

<sup>159</sup>Tb(n,n'γ) 1973Fe09,1987A107

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich	NDS 113, 157 (2012)	31-Dec-2010

**Additional information 1.**

The level scheme is that of 1973Fe09 with additions from 1987A107.

Experimental methods:

1969Ro36: Measured γ spectrum with NaI(Tl) detector and report γ's at 620, 970, 1290, 1420, 1750, and 1970 keV; spectrum has other peaks.

1973Fe09: E(n)=3.7 MeV. Report 34 Eγ and 29 Iγ with 26 γ's placed in scheme with 5 rotational bands.

1987A107: n from reactor beam. Measured γ's for specific levels by separating neutrons by time-of-flight. Report δ for 8 γ's from γ(θ) at six angles.

<sup>159</sup>Tb Levels

See <sup>159</sup>Tb Adopted Levels for band assignments.

E(level)	J <sup>π</sup> †	E(level)	J <sup>π</sup> †	E(level)	J <sup>π</sup> †	E(level)	J <sup>π</sup> †
0	3/2 <sup>+</sup>	362	11/2 <sup>+</sup>	532‡	9/2 <sup>+</sup>	674	5/2 <sup>+</sup>
58	5/2 <sup>+</sup>	363	5/2 <sup>-</sup>	536.7‡	9/2 <sup>+</sup>	761‡	(7/2 <sup>+</sup> )
138	7/2 <sup>+</sup>	386	7/2 <sup>-</sup>	581	1/2 <sup>+</sup>	855	(1/2 <sup>-</sup> )
241	9/2 <sup>+</sup>	429	7/2 <sup>+</sup>	618	3/2 <sup>+</sup>		
348	5/2 <sup>+</sup>	511	13/2 <sup>+</sup>	669	15/2 <sup>+</sup>		

† From <sup>159</sup>Tb Adopted Levels.

‡ Level proposed by 1987A107.

γ(<sup>159</sup>Tb)

E <sub>γ</sub> †	I <sub>γ</sub> ‡	E <sub>i</sub> (level)	J <sub>i</sub> <sup>π</sup>	E <sub>f</sub>	J <sub>f</sub> <sup>π</sup>	Comments
104	71 10	241	9/2 <sup>+</sup>	138	7/2 <sup>+</sup>	
121	78 10	362	11/2 <sup>+</sup>	241	9/2 <sup>+</sup>	
137		138	7/2 <sup>+</sup>	0	3/2 <sup>+</sup>	
148	35 8	511	13/2 <sup>+</sup>	362	11/2 <sup>+</sup>	
159	27 8	669	15/2 <sup>+</sup>	511	13/2 <sup>+</sup>	
184	284 15	241	9/2 <sup>+</sup>	58	5/2 <sup>+</sup>	
211	41 8	348	5/2 <sup>+</sup>	138	7/2 <sup>+</sup>	
225 <sup>b</sup>	103 <sup>b</sup> 12	362	11/2 <sup>+</sup>	138	7/2 <sup>+</sup>	I <sub>γ</sub> : From Coul. ex., I <sub>γ</sub> (225)/I <sub>γ</sub> (121)=0.72, which would give I <sub>γ</sub> (225)=56. But this value and the contribution to the 225 γ from the decay of the 363 level is not sufficient to account for the observed intensity. (See the comment for the other placement of this γ.).
225 <sup>b</sup>	103 <sup>b</sup> 12	363	5/2 <sup>-</sup>	138	7/2 <sup>+</sup>	I <sub>γ</sub> : In <sup>159</sup> Gd β <sup>-</sup> decay I <sub>γ</sub> (225)/I <sub>γ</sub> (363)=0.0184, which would give I <sub>γ</sub> (225)=18.4. But this value and the contribution to the 225 γ from the decay of the 362 level is not sufficient to account for the observed intensity. (See the comment for the other placement of this γ.).
237	53 10	855	(1/2 <sup>-</sup> )	618	3/2 <sup>+</sup>	
248	54 10	386	7/2 <sup>-</sup>	138	7/2 <sup>+</sup>	
270	62 10	511	13/2 <sup>+</sup>	241	9/2 <sup>+</sup>	
274	124 12	855	(1/2 <sup>-</sup> )	581	1/2 <sup>+</sup>	I <sub>γ</sub> : In the <sup>159</sup> Gd β <sup>-</sup> decay, I <sub>γ</sub> (274)/I <sub>γ</sub> (237)=0.74, so most of this intensity may be from another placement.
290		348	5/2 <sup>+</sup>	58	5/2 <sup>+</sup>	
290		429	7/2 <sup>+</sup>	138	7/2 <sup>+</sup>	
305	59 10	363	5/2 <sup>-</sup>	58	5/2 <sup>+</sup>	

Continued on next page (footnotes at end of table)

$^{159}\text{Tb}(n,n'\gamma)$  **1973Fe09,1987A107** (continued) $\gamma(^{159}\text{Tb})$  (continued)

$E_\gamma$ †	$I_\gamma$ ‡	$E_i(\text{level})$	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult. #	$\delta$ @
307	30 10	669	15/2 <sup>+</sup>	362	11/2 <sup>+</sup>		
<sup>x</sup> 317	185 14						
331 &	1079 50	386	7/2 <sup>-</sup>	58	5/2 <sup>+</sup>	[E1+M2]	0.00 5
348	423 30	348	5/2 <sup>+</sup>	0	3/2 <sup>+</sup>	[M1+E2]	0.43 +10-9
363	1000 50	363	5/2 <sup>-</sup>	0	3/2 <sup>+</sup>	[E1+M2]	0.00 5
371	226 20	429	7/2 <sup>+</sup>	58	5/2 <sup>+</sup>	[M1+E2]	0.05 5
395 &	277 20	532	9/2 <sup>+</sup>	138	7/2 <sup>+</sup>	[M1+E2]	0.075 25
429	40 12	429	7/2 <sup>+</sup>	0	3/2 <sup>+</sup>		
<sup>x</sup> 440	119 15						
520 &	97 16	761	(7/2 <sup>+</sup> )	241	9/2 <sup>+</sup>	[M1+E2]	0.09 +7-6
536.7 <sup>a</sup>		536.7	9/2 <sup>+</sup>	0	3/2 <sup>+</sup>	[M3+E4]	-0.08 5
560	77 14	618	3/2 <sup>+</sup>	58	5/2 <sup>+</sup>	[M1+E2]	0.67 +58-4
580	255 20	581	1/2 <sup>+</sup>	0	3/2 <sup>+</sup>		
616	145 20	674	5/2 <sup>+</sup>	58	5/2 <sup>+</sup>		
618	83 16	618	3/2 <sup>+</sup>	0	3/2 <sup>+</sup>		
<sup>x</sup> 912	30 14						
<sup>x</sup> 947	43 14						
<sup>x</sup> 976	53 16						

† From **1973Fe09**, except where noted otherwise. Uncertainties from a general statement (**1973Fe09**) are  $\approx 1$  keV below 618 keV and  $\approx 3$  keV above that energy.

‡ From **1973Fe09**.

# Assignments assumed by **1987A107** in giving  $\delta$  results.

@ From  $\gamma(\theta)$  (**1987A107**).

& Placed by **1987A107**, but not by **1973Fe09**.

<sup>a</sup>  $E_\gamma$  and placement from **1987A107**.

<sup>b</sup> Multiply placed with undivided intensity.

<sup>x</sup>  $\gamma$  ray not placed in level scheme.

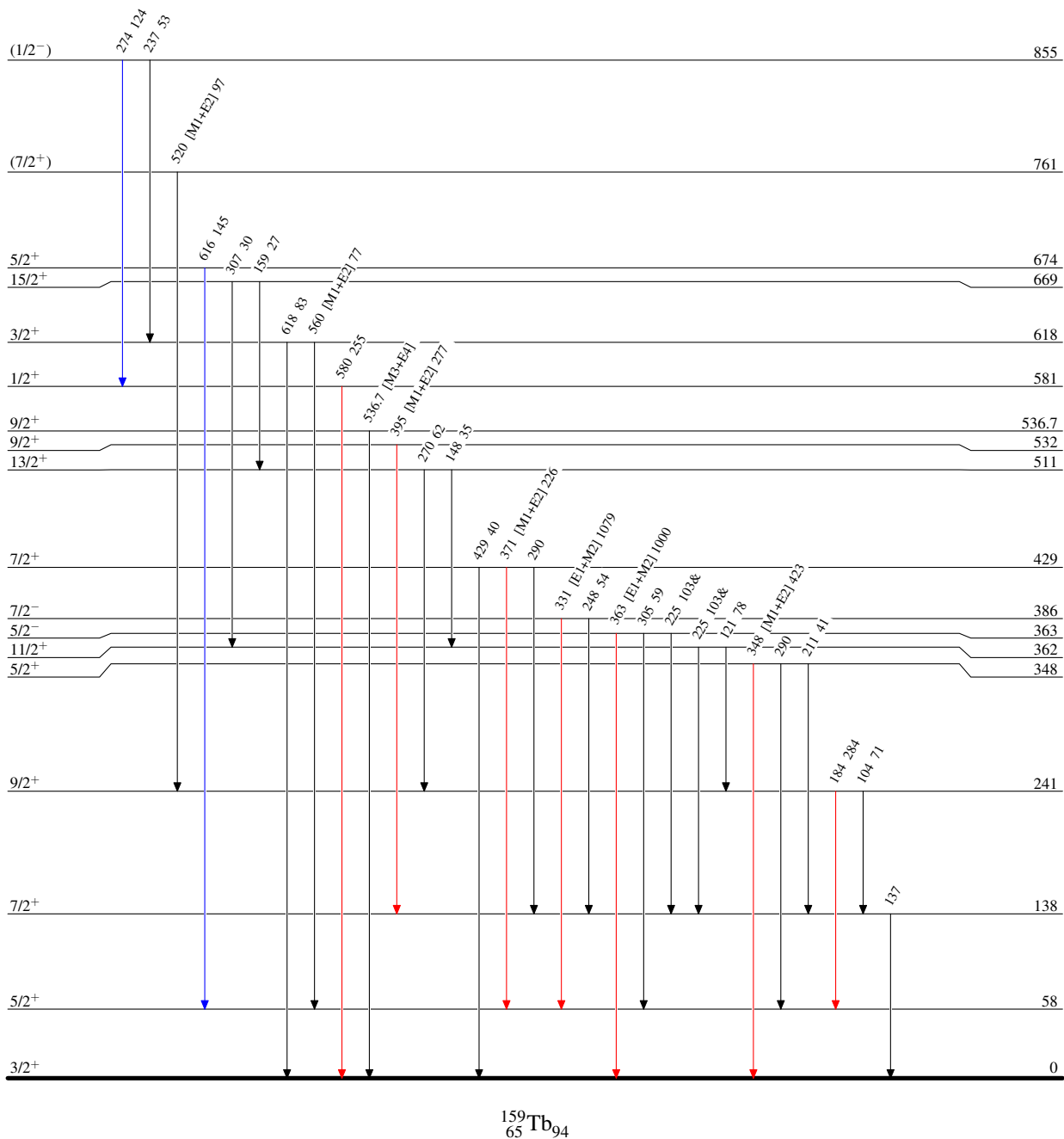
$^{159}\text{Tb}(n,n'\gamma)$  1973Fe09,1987A107

Level Scheme

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

Legend

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



$^{159}\text{Tb}_{65}\text{Tb}_{94}$