

$^{116}\text{Cd}(^{19}\text{F},4\text{n}\gamma)$ [1992Za11,1989Hi02](#)

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Yu. Khazov, I. Mitropolsky, A. Rodionov		NDS 107, 2715 (2006)	17-Jul-2006

[1975Bu08](#): $^{116}\text{Cd}(^{19}\text{F},4\text{n}\gamma)$, E=72 MeV; measured $E\gamma$, deduced levels, $T_{1/2}$. Recoil-distance method.

[1989Hi02](#), [1987Pa02](#): $^{116}\text{Cd}(^{19}\text{F},4\text{n}\gamma)$, E=76 MeV; measured $E\gamma$, $\gamma\gamma$, $\gamma\gamma(\theta)$. Four Ge detectors surrounded by BGO anti-Compton shield, 100 ns time resolution. Pulsed-beam measurement. Cranked shell model, semiclassical model.

[1992Za11](#): $^{116}\text{Cd}(^{19}\text{F},4\text{n}\gamma)$, E=80 MeV; measured $E\gamma$, deduced levels, $T_{1/2}$, B(E2). Recoil-distance method.

Others: [1973Le09](#), [1973Na08](#).

 ^{131}La Levels

The level scheme and band assignments are that of [1989Hi02](#). J^π values are from transition multiplicities and expected band structure.

E(level) [†]	J^π	$T_{1/2}$ [‡]	Comments
0.0 ⁱ	3/2 ⁺	59 [#] min 2	
26.27 ^b 5	5/2 ⁺		
145.22 ^h 17	(5/2 ⁺)		
195.73 ^a 7	7/2 ⁺		
304.67 [@] 25	11/2 ⁻	170 [#] μs 7	$T_{1/2}$: from the Adopted Levels.
422.0 ⁱ 4	(7/2 ⁺)		
440.55 ^b 9	(9/2 ⁺)		
588.28 ^h 18	(9/2 ⁺)		
640.82 [@] 25	15/2 ⁻	38.3 ps 12	$T_{1/2}$: weighted average of 38.1 ps 14 (1975Bu08) and 38.8 ps 21 (1992Za11); RDM.
671.83 ^a 11	(11/2 ⁺)		
906.8 ^{&} 3	(13/2 ⁻)		
1024.7 ⁱ 4	(11/2 ⁺)		
1055.38 ^b 12	(13/2 ⁺)		
1174.3 [@] 3	19/2 ⁻	3.8 ps 4	$T_{1/2}$: weighted average of 4.0 ps 4 (1975Bu08) and 3.0 s 9 (1992Za11).
1224.4 4			
1226.0 ^h 3	(13/2 ⁺)		
1329.19 ^a 13	(15/2 ⁺)		
1357.1 ^g 3	(15/2 ⁻)		
1410.7 ^{&} 3	(17/2 ⁻)		
1445.0 3			
1705.0 4			
1752.7 ^g 8	(17/2 ⁻)		
1752.7 ⁱ 11	(15/2 ⁺)		
1809.24 ^b 14	(17/2 ⁺)		
1846.3 [@] 3	23/2 ⁻	0.83 ps 35	
1917.7 3			
1933.4 ^g 4	(19/2 ⁻)		
1951.3 4			
1997.3 ^h 4	(17/2 ⁺)		
2091.0 ^{&} 3	(21/2 ⁻)		
2116.45 ^a 21	(19/2 ⁺)		
2121.9 ^e 3	(21/2 ⁻)	38 ns 2	$T_{1/2}$: from pulsed-beam (1989Hi02).
2160.1 3			
2235.5 ^c 3	(19/2 ⁺)		

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$^{116}\text{Cd}(^{19}\text{F},4n\gamma)$ **1992Za11,1989Hi02** (continued) ^{131}La Levels (continued)

E(level) [†]	J ^π	T _{1/2} [‡]	E(level) [†]	J ^π	T _{1/2} [‡]	E(level) [†]	J ^π
2268.0 ^f 5	(15/2 ⁺)		3287.3 4			4526.8 [@] 4	35/2 ⁻
2345.8 ^f 3	(17/2 ⁺)		3369.2 ^f 3	(25/2 ⁺)		4531.6 ^a 4	(31/2 ⁺)
2355.3 ^g 4	(21/2 ⁻)		3399.6 ^g 4	(27/2 ⁻)		4580.7? ^{&} 7	(33/2 ⁻)
2477.4 ^d 3	(19/2 ⁻)		3483.9? 10			4703.7 4	
2498.0 ^f 3	(19/2 ⁺)		3527.5 ^e 8	(27/2 ⁻)		4775.5 ^c 4	(35/2 ⁺)
2545.4 ^d 3	(21/2 ⁻)		3541.1 [@] 3	31/2 ⁻	0.35 ps 28	4839.2 11	
2549.4 ^e 4	(23/2 ⁻)		3544.9? 10			4968.5 ^d 6	(35/2 ⁻)
2621.0 ^g 4	(23/2 ⁻)		3580.8 4			5104.0 ^g 4	(35/2 ⁻)
2639.6 [@] 3	27/2 ⁻	0.35 ps 28	3610.6 ^d 5	(29/2 ⁻)		5184.4 5	
2641.27 ^b 23	(21/2 ⁺)		3619.1 4			5210.7 ^c 5	(37/2 ⁺)
2679.8 ^c 3	(23/2 ⁺)		3654.9 4			5490.6 ^d 6	(37/2 ⁻)
2680.85 ^f 24	(21/2 ⁺)		3682.6 ^{&} 4	(29/2 ⁻)		5581.4 [@] 4	39/2 ⁻
2699.7 ^d 3	(23/2 ⁻)		3689.2 ^c 3	(29/2 ⁺)		5654.3 ^c 4	(39/2 ⁺)
2845.3 ^h 11	(21/2 ⁺)		3809.5 ^a 4	(27/2 ⁺)		6038.2 ^d 8	(39/2 ⁻)
2848.5 ^{&} 4	(25/2 ⁻)		3922.5 4			6139.2 ^c 6	(41/2 ⁺)
2915.6 4			3973.7 ^c 3	(31/2 ⁺)		6602.8 ^c 5	(43/2 ⁺)
2935.7 ^d 4	(25/2 ⁻)		3989.2? ^g 10	(29/2 ⁻)		6606.6? ^d 6	(41/2 ⁻)
2942.2 ^f 3	(23/2 ⁺)		4024.5 ^d 5	(31/2 ⁻)		6673.8 [@] 5	43/2 ⁻
2975.5 ^a 3	(23/2 ⁺)		4043.6? 10			7149.5? ^c 10	(45/2 ⁺)
3018.6 ^e 4	(25/2 ⁻)		4231.0 ^g 4	(31/2 ⁻)		7185.6? ^d 12	(43/2 ⁻)
3118.9 ^g 5	(25/2 ⁻)		4332.2 5			7619.1? ^c 10	(47/2 ⁺)
3145.9 ^c 3	(25/2 ⁺)		4377.1 ^c 4	(33/2 ⁺)		7735.4? [@] 7	(47/2 ⁻)
3243.9 ^d 4	(27/2 ⁻)		4381.5 5			8832.8? [@] 6	(51/2 ⁻)
3267.8 ^c 3	(27/2 ⁺)		4480.0 ^d 5	(33/2 ⁻)		9974.8? [@] 12	(55/2 ⁻)

[†] From least-squares fit to E_γ.[‡] From RDM (1992Za11), except as noted.

From the Adopted Levels.

[@] Band(A): yrast band based on Configuration=(π h_{11/2}), ($\alpha=-1/2$).[&] Band(B): band based on Configuration=(π h_{11/2}), ($\alpha=+1/2$).^a Band(C): Band based on Configuration=(π g_{7/2}), $\alpha=-1/2$. according to IBM calculations (1996Ge12) this structure is more complex: configuration= $\pi(g_{7/2}, d_{5/2}, d_{3/2})$.^b Band(D): Band based on Configuration=(π g_{7/2}), $\alpha=+1/2$. according to IBM calculations (1996Ge12) this structure is more complex: configuration= $\pi(g_{7/2}, d_{5/2}, d_{3/2})$.^c Band(E): Band based on configuration=($\pi g_{7/2}, h_{11/2}^2$).^d Band(F): Band based on configuration=($\pi h_{11/2}$)($\nu h_{11/2}^2$).^e Band(G): Band based on configuration=($\pi g_{7/2}$)($\nu h_{11/2}, g_{7/2}$).^f Band(H): possible band based on Configuration=($P, G7/2$)($\nu h_{11/2}^2$).^g Band(I): rotational level sequence.^h Band(J): Band based on configuration ($\pi d_{5/2}$), $\alpha=+1/2$. By IBM calculations (1996Ge12) the structure has more complex configuration (composition of g_{7/2}, d_{5/2}, d_{3/2} components).ⁱ Band(K): Band based on configuration $\pi d_{5/2}$, $\alpha=-1/2$. By IBM calculations (1996Ge12) the structure has more complex configuration (composition of g_{7/2}, d_{5/2}, d_{3/2} components).

$^{116}\text{Cd}(^{19}\text{F},4n\gamma)$ **1992Za11,1989Hi02** (continued) $\gamma(^{131}\text{La})$ B(E2): from **1992Za11**.

$E_\gamma^\dagger$	$I_\gamma^\dagger$	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. ‡	Comments
(26.20 5)		26.27	5/2 ⁺	0.0	3/2 ⁺	M1(+E2)	E_γ : not observed, from ^{131}Ce ε decay (10.3 m) data.
67.3 6		2545.4	(21/2 ⁻)	2477.4	(19/2 ⁻)		
78 1		2345.8	(17/2 ⁺)	2268.0	(15/2 ⁺)		
108.9 3	120 5	304.67	11/2 ⁻	195.73	7/2 ⁺	M2	E_γ : from ^{131}La IT decay (170 μs).
118.8 2		145.22	(5/2 ⁺)	26.27	5/2 ⁺		E_γ : doublet with a strong transition in ^{130}La .
131.6 1	13.2 3	2477.4	(19/2 ⁻)	2345.8	(17/2 ⁺)	(E1)	$\gamma(\theta)$: $A_2=-0.08$ 4.
145 1		145.22	(5/2 ⁺)	0.0	3/2 ⁺		
152.1 3		2498.0	(19/2 ⁺)	2345.8	(17/2 ⁺)		
154.3 1	10.1 2	2699.7	(23/2 ⁻)	2545.4	(21/2 ⁻)	(M1,E2)	$\gamma(\theta)$: $A_2=-0.37$ 5.
169.2 1	136 3	195.73	7/2 ⁺	26.27	5/2 ⁺	M1,E2	$\gamma(\theta)$: $A_2=+0.04$ 4.
182.6 3		2680.85	(21/2 ⁺)	2498.0	(19/2 ⁺)		
196.0 1	19 1	195.73	7/2 ⁺	0.0	3/2 ⁺	E2	$\gamma(\theta)$: $A_2=+0.09$ 4.
231.0 2	2.1 1	671.83	(11/2 ⁺)	440.55	(9/2 ⁺)	M1	$\gamma(\theta)$: $A_2=0.0$ 1, $A_4=0.0$.
234.8 3		2915.6		2680.85	(21/2 ⁺)		
236.1 3	8.4 2	2935.7	(25/2 ⁻)	2699.7	(23/2 ⁻)	(M1,E2)	$\gamma(\theta)$: $A_2=-0.40$ 4.
242.0 3		2160.1		1917.7			
244.8 1	3.4 1	440.55	(9/2 ⁺)	195.73	7/2 ⁺		
261.3 3		2942.2	(23/2 ⁺)	2680.85	(21/2 ⁺)		
265.8 3		906.8	(13/2 ⁻)	640.82	15/2 ⁻		Mult.: stretched dipole.
267.4 3	1.8	3922.5		3654.9			
273.9 2	0.5 1	1329.19	(15/2 ⁺)	1055.38	(13/2 ⁺)		
284.2 4	0.4 1	3973.7	(31/2 ⁺)	3689.2	(29/2 ⁺)		
301.0 3		2942.2	(23/2 ⁺)	2641.27	(21/2 ⁺)		
307.4 4	0.4 1	2116.45	(19/2 ⁺)	1809.24	(17/2 ⁺)		
308.2 1	6.3 2	3243.9	(27/2 ⁻)	2935.7	(25/2 ⁻)	(M1,E2)	$\gamma(\theta)$: $A_2=-0.45$ 4.
315 1		2268.0	(15/2 ⁺)	1951.3			
317.3 1	1.6 8	2477.4	(19/2 ⁻)	2160.1			
331.5 3		3619.1		3287.3			
336.1 1	100	640.82	15/2 ⁻	304.67	11/2 ⁻	E2	B(E2) $\downarrow$ =0.33 2 $\gamma(\theta)$: $A_2=+0.36$ 3, $A_4=-0.15$ 4.
341.7 3	2 1	3922.5		3580.8			
345.0 3		3287.3		2942.2	(23/2 ⁺)		
366.6 1	3.6 1	3610.6	(29/2 ⁻)	3243.9	(27/2 ⁻)	(M1,E2)	$\gamma(\theta)$: $A_2=-0.54$ 4.
371.4 3	0.6 3	4703.7		4332.2			
371.5 3		3287.3		2915.6			
383.5 2	0.9 1	1055.38	(13/2 ⁺)	671.83	(11/2 ⁺)		
389.9 7	1.0 1	2935.7	(25/2 ⁻)	2545.4	(21/2 ⁻)		
392.7 2	2.6 1	588.28	(9/2 ⁺)	195.73	7/2 ⁺	(M1,E2)	$\gamma(\theta)$: $A_2=-0.60$ 6, $A_4=+0.10$ 6.
394.6 3	1.2 6	2345.8	(17/2 ⁺)	1951.3			
395.3 5		422.0	(7/2 ⁺)	26.27	5/2 ⁺		
396 [#] 1		1752.7?	(17/2 ⁻)	1357.1	(15/2 ⁻)		
398.0 4	0.6 2	4775.5	(35/2 ⁺)	4377.1	(33/2 ⁺)		
403.4 2	0.8 1	4377.1	(33/2 ⁺)	3973.7	(31/2 ⁺)	(M1,E2)	$\gamma(\theta)$: $A_2=-0.01$ 6.
409.6 3	1.6 8	4332.2		3922.5			
413.9 1	2.6 1	4024.5	(31/2 ⁻)	3610.6	(29/2 ⁻)	(M1,E2)	$\gamma(\theta)$: $A_2=-0.15$ 4.
414.3 1	8.4 2	440.55	(9/2 ⁺)	26.27	5/2 ⁺		
421.5 2	1.3 1	3689.2	(29/2 ⁺)	3267.8	(27/2 ⁺)	(M1,E2)	$\gamma(\theta)$: $A_2=0.0$ 1.
422.1 3		2355.3	(21/2 ⁻)	1933.4	(19/2 ⁻)		
422.5 5		422.0	(7/2 ⁺)	0.0	3/2 ⁺		
423.5 1	2.5 1	2545.4	(21/2 ⁻)	2121.9	(21/2 ⁻)	(M1)	Mult.: nonstretched $\Delta J=0$ or $\Delta J=2$ γ (decay pattern supports $\Delta J=0$); $\gamma(\theta)$: $A_2=+0.38$ 1, $A_4=+0.06$ 1.
427.1 3		3369.2	(25/2 ⁺)	2942.2	(23/2 ⁺)		

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$^{116}\text{Cd}(^{19}\text{F},4n\gamma)$ **1992Za11,1989Hi02 (continued)** $\gamma(^{131}\text{La})$ (continued)

E_γ †	I_γ †	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. ‡	Comments
427.5 2		2549.4	(23/2 ⁻)	2121.9	(21/2) ⁻		
435 1	0.3 1	5210.7	(37/2 ⁺)	4775.5	(35/2 ⁺)		
442.9 2	5.3 1	588.28	(9/2 ⁺)	145.22	(5/2 ⁺)		
444.3 1	2.2 1	2679.8	(23/2 ⁺)	2235.5	(19/2 ⁺)	(E2)	Mult.: stretched ($\Delta J=2$) E2; $\gamma(\theta)$: $A_2=+0.01$ 7.
449.9 3		1357.1	(15/2 ⁻)	906.8	(13/2 ⁻)		
455.4 3	1.5 2	4480.0	(33/2 ⁻)	4024.5	(31/2 ⁻)	(M1,E2)	$\gamma(\theta)$: $A_2=-0.46$ 2.
458.7 3	0.7 4	4381.5		3922.5			
466.4 3	6.9 2	3145.9	(25/2 ⁺)	2679.8	(23/2 ⁺)	(M1,E2)	$\gamma(\theta)$: $A_2=-0.05$ 4.
469.3 2		3018.6	(25/2 ⁻)	2549.4	(23/2 ⁻)		
472.7 3		1917.7		1445.0			
472.8 3	1.7 9	4703.7		4231.0	(31/2 ⁻)		
476.1 1	6.8 2	671.83	(11/2 ⁺)	195.73	7/2 ⁺	(E2)	$\gamma(\theta)$: $A_2=+0.07$ 4.
479.9 3	0.4 1	1809.24	(17/2 ⁺)	1329.19	(15/2 ⁺)		
480.7 3		1705.0		1224.4			
480.7 3	0.8	5184.4		4703.7			
488.6 3	1.0 1	4968.5	(35/2 ⁻)	4480.0	(33/2 ⁻)		
507 1	<1.2	4839.2		4332.2			
509 1		3527.5	(27/2 ⁻)	3018.6	(25/2 ⁻)		
522.2 3	0.6 1	5490.6	(37/2 ⁻)	4968.5	(35/2 ⁻)		
522.6 3	1.4 7	1933.4	(19/2 ⁻)	1410.7	(17/2 ⁻)		Mult.: stretched dipole.
525 1		2641.27	(21/2 ⁺)	2116.45	(19/2 ⁺)		
529.9 3		2621.0	(23/2 ⁻)	2091.0	(21/2 ⁻)		Mult.: stretched dipole.
530.5 3		1705.0		1174.3	19/2 ⁻		
533.5 1	70 1	1174.3	19/2 ⁻	640.82	15/2 ⁻	E2	B(E2) $\downarrow$ =0.42 12 $\gamma(\theta)$: $A_2=+0.36$ 3, $A_4=-0.22$ 4.
537.8 3		1445.0		906.8	(13/2 ⁻)		
543.3 1	2.9 2	3689.2	(29/2 ⁺)	3145.9	(25/2 ⁺)		Mult.: stretched ($\Delta J=2$) E2.
544.1 6	0.5 1	3243.9	(27/2 ⁻)	2699.7	(23/2 ⁻)		
547.8 5	0.3 1	6038.2	(39/2 ⁻)	5490.6	(37/2 ⁻)		
548# 1	<0.2	4231.0	(31/2 ⁻)	3682.6	(29/2 ⁻)		Mult.: stretched dipole.
551.1 3	0.4 2	3399.6	(27/2 ⁻)	2848.5	(25/2 ⁻)		Mult.: stretched dipole.
559.5 5		2477.4	(19/2 ⁻)	1917.7			
559.8 3		1917.7		1357.1	(15/2 ⁻)		
564 1		2680.85	(21/2 ⁺)	2116.45	(19/2 ⁺)		
568.5# 6		6606.6?	(41/2 ⁻)	6038.2	(39/2 ⁻)		
577.0 3	0.3 2	5104.0	(35/2 ⁻)	4526.8	35/2 ⁻		Mult.: $\Delta J=0$ dipole.
579# 1		7185.6?	(43/2 ⁻)	6606.6?	(41/2 ⁻)		
580.2 3		2498.0	(19/2 ⁺)	1917.7			
583.6 3	1.1 6	1224.4		640.82	15/2 ⁻		
584.0 5		1024.7	(11/2 ⁺)	440.55	(9/2 ⁺)		
588.0 1	7.2 2	3267.8	(27/2 ⁺)	2679.8	(23/2 ⁺)	(E2)	Mult.: stretched ($\Delta J=2$) E2; $\gamma(\theta)$: $A_2=+0.18$ 4, $A_4=-0.15$ 5.
602.0 3		906.8	(13/2 ⁻)	304.67	11/2 ⁻		Mult.: stretched dipole.
602.8 5		1024.7	(11/2 ⁺)	422.0	(7/2 ⁺)		
614.9 1	7.6 2	1055.38	(13/2 ⁺)	440.55	(9/2 ⁺)	(E2)	$\gamma(\theta)$: $A_2=+0.10$ 5.
628.4 2	3.4 1	3267.8	(27/2 ⁺)	2639.6	27/2 ⁻	(E1)	Mult.: nonstretched ($\Delta J=0$); $\gamma(\theta)$: $A_2=+0.30$ 7.
637.7 2	5 1	1226.0	(13/2 ⁺)	588.28	(9/2 ⁺)		
650.1 3	0.8 4	2355.3	(21/2 ⁻)	1705.0			
657.3 1	3.4 1	1329.19	(15/2 ⁺)	671.83	(11/2 ⁺)	(E2)	$\gamma(\theta)$: $A_2=+0.22$ 6, $A_4=+0.05$ 7.
672.0 1	56 1	1846.3	23/2 ⁻	1174.3	19/2 ⁻	E2	B(E2) $\downarrow$ =0.47 20 $\gamma(\theta)$: $A_2=+0.35$ 3, $A_4=-0.14$ 4.
675.6 4	0.5 1	3610.6	(29/2 ⁻)	2935.7	(25/2 ⁻)		
680.3 3		2091.0	(21/2 ⁻)	1410.7	(17/2 ⁻)		
687.6 3		2621.0	(23/2 ⁻)	1933.4	(19/2 ⁻)		
687.8 1	6.3 2	4377.1	(33/2 ⁺)	3689.2	(29/2 ⁺)	(E2)	Mult.: stretched ($\Delta J=2$) E2; $\gamma(\theta)$: $A_2=+0.27$ 5.

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$^{116}\text{Cd}(^{19}\text{F},4n\gamma)$ **1992Za11,1989Hi02 (continued)** $\gamma(^{131}\text{La})$ (continued)

E_γ †	I_γ †	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult.‡	Comments
690.0 3		4231.0	(31/2 ⁻)	3541.1	31/2 ⁻		Mult.: $\Delta J=0$ dipole.
703.8 3		3619.1		2915.6			
706.0 1	11.3 3	3973.7	(31/2 ⁺)	3267.8	(27/2 ⁺)	(E2)	Mult.: stretched ($\Delta J=2$) E2; $\gamma(\theta)$: $A_2=+0.18$ 5.
711.3 8	2 1	2121.9	(21/2 ⁻)	1410.7	(17/2 ⁻)		
715.8 3		1357.1	(15/2 ⁻)	640.82	15/2 ⁻		
722.1 2	0.3 1	4531.6	(31/2 ⁺)	3809.5	(27/2 ⁺)		
727.8 3		3369.2	(25/2 ⁺)	2641.27	(21/2 ⁺)		
728 1		1752.7	(15/2 ⁺)	1024.7	(11/2 ⁺)		
749.4 2	0.8 2	2160.1		1410.7	(17/2 ⁻)		
751 1		1055.38	(13/2 ⁺)	304.67	11/2 ⁻		
753.9 1	3.1 1	1809.24	(17/2 ⁺)	1055.38	(13/2 ⁺)	(E2)	$\gamma(\theta)$: $A_2=+0.32$ 6, $A_4=-0.07$ 7.
756# 1		4043.6?		3287.3			
757.5 3	0.5 3	2848.5	(25/2 ⁻)	2091.0	(21/2 ⁻)		
760.0 3	0.6 3	3399.6	(27/2 ⁻)	2639.6	27/2 ⁻		Mult.: $\Delta J=0$ dipole.
763.6 3	1.2 6	3118.9	(25/2 ⁻)	2355.3	(21/2 ⁻)		
770.0 3	4.7 4	1410.7	(17/2 ⁻)	640.82	15/2 ⁻		Mult.: stretched dipole.
771.3 2	3 1	1997.3	(17/2 ⁺)	1226.0	(13/2 ⁺)		
774 1	0.6 3	2621.0	(23/2 ⁻)	1846.3	23/2 ⁻		Mult.: $\Delta J=0$ dipole.
778 1	1.0 5	3399.6	(27/2 ⁻)	2621.0	(23/2 ⁻)		
780.7 4	0.4 1	4024.5	(31/2 ⁻)	3243.9	(27/2 ⁻)		
787.2 2	2.6 1	2116.45	(19/2 ⁺)	1329.19	(15/2 ⁺)	(E2)	$\gamma(\theta)$: $A_2=+0.02$ 8.
793.2 1	32 1	2639.6	27/2 ⁻	1846.3	23/2 ⁻	E2	$B(E2)\downarrow=0.49$ 39 $\gamma(\theta)$: $A_2=+0.32$ 3, $A_4=-0.12$ 4.
801.8 1	7.6 2	4775.5	(35/2 ⁺)	3973.7	(31/2 ⁺)	(E2)	Mult.: stretched ($\Delta J=2$) E2; $\gamma(\theta)$: $A_2=+0.35$ 6.
831.5 3		4231.0	(31/2 ⁻)	3399.6	(27/2 ⁻)		
832.0 2	1.3 1	2641.27	(21/2 ⁺)	1809.24	(17/2 ⁺)		
833.6 3	16.5 3	5210.7	(37/2 ⁺)	4377.1	(33/2 ⁺)	(E2)	Mult.: $\gamma(\theta)$: $A_2=+0.31$ 4; stretched ($\Delta J=2$) E2.
833.7 2		2679.8	(23/2 ⁺)	1846.3	23/2 ⁻		
834.0 2	0.7 1	3809.5	(27/2 ⁺)	2975.5	(23/2 ⁺)		
834.1 3		3682.6	(29/2 ⁻)	2848.5	(25/2 ⁻)		
837# 1		4377.1	(33/2 ⁺)	3541.1	31/2 ⁻		
844# 1	0.3 1	3483.9?		2641.27	(21/2 ⁺)		
845# 1		1752.7?	(17/2 ⁻)	906.8	(13/2 ⁻)		
848 1	<1.0	2845.3	(21/2 ⁺)	1997.3	(17/2 ⁺)		
859.0 2	0.9 1	2975.5	(23/2 ⁺)	2116.45	(19/2 ⁺)	(E2)	$\gamma(\theta)$: $A_2=+0.5$ 2, $A_4=0.0$ 2.
869.8 5	0.4 1	4480.0	(33/2 ⁻)	3610.6	(29/2 ⁻)		
870# 1		3989.2?	(29/2 ⁻)	3118.9	(25/2 ⁻)		
871.8 3		2680.85	(21/2 ⁺)	1809.24	(17/2 ⁺)		
873.2 3	0.7 4	5104.0	(35/2 ⁻)	4231.0	(31/2 ⁻)		
878.8 1	2.8 1	5654.3	(39/2 ⁺)	4775.5	(35/2 ⁺)	(E2)	Mult.: stretched ($\Delta J=2$) E2; $\gamma(\theta)$: $A_2=+0.47$ 8, $A_4=-0.09$ 9.
896 1		3018.6	(25/2 ⁻)	2121.9	(21/2 ⁻)		
897# 1		4580.7?	(33/2 ⁻)	3682.6	(29/2 ⁻)		
900.9 3		2345.8	(17/2 ⁺)	1445.0			
901.5 1	15 1	3541.1	31/2 ⁻	2639.6	27/2 ⁻	E2	$B(E2)\downarrow=0.26$ 21 $\gamma(\theta)$: $A_2=+0.44$ 5, $A_4=-0.33$ 6.
905# 1		3544.9?		2641.27	(21/2 ⁺)		
916.6 3	1.5 8	2091.0	(21/2 ⁻)	1174.3	19/2 ⁻		Mult.: stretched dipole.
928.5 3	1.6 1	6139.2	(41/2 ⁺)	5210.7	(37/2 ⁺)	(E2)	Mult.: stretched ($\Delta J=2$) E2; $\gamma(\theta)$: $A_2=+0.2$ 1, $A_4=-0.2$ 1.
941.0 3	3 1	3580.8		2639.6	27/2 ⁻		
943.9 7	0.2 1	4968.5	(35/2 ⁻)	4024.5	(31/2 ⁻)		
944.5 3		2355.3	(21/2 ⁻)	1410.7	(17/2 ⁻)		
947.6 1	7 1	2121.9	(21/2 ⁻)	1174.3	19/2 ⁻	M1,E2	$\gamma(\theta)$: $A_2=-0.42$ 4.
948.5 3		6602.8	(43/2 ⁺)	5654.3	(39/2 ⁺)		Mult.: stretched ($\Delta J=2$) E2.

Continued on next page (footnotes at end of table)

$^{116}\text{Cd}(^{19}\text{F},4\text{n}\gamma)$ [1992Za11,1989Hi02](#) (continued) $\gamma(^{131}\text{La})$ (continued)

$E_\gamma^\dagger$	$I_\gamma^\dagger$	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [‡]	Comments
^x 952 1							
978 1		3527.5	(27/2 ⁻)	2549.4	(23/2 ⁻)		
985.7 1	6.2 2	4526.8	35/2 ⁻	3541.1	31/2 ⁻	E2	$\gamma(\theta)$: $A_2=+0.25$ 5, $A_4=-0.01$ 6.
988.8 3		2345.8	(17/2 ⁺)	1357.1	(15/2 ⁻)		
1002.1 3	1.5 8	2848.5	(25/2 ⁻)	1846.3	23/2 ⁻		Mult.: stretched dipole.
1010 1	<0.1	5490.6	(37/2 ⁻)	4480.0	(33/2 ⁻)		
1010 [#] 1		7149.5?	(45/2 ⁺)	6139.2	(41/2 ⁺)		
1011.1 3		1917.7		906.8	(13/2 ⁻)		
1015.1 3	4 2	3654.9		2639.6	27/2 ⁻		
1016 [#] 1		7619.1?	(47/2 ⁺)	6602.8	(43/2 ⁺)		
1028 1	0.3 2	3118.9	(25/2 ⁻)	2091.0	(21/2 ⁻)		
1040 [#] 1	0.5 3	4580.7?	(33/2 ⁻)	3541.1	31/2 ⁻		
1043.0 3	1.1 6	3682.6	(29/2 ⁻)	2639.6	27/2 ⁻		Mult.: stretched dipole.
1049.1 3		3689.2	(29/2 ⁺)	2639.6	27/2 ⁻		
1053 1		1357.1	(15/2 ⁻)	304.67	11/2 ⁻		
1054.6 2	2.7 2	5581.4	39/2 ⁻	4526.8	35/2 ⁻		
1061.2 2		2235.5	(19/2 ⁺)	1174.3	19/2 ⁻		
1061.6 4	0.6 1	7735.4?	(47/2 ⁻)	6673.8	43/2 ⁻	E2	$\gamma(\theta)$: $A_2=+0.48$ 11, $A_4=-0.15$ 13.
1069 1	<0.1	6038.2	(39/2 ⁻)	4968.5	(35/2 ⁻)		
1092.4 3	0.8 2	6673.8	43/2 ⁻	5581.4	39/2 ⁻		
1097.1 [#] 4	0.4 2	8832.8?	(51/2 ⁻)	7735.4?	(47/2 ⁻)		
1115 [#] 1		6606.6?	(41/2 ⁻)	5490.6	(37/2 ⁻)		
1140.7 3		1445.0		304.67	11/2 ⁻		
1142 [#] 1	<0.2	9974.8?	(55/2 ⁻)	8832.8?	(51/2 ⁻)		
1169 1	<0.2	1809.24	(17/2 ⁺)	640.82	15/2 ⁻		
1171.4 4	0.4 2	2345.8	(17/2 ⁺)	1174.3	19/2 ⁻		
1293.2 5	1.1 6	1933.4	(19/2 ⁻)	640.82	15/2 ⁻		Mult.: stretched dipole.
1299.2 3	2.2 1	3145.9	(25/2 ⁺)	1846.3	23/2 ⁻	(E1)	$\gamma(\theta)$: $A_2=-0.36$ 8.
1310.2 4	2 1	1951.3		640.82	15/2 ⁻		
1361.6 5		2268.0	(15/2 ⁺)	906.8	(13/2 ⁻)		
1446.8 5	1.0 5	2621.0	(23/2 ⁻)	1174.3	19/2 ⁻		Mult.: stretched E2.
1506.8 5		2680.85	(21/2 ⁺)	1174.3	19/2 ⁻		
1553.8 5	0.6 3	3399.6	(27/2 ⁻)	1846.3	23/2 ⁻		Mult.: stretched E2.
1734.8 5	2 1	3580.8		1846.3	23/2 ⁻		
1742.5 5	1.0 5	4381.5		2639.6	27/2 ⁻		

[†] From [1989Hi02](#).[‡] From $\gamma(\theta)$ ([1989Hi02](#)), RUL, and expected band structure.

Placement of transition in the level scheme is uncertain.

^x γ ray not placed in level scheme.

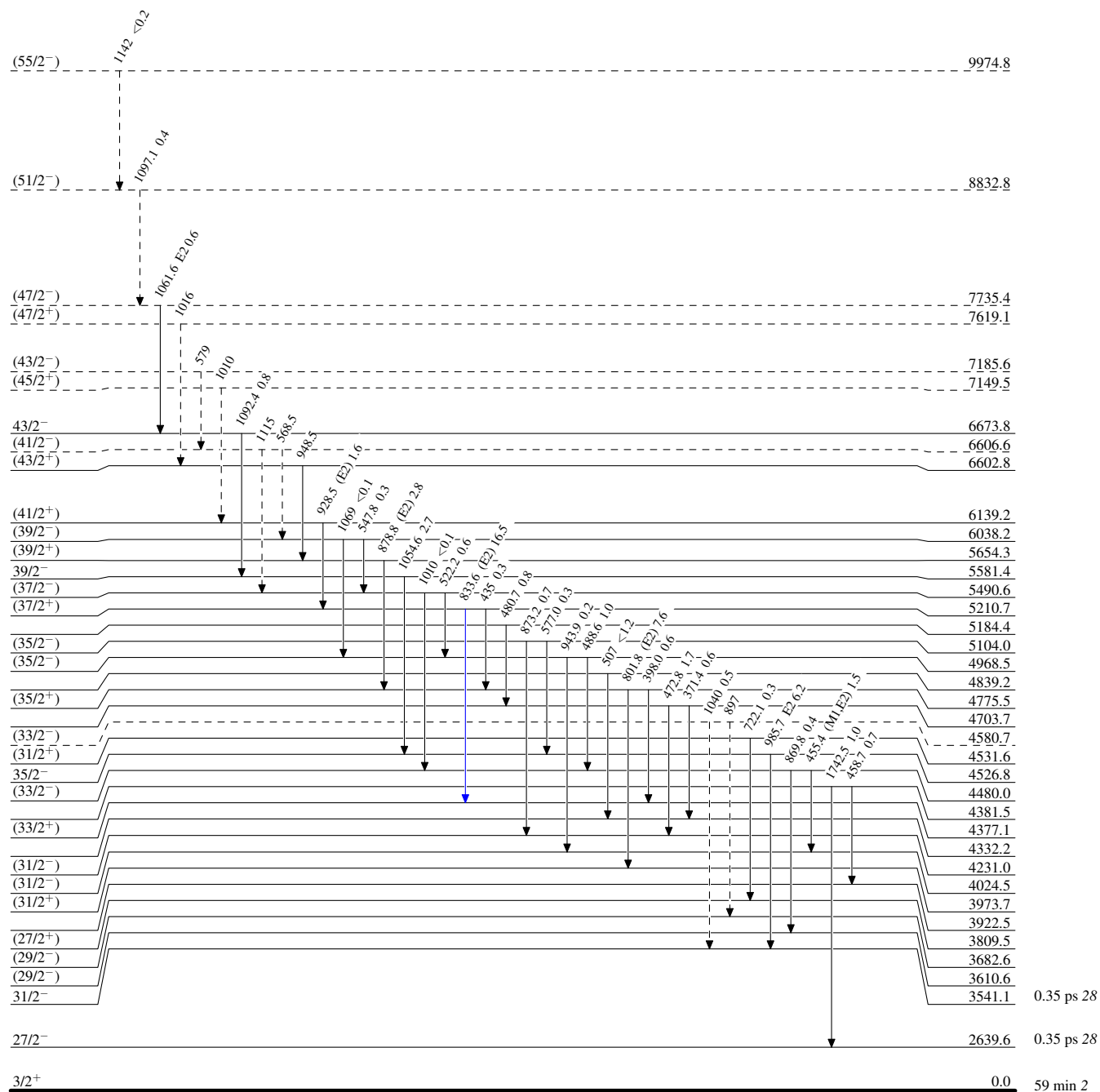
$^{116}\text{Cd}(^{19}\text{F},4n\gamma)$ 1992Za11,1989Hi02

Legend

Level Scheme

Intensities: Relative I_γ

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



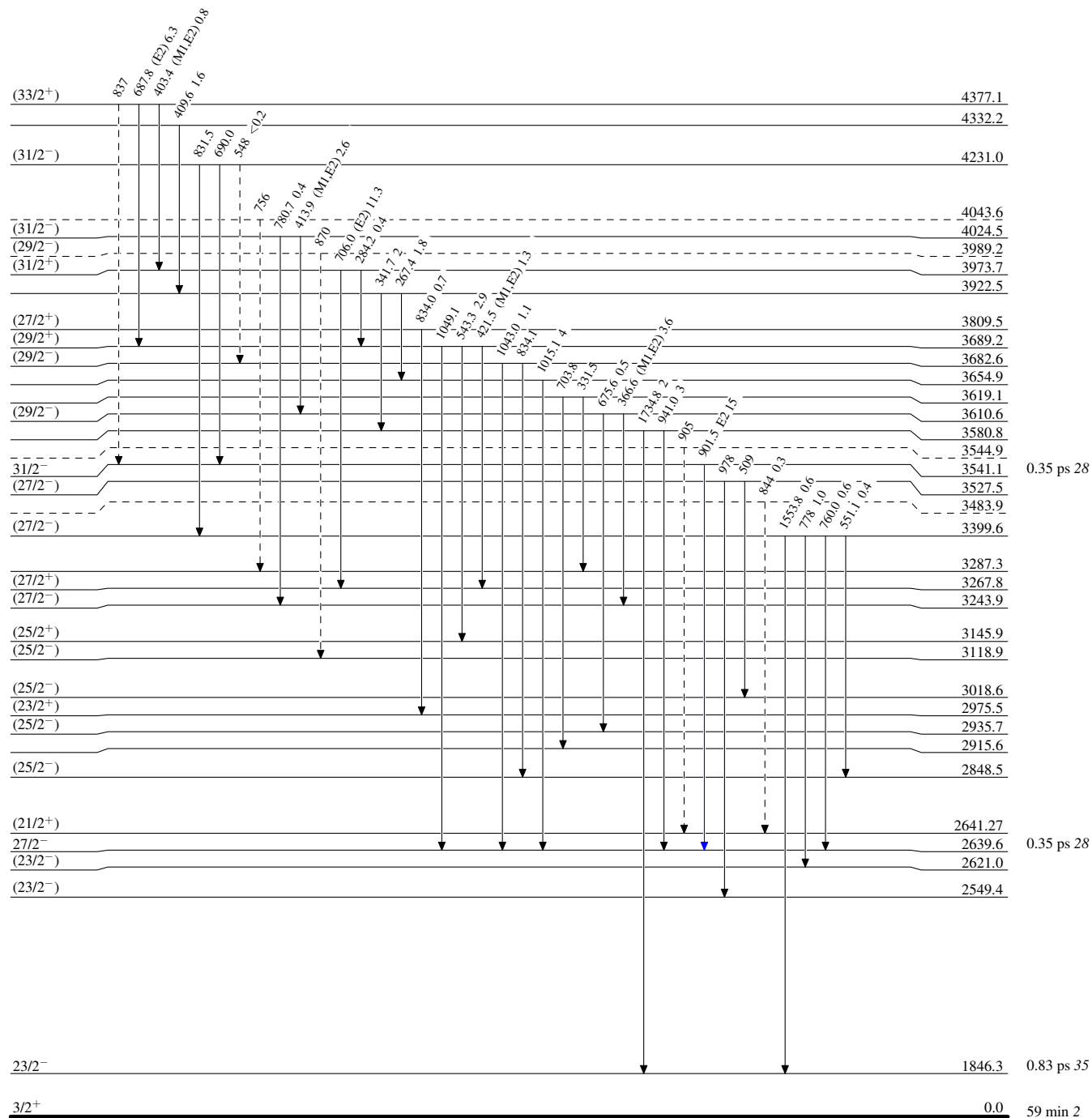
$^{116}\text{Cd}(^{19}\text{F},4n\gamma)$ 1992Za11,1989Hi02

Legend

Level Scheme (continued)

Intensities: Relative I_γ

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

 $^{131}_{57}\text{La}_{74}$

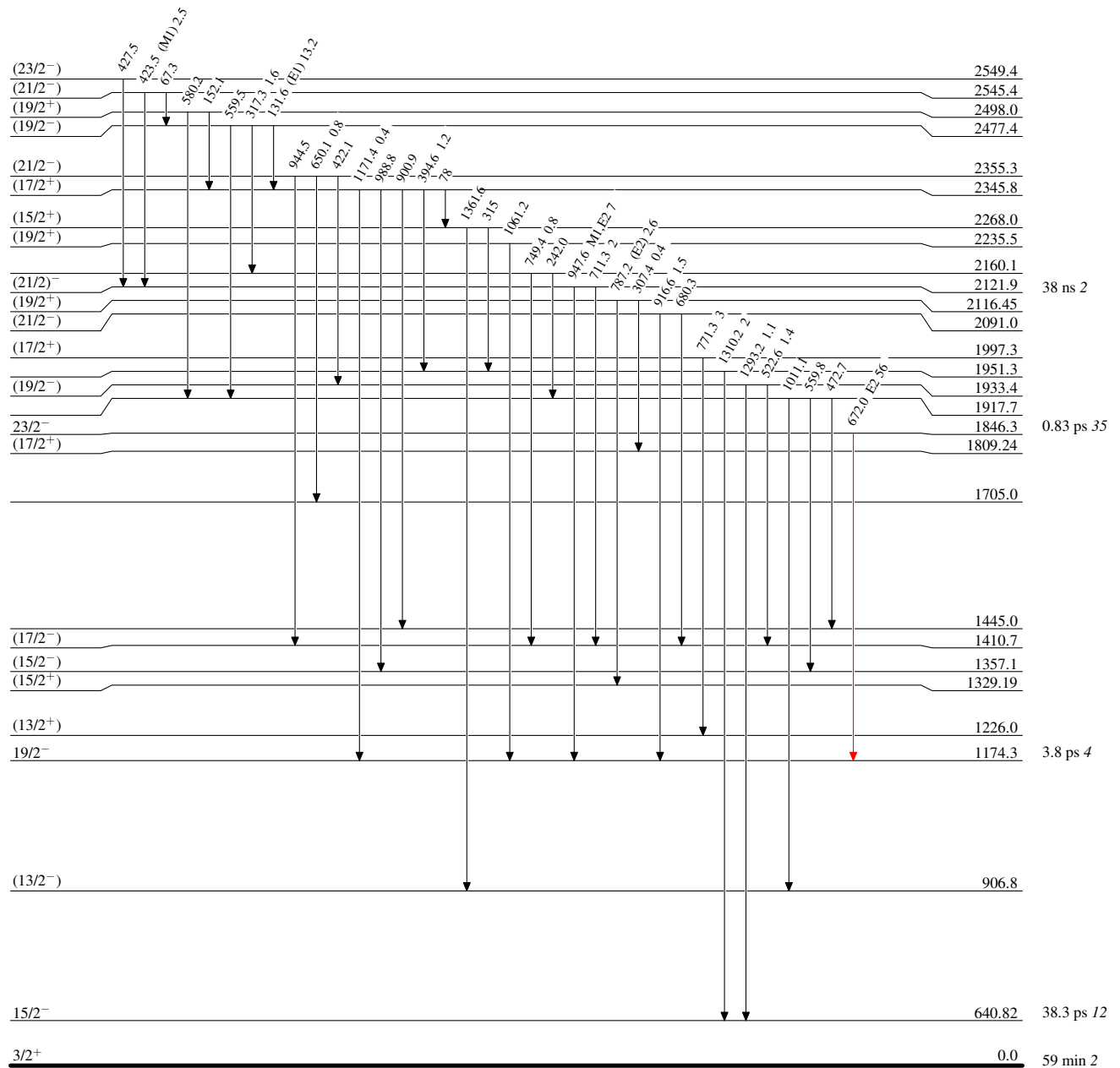
$^{116}\text{Cd}(^{19}\text{F},4n\gamma)$ 1992Za11,1989Hi02

Level Scheme (continued)

Intensities: Relative I_γ

Legend

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



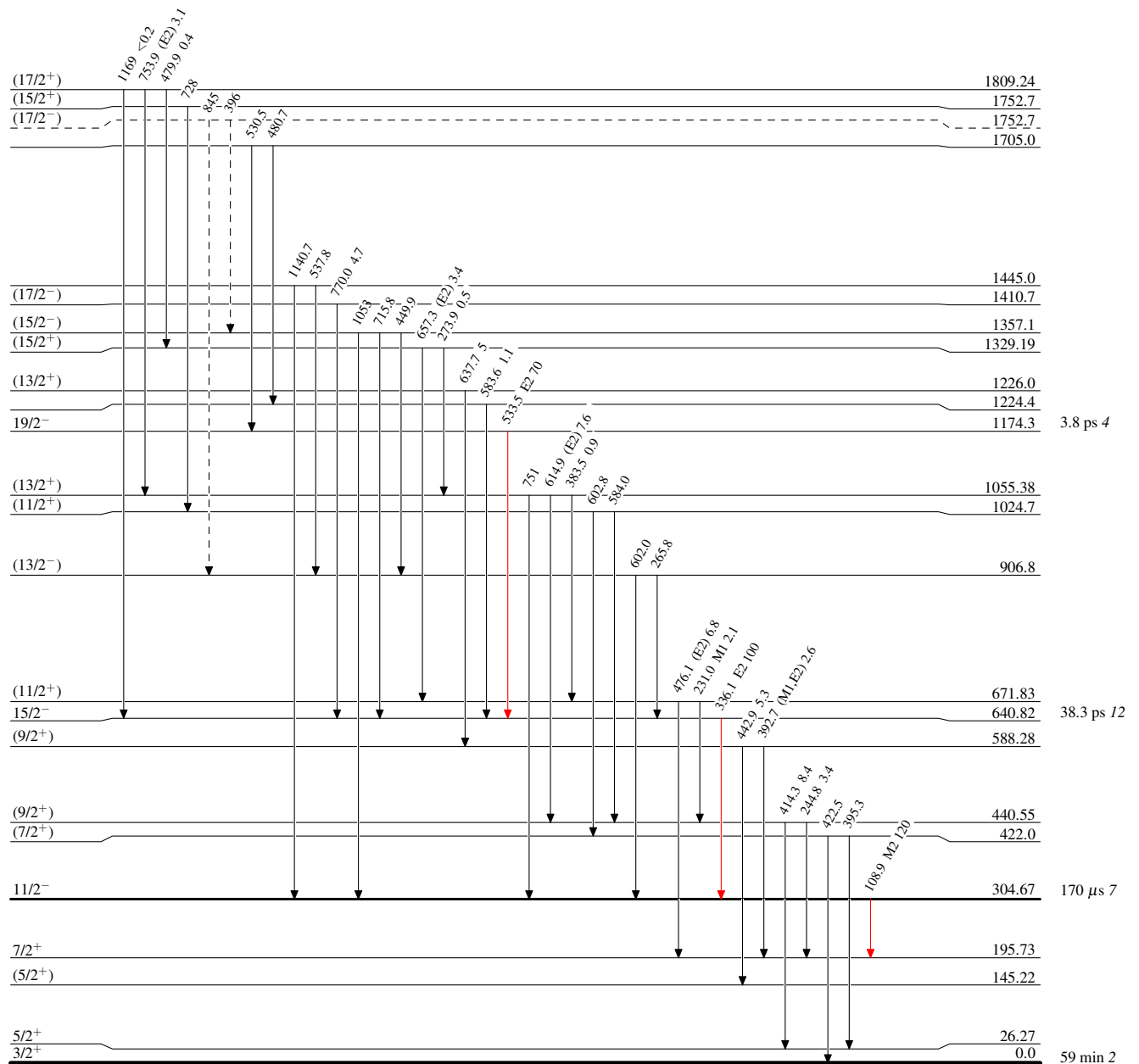
$^{116}\text{Cd}(^{19}\text{F},4n\gamma)$ 1992Za11,1989Hi02

Legend

Level Scheme (continued)

Intensities: Relative I_γ

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

 $^{131}_{57}\text{La}_{74}$

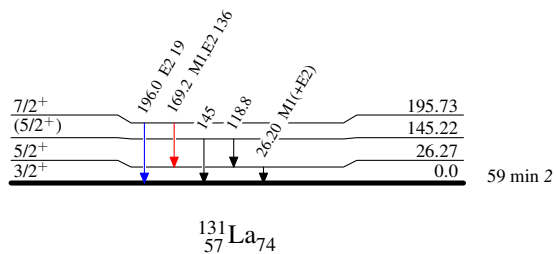
$^{116}\text{Cd}(^{19}\text{F},4n\gamma)$ 1992Za11,1989Hi02

Legend

Level Scheme (continued)

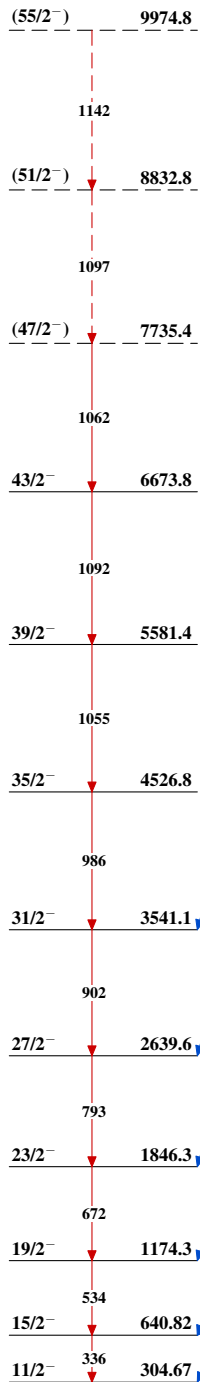
 Intensities: Relative I_γ

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

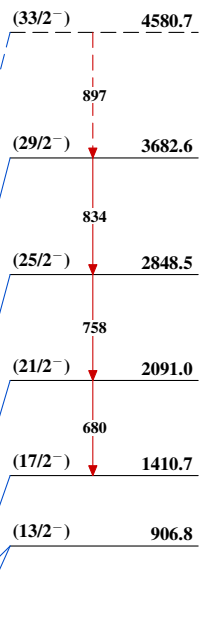


$^{116}\text{Cd}(^{19}\text{F},4n\gamma)$ 1992Za11,1989Hi02

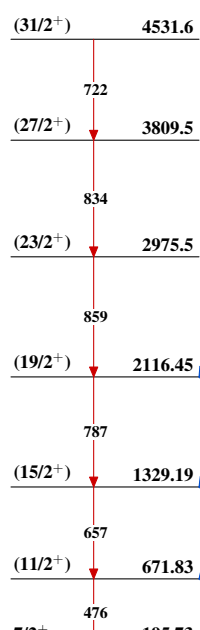
Band(A): Yrast band
based on Configuration= $(\pi$
 $h_{11/2})$, ($\alpha=-1/2$)



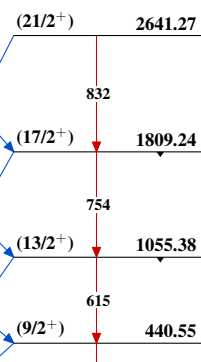
Band(B): Band based on
Configuration= $(\pi$
 $h_{11/2})$, ($\alpha=+1/2$)



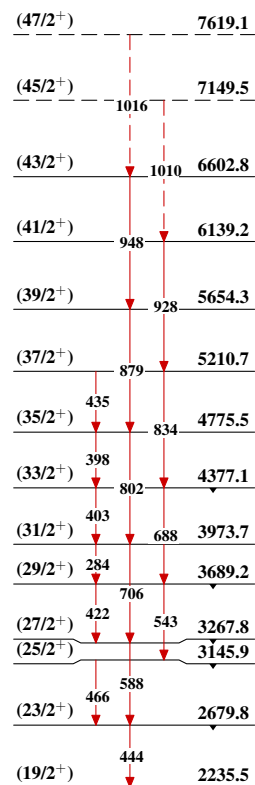
Band(C): Band based on
Configuration= $(\pi$
 $g_{7/2})$, ($\alpha=-1/2$)

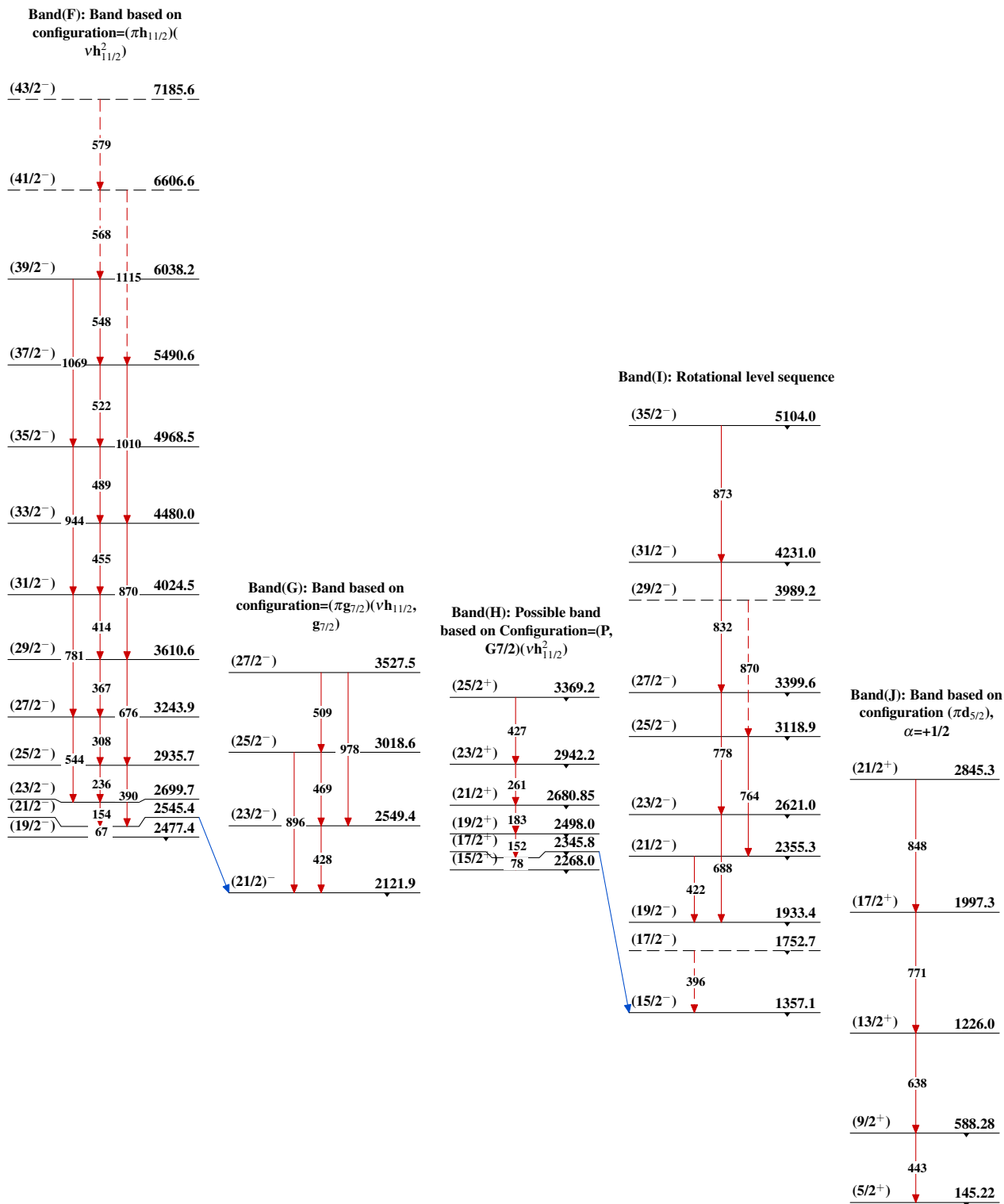


Band(D): Band based on
Configuration= $(\pi$
 $g_{7/2})$, ($\alpha=+1/2$)



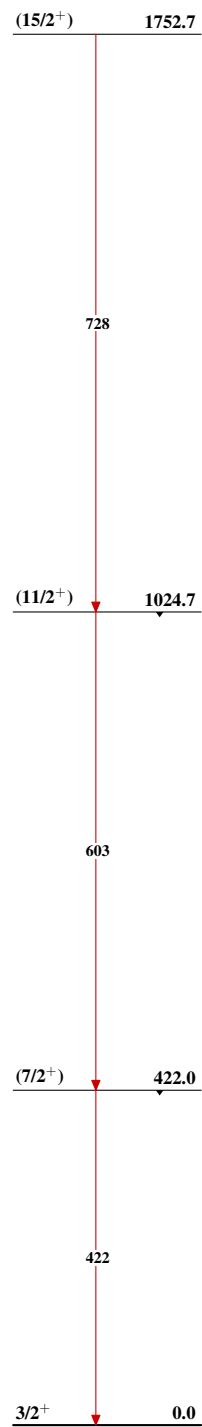
Band(E): Band based on
configuration= $(\pi g_{7/2}, h_{11/2}^2)$



$^{116}\text{Cd}(^{19}\text{F},4n\gamma)$ 1992Za11,1989Hi02 (continued)

$^{116}\text{Cd}(^{19}\text{F},4\text{n}\gamma)$ 1992Za11,1989Hi02 (continued)

Band(K): Band based on
configuration $\pi d_{5/2}$,
 $\alpha=-1/2$



$^{131}_{57}\text{La}_{74}$