^{100}Mo(^{13}C,4nγ) 1994Ju05,2001Ha09

History

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

1994Ju05: Reaction: ^{100}Mo(^{13}C,4nγ), E(^{13}C)=44 MeV. Target: A 0.59 mg/cm^2 thick (97.4% enriched) with a 8.9 mg/cm^2 thick gold backing. The beams were provided by the Tandem Accelerator Laboratory of the Niels Bohr Institute. γ-rays were detected using Nordball array consisting of 17-20 Compton-suppressed Ge detectors (at 37°, 79°, 101° and 143°) and a BaF_2-multiplicity filter. Measured: Eγ, $\gamma\gamma$, $\gamma(\theta)$. Deduced: ^{109}Cd levels, J^π, $T_{1/2}$, B(M1)/B(E2). 1994Ju05 also report data for ^{96}Zr(^{18}O,5nγ) and (p,nγ).

2001Ha09:Reaction:^{100}Mo(^{13}C,4nγ), E(^{13}C)=50 MeV, FN Van de Graaff Tandem accelerator at the University of Cologne. Target: A 0.6 mg/cm^2 thick (98 % enriched) with a 4.3 mg/cm^2 thick gold backing (Intensity measurements), A 0.6 μg/cm^2 thick (98 % enriched) with 2 mg/cm^2 Ta stopper (lifetime measurements). Detectors: 3 Ge detectors at 0°, 55°, 160° angles, 24 target-to- stopper distances in the range of 2.9 μm to 8 mm. Measured: Eγ, Iγ, $T_{1/2}$, lifetime using the Recoil Distance Doppler Shift technique (RDDS) and an intensity measurement, The data have been analyzed using the Differential Decay Curve Method.

^{109}Cd Levels

E(level)†	J$^\pi$‡	$T_{1/2}$#	Comments
0.0	5/2$^+$		
203.30 *10*	7/2$^+$		
462.91 *14*	11/2$^+$		
822.5 *3*	9/2$^+$		
985.32 *17*	15/2$^-$	10.0 ps *4*	
1066.3 *4*	11/2$^+$		
1105.9 *5*	9/2$^+$		
1425.8 *5*	13/2$^-$		
1563.0 *6*	11/2$^+$		
1821.34 *20*	19/2$^-$	0.59 ps *14*	
1854.3 *5*	13/2$^+$		
2065.3? *6*	13/2$^+$		E(level): proposed by 1994Ju05 in ^{100}Mo(^{13}C,4nγ) based on the 999.0γ, but not observed in ^{96}Zr(^{18}O,5nγ) by the same authors. Evaluators have considered this assignment questionable.
2141.8 *5*	15/2$^+$		
2166.1 *4*	17/2$^-$	0.5 ps *3*	
2589.8 *5*	19/2$^-$	0.8 ps *4*	
2687.2 *4*	17/2$^+$		
2700.2 *5*	19/2$^-$		
2862.03 *22*	23/2$^-$	<1.2 ps	
2866.54 *22*	21/2$^{(+)}$	1.26 ns *19*	
2942.2 *4*	19/2$^+$	<3.5 ps	
2973.8 *4*	21/2$^-$	<7.6 ps	
3042.7 *4*	21/2$^-$	<3.5 ps	
3059.15 *22*	21/2$^+$	0.8 ps *5*	
3282.2 *5*	21/2$^{(+)}$		
3353.8 *5*	21/2$^-$		
3369.9 *5*	23/2$^-$	<3.5 ps	
3383.0 *4*	23/2$^+$	12.1 ps *9*	
3410.6 *5*	23/2$^-$		
3524.2 *6*	21/2$^+$		
3524.76 *24*	25/2$^+$	12.1 ps *12*	
3548.8 *5*	23/2$^-$	<2.1 ps	
3569.8 *5*	23/2$^{(+)}$		
3615.4 *5*	23/2$^-$		
3620.7 *4*	23/2$^+$		
3897.4 *6*	25/2$^-$		
3910.2 *5*	25/2$^+$	<13 ps	

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^{100}Mo(^{13}C,4nγ) 1994Ju05,2001Ha09 (continued)

^{109}Cd Levels (continued)

E(level)†	Jπ‡	$T_{1/2}$#	E(level)†	Jπ‡	$T_{1/2}$#	E(level)†	Jπ‡	$T_{1/2}$#
3939.8 *4*	$27/2^+$	3.8 ps *4*	4296.3 *7*	$27/2^-$		5279.4 *8*	$29/2^-$	<7.6 ps
4021.6 *6*	$27/2^-$		4630.4 *7*	$27/2^-$	<4.2 ps	5441.0 *9*	$31/2^-$	
4030.4 *5*	$25/2^-$	<2.8 ps	4697.6 *7*	$29/2^+$		5731.0 *11*	$33/2^-$	
4232.8 *6*	$27/2^+$		4724.8 *6*	$31/2^+$	<3.1 ps	5775.4 *8*	$35/2^+$	
4246.8 *5*	$29/2^+$	<3.8 ps	5051.2 *8*	$31/2^-$		5971.9 *9*	$35/2^-$	
4293.2 *6*	$25/2^{(+)}$		5083.6 *8*	$31/2^+$		7011.0 *11*	$39/2^-$	

† From a least-squares fit to γ-ray energies.
‡ From 1994Ju05 (see ^{96}Zr(^{18}O,5nγ) for details).
# From 2001Ha09 using the RDDS method.

γ(^{109}Cd)

E_γ†	I_γ†	E_i(level)	J_i^π	E_f	J_f^π
161.6 *5*	1.4 *1*	5441.0	$31/2^-$	5279.4	$29/2^-$
195.0 *5*	1.1 *1*	3548.8	$23/2^-$	3353.8	$21/2^-$
203.3 *1*	26 *1*	203.30	$7/2^+$	0.0	$5/2^+$
243.8 *5*	0.45 *5*	1066.3	$11/2^+$	822.5	$9/2^+$
259.6 *1*	15.9 *3*	462.91	$11/2^+$	203.30	$7/2^+$
273.4 *5*	0.4 *2*	2973.8	$21/2^-$	2700.2	$19/2^-$
287.5 *5*	0.40 *5*	3569.8	$23/2^{(+)}$	3282.2	$21/2^{(+)}$
289.9 *5*	1.4 *1*	5731.0	$33/2^-$	5441.0	$31/2^-$
323.8 *5*	4.4 *1*	3383.0	$23/2^+$	3059.15	$21/2^+$
340.3 *5*	0.6 *3*	3383.0	$23/2^+$	3042.7	$21/2^-$
371.8 *5*	0.24 *8*	3059.15	$21/2^+$	2687.2	$17/2^+$
414.8 *5*	0.6 *2*	4030.4	$25/2^-$	3615.4	$23/2^-$
415.0 *5*	2.1 *1*	3939.8	$27/2^+$	3524.76	$25/2^+$
415.6 *5*	2.0 *3*	3282.2	$21/2^{(+)}$	2866.54	$21/2^{(+)}$
436.7 *5*	2.6 *1*	3410.6	$23/2^-$	2973.8	$21/2^-$
441.0 *5*	4.0 *2*	3383.0	$23/2^+$	2942.2	$19/2^+$
465.6 *1*	11.1 *2*	3524.76	$25/2^+$	3059.15	$21/2^+$
478.0 *5*	0.9‡ *1*	4724.8	$31/2^+$	4246.8	$29/2^+$
481.7 *5*	3.2 *1*	4030.4	$25/2^-$	3548.8	$23/2^-$
487.0 *5*	1.0 *1*	3897.4	$25/2^-$	3410.6	$23/2^-$
491.8 *5*	0.55 *5*	3353.8	$21/2^-$	2862.03	$23/2^-$
522.4 *1*	119 *1*	985.32	$15/2^-$	462.91	$11/2^+$
527.3 *5*	1.6‡ *2*	3910.2	$25/2^+$	3383.0	$23/2^+$
556.8 *5*	3.1 *2*	3939.8	$27/2^+$	3383.0	$23/2^+$
561.6 *5*	2.1 *1*	3620.7	$23/2^+$	3059.15	$21/2^+$
600.0 *5*	5.7‡ *4*	4630.4	$27/2^-$	4030.4	$25/2^-$
619.3 *5*	4.2 *1*	822.5	$9/2^+$	203.30	$7/2^+$
649.0 *5*	2.2‡ *1*	5279.4	$29/2^-$	4630.4	$27/2^-$
662.8 *5*	6.3 *1*	3524.76	$25/2^+$	2862.03	$23/2^-$
686.9 *5*	2.5 *1*	3548.8	$23/2^-$	2862.03	$23/2^-$
703.4 *5*	2.8 *1*	3569.8	$23/2^{(+)}$	2866.54	$21/2^{(+)}$
708.0 *5*	2.8 *1*	4232.8	$27/2^+$	3524.76	$25/2^+$
710.5 *5*	1.7 *3*	3410.6	$23/2^-$	2700.2	$19/2^-$
722.0 *5*	6.7 *2*	4246.8	$29/2^+$	3524.76	$25/2^+$
740.5 *5*	0.40 *3*	1563.0	$11/2^+$	822.5	$9/2^+$
741‡ *1*	1.1‡ *1*	2166.1	$17/2^-$	1425.8	$13/2^-$

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^{100}Mo(^{13}C,4nγ) 1994Ju05,2001Ha09 (continued)

γ(^{109}Cd) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Comments
758.7 5	0.71 7	3620.7	23/2$^+$	2862.03	23/2$^-$	
776.0 5	1.6 1	2942.2	19/2$^+$	2166.1	17/2$^-$	
780.2 5	2.1 2	3369.9	23/2$^-$	2589.8	19/2$^-$	
785.1 5	6.0‡ 2	4724.8	31/2$^+$	3939.8	27/2$^+$	
787.4 5	1.6 3	4697.6	29/2$^+$	3910.2	25/2$^+$	
788.0 5	0.54 5	1854.3	13/2$^+$	1066.3	11/2$^+$	
800.5 5	0.59 4	2942.2	19/2$^+$	2141.8	15/2$^+$	
807.8 5	1.0 1	2973.8	21/2$^-$	2166.1	17/2$^-$	
822.5 5	1.2 2	822.5	9/2$^+$	0.0	5/2$^+$	
836.0 1	100.0	1821.34	19/2$^-$	985.32	15/2$^-$	
850.8 5	3.1 3	5083.6	31/2$^+$	4232.8	27/2$^+$	
851‡ 1	1.8‡ 2	3910.2	25/2$^+$	3059.15	21/2$^+$	
863.1 5	5.8 2	1066.3	11/2$^+$	203.30	7/2$^+$	
876.7 5	2.1 2	3042.7	21/2$^-$	2166.1	17/2$^-$	
878.9 5	3.3 2	2700.2	19/2$^-$	1821.34	19/2$^-$	
902.6 5	0.6 1	1105.9	9/2$^+$	203.30	7/2$^+$	
920.7 5		5971.9	35/2$^-$	5051.2	31/2$^-$	I_γ: Not given in ^{100}Mo(^{13}C,4nγ) (1994Ju05), However, level is fed by 1039.0γ.
923.4 5	1.2 1	3897.4	25/2$^-$	2973.8	21/2$^-$	
926.4 5	1.8 1	4296.3	27/2$^-$	3369.9	23/2$^-$	
963.0 5	2.0 5	1425.8	13/2$^-$	462.91	11/2$^+$	
999.0 5	0.5 2	2065.3?	13/2$^+$	1066.3	11/2$^+$	E_γ: placed by 1994Ju05 in ^{100}Mo(^{13}C,4nγ), but not observed in ^{96}Zr(^{18}O,5nγ) by the same authors.
1029.6 5	1.3 1	5051.2	31/2$^-$	4021.6	27/2$^-$	
1031.8 5	1.1 1	1854.3	13/2$^+$	822.5	9/2$^+$	
1039.0 5	1.36 3	7011.0	39/2$^-$	5971.9	35/2$^-$	
1040.7 1	22.9 3	2862.03	23/2$^-$	1821.34	19/2$^-$	
1045.2 1	16.1 2	2866.54	21/2$^{(+)}$	1821.34	19/2$^-$	
1048‡ 1	1.5‡ 5	3910.2	25/2$^+$	2862.03	23/2$^-$	
1050.6 5	2.7 2	5775.4	35/2$^+$	4724.8	31/2$^+$	
1075.7 5	2.8 1	2141.8	15/2$^+$	1066.3	11/2$^+$	
1120.8 5	4.0 1	2942.2	19/2$^+$	1821.34	19/2$^-$	
1152.4 5	2.5 1	2973.8	21/2$^-$	1821.34	19/2$^-$	
1159.6 5	4.1 2	4021.6	27/2$^-$	2862.03	23/2$^-$	
1169‡ 1	2.2‡ 1	4030.4	25/2$^-$	2862.03	23/2$^-$	
1180.9 5	4.8‡ 1	2166.1	17/2$^-$	985.32	15/2$^-$	
1221.2 5	3.1 2	3042.7	21/2$^-$	1821.34	19/2$^-$	
1237.8 1	21.3 4	3059.15	21/2$^+$	1821.34	19/2$^-$	
1249‡ 1	0.4‡ 1	5279.4	29/2$^-$	4030.4	25/2$^-$	
1426.6 5	0.8 2	4293.2	25/2$^{(+)}$	2866.54	21/2$^{(+)}$	
1548.5 5	1.4 1	3369.9	23/2$^-$	1821.34	19/2$^-$	
1604.5 5	3.1 1	2589.8	19/2$^-$	985.32	15/2$^-$	
1701.8 5	2.2 2	2687.2	17/2$^+$	985.32	15/2$^-$	I_γ: given for 1701.8γ+1702.8γ.
1702.8 5	2.2 2	3524.2	21/2$^+$	1821.34	19/2$^-$	I_γ: given for 1701.8γ+1702.8γ.
1793.8 5	0.4 2	3615.4	23/2$^-$	1821.34	19/2$^-$	

† From ^{100}Mo(^{13}C,4nγ) in 1994Ju05.

‡ From 2001Ha09, Evaluators assigned $\Delta E\gamma$ according to author's statement in Table 1 (1994Ju05) that the $\Delta E\gamma$=0.1 keV for the strong transitions, rising to 0.5 keV for the weak ones: $\Delta E\gamma$=0.1 keV for I(γ) ≥ 10, $\Delta E\gamma$=0.5 keV for others. $\Delta E\gamma$=1 keV for transitions from 2001Ha09.

^{100}Mo(^{13}C,4nγ) 1994Ju05,2001Ha09

Level Scheme

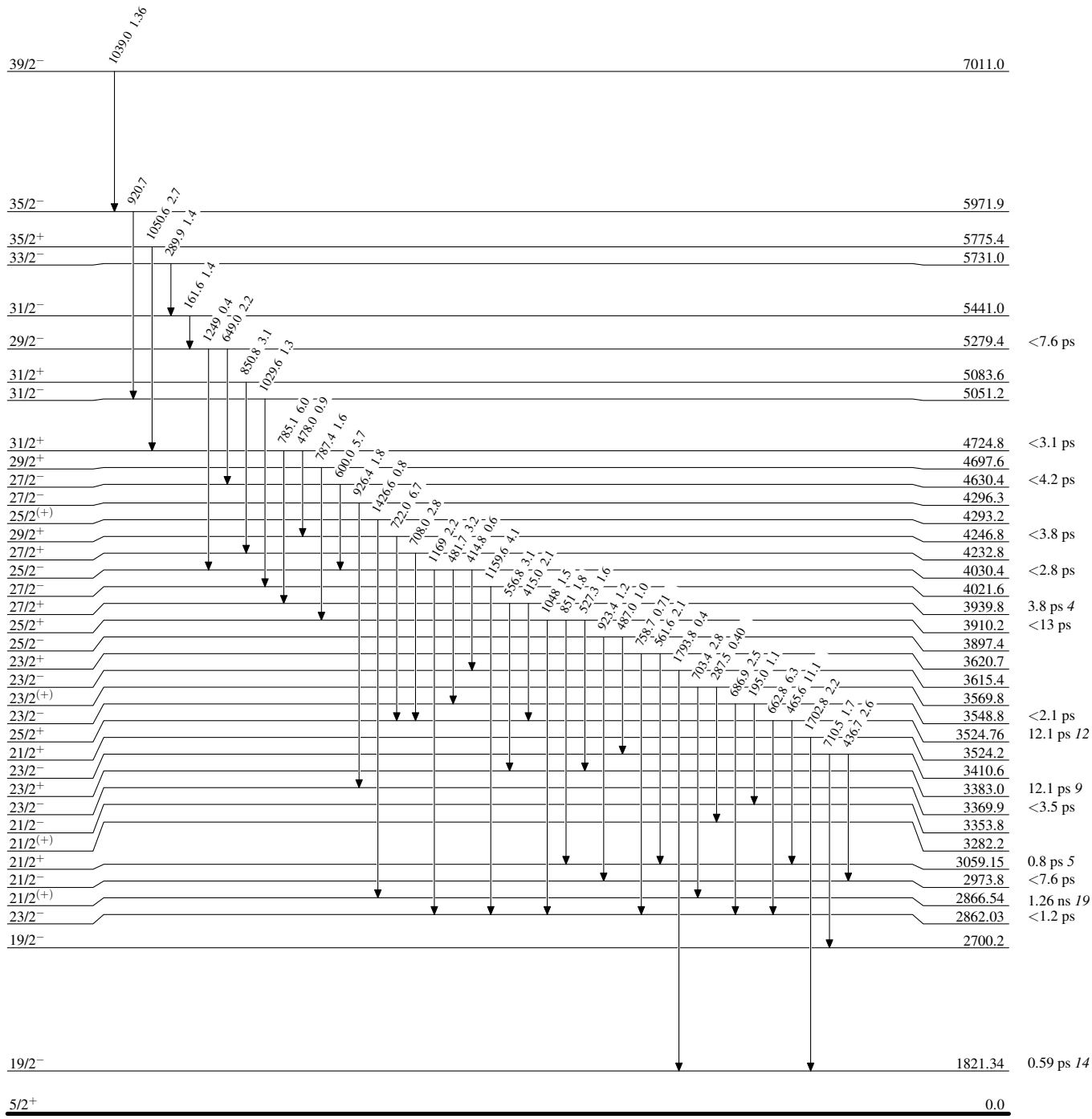
Intensities: Relative I_γ

Legend

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

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

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

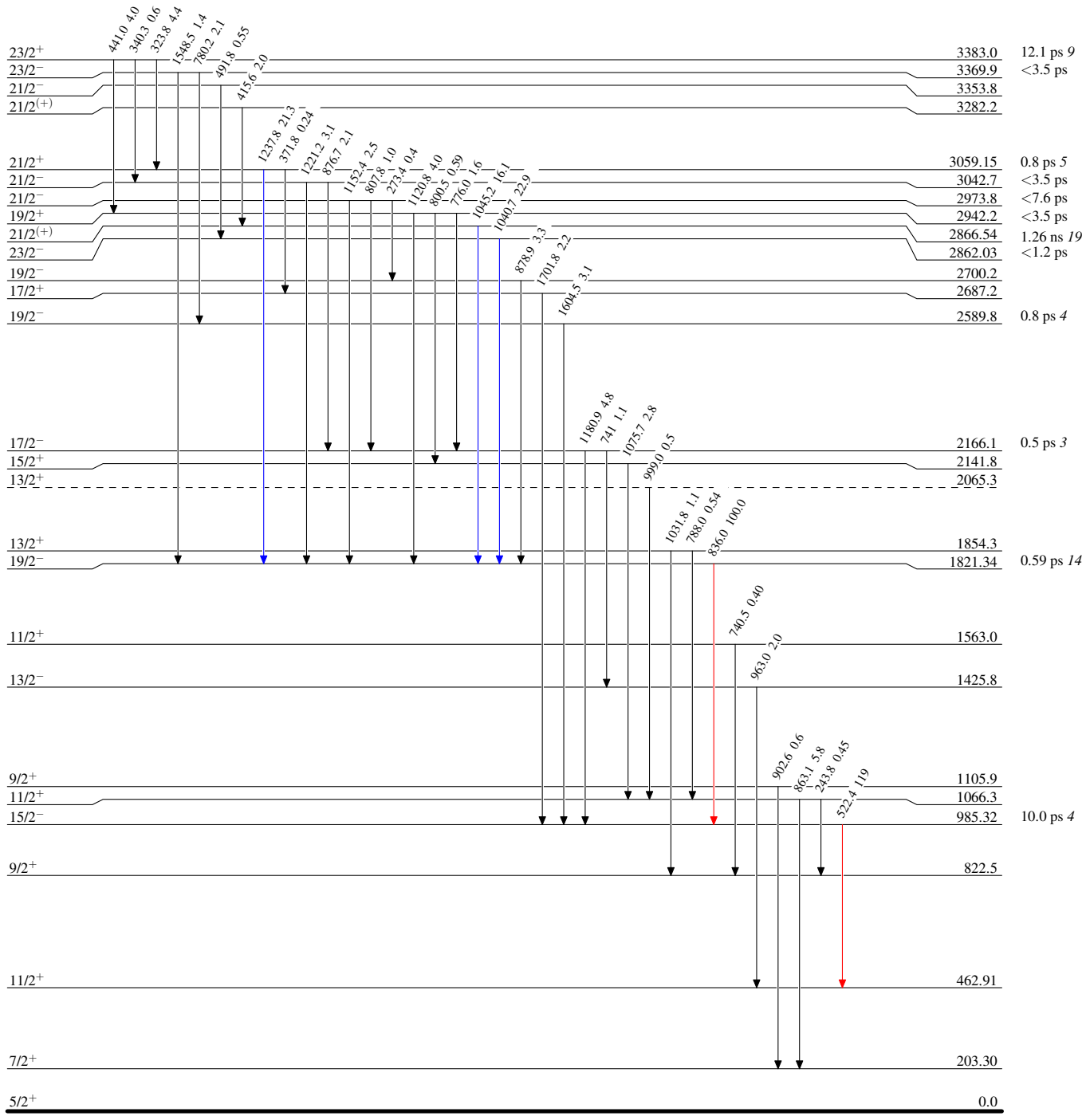


^{100}Mo(^{13}C,4nγ) 1994Ju05,2001Ha09

Level Scheme (continued)

Intensities: Relative I_γ

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

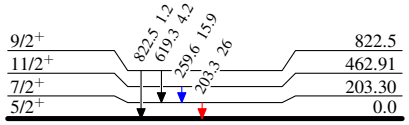


$^{109}_{48}Cd_{61}$

^{100}Mo(^{13}C,4nγ) 1994Ju05,2001Ha09

Level Scheme (continued)

Intensities: Relative I_γ



$^{109}_{48}Cd_{61}$