^{41}K(p,p′γ),(p,p′) 1986St10

History

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

1986St10: E=6.2 MeV. Measured Eγ, Iγ, pγ coincidences using Si surface-barrier detector and Ge(Li) detector; lifetimes by DSAM and γγ(t). Hauser-Feshbach analysis of (p,p′) and (p,p′γ) reaction cross sections.

Others:

1980Sa14: E=3.22 MeV. Measured Eγ, Iγ using Ge(Li) detector; deduced $T_{1/2}$ of 1582-keV level by direct timing.

1977Ay01: E=4.7 MeV. Measured pγ(θ,H,t) using annular solid state detector and NaI detector; deduced hyperfine fields and lifetime of 1294 level.

1977Li22: E=6.0 MeV. Measured Eγ, Iγ using Ge(Li) detector; deduced lifetime of 980 level by DSAM.

1974Ko10: E=6.8 MeV. Measured γ(θ,H,t), deduced magnetic moment of 1294 level.

1971Ju04: E=5.3-5.8 MeV. Measured Eγ, Iγ, pγ coin using solid state detector and Ge(Li) detector. (p,p′) measured with a broad range magnetic spectrograph. Proton spectrum in Fig. 5, with 14 proton group labeled with energies from 980 to 2600 keV is in excellent agreement with levels reported here.

1969Bl07: E=5.3 MeV. Measured pγ(θ,H,t), deduced g factor and lifetime of 1294 level.

1958Sh70: E=3.04 MeV. Measured Eγ, pγ coin.

1958En52: (p,p′) E=6.5 MeV. 19 proton groups reported from 978 to 3280 keV, energies of which agree well with those reported here from more recent measurements. Some of details apparently were given in an MIT-LNS Prog. rept., 111 (May 1959). This report is no longer available.

^{41}K Levels

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	σ_γ (relative)[@]	Comments
0	$3/2^+$			
980.42 *10*	$1/2^+$	>2.4 ps		$T_{1/2}$: other: >2.0 ps (1977Li22). E(level): from 1971Ju04. $\sigma_{p'}$=2.5 *6*.
1293.9 *4*	$7/2^-$	7.35 ns *20*		μ=+4.41 *5* (1969Bl07) $T_{1/2}$: weighted average of 8.04 ns *35* (1986St10), 7.14 ns *35* (1977Ay01), 7.1 ns *3* (1974Ko10), 7.3 ns *2* (1969Bl07). $\sigma_{p'}$=4.9 *6*.
1560.3 *4*	$3/2^+$	0.49 ps *14*	4.3 *7*	$\sigma_{p'}$=8.9 *12* for 1560+1582+1594 triplet.
1582.3 *4*	$3/2^-$	>2.8 ps	4.1 *7*	$T_{1/2}$: <26 ps (1980Sa14).
1593.6 *6*	$1/2^+$	0.13 ps *5*	1.5 *4*	Jπ: Hauser-Feshbach analysis allows $1/2^-$ also.
1677.5 *5*	$7/2^+$	1.25 ps *35*	3.2 *4*	$\sigma_{p'}$=7.0 *10* for 1678+1698 doublet.
1698.0 *5*	$5/2^+$	0.83 ps *21*	3.7 *5*	
2143.6 *6*	$3/2^+$,$5/2^+$	0.21 ps *6*	2.6 *4*	Jπ: adopted $J^\pi=5/2^+$. $\sigma_{p'}$=6.2 *11* for 2144+2167 doublet.
2166.8 *6*	$3/2^-$	0.22 ps *8*	3.6 *6*	
2317.0 *6*	$5/2^-$	0.59 ps *14*	3.2 *4*	$\sigma_{p'}$=2.9 *4*.
2439.9 *8*	$(3/2,5/2^+)$	83 fs *35*	2.6 *4*	Jπ: Hauser-Feshbach analysis gives 3/2,5/2,7/2, but $5/2^-$ and 7/2 are excluded due to unacceptably large transition strengths. $5/2^+$ is also less likely from E2 transition strength. $\sigma_{p'}$=1.9 *3*.
2494.9 *9*	$9/2^+$	>2.8 ps	1.6 *2*	$\sigma_{p'}$=3.5 *4* for 2495+2508 doublet.
2508.3 *6*	$7/2^+$	0.15 ps *4*	1.9 *2*	
2595.0 *10*	$1/2^-$		1.2 *3*	$\sigma_{p'}$=1.1 *3*. Jπ: adopted $J^\pi=1/2^-,3/2^-$.
2676.1 *7*	$1/2^+$		0.73 *18*	
2713.0 *6*	$3/2^-$,$7/2^-$	0.59 ps *28*	2.1 *3*	Jπ: adopted $J^\pi=(7/2)^-$.
2756.0 *6*	$3/2^+$	52 fs *21*	1.12 *19*	Jπ: adopted $J^\pi=5/2^+$.
2760.8 *6*	$11/2^-$	0.53 ps *21*	0.58 *6*	
3047.7 *9*	$1/2^-$		0.73 *18*	Jπ: adopted $J^\pi=1/2^-,3/2^-$.
3142.6[&] *7*	$5/2^-$	0.12 ps *8*	1.26 *18*	$T_{1/2}$: from DSAM of 1849γ.

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^{41}K(p,p′γ),(p,p′) 1986St10 (continued)

^{41}K Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	σ_γ (relative)[@]	Comments
3162.2 *8*	1/2	<21 fs	0.47 *12*	
3214.3 *7*	5/2,7/2,3/2$^-$	0.13 ps *6*	1.22 *20*	Jπ: 3/2$^-$ is less likely from transition strength. Adopted J^π=5/2$^-$.
3236.1 *8*	(3/2$^-$,5/2,7/2)	38 fs *35*	0.97 *16*	Jπ: 3/2$^-$ and 9/2$^-$ are allowed by Hauser-Feshbach analysis but 9/2$^-$ is unacceptable and 3/2$^-$ is less likely from transition strengths.
3281.7 *7*	(1/2,3/2,5/2$^+$)	76 fs *69*	0.64 *16*	

[†] From 1986St10, except where noted.
[‡] From Hauser-Feshbach analysis of (p,p′) and (p,p′γ) cross sections (1986St10).
[#] From DSAM (1986St10), except where noted.
[@] Total relative cross section from (p,p′γ). (1986St10). Relative cross sections from (p,p′) are given under comments.
[&] According to Adopted Levels, there are two levels near this energy, one depopulated by 634γ and the other by 1849γ.

γ(^{41}K)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π
980.42	1/2$^+$	980.4	100	0	3/2$^+$
1293.9	7/2$^-$	1293.9	100	0	3/2$^+$
1560.3	3/2$^+$	266.3[#d]	<2[#]	1293.9	7/2$^-$
		579.9	19.9 *7*	980.42	1/2$^+$
		1560.3	80.1[@] *15*	0	3/2$^+$
1582.3	3/2$^-$	288.4[#d]	<2[#]	1293.9	7/2$^-$
		601.9	19.6	980.42	1/2$^+$
		1582.3	80.4[&] *16*	0	3/2$^+$
1593.6	1/2$^+$	300.4[#d]	<17[#]	1293.9	7/2$^-$
		613.2	40	980.42	1/2$^+$
		1593.6	60[a]	0	3/2$^+$
1677.5	7/2$^+$	383.5[#d]	<10[#]	1293.9	7/2$^-$
		696.7[#d]	<5[#]	980.42	1/2$^+$
		1677.5	100	0	3/2$^+$
1698.0	5/2$^+$	404.5[#d]	<9[#]	1293.9	7/2$^-$
		717.7[#d]	<10[#]	980.42	1/2$^+$
		1698.0	100	0	3/2$^+$
2143.6	3/2$^+$,5/2$^+$	446.1	5.1	1698.0	5/2$^+$
		467.1[#d]	<13[#]	1677.5	7/2$^+$
		550.1[#d]	<12[#]	1593.6	1/2$^+$
		562.1[#d]	<15[#]	1582.3	3/2$^-$
		583.3	13.6	1560.3	3/2$^+$
		850.5[#d]	<12[#]	1293.9	7/2$^-$
		1163.2	8.4	980.42	1/2$^+$
		2143.5	72.9[b]	0	3/2$^+$
2166.8	3/2$^-$	467.9[#d]	<25[#]	1698.0	5/2$^+$
		489.0[#d]	<25[#]	1677.5	7/2$^+$
		572.0[#d]	<24[#]	1593.6	1/2$^+$
		584.5	30.1[c]	1582.3	3/2$^-$
		606.1[#d]	<25[#]	1560.3	3/2$^+$

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^{41}K(p,p′γ),(p,p′) 1986St10 (continued)

γ(^{41}K) (continued)

E_i(level)	J_i^π	E_γ †	I_γ ‡	E_f	J_f^π
2166.8	3/2⁻	872.4#d	<25#	1293.9	7/2⁻
		1186.4	35.7 *11*	980.42	1/2⁺
		2166.7	34.2c	0	3/2⁺
2317.0	5/2⁻	734.7	5.5 *7*	1582.3	3/2⁻
		1023.1	94.5 *20*	1293.9	7/2⁻
2439.9	(3/2,5/2⁺)	741.9	14.4	1698.0	5/2⁺
		879.6	6.2	1560.3	3/2⁺
		1459.5	16.6	980.42	1/2⁺
		2439.8	62.8	0	3/2⁺
2494.9	9/2⁺	796.9	18.1	1698.0	5/2⁺
		817.4	42.0 *19*	1677.5	7/2⁺
		1201.0	39.9 *17*	1293.9	7/2⁻
2508.3	7/2⁺	830.8	48.0 *17*	1677.5	7/2⁺
		1214.4	11	1293.9	7/2⁻
		2508.2	41	0	3/2⁺
2595.0	1/2⁻	1012.7	91	1582.3	3/2⁻
		2594.9	9	0	3/2⁺
2676.1	1/2⁺	1115.8	64	1560.3	3/2⁺
		2676.0	36	0	3/2⁺
2713.0	3/2⁻,7/2⁻	396.0	12.5 *7*	2317.0	5/2⁻
		1130.7	21.9	1582.3	3/2⁻
		1419.1	65.6 *18*	1293.9	7/2⁻
2756.0	3/2⁺	612.4	29	2143.6	3/2⁺,5/2⁺
		2755.9	71	0	3/2⁺
2760.8	11/2⁻	1466.9	100	1293.9	7/2⁻
3047.7	1/2⁻	1454.1	33	1593.6	1/2⁺
		2067.2	19	980.42	1/2⁺
		3047.6	48	0	3/2⁺
3142.6	5/2⁻	634.3	45	2508.3	7/2⁺
		1848.7	55	1293.9	7/2⁻
3162.2	1/2	3162.1	100	0	3/2⁺
3214.3	5/2,7/2,3/2⁻	1920.4	100	1293.9	7/2⁻
3236.1	(3/2⁻,5/2,7/2)	919.1	34	2317.0	5/2⁻
		1942.2	66	1293.9	7/2⁻
3281.7	(1/2,3/2,5/2⁺)	2301.2	58	980.42	1/2⁺
		3281.6	42	0	3/2⁺

† From level-energy differences, with recoil removed.
‡ From 1986St10, except where noted.
# From 1971Ju04.
@ Iγ(1560)/Iγ(580)=87 *4*/13 *3* (1971Ju04).
& Iγ(1582)/Iγ(602)=90 *4*/10 *2* (1971Ju04).
a Iγ(1594)/Iγ(613)=61 *8*/39 *8* (1971Ju04).
b Iγ(2143):Iγ(1163):Iγ(583):Iγ(446)=46 *7*:14 *4*:26 *6*:14 *6* (1971Ju04).
c Iγ(2167):Iγ(1186):Iγ(584)=26 *8*:34 *7*:≈16 (1971Ju04).
d Placement of transition in the level scheme is uncertain.

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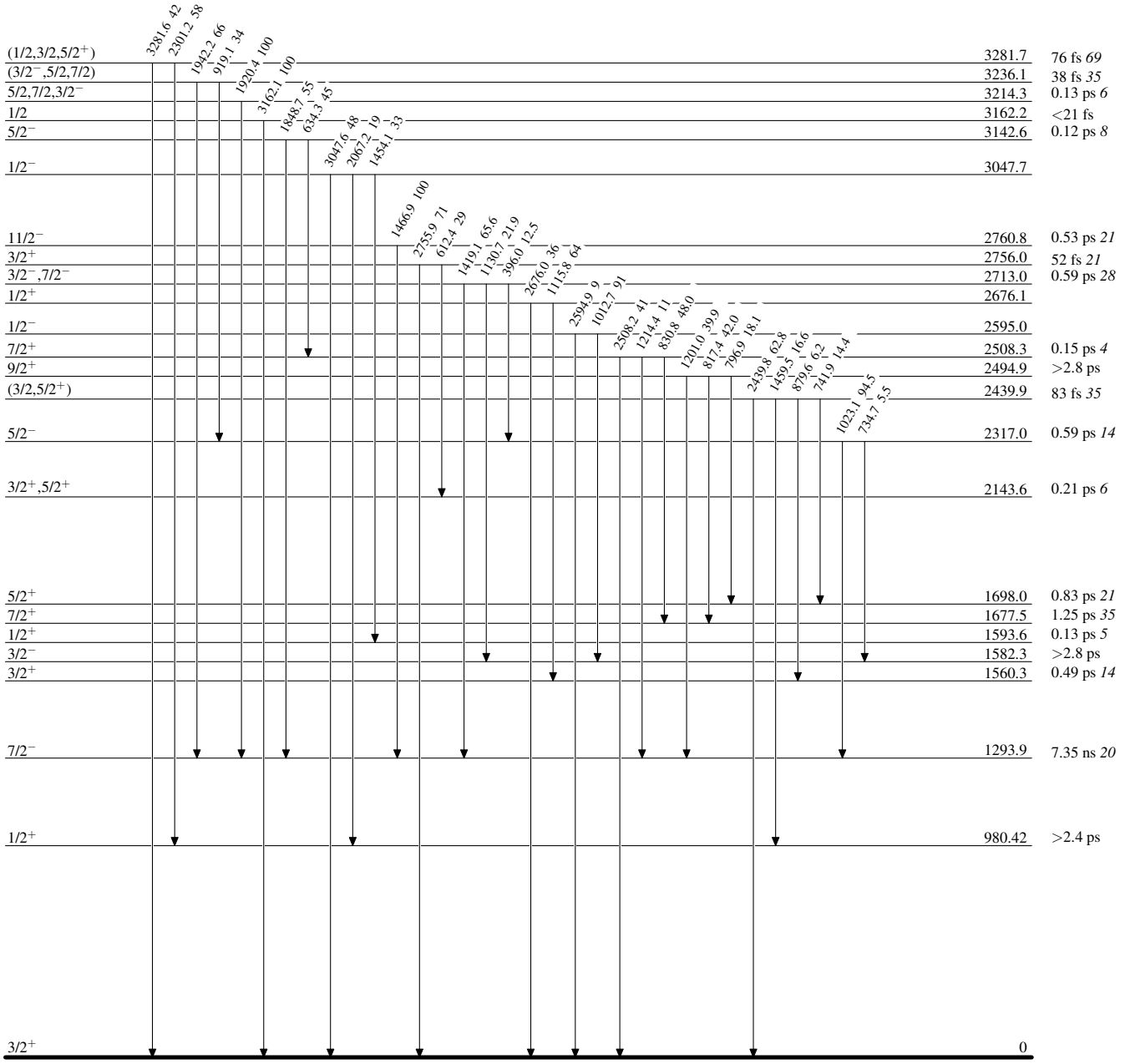
Level Scheme

Intensities: % photon branching from each level



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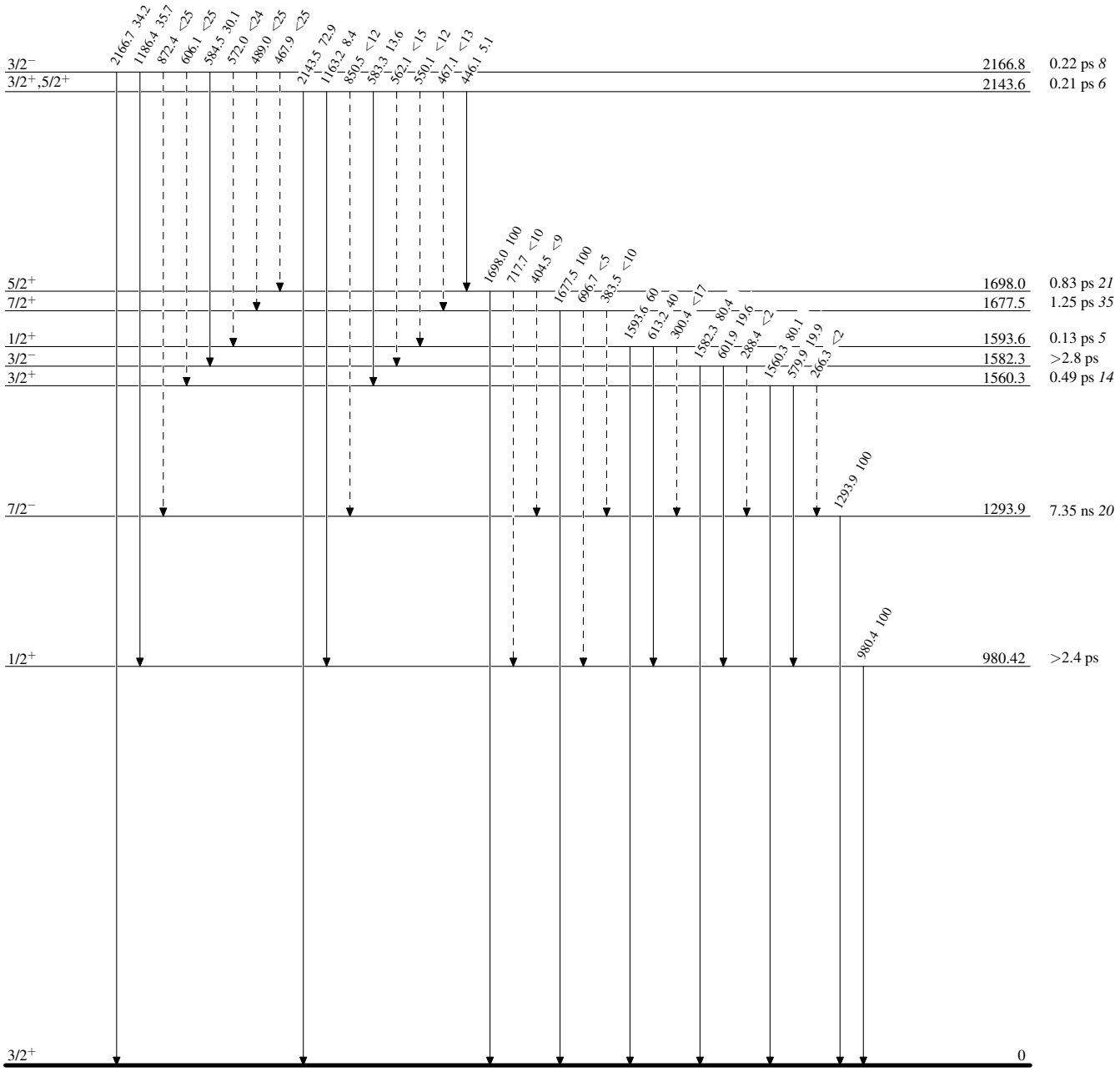
Legend

Level Scheme (continued)

Intensities: % photon branching from each level

– – – – – – ► γ Decay (Uncertain)



$^{41}_{19}K_{22}$