

¹⁰⁵Pd($\alpha,2n\gamma$), ¹⁰⁶Pd($\alpha,3n\gamma$) **1974Ha41,1979Oh02,1991Vi07**

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jean Blachot	NDS 109, 1383 (2008)	1-Mar-2008

1974Be17: ¹⁰⁴Pd($\alpha,n\gamma$) E=13 MeV; measured $\gamma(\theta,H,t)$, $\gamma(t)$ pulsed beam.

1974Ha41: ¹⁰⁵Pd($\alpha,2n\gamma$) E=27 MeV; measured $\gamma\gamma$ -coin, $\alpha\gamma(t)$, $\gamma(\theta)$.

1979Oh02: ¹⁰⁶Pd($\alpha,3n\gamma$) E=40 MeV; measured $\gamma\gamma$ -coin, $\gamma\gamma(t)$.

1991Vi07: ¹⁰⁵Pd($\alpha,2n\gamma$) E=27 MeV; measured $\gamma\gamma$ -coin, $\gamma(\theta)$, $\gamma(t)$.

¹⁰⁷Cd Levels

E(level) [‡]	J ^π [†]	T _{1/2}	Comments
0.0 ^{&}	5/2 ⁺	6.50 h 2	
205.00 [@] 3	7/2 ⁺		
320.90 4	5/2 ⁺		
365.33 6	3/2 ⁺		1976Do01 propose band structure of d3/2 neutron coupled to ¹⁰⁶ Cd core; E(levels) compared (exp vs theory).
505.50 ^{&} 5	7/2 ⁺		
809.01 [@] 5	9/2 ⁺	3.0 ps 15	T _{1/2} : from Doppler shift (1991Vi07). Branching: I γ (303 γ)/I γ (604 γ)/I γ (809 γ)=23.5 13/65 5/100 (1974Ha41), 16 3/56 10/100 (1979Oh02).
845.52 [#] 11	11/2 ⁻	71 ns 5	T _{1/2} : weighted average of 67 ns 6 (1974Ha41) and 77 ns 7 (1974Be17) from $\alpha\gamma(t)$. Branching: I γ (36 γ)/I γ (640 γ)/I γ (845 γ)=11.2 12/100/2.3 7 (1974Ha41). g-factor: -0.184 2 (1974Be17), -0.195 8 (1974Ha48), -0.201 4 (1976Le13) via $\gamma(\theta,H,t)$.
921.75 ^{&} 9	(9/2) ⁺	0.4 ps +2-1	T _{1/2} : from Doppler shift (1991Vi07). Branching: I γ (921.8 γ)/I γ (416 γ)=0.71 8 (1974Ha41), 0.25 12 (1979Oh02) is ascribed to I γ doublets; compare I γ -branching=0.72 10 via ¹⁰⁷ In decay.
933.08 [@] 7	11/2 ⁺	>2 ps	T _{1/2} : from Doppler shift (1991Vi07).
1360.29 [#] 13	15/2 ⁻	16.3 ps 10	T _{1/2} : 16.3 ps 10 (1974Ha48) recoil-distance Doppler shift. B(E2)(15/2 ⁻ to 11/2 ⁻)=0.095 6; compare with 1976Es02 measurements B(E2)(2 ⁺ to 0 ⁺ , ¹⁰⁶ Cd)=0.077 1, B(E2)(2 ⁺ to 0 ⁺ , ¹⁰⁸ Cd)=0.081 1, and calculated B(E2)=0.110 7 (1976Do01).
1420.65 ^{&} 15	(11/2) ⁺	0.8 ps +4-2	T _{1/2} : from Doppler shift (1991Vi07). Branching: I γ (611 γ)/I γ (915 γ)=0.70 15 (1974Ha41).
1530.7 5		+0.16 ps +8-4	T _{1/2} : from Doppler shift (1991Vi07).
1692.2 6			
1731.1 [@] 3	(13/2) ⁺		
1923.28 [@] 24	15/2 ⁺	0.90 ps 25	T _{1/2} : from Doppler shift (1991Vi07).
2158.46 [#] 14	19/2 ⁻	2.3 ps 7	T _{1/2} : from Doppler shift (1991Vi07).
2278.9 4		0.55 ps +25-15	T _{1/2} : from Doppler shift (1991Vi07).
2545.9 5	(17/2 ⁻)	0.45 ps 15	T _{1/2} : from Doppler shift (1991Vi07).
2678.87 17	21/2 ⁺	55 ns 4	T _{1/2} : from $\alpha\gamma(t)$ (1974Ha41). g-factor: +0.866 10 (1974Ha48), +0.876 15 (1976Le29) via $\gamma(\theta,H,t)$.
2806.78 [@] 19	(19/2) ⁺	1.0 ps 4	T _{1/2} : from Doppler shift (1991Vi07). Branching: I γ (128 γ)/I γ (884 γ)=0.40 7 (1974Ha41), 0.15 5 (1979Oh02) undetermined discrepancy.
3049.0 5	21/2 ⁻	0.6 ps 2	T _{1/2} : from Doppler shift (1991Vi07).
3063.2 5			
3114.46 [#] 25	23/2 ⁻	0.8 ps 3	T _{1/2} : from Doppler shift (1991Vi07).
4164.6 [#] 5	27/2 ⁻	0.40 ps 15	T _{1/2} : from Doppler shift (1991Vi07).
4190.5 5	25/2 ⁺		

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¹⁰⁵Pd($\alpha,2n\gamma$), ¹⁰⁶Pd($\alpha,3n\gamma$) **1974Ha41,1979Oh02,1991Vi07 (continued)**

¹⁰⁷Cd Levels (continued)

† From Adopted Levels.

‡ Level energy from least-squares adjustment.

Band(A): h11/2 decoupled band. $\Delta J=2$ spacing corresponds to ¹⁰⁶Cd g.s. band up to 8⁺. Similar band structures are populated in ¹⁰⁵Cd, ¹⁰⁹Cd, ¹¹¹Cd up to J=27/2⁻.

@ Band(B): g7/2 band; $\Delta J=1$ sequence populated up to 19/2⁺. See 1976Do01 for core-plus-particle model prediction of g7/2 band structure.

& Band(C): d5/2 g.s. band; $\Delta J=1$ members up to J=11/2⁺.

$\gamma(^{107}\text{Cd})$

Except as noted, E γ , I γ are from 1974Ha41 ($\alpha,2n\gamma$) E $\alpha=27$ MeV.

$\alpha(K)\text{exp}=\text{ce}(K)/I\gamma$ in-beam (1974Ha41) normalized to $\alpha(K)(640\gamma)=0.0093$ (M2 theory).

A₂,A₄ coef are extracted from $\gamma(\theta)$ measured at 6 angles at E $\alpha=27$ MeV (1974Ha41), except as noted.

E γ	I γ	E _i (level)	J π _i	E _f	J π _f	Mult.	δ	Comments
36.5 1	6.7 7	845.52	11/2 ⁻	809.01	9/2 ⁺	E1		Mult.: consistent with $\alpha(\text{exp})=2.7$ 10 (1974Ha41) deduced from I($\gamma+\text{ce}$) balance about 809 level via delayed γ -spectra.
127.9 1	1.5 2	2806.78	(19/2 ⁺)	2678.87	21/2 ⁺			E γ : other: 128.4 5 (1979Oh02).
204.99 3	100 3	205.00	7/2 ⁺	0.0	5/2 ⁺	M1+E2	+0.25 1	Mult.: from $\alpha(K)\text{exp}=0.074$ 15 (1974Ha41). δ : +0.25 1 from measured anisotropy ratio A ₂ (205 γ)/A ₂ (640 γ)=0.31 3 (1974Be17).
303.53 4	5.4 2	809.01	9/2 ⁺	505.50	7/2 ⁺	M1(+E2)	-0.23 7	Mult.: from $\alpha(K)\text{exp}=0.019$ 5 and 303 $\gamma(\theta)$ A ₂ =-0.30 6 (1974Ha41). δ : from 1991Vi07.
320.90 4	5.6 2	320.90	5/2 ⁺	0.0	5/2 ⁺	M1(+E2)		Mult.: from $\alpha(K)\text{exp}=0.018$ 3 and 321 $\gamma(\theta)$ A ₂ =0.21 6 (1974Ha41). δ : 321 $\gamma(\theta)$ A ₂ =0.21 6 via ($\alpha,2n\gamma$) suggests a highly mixed ($\Delta J=0$) transition.
365.33 6	2.8 2	365.33	3/2 ⁺	0.0	5/2 ⁺	M1(+E2)		Mult.: from $\alpha(K)\text{exp}=0.0144$ 12 (p,n γ), 0.007 3 ($\alpha,2n\gamma$), and 365 $\gamma(\theta)$ A ₂ =-0.08 7 ($\alpha,2n\gamma$).
384.3† 4		3063.2		2678.87	21/2 ⁺			
416.25 7	5.2 2	921.75	(9/2 ⁺)	505.50	7/2 ⁺	M1(+E2)	-0.19 6	Mult.: from $\alpha(K)\text{exp}=0.0081$ 12 (p,n γ), 0.0062 14 ($\alpha,2n\gamma$), and 416 $\gamma(\theta)$ A ₂ =-0.36 6 ($\alpha,2n\gamma$). δ : from 1991Vi07.
505.57 8	21 1	505.50	7/2 ⁺	0.0	5/2 ⁺	M1+E2	-0.28 8	Mult.: from $\alpha(K)\text{exp}=0.0052$ 7 (p,n γ), 0.0032 6 ($\alpha,2n\gamma$), and 505 $\gamma(\theta)$ A ₂ =-0.49 9 ($\alpha,2n\gamma$). δ : -0.28 8 from 505 $\gamma(\theta)$ A ₂ =-0.430 26 via (¹⁶ O, ₃ n γ) δ =-0.39 12 (1991Vi07).
514.76 7	63 2	1360.29	15/2 ⁻	845.52	11/2 ⁻	E2		Mult.: from $\alpha(K)\text{exp}=0.0053$ 8 and 515 $\gamma(\theta)$ A ₂ =0.35 5 (1974Ha41).
520.4 1	10 1	2678.87	21/2 ⁺	2158.46	19/2 ⁻	E1		Mult.: from $\alpha(K)\text{exp}=0.0018$ 10 and 520 $\gamma(\theta)$ A ₂ =-0.33 7 (1974Ha41). B(E1)(W.u.)=3.8 \times 10 ⁻⁸ .
603.98 6	15 1	809.01	9/2 ⁺	205.00	7/2 ⁺	M1+E2	-2.3 3	Mult.: from $\alpha(K)\text{exp}=0.0032$ 6 and 604 $\gamma(\theta)$ A ₂ =-0.58 4 (1974Ha41). δ : -2.3 3 from 604 $\gamma(\theta)$ via (¹⁶ O, ₃ n γ) δ =-1.9 3 (1991Vi07).
611.6 2	2.3 4	1420.65	(11/2 ⁺)	809.01	9/2 ⁺	M1+E2	-0.14 4	δ : from 1991Vi07.

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$^{105}\text{Pd}(\alpha,2n\gamma), ^{106}\text{Pd}(\alpha,3n\gamma)$ **1974Ha41,1979Oh02,1991Vi07 (continued)** $\gamma(^{107}\text{Cd})$ (continued)

E_γ	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult.	δ	Comments
640.6 6	60 2	845.52	11/2 ⁻	205.00	7/2 ⁺	M2		Mult.: from $\alpha(\text{K})\text{exp}=0.0112$ 1/2 (p,n γ), and 640 $\gamma(\theta)$ $A_2=0.25$ 5 ($\alpha,2n\gamma$).
728.09 6	22 1	933.08	11/2 ⁺	205.00	7/2 ⁺	E2		Mult.: from $\alpha(\text{K})\text{exp}=0.0023$ 4 and 728 $\gamma(\theta)$ $A_2=0.35$ 6 (1974Ha41).
798.16 7	45 1	2158.46	19/2 ⁻	1360.29	15/2 ⁻	E2		Mult.: from $\alpha(\text{K})\text{exp}=0.0014$ 3 and 798 $\gamma(\theta)$ $A_2=0.34$ 6 (1974Ha41).
808.97 8	23 1	809.01	9/2 ⁺	0.0	5/2 ⁺	E2		Mult.: from $\alpha(\text{K})\text{exp}=0.0014$ 3 and 809 $\gamma(\theta)$ $A_2=0.30$ 6 (1974Ha41).
845.5 4	1.4 4	845.52	11/2 ⁻	0.0	5/2 ⁺	[E3]		
846.7 [†] 5		1692.2		845.52	11/2 ⁻			
883.6 3	3.7 4	2806.78	(19/2 ⁺)	1923.28	15/2 ⁺	(E2)		Mult.: from 883 $\gamma(\theta)$ $A_2=0.33$ 9 (1974Ha41).
890.5 [†] 4		3049.0	21/2 ⁻	2158.46	19/2 ⁻	M1+E2	+0.9 3	δ : +0.9 3 from 890 $\gamma(\theta)$ $A_2=0.445$ 3/4 via ($^{16}\text{O},3n\gamma$) $\delta=0.9$ 3 (1991Vi07).
915.2 2	3.3 4	1420.65	(11/2 ⁺)	505.50	7/2 ⁺			
921.8 3	3.7 4	921.75	(9/2 ⁺)	0.0	5/2 ⁺	(E2)		Mult.: from doublet $\alpha(\text{K})\text{exp}=0.0007$ 4 and (921.8+922.1 γ)(θ) $A_2=0.35$ 5 (1974Ha41).
922.1 3	4.6 4	1731.1	(13/2 ⁺)	809.01	9/2 ⁺	(E2)		
956.0 2	12 1	3114.46	23/2 ⁻	2158.46	19/2 ⁻	E2		Mult.: from $\alpha(\text{K})\text{exp}=0.0008$ 3 and 956 $\gamma(\theta)=0.33$ 6 (1974Ha41).
990.3 3	13 1	1923.28	15/2 ⁺	933.08	11/2 ⁺	E2		Mult.: from 990 $\gamma(\theta)$ $A_2=0.34$ 5 (1974Ha41); supported by 990 γ linear pol=+0.7 (1978St01).
1050.1 [†] 4		4164.6	27/2 ⁻	3114.46	23/2 ⁻	E2		Mult.: from $\gamma(\theta)$ $A_2=0.28$ 5 and 1050 γ linear pol=+0.54 ($^{16}\text{O},3n\gamma$).
1076.0 [†] 4		4190.5	25/2 ⁺	3114.46	23/2 ⁻	(E1)		Mult.: from change in sign of 1076 γ pol via $\gamma(\theta)$ versus γ -ray linear pol ($^{16}\text{O},3n\gamma$).
1185.6 4	2.6 4	2545.9	(17/2 ⁻)	1360.29	15/2 ⁻	(M1+E2)	$\approx+1.6$	E_γ : other: 1185.1 4 (1979Oh02). δ : from $A_2=0.61$ (1974Ha41); evaluated by 1979Oh02. Analogous 17/2 ⁻ to 15/2 ⁻ transitions: $\delta(1180\gamma, ^{109}\text{Cd})=+1.2$ 5, $\delta(1179\gamma, ^{111}\text{Cd})=+1.1$ 5, $\delta=0.70$ 1/4 (1991Vi07).
1325.7 5	2.0 4	1530.7		205.00	7/2 ⁺			
1433.4 [†] 3		2278.9		845.52	11/2 ⁻			

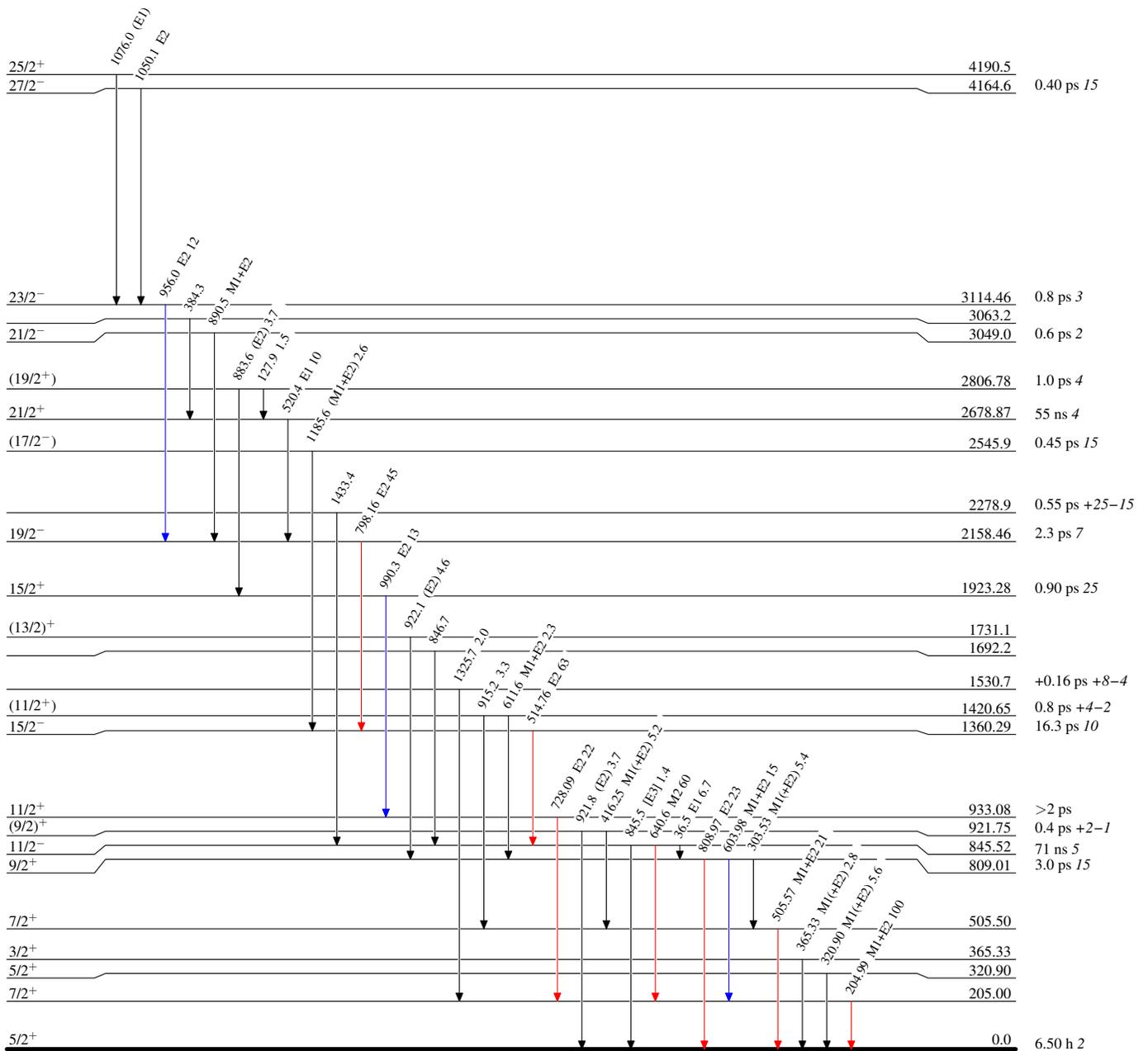
[†] Observed in $^{106}\text{Pd}(\alpha,3n\gamma)$, not in $^{105}\text{Pd}(\alpha,2n\gamma)$.

$^{105}\text{Pd}(\alpha,2n\gamma), ^{106}\text{Pd}(\alpha,3n\gamma)$ 1974Ha41,1979Oh02,1991Vi07

Legend

Level Scheme
Intensities: Type not specified

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



$^{107}_{48}\text{Cd}_{59}$

$^{105}\text{Pd}(\alpha,2n\gamma), ^{106}\text{Pd}(\alpha,3n\gamma)$ 1974Ha41,1979Oh02,1991Vi07Band(A): h11/2 decoupled
band $27/2^-$ 4164.6

1050

 $23/2^-$ 3114.46Band(B): g7/2 band; $\Delta J=1$ sequence
populated up to $19/2^+$ $(19/2^+)$ 2806.78

956

884

 $19/2^-$ 2158.46 $15/2^+$ 1923.28

798

 $(13/2^+)$ 1731.1Band(C): d5/2 g.s. band; $\Delta J=1$
members up to $J=11/2^+$ $15/2^-$ 1360.29

990

 $(11/2^+)$ 1420.65

515

922

 $11/2^-$ 845.52 $11/2^+$ 933.08 $(9/2^+)$ 915 921.75 $9/2^+$ 809.01 $7/2^+$ 505.50

604

728

 $7/2^+$ 205.00

416

922

 $5/2^+$ 0.0

506

 $^{107}_{48}\text{Cd}_{59}$