

$^{140}\text{Ce}(\alpha,5n\gamma)$ 1980Mu10,1977Lu04

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	P. K. Joshi, B. Singh, S. Singh, A. K. Jain		NDS 138, 1 (2016)	15-Oct-2016

Includes $^{140}\text{Ce}(\alpha,5n\gamma)$ from 1977Lu04.

1980Mu10: $E\alpha=85$ MeV. Measured γ 's, $\gamma\gamma$ -coincidences, $\gamma(\theta)$, and $\gamma(t)$.

1977Lu04: $E(^3\text{He})=38$ and 42 MeV, $E\alpha=45-59$ MeV. Measured excitation functions, γ 's, $\gamma\gamma(\theta)$.

Others: 1977Lu04, 1973HaWA.

All data are from 1980Mu10, except as noted.

^{139}Nd Levels

E(level)	J^π [†]	$T_{1/2}$ [‡]	Comments
0.0	$3/2^+$ [#]		
231.15 15	$11/2^-$ [#]	5.50 h 20	$T_{1/2}$: from Adopted Levels.
896.0 3	$15/2^-$		
1343.4 3	$(13/2^-)$		
1966.5 4	$(17/2^-)$		
2053.4 5	$19/2^-$		
2134.8 3			
2570.9 6	$(19/2^-)$		
2570.9+x		≥ 141 ns	Additional information 1.
2622.2 3	$(21/2)$		
2763.8 3			
2802.9 7	$(21/2^+)$		
3024.7 7	$(23/2^+)$		
3253.7 8	$(25/2)$		
3524.0 8	$(27/2)$		
3889.8 3	$(29/2)$		
4037.4 5			

[†] From 1980Mu10 based on $\gamma(\theta)$ data and the assumption that $(\alpha,5n\gamma)$ primarily populates yrast type states, except as noted.

[‡] From off-beam delayed coincidence spectrum of the 665 γ .

[#] From the Adopted Levels.

$\gamma(^{139}\text{Nd})$

205.5 γ ($I_\gamma(\alpha,5n\gamma)=5.5$ 11, not observed in $(^3\text{He},4n\gamma)$; placement from possible 1102 level not confirmed by later work), 871.6 γ ($I_\gamma(\alpha,5n\gamma)=13$ 4, $I_\gamma(^3\text{He},4n\gamma)=10$ 3; placement from 896 level not confirmed by later work), and 1291.0 γ ($I_\gamma(\alpha,5n\gamma)=15$ 4, $I_\gamma(^3\text{He},4n\gamma)=12$ 4; placement from 1967 level not confirmed by later work) were observed by 1977Lu04 only.

E_γ	I_γ [†]	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [‡]	Comments
(x)		2570.9+x		2570.9	$(19/2^-)$		Off-beam delayed coin spectra of γ 's deexciting the 2571 show a weak delayed component.
^x 138.4 ^{&} 3	10.7 16						$A_2=-0.28$ 8; $A_4=+0.10$ 12
147.6 ^{&} 3	5.1 8	4037.4		3889.8	$(29/2)$		$A_2=+0.26$ 13; $A_4=-0.03$ 19
192.9 ^{#&} 3	7.0 [#] 10	2763.8		2570.9	$(19/2^-)$		$A_2=-0.04$ 11; $A_4=+0.05$ 17
221.8 [@] 3	42 [@] 5	3024.7	$(23/2^+)$	2802.9	$(21/2^+)$	D	$A_2=-0.38$ 7; $A_4=+0.04$ 11
229.0 [#] 3	31 [#] 60	3253.7	$(25/2)$	3024.7	$(23/2^+)$	D	$A_2=-0.25$ 10; $A_4=+0.04$ 15
(231.15 15)		231.15	$11/2^-$	0.0	$3/2^+$	M4	$A_2=-0.25$ 10; $A_4=+0.04$ 15 $E_\gamma, \text{Mult.}$: from Adopted Gammas.

Continued on next page (footnotes at end of table)

$^{140}\text{Ce}(\alpha,5n\gamma)$ **1980Mu10,1977Lu04 (continued)** $\gamma(^{139}\text{Nd})$ (continued)

E_γ	I_γ^\dagger	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. ‡	δ	Comments
232.0@ 3	50@ 8	2802.9	(21/2 ⁺)	2570.9	(19/2 ⁻)	D		$A_2=-0.27$ 6; $A_4=+0.05$ 9
270.3 3	30.0 13	3524.0	(27/2)	3253.7	(25/2)	D		$A_2=-0.33$ 8; $A_4=+0.06$ 12
^x 311.6#& 3	6.5# 65							$A_2=-0.39$ 7; $A_4=+0.04$ 11
^x 327.5@& 3	15@ 9							$A_2=-0.25$ 7; $A_4=+0.14$ 12
365.8& 3	14.7 18	3889.8	(29/2)	3524.0	(27/2)	D		$A_2=-0.40$ 10; $A_4=+0.07$ 15
435.5@& 4	8.9 22	2570.9	(19/2 ⁻)	2134.8		D		$A_2=-0.48$ 8; $A_4=+0.02$ 12 I_γ : corrected for contamination.
^x 520.1& 3								
568.8& 3	44 5	2622.2	(21/2)	2053.4	19/2 ⁻	D		$A_2=-0.33$ 7; $A_4=+0.05$ 11
604.4 4	40 4	2570.9	(19/2 ⁻)	1966.5	(17/2 ⁻)	D+Q		$A_2=-0.24$ 6; $A_4=+0.09$ 9
622.9 3	6.9 10	1966.5	(17/2 ⁻)	1343.4	(13/2 ⁻)			$A_2=+0.01$ 20; $A_4=-0.10$ 30
665.0 3	100 10	896.0	15/2 ⁻	231.15	11/2 ⁻	Q		$A_2=+0.28$ 4; $A_4=-0.03$ 6
1070.9 4	61 6	1966.5	(17/2 ⁻)	896.0	15/2 ⁻	D(+Q)	<0	$A_2=-0.66$ 4; $A_4=+0.02$ 6
1112.1 3	10.0 12	1343.4	(13/2 ⁻)	231.15	11/2 ⁻	D+Q		$A_2=-0.45$ 16; $A_4=+0.24$ 24
1157.4 3	54 7	2053.4	19/2 ⁻	896.0	15/2 ⁻	Q		$A_2=+0.25$ 6; $A_4=-0.04$ 9 Mult.: stretched.
1238.2& 4	10.3 12	2134.8		896.0	15/2 ⁻			$A_2=+0.47$ 20; $A_4=-0.04$ 30

† From 1980Mu10 renormalized to $I_\gamma(665\gamma)=100$ by evaluators.

‡ From $\gamma(\theta)$ (theory of 1967Ya05 used for comparison).

Unresolved from a line in ^{138}Nd .

@ Contaminated.

& Placement of transition in the level scheme is uncertain.

^x γ ray not placed in level scheme.

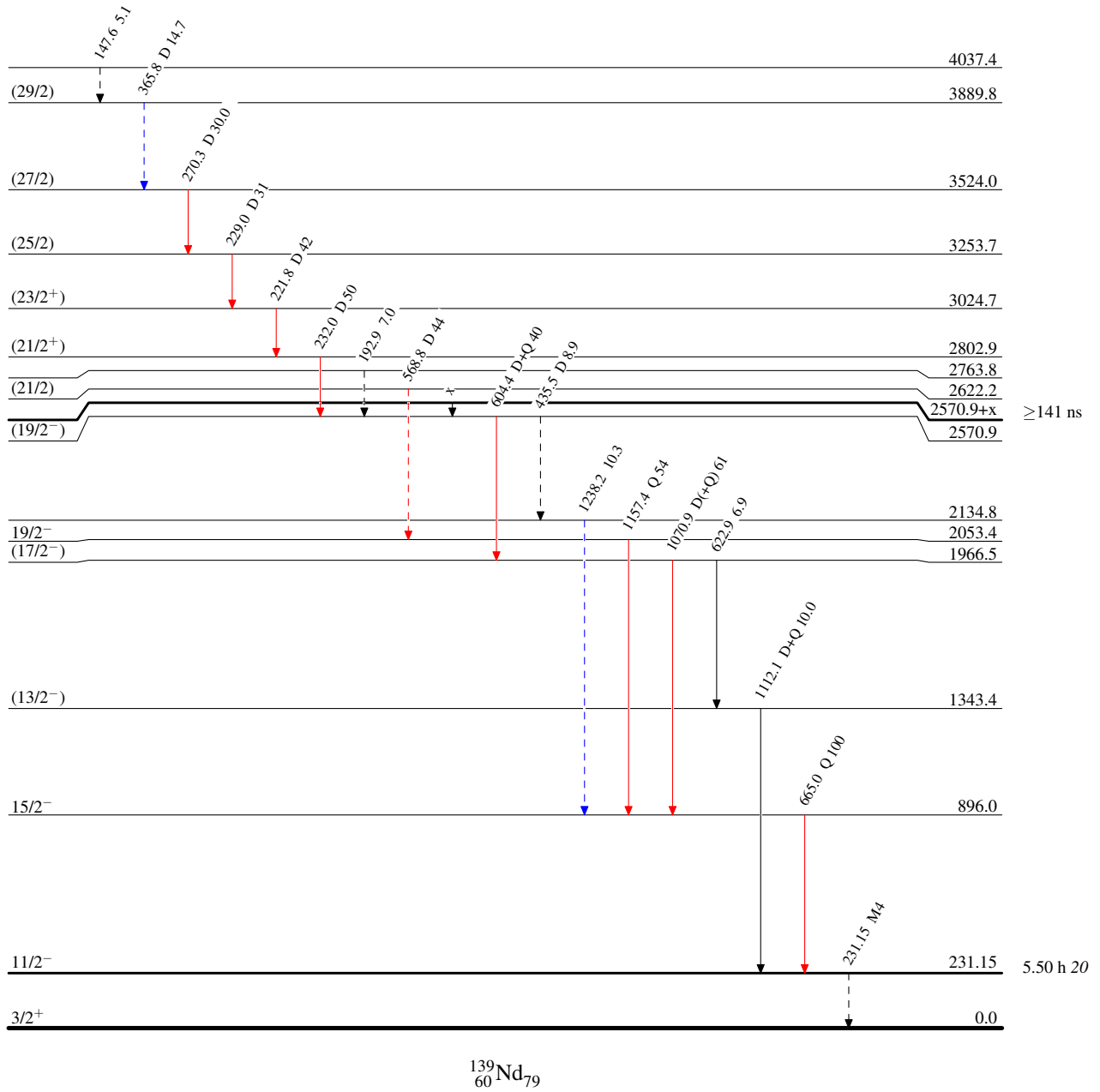
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Legend

Level Scheme

Intensities: Relative I_γ

- $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
- $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
- $I_\gamma > 10\% \times I_\gamma^{\text{max}}$
- - - - - γ Decay (Uncertain)

 $^{139}_{60}\text{Nd}_{79}$