Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen[#]	NDS 126, 1 (2015)	31-Mar-2015

Q(β^-)=4566 *5*; S(n)=5658 *8*; S(p)=14.39×10^3 *14*; Q(α)=−11270 *50* 2012Wa38
S(2n)=15085 *5*, S(2p)=27579 *7* (2012Wa38).
First identification of ^{43}Ar nuclide by 1969Ha03.
1971Ar32: ^{232}Th(^{40}Ar, X), E=290 MeV; measured fragments isotopic yields.
2005Bl33: measured charge radii.
2007Na31: ^{136}Xe(p,X) production cross sections.
Mean-square radius from energy-integrated cross sections: 1999Ai02, 1997Li15.
Mass measurements: 2001He29.
2008Bl01: mass-separated ^{43}Ar ion beam obtained from spallation of Ti by 1.4 GeV beam provided by CERN synchrotron followed by on-line mass separation at ISOLDE-CERN facility. Measured spins, isotope shifts, hyperfine structure, mean-square charge radii, magnetic dipole and electric quadrupole moments by fast beam collinear laser spectroscopy using highly sensitive ion detection of optical resonance. Comparisons with spherical Skyrme-type Hartree-Fock mean-field calculations.
Structure calculations: 2011Ka03, 2007Sh10, 1991Wa19, 1987Sa19, 1974Gl04.

^{43}Ar Levels

Cross Reference (XREF) Flags

A	^{43}Cl β^- decay (3.13 s)	D	^{48}Ca(α,^{9}Be)
B	^{1}H(^{43}Ar,p′)	E	^{208}Pb(^{40}Ar,Xγ)
C	^{9}Be(^{36}S,2pγ)		

E(level)	J$^\pi$	T$_{1/2}$	XREF	Comments
0	5/2$^{(-)}$	5.37 min *6*	ABCDE	%β^-=100 μ=−1.021 *6* (2008Bl01,2014StZZ) Q=+0.142 *14* (2008Bl01,2014StZZ) Evaluated rms charge radius=3.4414 fm *41* (2013An02). μ,Q: fast beam collinear laser spectroscopy using highly sensitive ion detection of optical resonance. Statistical uncertainty=0.002 and systematic uncertainty of 10% in Q due to electric field gradient and Sternheimer shielding correction are combined in quadrature. Isotope shift (^{38}Ar,^{43}Ar)=556.7 MHz *23* (2008Bl01); statistical uncertainty=1.4, systematic uncertainty=1.8. Measured mean-square radius (r_0^2)=1.23 fm^2 *8* (beam energy=50 MeV/nucleon, 1999Ai02), 1.31 fm^2 *7* (beam energy=90 MeV/nucleon, 1999Ai02), 1.23 fm^2 *3* (beam energy=70 MeV/nucleon, 1997Li15). The rms charge radius $\langle r^2\rangle^{1/2}$=3.4415 fm *23* from $\delta\langle r^2\rangle$(^{38}Ar,^{43}Ar)=+0.221 fm^2 *14*(stat) *66*(syst) (2008Bl01, laser spectroscopy). J$^\pi$: from laser spectroscopy in 2008Bl01. Hyperfine structure intervals and relative amplitudes of the resonances firmly establish 5/2. log *ft*=6.6 (log $f^{1u}t$<8.5) to 3/2$^-$ and log *ft*=6.2 to 5/2$^+$ give 3/2 or 5/2. log *ft*=7.8 to 7/2$^-$ and log *ft*=7.9 to 7/2$^+$ make 3/2 less likely. Model arguments as discussed by 1999Ma89 propose 5/2$^-$ or 7/2$^-$ from systematics of N=23 and 25 nuclides. Possible configuration= $\pi d_{3/2}^{-2}\nu f_{7/2}^{-3}$ (1999Ma89). T$_{1/2}$: from 1970Hu11 (β and γ activity measurements). Other: 5.35 min *15* (β decay, 1969Ha03), 6.5 min *18* (1969La16).
0+x	(7/2$^-$)		E	E(level): predicted value of x≈100 keV (2011Sz02), 200 keV (2009Mo09).
201.27? *16*	(7/2$^-$)		C	E(level): this level was proposed only in 2009Mo09 but not confirmed in other measurements. It is probably the same level as the 0+x level. J$^\pi$: from theoretical predictions in ^{9}Be(^{36}S,2pγ).
762.05 *8*	(3/2$^-$)		A E	J$^\pi$: from theoretical predictions in ^{208}Pb(^{40}Ar,Xγ).

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Adopted Levels, Gammas (continued)

^{43}Ar Levels (continued)

E(level)	J^π	XREF	Comments
1381.74 *7*		A	
1441.48 *10*		A	
1527.4+x *5*	(11/2$^-$)	E	J^π: assignment based on conclusion from 1999Ma89 that this is a negative parity state which is dominated by a configuration with the valence neutrons in the *fp* shell and new results from 2006Wi10.
1610 *40*	(3/2$^-$)	B	β_2=0.25 *3* (1999Ma89) β_2 is from assumed E2 excitation. J^π: from syst (1999Ma89).
1740 *50*		D	E(level): this level may correspond to the 1794 level reported in ^{43}Cl β^-.
1793.80 *10*	(3/2$^+$)	A	J^π: from shell-model prediction; allowed β^- decay from (1/2$^+$).
1816.8 *7*		A	
1859+x *2*	(9/2$^-$)	E	J^π: assignment based on strong 2$^+\otimes$f$_{7/2}$ component of the wave function for the state, similar to that in ^{41}Ar.
1944.96? *21*		A	
2344.4 *8*		A	
2390.50 *15*		A	
2520.38 *13*		A D	XREF: D(2550).
2798.8? *5*		A	
3374.8? *5*		A	
3395.8? *3*		A	
3425.5? *5*		A	
3549.4? *7*		A D	XREF: D(3560).
4247.06 *17*	(3/2$^+$)	A	J^π: log *ft*=4.9 from (1/2$^+$) parent; 4247.0γ to 5/2$^{(-)}$.
4289.0? *5*		A	
4550.8? *4*		A	
4.74×10^3 *10*		D	

γ(^{43}Ar)

E$_i$(level)	J_i^π	E$_\gamma$	I$_\gamma$	E$_f$	J_f^π
201.27?	(7/2$^-$)	201.27 *16*		0	5/2$^{(-)}$
762.05	(3/2$^-$)	761.81 *11*	100	0	5/2$^{(-)}$
1381.74		619.56 *10*	36 *3*	762.05	(3/2$^-$)
		1381.79 *7*	100 *6*	0	5/2$^{(-)}$
1441.48		679.24 *10*	100 *7*	762.05	(3/2$^-$)
		1441.69 *23*	16 *3*	0	5/2$^{(-)}$
1527.4+x	(11/2$^-$)	1527.4 *5*	100	0+x	(7/2$^-$)
1793.80	(3/2$^+$)	352.13 *14*	2.3 *3*	1441.48	
		411.8 *3*	1.37 *21*	1381.74	
		1031.84 *9*	100.0 *27*	762.05	(3/2$^-$)
		1793.5 *6*	3.03 *19*	0	5/2$^{(-)}$
1816.8		1816.5† *3*	100	0	5/2$^{(-)}$
1859+x	(9/2$^-$)	1859 *2*	100	0+x	(7/2$^-$)
1944.96?		1944.96† *21*	100	0	5/2$^{(-)}$
2344.4		903†		1441.48	
		2344†		0	5/2$^{(-)}$
2390.50		948.96 *17*	33 *3*	1441.48	
		1008.82 *24*	13.3 *25*	1381.74	
		1628.1† *6*	13.5 *27*	762.05	(3/2$^-$)
		2390.5 *4*	100 *8*	0	5/2$^{(-)}$
2520.38		726.58 *8*	100 *5*	1793.80	(3/2$^+$)

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Adopted Levels, Gammas (continued)

$\gamma(^{43}Ar)$ (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π
2520.38		1758.2 *5*	6.3 *26*	762.05	$(3/2^-)$
2798.8?		2036.4† *4*	100	762.05	$(3/2^-)$
3374.8?		1933.3† *5*	100	1441.48	
3395.8?		3395.8† *3*	100	0	$5/2^{(-)}$
3425.5?		1631.8† *5*	100	1793.80	$(3/2^+)$
3549.4?		2108.0† *7*	100	1441.48	
4247.06	$(3/2^+)$	2430.0† *5*	42 *5*	1816.8	
		2452.7 *6*	39 *5*	1793.80	$(3/2^+)$
		2805.43 *17*	83 *9*	1441.48	
		2865.7 *4*	24 *4*	1381.74	
		4247.0 *7*	100 *20*	0	$5/2^{(-)}$
4289.0?		2344.0† *4*	100	1944.96?	
4550.8?		3109.3† *4*	100	1441.48	

† Placement of transition in the level scheme is uncertain.

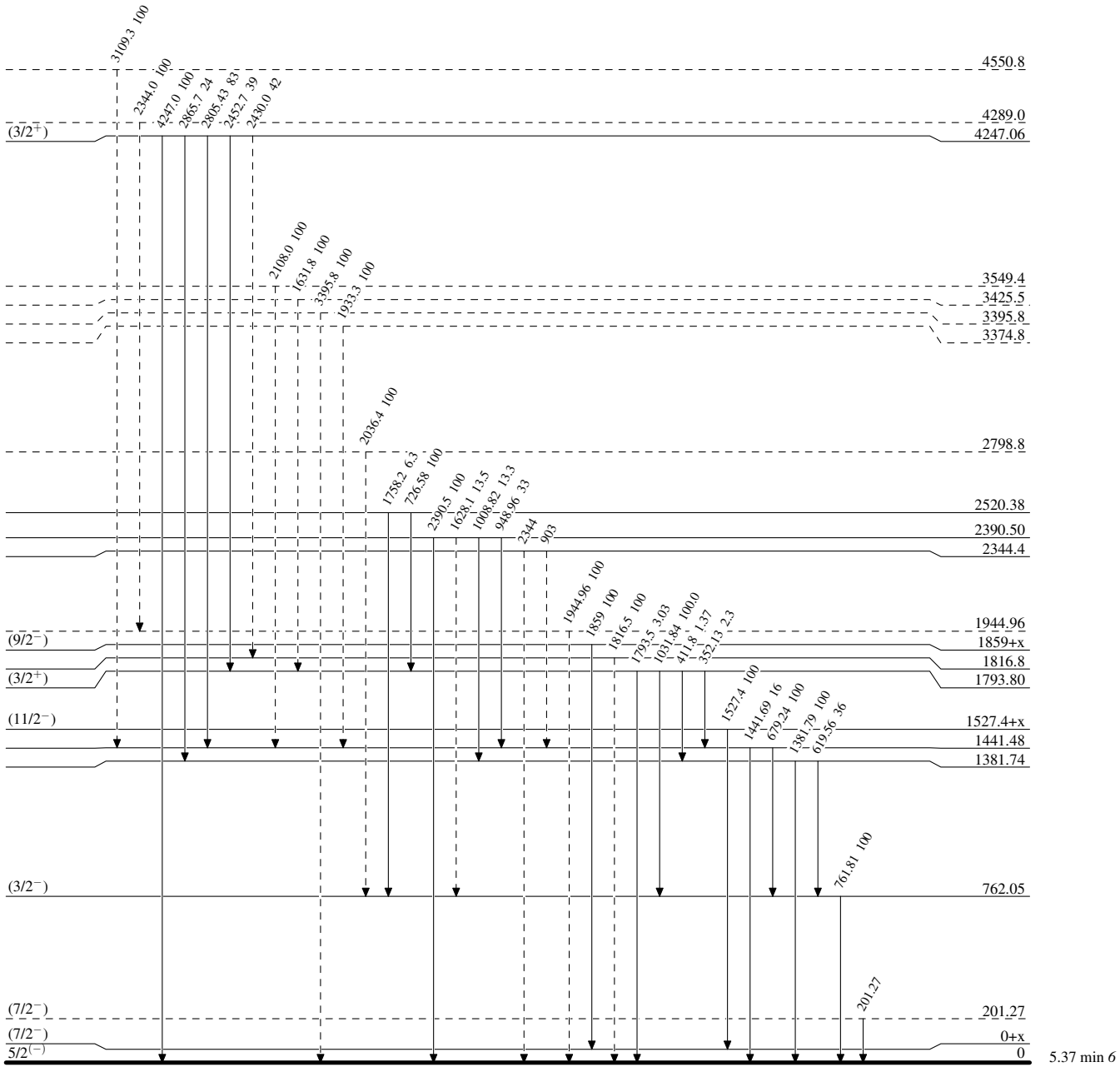
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{43}_{18}Ar_{25}$