^{39}K(n,pγ) 1969Ba22,1967Ba05

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 149, 1 (2018)	1-Jan-2018

1969Ba22: E=5.4 and 7.0 MeV neutron beams were produced via ^{2}H(d,n) reaction with deuterons provided from the Frankfurt 5.5-MeV Van de Graaff accelerator on a deuterium gas target. Reaction target was a KI(Tl) scintillation crystal, which also served as a charged-particle detector for detecting reaction products. γ rays were detected with a five-sided Ge(Li) detector (FWHM=5-6 keV at 1 MeV). Measured Eγ, Iγ, pγ-coin. σ(E$_n$,E$_p$). Deduced levels, γ-ray branching ratios. Comparisons with available data. Report 12 levels up to 2755.

1967Ba05: E=4-8 MeV neutrons were produced via ^{2}H(d,n) with deuterons from the Frankfurt 5.5-MeV Van de Graaff. Target was a KI(Tl) crystal also as charged-particle detector. γ rays were detected with a NaI(Tl) crystal. Measured Eγ, Iγ, pγ-coin, $\gamma(\theta)$. Deduced levels, γ-ray branching ratios, multipolarities, mixing ratios. Comparisons with available data. Report 23 levels up to 4400 from γ- ray study. Also report levels from measured σ(E$_p$) in (n,p). See also 1964Ba30 and 1963Ba07.

All references above are from the same group.

^{39}Ar Levels

E(level)[†]	J$^\pi$	Comments
0	7/2$^-$	J$^\pi$: from Adopted Levels.
1266.5 *10*	3/2[‡]	
1516.5 *10*	3/2[‡]	
2091 *2*		
2341 *2*		
2357.5 *20*		
2432 *2*		
2480 *2*		
2502 *2*		
2523 *2*		
2631 *2*		
2650 *2*		
2755 *2*		
3.09×10^3 *2*		E(level): 3090 *30* from 1963Ba07.
3.18×10^3 *5*		
3.23×10^3 *5*		
3.29×10^3? *5*		
3.36×10^3 *3*		
3.47×10^3 *3*		
3.56×10^3 *2*		
3.66×10^3 *2*		
3.83×10^3 *3*		
3.91×10^3 *3*		
3.97×10^3? *4*		
4.04×10^3 *3*		
4.25×10^3 *2*		
4.29×10^3? *3*		
4.40×10^3 *3*		

[†] From 1969Ba22 below 3000 and others from 1967Ba05.
[‡] From γ-ray multipolarity deduced based on $\gamma(\theta)$ anisotropy (1967Ba05).

^{39}K(n,pγ) 1969Ba22,1967Ba05 (continued)

γ(^{39}Ar)

E_i(level)	J_i^π	E_γ[†]	I_γ[@]	E_f	J_f^π	Mult.[&]	Comments
1266.5	3/2	1266.5 *10*	100	0	7/2$^-$	Q	Additional information 1. Mult.: Iγ(30°)/Iγ(90°)=1.08 *5*, 1.04 *4*, 1.01 *8* for E_n=4.0, 5.4 and 7.0 MeV, respectively; predicted ratio=1.02 for E2 (1967Ba05).
1516.5	3/2	250 *1*	50 *20*	1266.5	3/2		
		1516.5 *10*	50 *20*	0	7/2$^-$	Q	Mult.: Iγ(30°)/I(90°)=0.96 *8* at E_n=5.4 MeV; predicted ratio=1.02 for M2 (1967Ba05).
2091		574[a]	<3	1516.5	3/2		I_γ: other: 8.5 *30* (1967Ba05).
		824	8 *4*	1266.5	3/2		I_γ: other: 10.0 *25* (1967Ba05).
		2091 *2*	92 *4*	0	7/2$^-$		Iγ(30°)/Iγ(90°)=0.86 *10*, 1.04 *15* for E_n=5.4 and 7.0 MeV, respectively. I_γ: other: 81.5 *75* (1967Ba05).
2341		250[a]	<30	2091			
		824[a]	<10	1516.5	3/2		I_γ: other: 12.5 *50* (1967Ba05).
		1074[a]	<10	1266.5	3/2		I_γ: other: 20 *5* (1967Ba05).
		2341 *1*	100	0	7/2$^-$		I_γ: other: 67.5 *70* (1967Ba05).
2357.5		266[a]	<15	2091			
		841[a]	<25	1516.5	3/2		
		1091 *1*	100	1266.5	3/2		
		2357[a]	<30	0	7/2$^-$		
2432		341[a]	<10	2091			I_γ: other: 7 *7* (1967Ba05).
		915[a]	<15	1516.5	3/2		I_γ: other: 15 *6* (1967Ba05).
		1165.5 *10*	75 *10*	1266.5	3/2		I_γ: other: 68 *10* (1967Ba05).
		2432 *2*	25 *10*	0	7/2$^-$		I_γ: other: 10 *7* (1967Ba05).
2480		389 *1*	20 *8*	2091			I_γ: other: 16 *6* (1967Ba05).
		963[a]	<10	1516.5	3/2		I_γ: other: 15 *5* (1967Ba05).
		1213[a]	<10	1266.5	3/2		I_γ: other: 8 *3* (1967Ba05).
		2480 *2*	80 *8*	0	7/2$^-$		I_γ: other: 61 *12* (1967Ba05).
2502		411[a]	<20	2091			
		985.5 *10*	100	1516.5	3/2		
		1235[a]	<20	1266.5	3/2		
		2502[a]	<20	0	7/2$^-$		
2523		432[a]	<10	2091			
		1006[a]	<15	1516.5	3/2		
		1256[a]	<20	1266.5	3/2		
		2523 *2*	100	0	7/2$^-$		
2631		273[a]	<10	2357.5			
		290[a]	<10	2341			
		540 *1*	100	2091			
		1114[a]	<20	1516.5	3/2		
		1364[a]	<20	1266.5	3/2		
		2631[a]	<10	0	7/2$^-$		
2650		218[a]	<10	2432			
		292[a]	<15	2357.5			
		309[a]	<15	2341			
		559[a]	<15	2091			I_γ: other: 35 *15* (1967Ba05).
		1133[a]	<15	1516.5	3/2		
		1383[a]	<20	1266.5	3/2		
		2650 *2*	100	0	7/2$^-$		I_γ: other: 65 *15* (1967Ba05).
2755		232[a]	<10	2523			
		253[a]	<30	2502			
		275[a]	<10	2480			

Continued on next page (footnotes at end of table)

^{39}K(n,pγ) 1969Ba22,1967Ba05 (continued)

$\gamma(^{39}Ar)$ (continued)

E_i(level)	E_γ [†]	I_γ [@]	E_f	J_f^π	E_i(level)	J_i^π	E_γ [†]	E_f	J_f^π
2755	323[a]	<15	2432		3.29×10^3?		3.29×10^3[#]	0	$7/2^-$
	397[a]	<10	2357.5		3.36×10^3		3.36×10^3[#]	0	$7/2^-$
	414[a]	<15	2341		3.47×10^3		3.47×10^3[#]	0	$7/2^-$
	664[a]	<25	2091		3.56×10^3		3.56×10^3[#]	0	$7/2^-$
	1238[a]	<20	1516.5	3/2	3.66×10^3		3.66×10^3[#]	0	$7/2^-$
	1488	50 *25*	1266.5	3/2	3.83×10^3		3.83×10^3[#]	0	$7/2^-$
	2755 *2*	50 *25*	0	$7/2^-$	3.91×10^3		3.91×10^3[#]	0	$7/2^-$
3.09×10^3	1574[‡]		1516.5	3/2	3.97×10^3?		3.97×10^3[#]	0	$7/2^-$
	1823[‡]		1266.5	3/2	4.04×10^3		4.04×10^3[#]	0	$7/2^-$
	3090[‡]		0	$7/2^-$	4.25×10^3		4.25×10^3[#]	0	$7/2^-$
3.18×10^3	3.18×10^3[#]		0	$7/2^-$	4.29×10^3?		4.29×10^3[#]	0	$7/2^-$
3.23×10^3	3.23×10^3[#]		0	$7/2^-$	4.40×10^3		4.40×10^3[#]	0	$7/2^-$

[†] From 1969Ba22 when uncertainty is quoted, otherwise from level-energy differences, unless otherwise noted.
[‡] Transition shown in Figure 4 of 1963Ba07.
[#] Added by the evaluator assuming ground-state transition. These transitions are not reported in 1967Ba05, but authors mentioned that the parent levels of these transitions are determined from γ rays and the ground-state transitions could be weak.
[@] From 1969Ba22. Values from the earlier work of the same group in 1967Ba05 are given under comments.
[&] From 1967Ba05 based on $\gamma(\theta)$ anisotropy.
[a] Placement of transition in the level scheme is uncertain.

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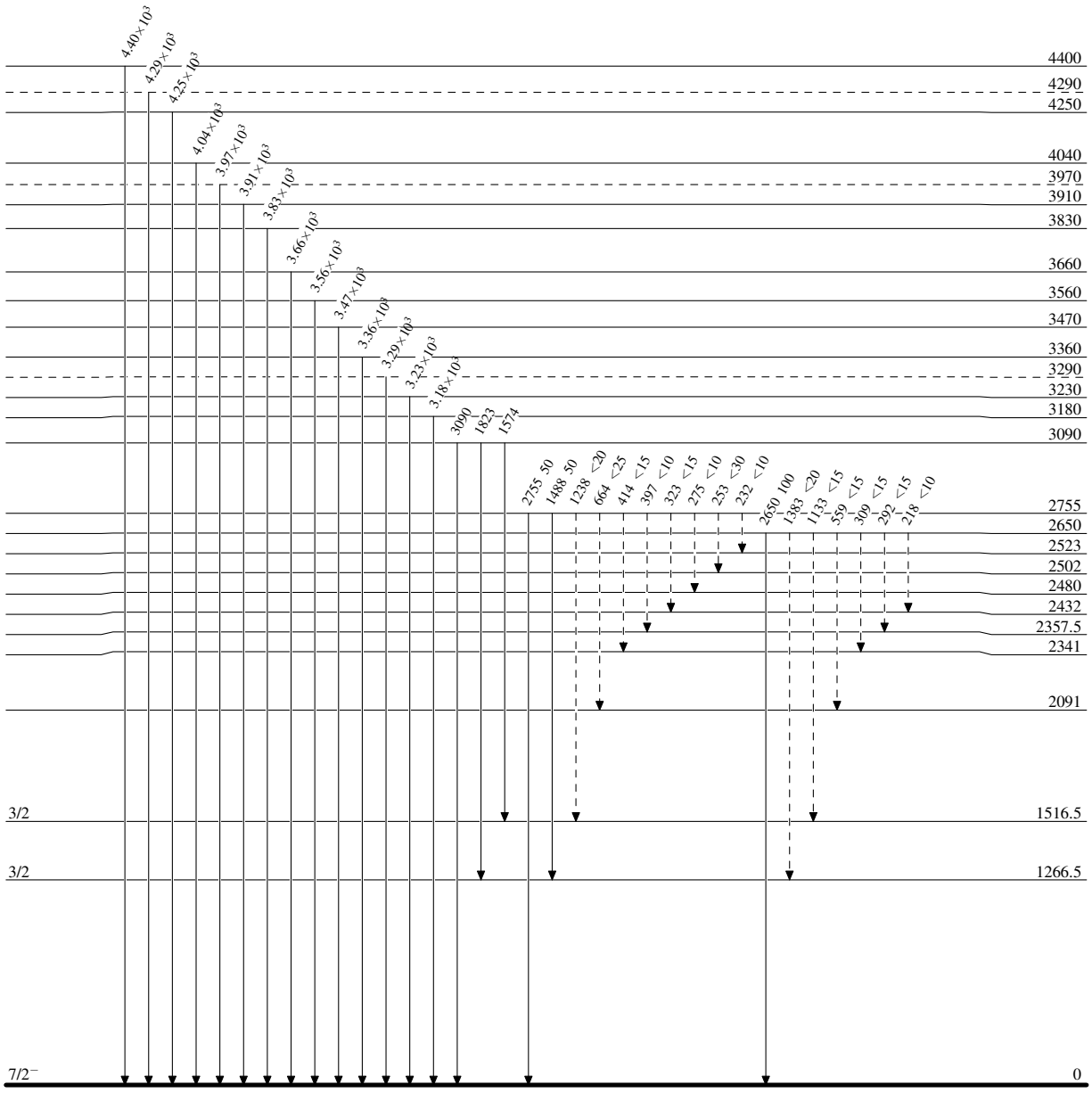
Legend

Level Scheme

Intensities: % photon branching from each level

γ Decay (Uncertain)



$^{39}_{18}Ar_{21}$

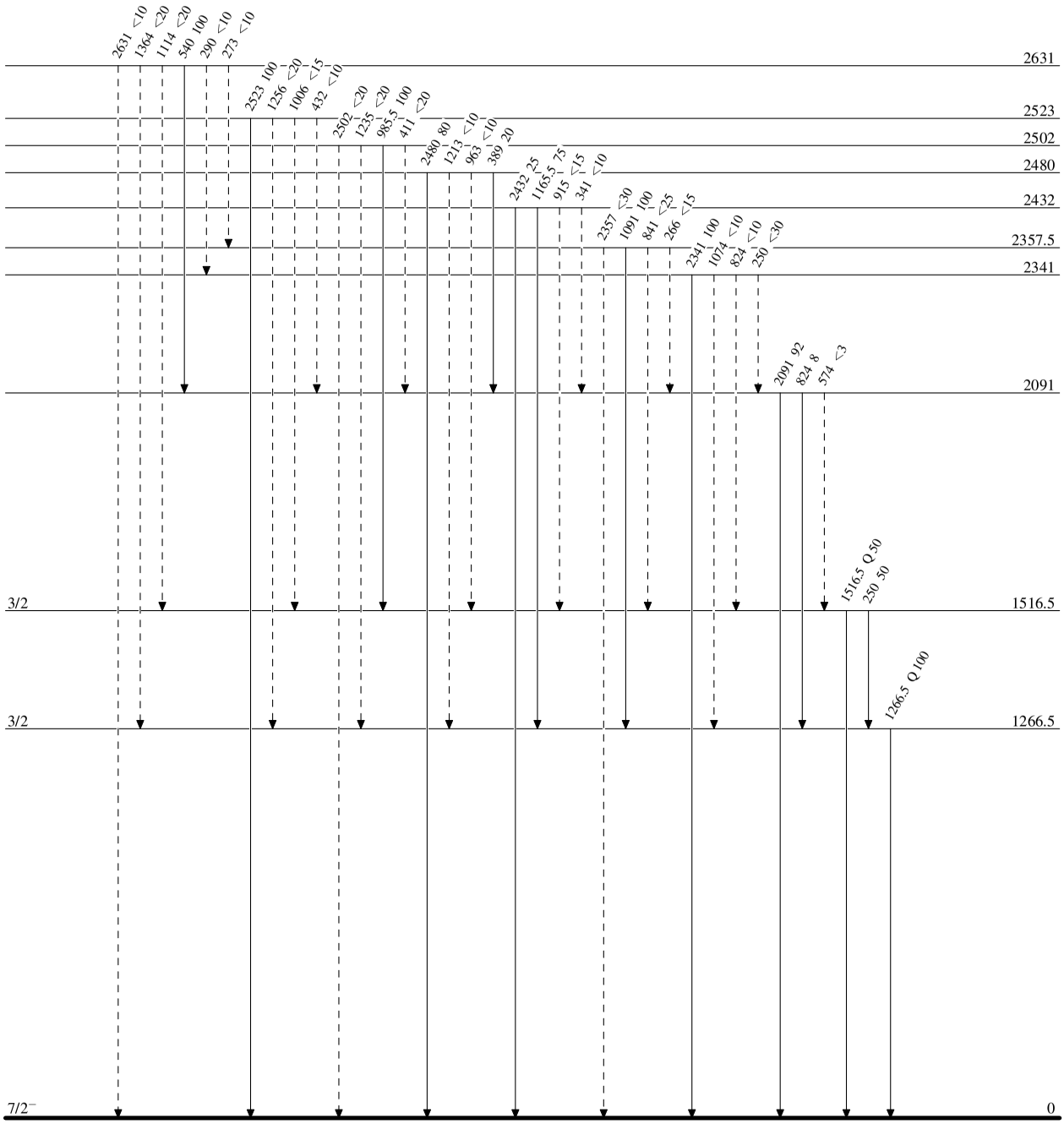
^{39}K(n,pγ) 1969Ba22,1967Ba05

Legend

Level Scheme (continued)

Intensities: % photon branching from each level

- - - - - - ► γ Decay (Uncertain)



$^{39}_{18}Ar_{21}$