

$^{108}\text{Pd}(\alpha,3n\gamma)$ **1975Me22,1979Oh02**

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	S. Kumar(a), J. Chen(b) and F. G. Kondev		NDS 137, 1 (2016)	31-May-2016

1975Me22: $^{108}\text{Pd}(\alpha,3n\gamma)$, $E(\alpha)=36.7\text{-}45.8$ MeV, variable energy cyclotron at Grenoble. Target: ≈ 15 mg/cm² ^{108}Pd (≈ 94.7 % enriched) deposited on a 14 mg/cm² polyethylene backing. Detectors: two coaxial Ge(Li) Measured: $E\gamma$, $I\gamma$, $\gamma\gamma$, $\gamma(\theta)$, $T_{1/2}$.

1979Oh02: $^{108}\text{Pd}(\alpha,3n\gamma)$, $E(\alpha)=35\text{-}45$ MeV, SF cyclotron at INS. Target: a metallic powder of ^{108}Pd precipitated on VYNS.

Detectors: two coaxial Ge(Li) Measured: $E\gamma$, $I\gamma$, $\gamma\gamma$ (40 MeV data). New levels were proposed at 1425.2, 2165.1, 2864.1, 2940.6, 3344.6, 3571.2 and 4243.9 keV.

Level scheme is taken from **1975Me22** with addition of new levels proposed by **1979Oh02**. The level of 2030.3 keV (**1975Me22**) is ruled out, as proposed by **1979Oh02**.

 ^{109}Cd Levels

E(level) [†]	J ^π [#]	T _{1/2}	Comments
0.0	5/2 ⁺		
203.47 19	7/2 ⁺		
463.3 @ 3	11/2 ⁻	10.8 μs 7	T _{1/2} : using 552.2-259.8 γ (t) by the Time correlation method (1975Me22).
822.5 3	9/2 ⁺		
985.6 @ 4	15/2 ⁻		
1066.4 4	(11/2 ⁺)		
1419.5? 4			
1424.8 5	(13/2 ⁻)		
1448.2? ‡ 6			
1821.3 @ 5	19/2 ⁻		
2033.4 5			
2141.5 6	(15/2 ⁺)		
2165.3 ‡ 5	(17/2 ⁻)		
2461.8? 11			
2861.3 @ 6	23/2 ⁻		
2865.4? ‡ 6			
2941.4? ‡ 6			
3058.3 5	(21/2)		
3261.8? 7	(19/2 ⁺)		
3345.8? ‡ 7	(19/2 ⁺)		
3382.2 6	(19/2,23/2)		
3523.5 6	(25/2)		
3571.7 ‡ 7			
3938.6 6	(23/2,27/2)		
4020.2 @ 7	(27/2 ⁻)		
4244.9 ‡ 7			
4501.6? 7			

[†] From a least-squares fit to γ -ray energies.

[‡] Only seen in **1979Oh02**.

[#] From **1975Me22** based on deduced γ -ray transition multipolarities and band structure.

@ Band(A): $\Delta J=2$, $\nu h_{11/2}$.

$^{108}\text{Pd}(\alpha,3n\gamma)$ **1975Me22,1979Oh02 (continued)**

$\gamma(^{109}\text{Cd})$							Comments
E_γ †	I_γ †	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. #	
$^{x184.5} 3$	22 4						
$^{x191.8} 3$	23 8						
197.6 5	30 15	3058.3	(21/2)	2861.3	23/2 ⁻	M1	Mult.: $A_2/A_0=-0.05$ 6, $A_4/A_0=+0.08$ 10, $\Delta J=\pm 1$.
203.5 2	1000	203.47	7/2 ⁺	0.0	5/2 ⁺		
$^{x214.4} 2$	19 4						
259.8 2	800 80	463.3	11/2 ⁻	203.47	7/2 ⁺	M2	
$^{x273.3} 3$	14 3						
$^{x287.6} 4$	9 2						
$^{x290.6} 4$	12 3						
$^{x311.8} 2$	13 2						
324.1 3	24 5	3382.2	(19/2,23/2)	3058.3	(21/2)		Mult.: $A_2/A_0=+0.13$ 3, $A_4/A_0=-0.08$ 4, $\Delta J=0,\pm 1,\pm 2$.
$^{381.8} 4$	$^{2.5} 13$	1448.2?		1066.4	(11/2 ⁺)		Mult.: $A_2/A_0=+0.04$ 3, $A_4/A_0=-0.02$ 5, $\Delta J=(\pm 1)$.
415.2 2	30 5	3938.6	(23/2,27/2)	3523.5	(25/2)		
$^{x426.4} 4$	10 2						Mult.: $A_2/A_0=+0.25$ 5, $A_4/A_0=-0.16$ 7, $\Delta J=0,\pm 2$.
433.9 2	91 10	1419.5?		985.6	15/2 ⁻		Mult.: $A_2/A_0=-0.27$ 1, $A_4/A_0=-0.08$ 2, $\Delta J=\pm 1$.
440.4 3	28 5	3382.2	(19/2,23/2)	2941.4?			E_γ : 440.2 3 in 1979Oh02. Placement from 1979Oh02, unplaced in 1975Me22.
465.2 3	20 10	3523.5	(25/2)	3058.3	(21/2)		Mult.: $A_2/A_0=+0.29$ 2, $A_4/A_0=-0.13$ 2, $\Delta J=0,-2$.
481.4 3	18 3	4501.6?		4020.2	(27/2 ⁻)	E2	E_γ : not given in table of 1975Me22. Mult.: $A_2/A_0=+0.292$ 3, $A_4/A_0=-0.108$ 4. Mult.: $A_2/A_0=+0.35$ 3, $A_4/A_0=-0.19$ 4, $\Delta J=0,-2$.
497.0		4020.2	(27/2 ⁻)	3523.5	(25/2)		
522.2 2	610 6	985.6	15/2 ⁻	463.3	11/2 ⁻		
556.2 5	21 5	3938.6	(23/2,27/2)	3382.2	(19/2,23/2)		
$^{x571.0} 5$	12 5						
613.9 3	20 4	2033.4		1419.5?			
619.1 3	25 5	822.5	9/2 ⁺	203.47	7/2 ⁺		
$^{x623.8} 3$	21 4						
640.5		2461.8?		1821.3	19/2 ⁻		E_γ : Not in table of 1975Me22. Mult.: $A_2/A_0=-0.47$ 9, $A_4/A_0=+0.17$ 14, $\Delta J=\pm 1$.
662.3 3	24 6	3523.5	(25/2)	2861.3	23/2 ⁻		
$^{x703.9} 5$	13 3						
$^{706.3} 3$	$^{31} 6$	3571.7		2865.4?			E_γ : 721.8 4 in 1975Me22. I_γ : 31 4 in 1975Me22. Mult.: $A_2/A_0=+0.37$ 3, $A_4/A_0=-0.16$ 5, $\Delta J=0,-2$.
$^{x707.7} 4$	24 4						
$^{x717.7} 4$	22 3						
$^{721.4} 3$	$^{30} 6$	4244.9		3523.5	(25/2)		
$^{740.9} 4$	$^{9} 3$	2165.3	(17/2 ⁻)	1424.8	(13/2 ⁻)		
$^{x755.4} 4$	10 2						
$^{x778.7} 5$	10 2						
$^{x786.7} 5$	15 3						
822.3 5	11 2	822.5	9/2 ⁺	0.0	5/2 ⁺	E2	Mult.: $A_2/A_0=+0.274$ 5, $A_4/A_0=-0.093$ 8. Mult.: $A_2/A_0=+0.32$ 6, $A_4/A_0=-0.02$ 8, $\Delta J=0,\pm 1,\pm 2$.
835.7 3	431 45	1821.3	19/2 ⁻	985.6	15/2 ⁻		
862.9 3	32 5	1066.4	(11/2 ⁺)	203.47	7/2 ⁺		
$^{961.8} 4$	39 6	1424.8	(13/2 ⁻)	463.3	11/2 ⁻		
$^{x1014.4} 4$	25 6						
1040.4 4	116 15	2861.3	23/2 ⁻	1821.3	19/2 ⁻	E2	Mult.: $A_2/A_0=+0.26$ 4, $A_4/A_0=-0.09$ 5.

Continued on next page (footnotes at end of table)

$^{108}\text{Pd}(\alpha,3n\gamma)$ **1975Me22,1979Oh02** (continued) $\gamma(^{109}\text{Cd})$ (continued)

E_γ [†]	I_γ [†]	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
1044.1 [‡] 3	66 [‡] 11	2865.4?		1821.3	19/2 ⁻	E_γ : 1044.8 5 in 1975Me22 . I_γ : 46 9 in 1975Me22 . Mult.: $A_2/A_0 = -0.06$ 2, $A_4/A_0 = -0.06$ 3, $\Delta J = 0, \pm 1$. Mult.: $A_2/A_0 = +0.23$ 9, $A_4/A_0 = +0.30$ 16, $\Delta J = 0, -2$.
1075.1 4	18 3	2141.5	(15/2 ⁺)	1066.4	(11/2 ⁺)	
1119.8 [‡] 3	30 [‡] 6	2941.4?		1821.3	19/2 ⁻	
1120.3 4	22 4	3261.8?	(19/2 ⁺)	2141.5	(15/2 ⁺)	Mult.: $A_2/A_0 = 0.28$ 5, $A_4/A_0 = -0.19$ 7, $\Delta J = 0, -2$.
1158.9 4	19 4	4020.2	(27/2 ⁻)	2861.3	23/2 ⁻	Mult.: $A_2/A_0 = +0.18$ 5, $A_4/A_0 = -0.04$ 7.
1179.6 [‡] 3	36 [‡] 7	2165.3	(17/2 ⁻)	985.6	15/2 ⁻	
1204.3 [‡] 4	5.7 [‡] 14	3345.8?	(19/2 ⁺)	2141.5	(15/2 ⁺)	
^x 1220.8 5	14 3					
1237.2 3	109 10	3058.3	(21/2)	1821.3	19/2 ⁻	Mult.: $A_2/A_0 = -0.29$ 2, $A_4/A_0 = +0.05$ 3, $\Delta J = \pm 1$.

[†] From **1975Me22**, unless otherwise noted.[‡] From **1979Oh02**, re-normalised by evaluators w.r.t. 203.5 γ per 1000 γ -rays.# Based on angular distribution data (**1975Me22**) and proposed band structure.^x γ ray not placed in level scheme.

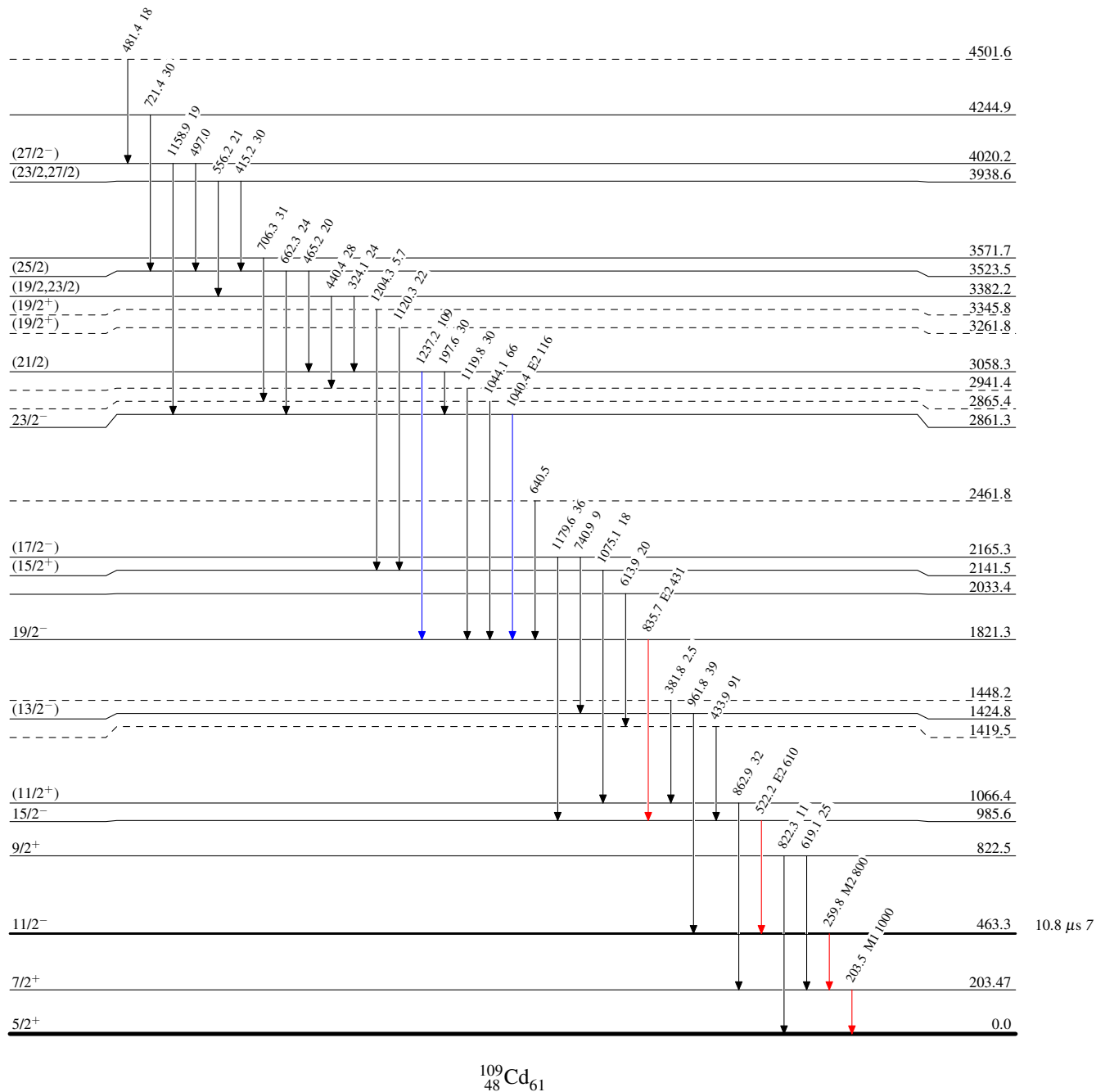
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Level Scheme

Intensities: Relative I_γ

Legend

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



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Band(A): $\Delta J=2, \nu h_{11/2}$

$(27/2^-)$ 4020.2

1159

$23/2^-$ 2861.3

1040

$19/2^-$ 1821.3

836

$15/2^-$ 985.6

522

$11/2^-$ 463.3

$^{109}_{48}\text{Cd}_{61}$