

$^{40}\text{Ar}(\text{d},\text{p}\gamma), ^2\text{H}(^{40}\text{Ar},\text{p}\gamma)$ 1978Ra13,1977Sc11,1967A102

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	C. D. Nesaraja, E. A. Mccutchan		NDS 133, 1 (2016)	30-Sep-2015

Other main references: 1971Me06, 1966Fo12.

1978Ra13: (d,p γ). $E_d=2.99$ MeV from tandem accelerator at University of Auckland. Measured lifetimes by DSAM, γ , p γ -coin.

Protons detected with an annular surface barrier detector and γ -rays with a Ge(Li) detector. Authors only provide energy level difference in γ spectrum in Fig.3 (1978Ra13).

1977Sc11: $^2\text{H}(^{40}\text{Ar},\text{p}\gamma)$. Inverse kinematics with $E(^{40}\text{Ar})=56$ MeV from UNILAC at GSI, Darmstadt. Measured E_γ with a Ge(Li) detector, level energies up to 3.1 MeV. Authors only provide energy level difference in γ spectrum in Fig.1 (1977Sc11). lifetimes by DSAM.

1971Me06: (d,p γ), $E_d=2.8$ MeV from the Van de Graaff accelerator at Alger in Lyon, France. Measured γ branching, p $\gamma(\theta)$.

1967A102: (d,p γ) $E_d=3.5$ MeV from Van de Graaff accelerator at Brookhaven National Laboratory. Measured γ branching with NaI(Tl) detector, charged particles were detected with a Si surface barrier detector. Also measured p γ -coin., and p $\gamma(\theta)$ with $E_d=3.2$ MeV. Authors have not provided any gamma-ray transition energies.

1966Fo12: (d,p γ) $E_d=2.8$ MeV from Van de Graaff accelerator at Brookhaven National Laboratory. Protons detected with a Si surface barrier detector and the γ -rays were measured with a plastic scintillator. Measured lifetimes by p $\gamma(t)$.

 ^{41}Ar Levels

E(level) [†]	J^π [‡]	$T_{1/2}$ [#]	Comments
0	$7/2^-$		
167.3 3	$5/2^-$	410 [@] ps 30	$T_{1/2}$: Other: >3.5 ps (1977Sc11). (1990En08).
516.1 5	$3/2^-$	340 [@] ps 20	$T_{1/2}$: Other: >2.8 ps (1977Sc11).
1035.0 6	$3/2^+$	5 ps +28-3	$T_{1/2}$: from 4.5 ps +277-26 from $\tau=6.5$ +400-37 (1978Ra13). Other: >2.8 ps (1977Sc11).
1354.1 5	$3/2^-$	0.40 ps 6	$T_{1/2}$: From weighted average of 0.44 ps 6 from $\tau=0.64$ ps +9-8 (1977Sc11) and 0.32 ps 8 from $\tau=0.46$ ps 12 (1978Ra13). Other: <100 ps (1966Fo12).
1869.4 10	$1/2^+$		
2398.3 10	$1/2^-$	0.12 ps 3	$T_{1/2}$: From $\tau=0.17$ ps 5 (1978Ra13).
2734	$3/2^-$	<31 fs	$T_{1/2}$: From $\tau<0.045$ ps (1978Ra13).
2947	$3/2^-$	<62 fs	$T_{1/2}$: From $\tau<0.09$ ps (1978Ra13).
3010	$3/2^-$	<111 fs	$T_{1/2}$: From $\tau<0.16$ ps (1978Ra13).
3327	$1/2^-$	<17 fs	$T_{1/2}$: From $\tau<0.025$ ps (1978Ra13).
3968	$1/2^-$	21 fs 12	$T_{1/2}$: From $\tau=0.030$ ps 17 (1978Ra13).

[†] From $^2\text{H}(^{40}\text{Ar},\text{p}\gamma)$ (1977Sc11) up to 2398 level. 2734 and 2947 levels are from 1971Me06. Above 3000, the values are from 1978Ra13. The decay of 3327 is from 1967A102.

[‡] From Adopted Levels, based on L(pol d,p) and p $\gamma(\theta)$.

[#] From DSAM (1978Ra13), unless otherwise stated.

[@] From p $\gamma(t)$ (1966Fo12).

 $\gamma(^{41}\text{Ar})$

A_2 and A_4 are from p $\gamma(\theta)$; values are from 1967A102, unless otherwise stated.

$E_i(\text{level})$	J_i^π	E_γ [#]	I_γ [†]	E_f	J_f^π	Comments
167.3	$5/2^-$	167	100	0	$7/2^-$	
516.1	$3/2^-$	349	28 4	167.3	$5/2^-$	
		516	100 4	0	$7/2^-$	$A_2=+0.14$ 4, $A_4=+0.01$ 5.
1035.0	$3/2^+$	519	79 9	516.1	$3/2^-$	

Continued on next page (footnotes at end of table)

$^{40}\text{Ar}(\text{d},\text{p}\gamma), ^2\text{H}(^{40}\text{Ar},\text{p}\gamma)$ **1978Ra13,1977Sc11,1967Al02 (continued)** $\gamma(^{41}\text{Ar})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\#$	$I_\gamma^\dagger$	E_f	J_f^π	Comments
1035.0	$3/2^+$	868	100 9	167.3	$5/2^-$	
		1035	<36	0	$7/2^-$	
1354.1	$3/2^-$	838	20 3	516.1	$3/2^-$	$A_2=+0.34$ 9, $A_4=+0.09$ 10.
		1187	100 3	167.3	$5/2^-$	$A_2=+0.12$ 5, $A_4=-0.02$ 5.
		1354	4 3	0	$7/2^-$	
1869.4	$1/2^+$	515	100 11	1354.1	$3/2^-$	
		834	53 11	1035.0	$3/2^+$	
		1353	60 11	516.1	$3/2^-$	
		1702@	<21	167.3	$5/2^-$	E_γ : From 1967Al02. Evaluators have considered this transition as uncertain as it was not seen in 1975Sc11.
2398.3	$1/2^-$	1044	100 7	1354.1	$3/2^-$	$A_2=+0.09$ 4 (1971Me06). $A_2=+0.08$ 7, $A_4=+0.02$ 8.
		1882	47 7	516.1	$3/2^-$	$A_2=-0.06$ 7 (1971Me06). $A_2=0.00$ 11, $A_4=+0.11$ 12.
		2231	$7\frac{1}{2}^{\ddagger}$ 3	167.3	$5/2^-$	
2734	$3/2^-$	864	<5.4 $\frac{1}{2}^{\ddagger}$	1869.4	$1/2^+$	
		1380	$9\frac{1}{2}^{\ddagger}$ 5	1354.1	$3/2^-$	
		2567	$100\frac{1}{2}^{\ddagger}$ 5	167.3	$5/2^-$	$A_2=+0.28$ 7 (1971Me06).
2947	$3/2^-$	1593@	<8 $\frac{1}{2}^{\ddagger}$	1354.1	$3/2^-$	E_γ : From 1971Me06. Evaluators have considered this transition as uncertain as it was not seen in 1978Ra13 and 1967Al02.
		2429	$67\frac{1}{2}^{\ddagger}$	516.1	$3/2^-$	
		2780	$100\frac{1}{2}^{\ddagger}$	167.3	$5/2^-$	$A_2=+0.08$ 10 (1971Me06).
3010	$3/2^-$	2842		167.3	$5/2^-$	
3327	$1/2^-$	1458	8.5 24	1869.4	$1/2^+$	
		1973	13.0 24	1354.1	$3/2^-$	
		2811	100.0 24	516.1	$3/2^-$	
		3160@	<8.5	167.3	$5/2^-$	E_γ : From 1967Al02. Evaluators have considered this transition as uncertain as it was not seen in 1978Ra13.
3968	$1/2^-$	2614		1354.1	$3/2^-$	
		3452		516.1	$3/2^-$	

† Relative branchings from 1967Al02, unless otherwise stated.

‡ From 1971Me06.

$^\#$ Level-energy differences, rounded off to nearest keV.

@ Placement of transition in the level scheme is uncertain.

$^{40}\text{Ar}(\text{d,p}\gamma), ^2\text{H}(^{40}\text{Ar,p}\gamma)$ 1978Ra13,1977Sc11,1967Al02

Legend

Level Scheme

Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain)