

$^{169}\text{Tm}(^{24}\text{Mg},4n\gamma)$ 1988Kr16

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	T. D. Johnson, Balraj Singh		NDS 142, 1 (2017)	15-Apr-2017

Includes $^{165}\text{Ho}(^{28}\text{Si},4n\gamma)$ and $^{175}\text{Lu}(^{20}\text{Ne},6n\gamma)$.

1988Kr16: $^{169}\text{Tm}(^{24}\text{Mg},4n\gamma)$, E=115-135 MeV; $^{165}\text{Ho}(^{28}\text{Si},4n\gamma)$, E=140 MeV; $^{175}\text{Lu}(^{20}\text{Ne},6n\gamma)$, E=128 MeV; Ge detectors with anti-Compton shields, measured $E\gamma$, $I\gamma$, $\gamma\gamma$, $\gamma(\theta)$.

^{189}Tl Levels

E(level) [†]	J ^π	T _{1/2}	Comments
281 [‡] 7	9/2 ⁻	1.4 min <i>l</i>	%ε+%β ⁺ =98 2; %IT<4 Additional information 1. E(level),T _{1/2} : from Adopted Levels.
667.61 [‡] 8	11/2 ⁻		
981.49 [‡] 8	13/2 ⁻		
1147.77 ^{&} 13	13/2 ⁺		
1325.01 22			
1409.49 [‡] 15	(15/2 ⁻)		
1483.7 [#] 4			E(level): rearrangement of the 502-664-502 cascade as 664-502-502 in Adopted Levels, Gammas dataset defines a level at 1645, instead of the 1484 level here.
1546.66 ^{&} 16	15/2 ⁺		
1738.72? 19			E(level): level not included in Adopted Levels, Gammas dataset.
1830.36 ^{&} 25	17/2 ⁺		
1995.2 4			
2109.3 3			E(level): corresponding level is probably 2308.1 in Adopted Levels.
2148.0 [#] 4			
2237.9 [@] 4	(21/2 ⁺)		
2308.3 4			
2626.1 5			
2633.5 [@] 5	(25/2 ⁺)		
2650.2 [#] 5			
2788.8 [#] 6			
3025.7 [#] 6			
3095.7 [@] 6	(29/2 ⁺)		
3278.0 [#] 7			
3629.7 [@] 7	(33/2 ⁺)		

[†] From a least-square fit to $E\gamma$ data using 281-keV level as fixed. Uncertainty of 7 keV in this energy is not reflected in the uncertainties of other level energies.

[‡] Band(A): 9/2⁻ band.

[#] Band(B): γ cascade.

[@] Band(C): (21/2⁺) band.

[&] Band(D): 13/2⁺ band.

¹⁶⁹Tm(²⁴Mg,4n γ) **1988Kr16 (continued)**

$\gamma(^{189}\text{Tl})$

E_γ †	I_γ ‡	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. #	Comments
138.6 3	6.2 ^c 6	2788.8		2650.2			
165.9 3	4.4 ^c 9	1147.77	13/2 ⁺	981.49	13/2 ⁻		
199.0 [@] 3	4.6 5	2308.3		2109.3			E_γ : this γ deexcites a 1745 or an 1845 level in Adopted Levels, Gammas dataset.
236.9 2	10.0 ^c 10	3025.7		2788.8			
252.3 3	6.5 6	3278.0		3025.7			
283.8 3	8 4	1830.36	17/2 ⁺	1546.66	15/2 ⁺	D	$I_\gamma(0^\circ)/I_\gamma(90^\circ)=0.46$ 14.
313.9 1	31 3	981.49	13/2 ⁻	667.61	11/2 ⁻	D	$I_\gamma(0^\circ)/I_\gamma(90^\circ)=0.45$ 5.
317.8 [@] 3	2.7 ^c 3	2626.1		2308.3			E_γ : this γ deexcites a 2163 level in Adopted Levels, Gammas dataset.
329.5 ^{be} 3	2.5	1738.72?		1409.49	(15/2 ⁻)		
375.8 ^e 3	3.5 4	3025.7		2650.2			
386.7 1	100.0 20	667.61	11/2 ⁻	281	9/2 ⁻	D	$I_\gamma(0^\circ)/I_\gamma(90^\circ)=0.34$ 2.
395.6 3	7.4 ^c 7	2633.5	(25/2 ⁺)	2237.9	(21/2 ⁺)		
398.9 1	34 7	1546.66	15/2 ⁺	1147.77	13/2 ⁺	D	$I_\gamma(0^\circ)/I_\gamma(90^\circ)=0.35$ 2.
407.5 2	15.0 15	2237.9	(21/2 ⁺)	1830.36	17/2 ⁺	Q	$I_\gamma(0^\circ)/I_\gamma(90^\circ)=1.05$ 10.
428.0 2	15.7 8	1409.49	(15/2 ⁻)	981.49	13/2 ⁻	D	$I_\gamma(0^\circ)/I_\gamma(90^\circ)=0.40$ 10.
448.5 3	6.6 ^c 6	1995.2		1546.66	15/2 ⁺	D	$I_\gamma(0^\circ)/I_\gamma(90^\circ)=0.38$ 12.
462.2 3	6.6 9	3095.7	(29/2 ⁺)	2633.5	(25/2 ⁺)	Q	$I_\gamma(0^\circ)/I_\gamma(90^\circ)=1.37$ 7.
480.2 1	55.0 16	1147.77	13/2 ⁺	667.61	11/2 ⁻	D	$I_\gamma(0^\circ)/I_\gamma(90^\circ)=0.71$ 4. Mult.: E1 implied by ΔJ^π .
502.2 ^{d@} 3	36 ^d 4	1483.7		981.49	13/2 ⁻		$I_\gamma(0^\circ)/I_\gamma(90^\circ)=1.46$ 7 for doublet; mult=D+Q.
502.2 ^{d@} 3	36 ^d 4	2650.2		2148.0			
534.0 3	4.4 ^c 4	3629.7	(33/2 ⁺)	3095.7	(29/2 ⁺)		
562.6 ^a 2	13.8 7	2109.3		1546.66	15/2 ⁺		E_γ : this γ placed from a 2308.1 level in Adopted Levels, Gammas dataset.
657.4 ^{&} 2	12.4 6	1325.01		667.61	11/2 ⁻		
664.3 [@] 1	25.6 8	2148.0		1483.7		Q	$I_\gamma(0^\circ)/I_\gamma(90^\circ)=1.38$ 9.
682.5 3	9.4 5	1830.36	17/2 ⁺	1147.77	13/2 ⁺	Q	$I_\gamma(0^\circ)/I_\gamma(90^\circ)=1.6$ 3.
700.4 1	26.0 10	981.49	13/2 ⁻	281	9/2 ⁻	Q	$I_\gamma(0^\circ)/I_\gamma(90^\circ)=1.34$ 16.
742.0 2	10.0 10	1409.49	(15/2 ⁻)	667.61	11/2 ⁻	Q	$I_\gamma(0^\circ)/I_\gamma(90^\circ)=1.9$ 5.
757.1 ^e 2	11.0 ^c 10	1738.72?		981.49	13/2 ⁻		E_γ : probably corresponds to 754.7+761.7 doublet in 1991Po15 , first from a 2163 level and the second from a 2308 level in Adopted Levels, Gammas dataset.

† Uncertainty quoted in **1988Kr16** is 0.1-0.3. The evaluators assign 0.1 keV for $I_\gamma > 20$, 0.2 keV for $I_\gamma = 10-20$ and 0.3 keV for $I_\gamma < 10$ and for doublets.

‡ At 90° and $E(^{24}\text{Mg})=125$ MeV.

From $I_\gamma(0^\circ)/I_\gamma(90^\circ)$ data from ¹⁶⁵Ho(²⁸Si,4n γ) at 140 MeV. Mult=D corresponds to $\Delta J=1$ transition and is assigned M1 in **1988Kr16**, except E1 for 480.2 γ . The mult=Q corresponds to $\Delta J=2$ transition and is assigned E2 in **1988Kr16**.

@ The γ transition is ordered differently in **1996RiZZ** and/or **1991Po15**, and in Adopted Levels, Gammas. The 502-664-502 cascade in **1988Kr16** is ordered as 502-502-664 in Adopted Levels. 318-199 cascade is placed in a different location in Adopted Levels following the level scheme from **1996RiZZ**.

& Placement different in **1996RiZZ**, but same in **1991Po15**.

a Placement different in **1991Po15**, γ not reported in **1996RiZZ**.

b This γ is not confirmed in later studies (**1996RiZZ**, **1991Po15**).

c From $\gamma\gamma$ coin data.

d Multiply placed with undivided intensity.

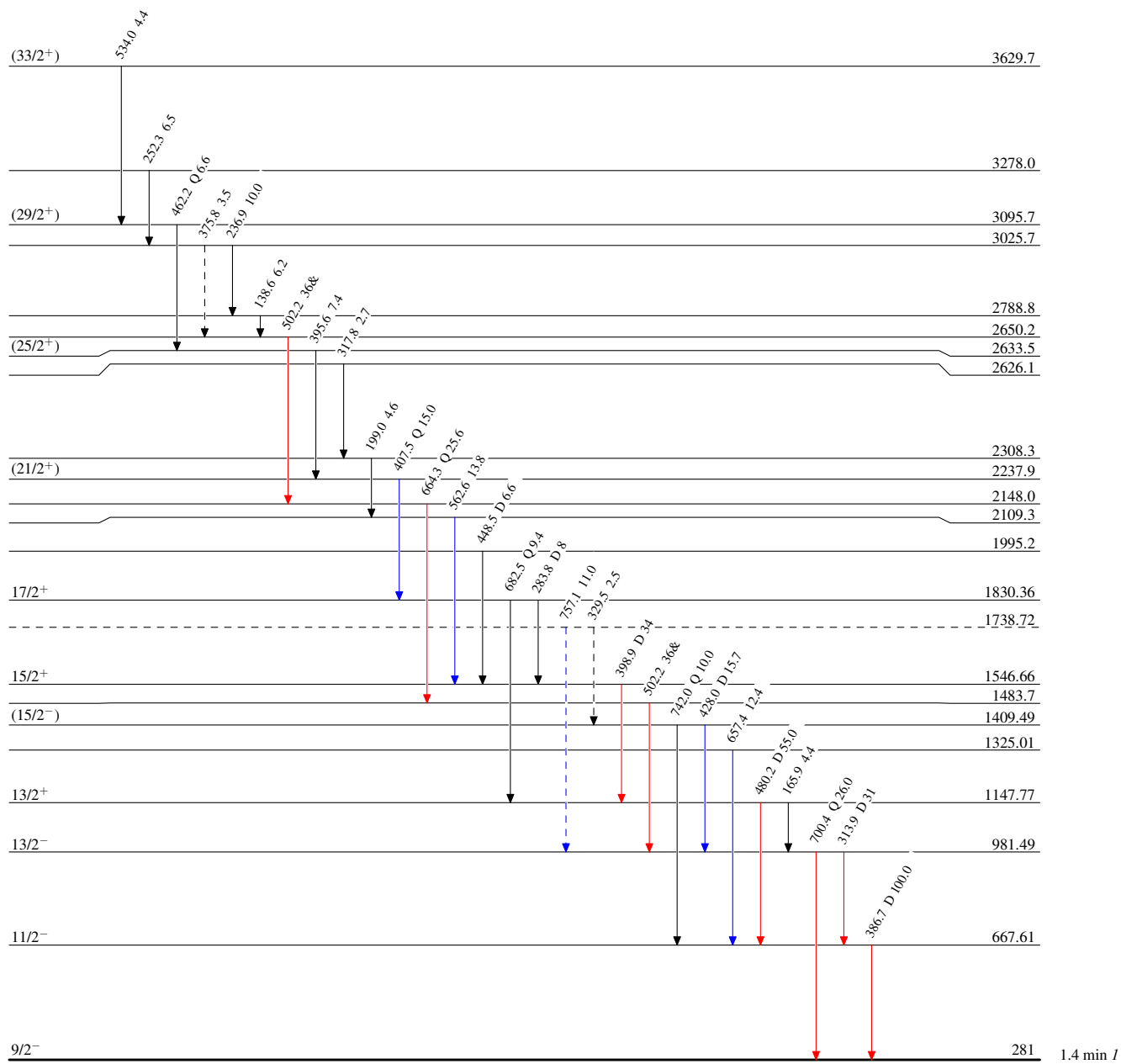
e Placement of transition in the level scheme is uncertain.

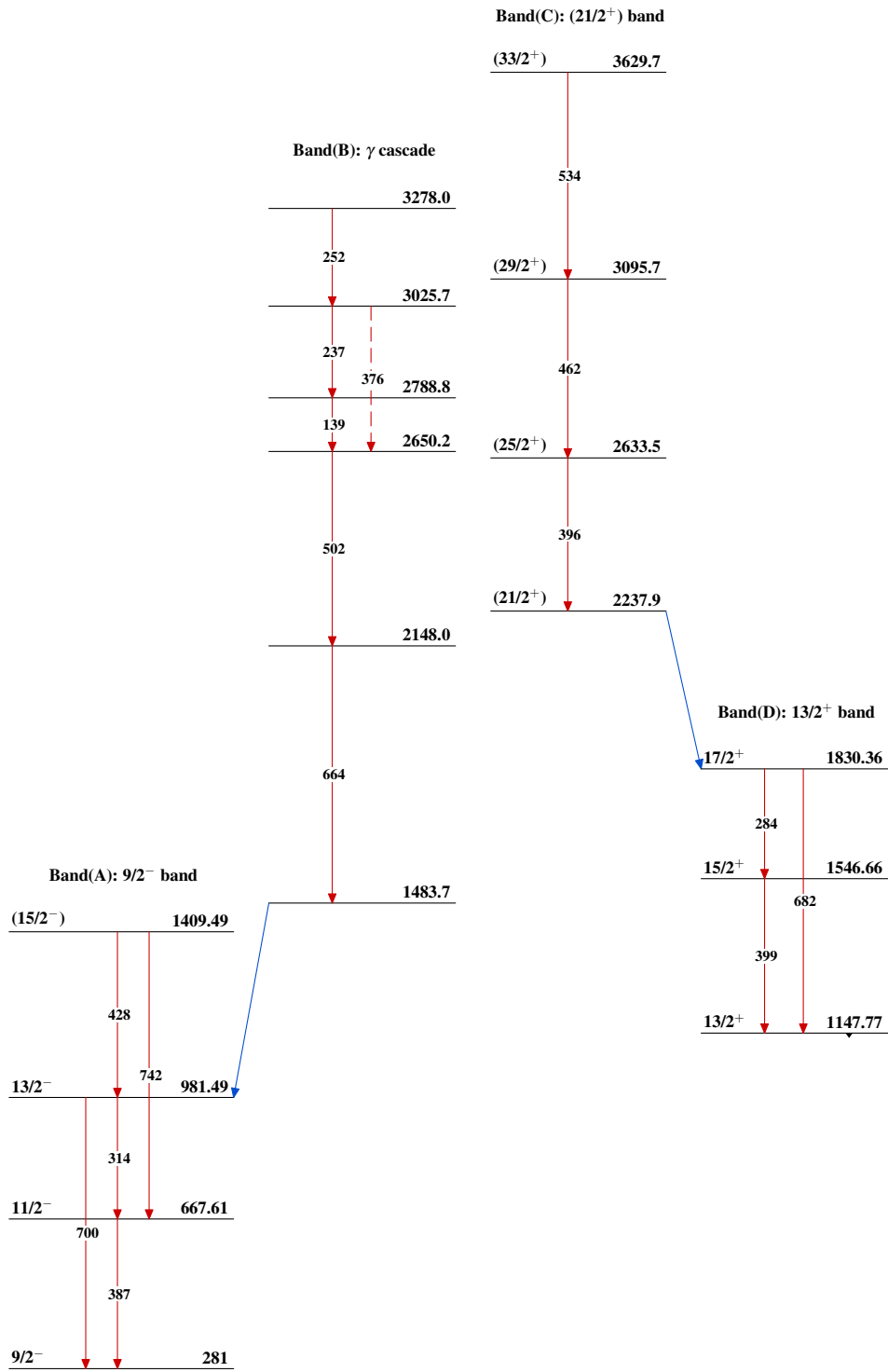
$^{169}\text{Tm}(^{24}\text{Mg},4n\gamma)$ 1988Kr16

Legend

Level Scheme
 Intensities: Relative I_γ
 & Multiply placed: undivided intensity given

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



$^{169}\text{Tm}(^{24}\text{Mg},4n\gamma)$ 1988Kr16 $^{189}_{81}\text{Tl}_{108}$