

¹⁴³Nd(⁷Li,3nγ), ¹⁴⁵Nd(⁶Li,4nγ) **1977FI09**

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	N. Nica and B. Singh		NDS 181, 1 (2022)	9-Mar-2022

1977FI09: ¹⁴³Nd(⁷Li,3nγ), ¹⁴⁵Nd(⁶Li,4nγ) E=26-34 MeV, γγ, γγ(t), excit. function. The first reaction was particularly used for γγ. γγ(t) resolving time was 80 ns for E_γ=0.1-2.0 MeV. Also, ¹³⁹La(¹²C,4nγ) E=60,63 MeV for measured angular distributions at six-seven angles including 0° and 90°. Used two Ge(Li) detectors for all types of measurements.

¹⁴⁷Eu Levels

E(level) [†]	J ^π [‡]	E(level) [†]	J ^π [‡]	E(level) [†]	J ^π [‡]	E(level) [†]	J ^π [‡]
0.0	5/2 ⁺	1926.9 [#] 6	19/2 ⁻	2900.7 [#] 8	27/2 ⁻	3795.2 8	(31/2 ⁻)
229.5 3	7/2 ⁺	2012.9 6	(13/2,17/2) ⁻	2997.3 7	23/2 ⁻	4178.1 9	(33/2 ⁺)
625.6 [#] 5	11/2 ⁻	2293.0 [#] 7	23/2 ⁻	3191.0 8	(25/2 ⁺ ,29/2 ⁺)		
995.1 6	9/2 ⁻	2348.2 7	21/2 ⁻	3230.3 8	(27/2) ⁻		
1346.7 [#] 6	15/2 ⁻	2845.5 8	(19/2,23/2) ⁻	3523.6 8	(29/2 ⁺)		

[†] From least-squares fit to E_γ values.

[‡] Assigned by **1977FI09** based on γ multiplicities and details of the decay.

[#] Band(A): π h_{11/2} decoupled band. ΔJ=2 level spacing resembles ¹⁴⁶Sm g.s. band up to 6⁺.

γ(¹⁴⁷Eu)

E _γ	I _γ	E _i (level)	J _i ^π	E _f	J _f ^π	Mult. [†]	δ [†]	Comments
(55)		2348.2	21/2 ⁻	2293.0	23/2 ⁻			E _γ : unobserved; deduced from (649γ)(366γ)-coin relation.
229.5 3		229.5	7/2 ⁺	0.0	5/2 ⁺	M1+E2	+0.13 2	See ¹⁴⁷ Gd ε decay for mult and δ assignments.
233		3230.3	(27/2) ⁻	2997.3	23/2 ⁻			I _γ : composite with ¹⁴⁸ Eu γ ray.
271.6 3	8.9 2	3795.2	(31/2) ⁻	3523.6	(29/2 ⁺)	D(+Q)	-0.02 3	A ₂ =-0.21 5; A ₄ =0.02 5 Mult.: D, E1 (1977FI09) not adopted because Δπ=no (Adopted Levels).
290.3 3	1.0 1	3191.0	(25/2 ⁺ ,29/2 ⁺)	2900.7	27/2 ⁻	D		A ₂ =-0.31 10; A ₄ =-0.10 12 δ: δ=+0.05 14 if J(initial)=29/2, 0.09 12 for J=25/2. Mult.: D, E1 (1977FI09) not adopted because Δπ=no (Adopted Levels).
293.5 3	9.2 3	3523.6	(29/2 ⁺)	3230.3	(27/2) ⁻	D(+Q)	+0.01 2	A ₂ =-0.25 7; A ₄ =0.01 7 Mult.: D, ΔJ=1 (from A ₂ ,A ₄); E1 from 1977FI09 not adopted because Δπ=no (Adopted Levels).
329.8 3	5.4 1	3230.3	(27/2) ⁻	2900.7	27/2 ⁻	D+Q	-0.52 13	A ₂ =0.39 4; A ₄ =-0.14 5 Mult.: D+Q, ΔJ=0 (from A ₂ ,A ₄); M1+E2 from 1977FI09 not adopted because Δπ=yes (Adopted Levels).
366.3 3	57.7 5	2293.0	23/2 ⁻	1926.9	19/2 ⁻	E2		A ₂ =0.287 18; A ₄ =-0.080 23
369.5 3	5.5 1	995.1	9/2 ⁻	625.6	11/2 ⁻	(M1+E2)		A ₂ =0.361 37; A ₄ =0.04 4 δ: +1.4 4 (1977FI09), +0.07 3 (1970KI07 , ¹⁴⁷ Gd decay).
382.9 3	6.6 1	4178.1	(33/2 ⁺)	3795.2	(31/2) ⁻	D+Q	+0.06 5	A ₂ =-0.34 4; A ₄ =0.08 4 Mult.: D+Q, ΔJ=1 (from A ₂ ,A ₄); E1(+M2) from 1977FI09 not adopted because Δπ=no (Adopted Levels).

Continued on next page (footnotes at end of table)

$^{143}\text{Nd}(^7\text{Li},3\text{n}\gamma), ^{145}\text{Nd}(^6\text{Li},4\text{n}\gamma)$ **1977F109 (continued)** $\gamma(^{147}\text{Eu})$ (continued)

E_γ	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [†]	δ^\dagger	Comments
396.1 3		625.6	11/2 ⁻	229.5	7/2 ⁺	M2		see ^{147}Gd ε decay for mult.
421.1 3	3.3 1	2348.2	21/2 ⁻	1926.9	19/2 ⁻	M1+E2	+0.22 +6-11	$A_2=-0.65$ 7; $A_4=-0.12$ 8
497.3 3	2.8 1	2845.5	(19/2,23/2) ⁻	2348.2	21/2 ⁻	M1+E2		$A_2=-0.23$ 12; $A_4=0.11$ 14 $\delta: \delta \geq 4.1$ for $J=23/2$ and < -5.1 for $J=19/2$.
580.2 3	93.8 11	1926.9	19/2 ⁻	1346.7	15/2 ⁻	E2		$A_2=0.310$ 22; $A_4=-0.074$ 28 A_2, A_4 : in agreement with theoretical coefs. ($A_2(\text{max})=0.413$, $A_4(\text{max})=-0.175$) if σ/J is taken to be 0.30.
607.7 3	37.2 5	2900.7	27/2 ⁻	2293.0	23/2 ⁻	E2		$A_2=0.29$ 3; $A_4=-0.065$ 32
622.7 3	9.6 2	3523.6	(29/2 ⁺)	2900.7	27/2 ⁻	E1(+M2)	+0.03 6	$A_2=-0.27$ 4; $A_4=0.06$ 4 Mult.: D, $\Delta J=1$ (from A_2, A_4); E1 from 1977F109 adopted here based on $\Delta\pi=\text{yes}$ (Adopted Levels).
648.9 3	6.0 1	2997.3	23/2 ⁻	2348.2	21/2 ⁻	D+Q	+2.5 +10-6	$A_2=-0.49$ 4; $A_4=0.02$ 5 Mult.: D+Q, $\Delta J=1$ (from A_2, A_4); M1+E2 from 1977F109 not adopted (because of A_4).
666.2 3	2.1 2	2012.9	(13/2,17/2) ⁻	1346.7	15/2 ⁻	(M1+E2)		$A_2=-0.39$ 3; $A_4=-0.31$ 21
704.4 3	24.7 3	2997.3	23/2 ⁻	2293.0	23/2 ⁻	D(+Q)	+0.38 4	$A_2=0.225$ 23; $A_4=-0.03$ 3 Mult.: D(+Q), $\Delta J=0$ (from A_2, A_4); M1+E2 from 1977F109 not adopted because $\Delta\pi=\text{yes}$ (Adopted Levels).
721.1 3	100 1	1346.7	15/2 ⁻	625.6	11/2 ⁻	E2		$A_2=0.272$ 21; $A_4=-0.055$ 26 A_2, A_4 : in $\gamma(721)(\theta)$ (aligned).
≈ 765	<1	995.1	9/2 ⁻	229.5	7/2 ⁺			I_γ : weak; (765 γ)(229.5 γ) coin observed.

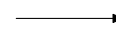


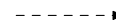
[†] From angular distribution measurements. For $\Delta J=\pm 1$, E1 is assigned if $\delta \approx 0$, otherwise M1+E2 is assigned. For $\Delta J=2$ E2 is assumed.

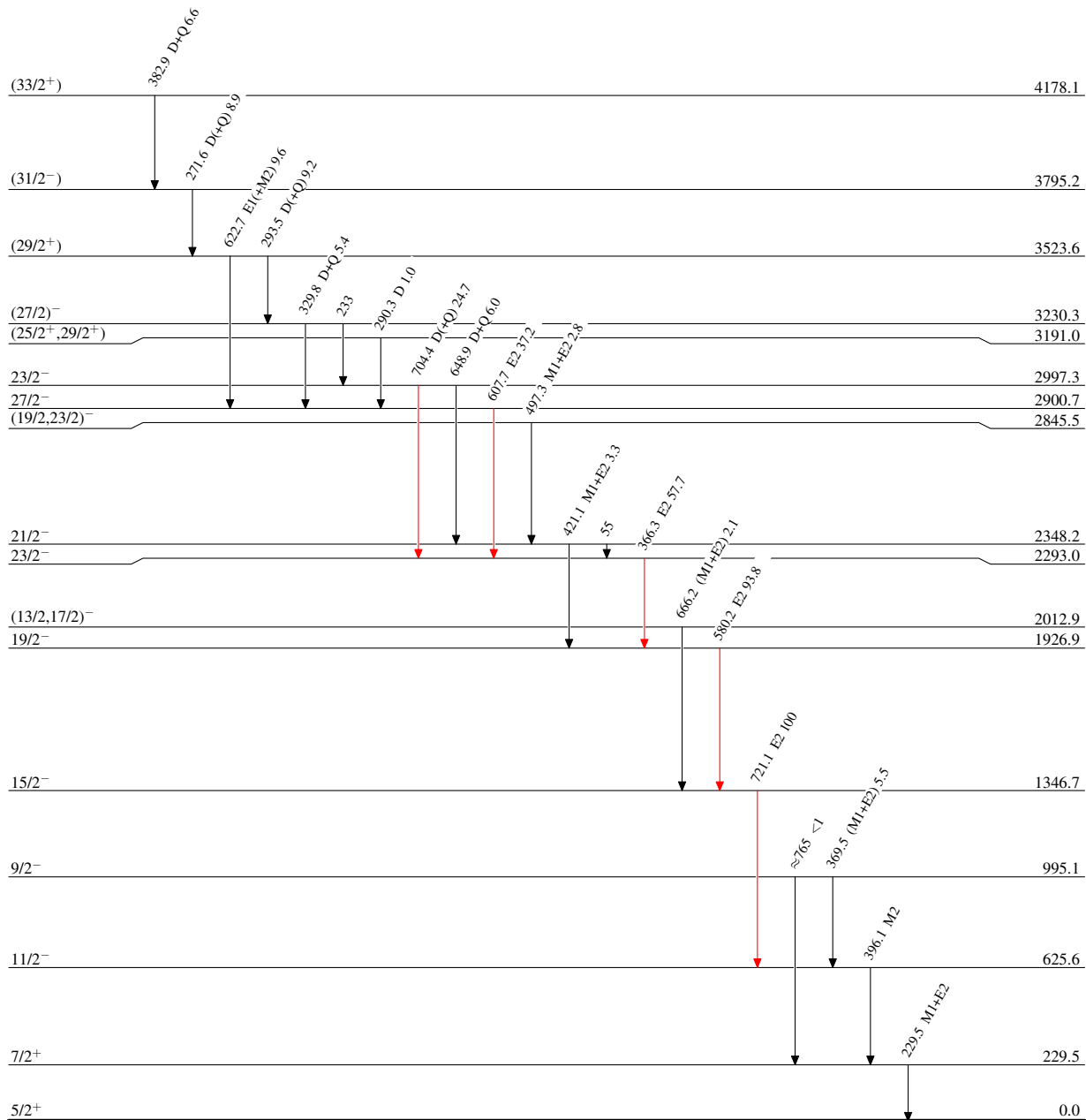
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Legend

Level Scheme

Intensities: Relative I_γ

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

 $^{147}_{63}\text{Eu}_{84}$

$^{143}\text{Nd}(^7\text{Li},3\text{n}\gamma), ^{145}\text{Nd}(^6\text{Li},4\text{n}\gamma)$ 1977F109