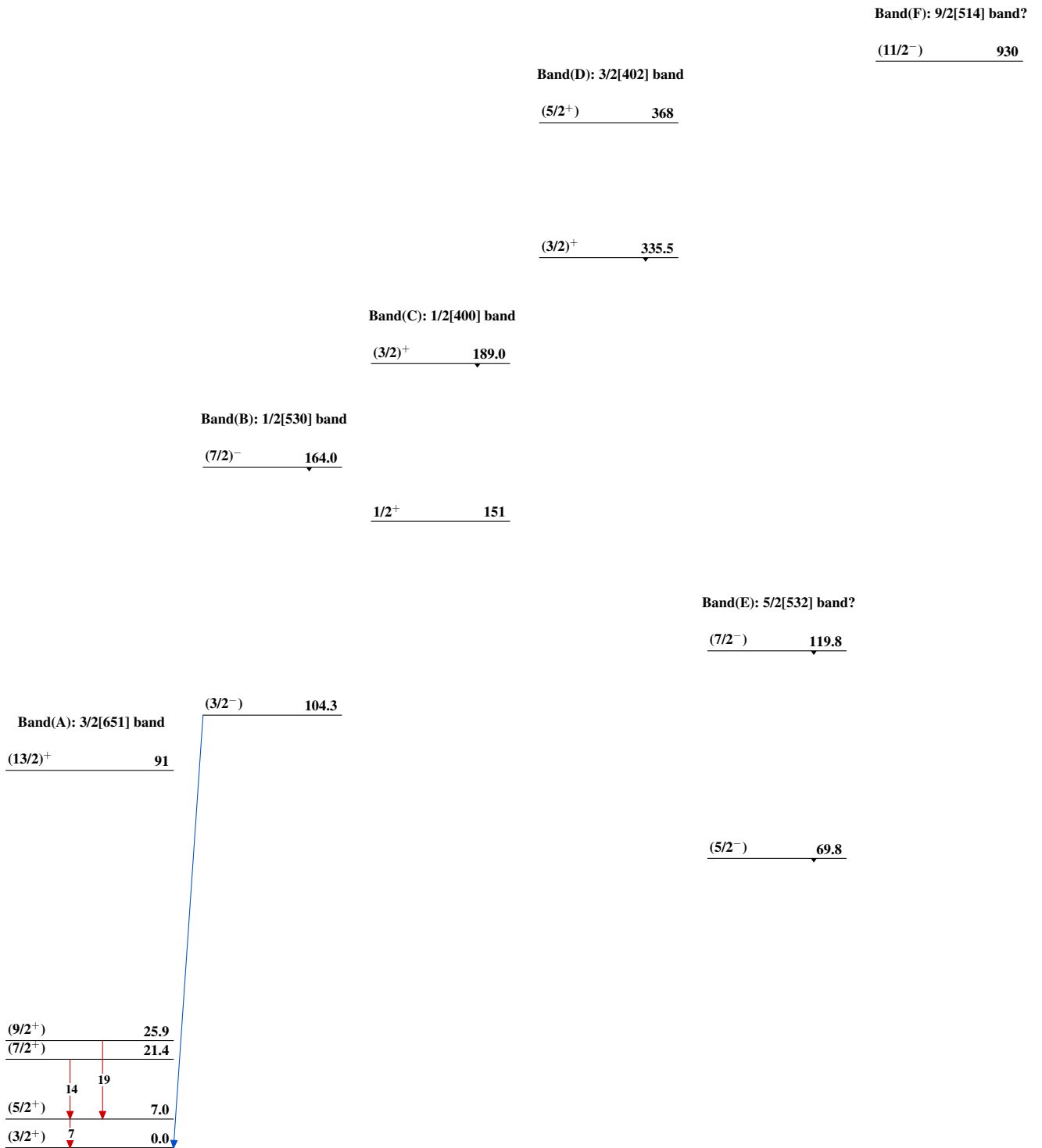
Adopted Levels, Gammas

Legend

Level Scheme-----►  $\gamma$  Decay (Uncertain)

62.7 min 5

 $^{229}_{89}\text{Ac}_{140}$

Adopted Levels, Gammas

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**Adopted Levels, Gammas (continued)**

Band(G): 1/2[541] band?

(5/2)<sup>-</sup>      1004 $^{229}_{89}\text{Ac}_{140}$