^{37}Cl(d,pγ) 1972En02,1973We01,1974Mc16

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 152, 1 (2018)	30-Sep-2017

Includes ^{2}H(^{37}Cl,^{38}Clγ).

1972En02: (d,pγ) E=3.1 MeV deuteron beam was produced from the BNL accelerator. Target was 0.5 mg/cm^2 $BaCl_2$ (96.1% in ^{37}Cl) on a Au backing. Protons were detected with an annular surface-barrier detector and γ rays were detected with a Ge(Li) detector. Measured Eγ, Iγ, pγ-coin, Doppler-shift attenuation. Deduced levels, J, π, $T_{1/2}$, γ-ray branching ratios, transitions strengths, γ widths. Comparisons with shell-model calculations.

1973We01: (d,pγ) E=3.5 MeV deuteron beam was produced from the Argonne Dynamitron accelerator. Targets were enriched $PbCl_2$ on gold backings. Protons were detected with two silicon surface-barrier detectors and γ rays were detected with a Ge(Li) detector. Measured Eγ, Iγ, pγ-coin, Doppler-shift attenuation. Deduced $T_{1/2}$ for 8 levels, γ-ray transition strengths.

1974Mc16: (d,pγ) E=3.0 MeV deuteron beam was produced from the University of Arizona 5.5-MV Van de Graaff accelerator. Targets were enriched $PbCl_2$ (90% in ^{37}Cl) on Au and Ta backings. Protons were detected with an annular particle detector and γ rays were detected with a Ge(Li) detector. Measured Eγ, Iγ, pγ-coin, Doppler-shift attenuation. Deduced $T_{1/2}$ for 8 levels.

1973Wa10: (^{37}Cl,^{38}Clγ) E=57.4 MeV ^{37}Cl beam was produced from the BNL MP-tandem Van de Graaff. Target was prepared by evaporating titanium onto a target backing in a deuterium atmosphere. Measured lifetimes of 1617 and 1981 levels by DSAM using a Ge(Li) detector.

^{38}Cl Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[#]	Comments
0	2$^-$		
671.27 *16*	5$^-$		
755.26 *11*		0.220 ps *37*	$T_{1/2}$: weighted average of 0.225 ps *42* (1974Mc16), 0.201 ps *37* (1973We01), 0.37 ps *12* (1972En02).
1308.87 *14*		0.37 ps *6*	$T_{1/2}$: weighted average of 0.35 ps *6* (1974Mc16), 0.39 ps *+12−9* (1973We01), 0.69 ps *+62−28* (1972En02).
1617.22 *14*		1.52 ps *14*	$T_{1/2}$: from 1973Wa10. Others: 0.77 ps *+18−15* (1974Mc16), 1.0 ps *+7−4* (1973We01), 1.6 ps *+16−6* (1972En02). Weighted average of all values is 1.18 ps *21*.
1692.41 *16*		0.91 ps *+22−19*	$T_{1/2}$: weighted average of 0.92 ps *+22−19* (1974Mc16), 0.83 ps *+24−19* (1973We01), 1.3 ps *5* (1972En02).
1745.3 *6*		0.51 ps *+14−10*	$T_{1/2}$: weighted average of 0.44 ps *+14−10* (1974Mc16), 0.69 ps *23* (1973We01), 1.5 ps *+10−5* (1972En02).
1785.1 *5*		66 fs *15*	$T_{1/2}$: weighted average of 69 fs *15* (1974Mc16), 62 fs *43* (1973We01), 62 fs *21* (1972En02).
1941.75 *20*			
1981.12 *15*		0.26 ps *4*	$T_{1/2}$: weighted average of 0.39 ps *6* (1973Wa10), 0.229 ps *39* (1974Mc16), 0.18 ps *6* (1973We01), 0.30 ps *6* (1972En02).
2743.1 *4*		28 fs *15*	$T_{1/2}$: from 1973We01. Others: ≤21 fs (1974Mc16,1972En02).

[†] From a least-squares fit to γ-ray energies.
[‡] From Adopted Levels.
[#] From DSAM in 1972En02, 1973We01 and 1974Mc16. Weighted average is taken where available. An additional 15% systematic uncertainty due to slowing-down process has been added in quadrature to the values from 1973We01 and 1974Mc16.

γ(^{38}Cl)

E$_i$(level)	J$_i^\pi$	E$_\gamma$[†]	I$_\gamma$[†]	E$_f$	J$_f^\pi$
671.27	5$^-$	671.0 *10*	100	0	2$^-$
755.26		755.30 *12*	100	0	2$^-$
1308.87		553.59 *14*	18 *3*	755.26	
		637.60 *7*	74 *2*	671.27	5$^-$

Continued on next page (footnotes at end of table)

^{37}Cl(d,pγ) 1972En02,1973We01,1974Mc16 (continued)

$\gamma(^{38}Cl)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Comments
1308.87		1308.9	8 *3*	0	2^-	
1617.22		308.34 *6*	51 *2*	1308.87		
		862.07 *13*	25 *2*	755.26		
		945.9	3 *2*	671.27	5^-	
		1617.2 *7*	21 *2*	0	2^-	
1692.41		383.5‡	<5	1308.87		
		937.0 *5*	8 *2*	755.26		
		1021.1‡	<5	671.27	5^-	
		1691.6 *4*	92 *4*	0	2^-	
1745.3		437.0‡	<6	1308.87		
		990.6‡	<9	755.26		
		1074.6‡	<10	671.27	5^-	
		1745.3 *6*	100	0	2^-	
1785.1		167.8‡	<12	1617.22		
		476.2‡	<12	1308.87		
		1029.6 *7*	100	755.26		
		1113.8‡	<17	671.27	5^-	
		1785.0‡	<18	0	2^-	
1941.75		156.7‡	<0.4	1785.1		
		195.9‡	<0.4	1745.3		
		249.3‡	<0.4	1692.41		
		324.5‡	<0.4	1617.22		
		632.9‡	<0.4	1308.87		
		1186.5‡	<0.3	755.26		
		1270.5‡	<0.3	671.27	5^-	
		1941.7 *2*	100	0	2^-	E_γ: 1972En02 used this value from 1971En01 in ^{38}S β^- for calibration.
1981.12		196.1‡	<1	1785.1		
		235.3‡	<1	1745.3		
		288.69 *6*	12 *1*	1692.41		
		363.92 *6*	31 *2*	1617.22		
		672.2‡	<2	1308.87		
		1226.0 *9*	25 *2*	755.26		
		1309.8‡	<3	671.27	5^-	
		1980.7 *10*	32 *2*	0	2^-	
2743.1		762.0‡	<2	1981.12		
		801.3‡	<2	1941.75		
		957.9 *5*	24 *3*	1785.1		
		997.2‡	<2	1745.3		
		1050.7‡	<2	1692.41		
		1126.2 *9*	12 *2*	1617.22		
		1434.2 *11*	33 *3*	1308.87		
		1986.4 *8*	6 *2*	755.26		
		2071.8‡	<5	671.27	5^-	
		2743.5 *5*	25 *3*	0	2^-	

† From 1972En02. Energy values given without uncertainties are from level-energy differences.
‡ Placement of transition in the level scheme is uncertain.

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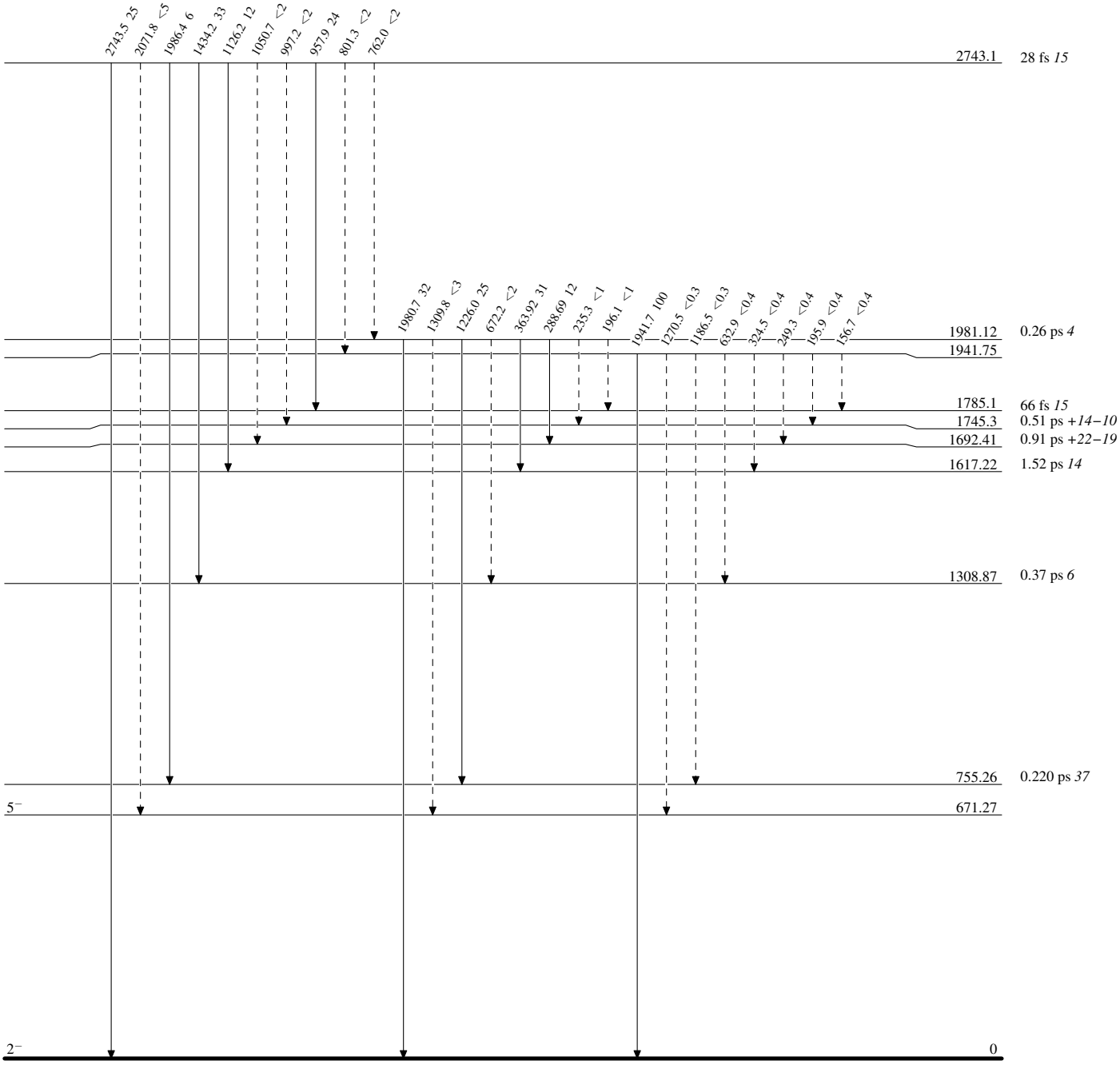
Legend

Level Scheme

Intensities: % photon branching from each level

γ Decay (Uncertain)



$^{38}_{17}Cl_{21}$

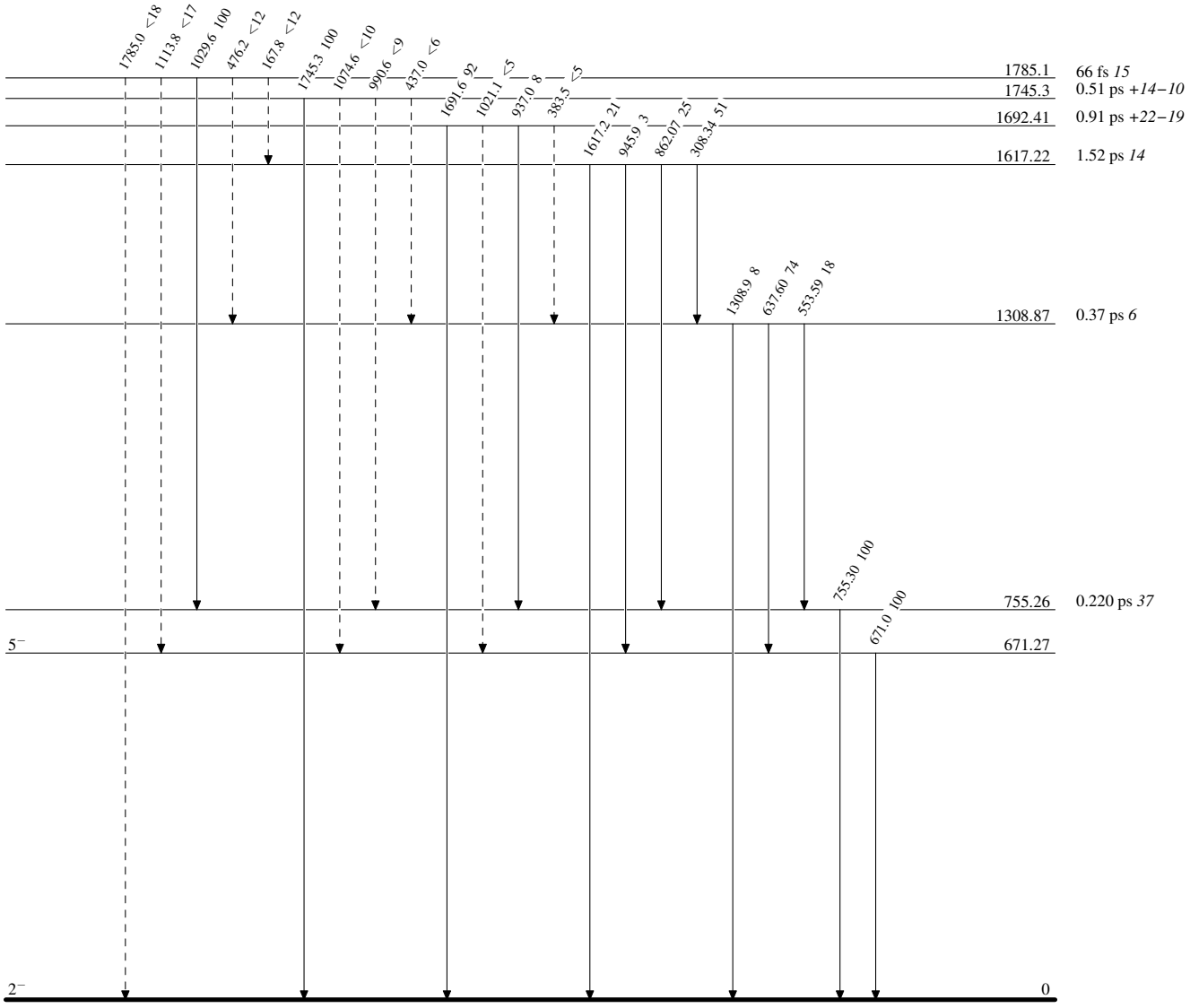
^{37}Cl(d,pγ) 1972En02,1973We01,1974Mc16

Legend

Level Scheme (continued)

Intensities: % photon branching from each level

- - - - - - ► γ Decay (Uncertain)



$^{38}_{17}Cl_{21}$