Nuclear Data Sheets for A=43*

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*(Received ****)*

Abstract: The experimental data are evaluated for known nuclides of mass number A=43 (Al,Si,P,S,Cl,Ar,K,Ca,Sc,Ti,V,Cr). Detailed evaluated level properties and related information are presented, including adopted values of level and γ-ray energies, decay data (energies, intensities and placement of radiations), and other spectroscopic data. This work supersedes earlier full evaluations of A=43 published by 2001Ca24 and 1990En08 (also 1998En04 update). No excited states are known in ^{43}Al, ^{43}Si, ^{43}Cr. Only one excited state is known in ^{43}V which is the probable Isobaric Analog State (IAS) of ^{43}Cr ground state. Information for ^{43}P, ^{43}S, ^{43}Cl, ^{43}Ar and ^{43}Ti is limited; there is no decay data or their radioactive decay schemes are incomplete in view of large Q values and known excitations much below than allowed by Q values. The ^{43}Sc, ^{43}Ca and ^{43}K nuclides remain as the most extensively studied from many different reactions and decays.

Cutoff Date: Literature available in NSR database up to August 31, 2011 has been included.

General Policies and Organization of Material: See the January issue of the *Nuclear Data Sheets* or http:// www.nndc.bnl.gov /nds/NDSPolicies.pdf.

General Comments: The statistical analysis of γ-ray data and deduced level schemes is carried out through computer codes available at NNDC, BNL website: www.nndc.bnl.gov. The direct feedings to excited states in β^- and ε decays have generally been computed from I(γ+ce) intensity balances at each level; the associated log *ft* values are calculated using LOGFT code. All Q values have been adopted from 2011AuZZ. These values in general are very close to those in 2003Au03 and 2009AuZZ. Static magnetic dipole and quadruple moments have been adopted from 2005St24 and 1989Ra17 when available. In cases where weighted averaging procedures have been used and the number of independent measurements is small (four or less), the assigned uncertainty is the higher of the two values: generally the one given by the averaging procedure and the lowest uncertainty quoted for a measurement. Nuclear charge radii have been adopted from the update of 2004An14 by I. Angeli which are avaible on the following website: http://cdfe.sinp.msu.ru.

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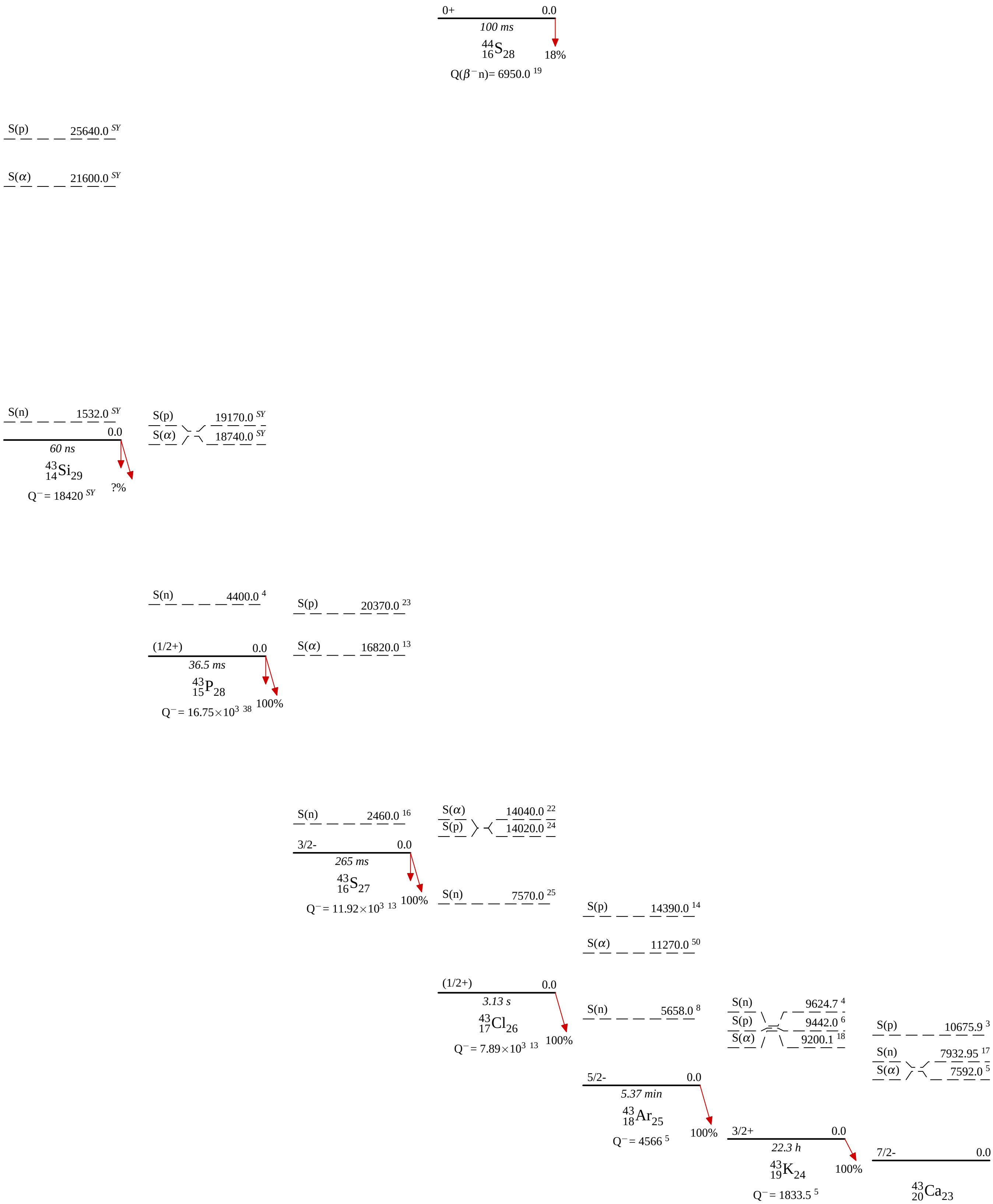
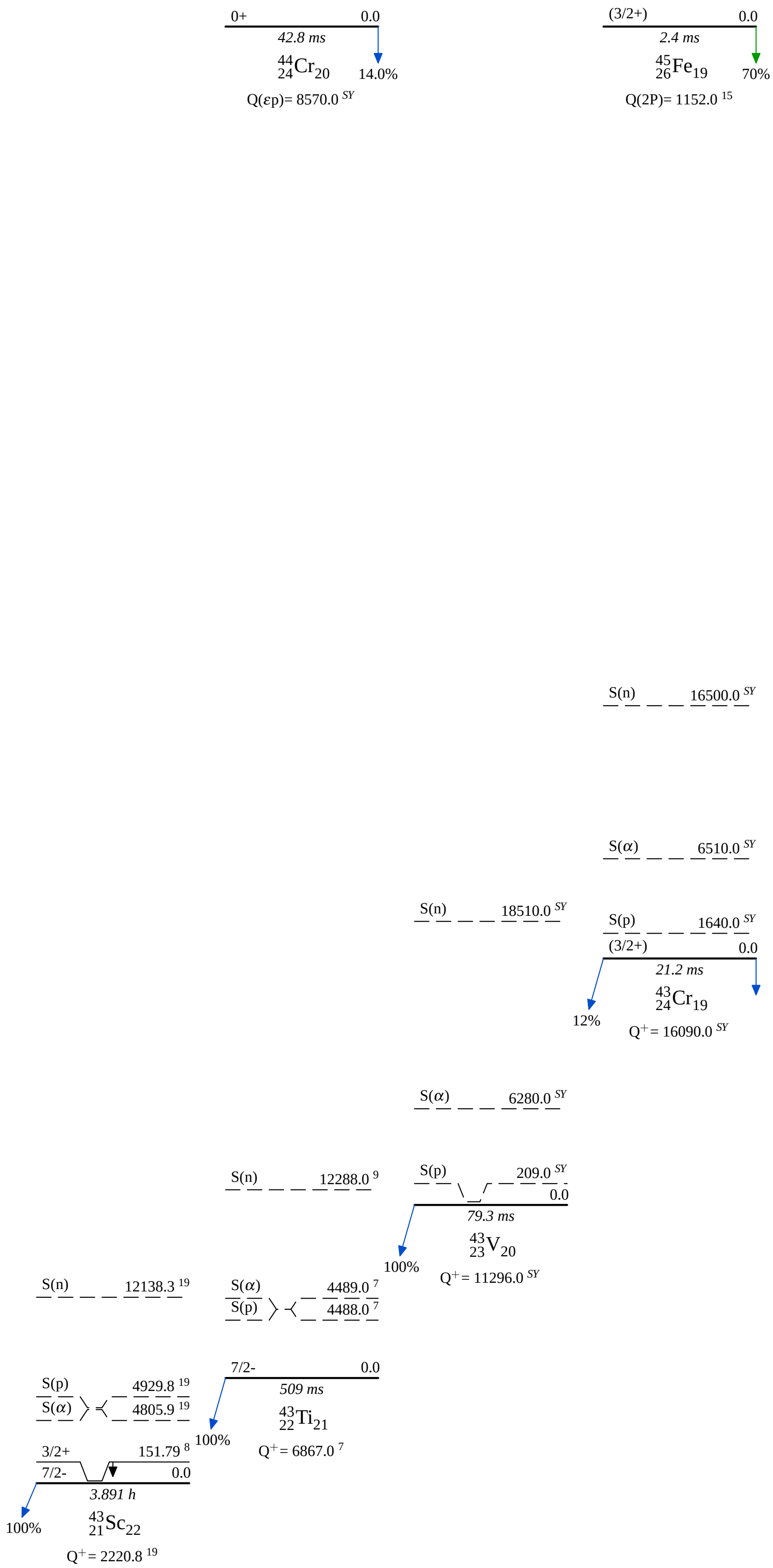
Skeleton Scheme for A=43



Skeleton Scheme for A=43 (continued)



Ground-State and Isomeric-Level Properties

Nuclide	Level	Jπ	$T_{1/2}$	Decay Mode
^{43}Si	0.0		> 60 ns	%β^-=? ; %β^-n=?
^{43}P	0.0	(1/2+)	36.5 ms *15*	%β^-=100 ; %β^-n=100
^{43}S	0.0	3/2-	265 ms *15*	%β^-=100 ; %β^-n=40 *10*
^{43}Cl	0.0	(1/2+)	3.13 s *9*	%β^-=100
^{43}Ar	0.0	5/2-	5.37 min *6*	%β^-=100
^{43}K	0.0	3/2+	22.3 h *1*	%β^-=100
^{43}Ca	0.0	7/2-	STABLE	
^{43}Sc	0.0	7/2-	3.891 h *12*	%ε+%β^+=100
^{43}Ti	0.0	7/2-	509 ms *5*	%ε+%β^+=100
^{43}V	0.0		79.3 ms *24*	%ε+%β^+=100
^{43}Cr	0.0	(3/2+)	21.2 ms *7*	%ε+%β^+=12 *4*; %εp=81 *4*; %ε2p=7.1 *4*
^{44}S	0.0	0+	100 ms *1*	%β^-n=18 *3*
^{44}Cr	0.0	0+	42.8 ms *6*	%εp=14.0 *9*
^{45}Fe	0.0	(3/2+)	2.4 ms *3*	%2P=70 *4*

Adopted Levels:tentative

Q(β^-)=25330 *SY*; S(n)=1090 *SY*; S(p)=25640 *SY*; Q(α)=-21730 *CA* 2011AuZZ,1997Mo25
Δ(Q(β^-))=1210, Δ(S(n))=1280, Δ(S(p))=1210 (syst,2011AuZZ).
Q(β^-n)=23800 *030* (syst,2011AuZZ).
From 1997Mo25.
First possible identification of ^{43}Al nuclide by 2007Ba71.
2007Ba71: W(^{48}Ca,Xγ) E=141 MeV/nucleon beam from the National Superconducting Cyclotron Laboratory (NSCL). The fragments were separated with the A1900 fragment separator. Isotopic identification by multiple ΔE signals, magnetic rigidity, total energy and time of flight analysis. Detectors: plastic scintillators, parallel-plate avalanche counters (PPACs) and silicon PIN diodes.
2008Ad08: calculated production cross section for ^{181}Ta(^{48}Ca,X): 40 fb.
One event was possibly assigned to ^{43}Al.

^{43}Al Levels

E(level)	J$^\pi$	$T_{1/2}$	Comments
0		>170 ns	%β^-=? . %β^-n=? . E(level): the observed event is assumed to correspond to the g.s. of ^{43}Al. $T_{1/2}$: limiting value estimated from time-of-flight of ≈170 ns (figure 3 in 2007Ba71) at NSCL facility. Actual half-life is expected to be much longer as suggested by 1.2 ms from calculations by 1997Mo25. J$^\pi$: 5/2+ (syst,1997Mo25).

Adopted Levels

Q(β^-)=18420 *SY*; S(n)=1532 *SY*; S(p)=25640 *SY*; Q(α)=-21600 *SY* 2011AuZZ
Δ(Q(β^-))=880, Δ(S(n))=950, Δ(S(p))=1210, Δ(Q(α))=950 (syst,2011AuZZ).
Q(β^-n)=14020 *830* (syst,2011AuZZ).
First identification of ^{43}Si nuclide by 2002No11.
2007Ta15: E=142 MeV/nucleon ^{48}Ca beam from the coupled cyclotron facility at the National Superconducting Cyclotron Laboratory (NSCL). Targets of a 724 mg/cm^2 ^{9}Be or a 1111 mg/cm^2 natural W. Reaction products separated by the A1900 fragment separator and detected in a plastic scintillator at the focal plane. Measured production cross section, 5 pb *2*.
2002No11: ^{43}Si seen in reaction: Ta(^{48}Ca,X) E=64 MeV/nucleon. Reaction fragments analyzed by RIPS recoil fragment separator at RIKEN facility. Identification by measurements of energy loss, total kinetic energy, time-of-flight and magnetic rigidity for each fragment. Four events were observed.
2008Ad08: calculated production cross section for ^{nat}W(^{48}Ca,X): 4.4 pb.

^{43}Si Levels

E(level)	J$^\pi$	$T_{1/2}$	Comments
0		>60 ns	%β^-=? . %β^-n=? . E(level): the observed ^{43}Si fragments are assumed to correspond to the g.s. $T_{1/2}$: limiting value from time-of-flight in 2002No11. Actual half-life is expected to be much longer as suggested by systematics value of 15 ms (systematics,2003Au02) and calculated value of 13.5 ms (1997Mo25). J$^\pi$: systematics: 3/2- (2003Au02,1997Mo25).

Adopted Levels, Gammas

Q(β^-)=16.75×10^3 *38*; S(n)=4.4×10^3 *4*; S(p)=19170 *SY*; Q(α)=-18740 *SY* 2011AuZZ
Uncertainties (syst,2011AuZZ): Δ(S(p))=620, Δ(Q(α))=730.
Q(β^-n)=14286 *390* (2011AuZZ).
First identification of ^{43}S nuclide by 1989Gu03.
^{43}P isotope identified in ^{181}Ta(^{48}Ca,X) E=55 MeV/nucleon (1989Gu03) and in ^{64}Ni(^{48}Ca,X) E=60 MeV/nucleon (1995So03, GANIL facility), followed by measurement of fragment spectra. Measured %β^-n.
2004Gr20 (also 2003Gr22): ^{43}P produced in ^{9}Be(^{48}Ca,X) at E=60 MeV/nucleon, LISE3 spectrometer at GANIL, isotopic identification by energy loss, time-of-flight and magnetic rigidities, double-sided Si strip (DSSD) detectors for residues. Measured (β)(residues) time correlations and half-life using scintillation detectors for β rays.
Mass measurement: 2000Sa21 (also 2001Sa72).
2006Fr13 (also 2005Fr19): see ^{9}Be(^{44}S,43PXG) dataset.
Mean-square radius from energy-integrated cross sections: 2006Kh08.

^{43}P Levels

Cross Reference (XREF) Flags

A ^{9}Be(^{44}S,43PXG)

E(level)†	J$^\pi$‡	T$_{1/2}$	XREF	Comments
0	(1/2+)	36.5 ms *15*	A	%β^-=100 . %β^-n=100 . Measured mean square radius (r_0^2)=1.77 fm^2 *28* (2006Kh08). J$^\pi$: probable $\pi s_{1/2}$ orbital (2006Fr13);configuration=2s$_{1/2}$ (2008Ri04). T$_{1/2}$: from β(^{43}P) timing correlations followed up to 400 ms (2004Gr20, measurement at GANIL). Others: 33 ms *3* (1995So03, earlier measurement at GANIL), 1999YoZW. Weighted average of the two values (from 2004Gr20 and 1995So03) is 35.8 ms *15*. %β^-n: from 1995So03. Other: 1999YoZW.
184	(3/2+)		A	J$^\pi$: probable $\pi d_{3/2}$ orbital (2006Fr13); configuration=1d$_{3/2}$ (2008Ri04).
845	(5/2+)		A	
1009	(5/2+)		A	
1095	(5/2+)		A	
1774	(5/2+)		A	
2035	(5/2+)		A	

† From least-squares fit to Eγ data (by compilers).
‡ From comparisons of experimental data with shell model calculations (2008Ri04).

γ(^{43}P)

E$_i$(level)	J$^\pi_i$	E$_f$(level)	J$^\pi_f$	Eγ†	Iγ†
184	(3/2+)	0	(1/2+)	184 *1*	100
845	(5/2+)	184	(3/2+)	661 *4*	100 *13*
		0	(1/2+)	845 *4*	34 *9*
1009	(5/2+)	184	(3/2+)	825 *5*	100
1095	(5/2+)	184	(3/2+)	911 *6*	100
1774	(5/2+)	1009	(5/2+)	765 *6*	100
2035	(5/2+)	1009	(5/2+)	1018 *6*[a]	71 *14*
		184	(3/2+)	1851 *11*	100 *14*

† From 2008Ri04.
[a] Placement of transition in the level scheme is uncertain.

^{9}Be(^{44}S,43PXG) 2008Ri04,2006Fr13

One-proton knockout reaction.

2008Ri04: E=91.7 MeV/nucleon ^{44}S beam was produced by the Coupled- Cyclotron facility at NSCL by fragmentation of 140 MeV/nucleon ^{48}Ca beam on a 705 mg/cm^2 ^{9}Be fragmentation target and incident on a ^{9}Be 376 mg/cm^2 reaction target. Fragments were separated by the A1900 fragment separator and S800 magnetic spectrograph. Projectiles were identified by time-of-flight and energy loss in the S800 ion chamber and γ-rays were detected by a 32-fold segmented high-purity germanium detector array (SeGA). Measured Eγ, Iγ, $\gamma\gamma$. Deduced levels, J, π. Comparisons with shell-model calculations.

2007Ba47: E^{44}S=39 MeV/nucleon secondary beam produced from primary beam of ^{48}Ca produced at GANIL facility with E=60 MeV/nucleon. Fragments separated using ALPHA spectrometer. Decay residue identified using time-of-flight and energy loss measurements. Measured Eγ, Iγ using an array of 74 BaF_2 crystals arranged in two hemispheres above and below the ^{9}Be target.

2006Fr13 (also 2005Fr19): E^{44}S=98.6 MeV/nucleon secondary beam produced from fragmentation of ^{48}Ca beam at 140 MeV/nucleon with a ^{9}Be target. Fragments were separated by A1900 separator at NSCL, Michigan facility. The ^{44}S beam impinged another ^{9}Be target and the residues were analyzed by S-800 spectrograph. The knockout residues were identified by time-of- flight, energy loss measurement, position and angle information. The γ rays were detected in coin with knockout residues of ^{43}P using SeGA array of highly-segmented HPGe detectors. Shell-model calculations.

Structure calculations: 2011Ka03, 2010Ga15, 2009No01, 1999Du05, 1995Pe19, 1995Zv02.

All data from 2008Ri04 unless otherwise noted.

Total cross section for ^{43}P=7.6 mb *11* in comparison with 11.6 mb from theoretical predictions (2006Fr13).

^{43}P Levels

E(level)[†]	J$^{\pi}$[‡]	σ (mb)[a]
0	1/2+[#]	2.3 *4*
184	3/2+[@]	3.1 *3*
845	(5/2+)[&]	0.37 *7*
1009	(5/2+)[&]	0.8 *2*
1095	(5/2+)[&]	1.9 *2*
1774	(5/2+)	0.4 *1*
2035	(5/2+)[&]	0.7 *2*

† From least-squares fit to Eγ data (by compilers).

‡ From comparisons of experimental data with shell model calculations.

\# Configuration=$2s_{1/2}$.

@ Configuration=$1d_{3/2}$.

& Configuration=$1d_{5/2}$.

a Partial cross section.

γ(^{43}P)

E_i(level)	J^{π}_i	E_f(level)	J^{π}_f	Eγ	Iγ
184	3/2+	0	1/2+	184 *1*	100
845	(5/2+)	184	3/2+	661 *4*	8 *1*
		0	1/2+	845 *4*	2.7 *7*
1009	(5/2+)	184	3/2+	825 *5*	17 *1*
1095	(5/2+)	184	3/2+	911 *6*	25 *1*
1774	(5/2+)	1009	(5/2+)	765 *6*	3.9 *6*
2035	(5/2+)	1009	(5/2+)	1018 *6*[a]	5 *1*
		184	3/2+	1851 *11*	7 *1*

a Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Q(β^-)=11.92×10^3 *13*; S(n)=2.46×10^3 *16*; S(p)=20.37×10^3 *23*; Q(α)=-16.82×10^3 *13* 2011AuZZ
From mass excess (^{43}S)=-12196 *5* (2009Ri12) and mass excess (^{43}Cl)=-24120 *130* (2007Ju03,2000Sa21). 2011AuZZ gives 12340 *230*.
Q(β^-n)=4771 *175* (2011AuZZ).
First identification of ^{43}S nuclide by 1979We10.
^{43}S isotope produced and identified in ^{9}Be(^{48}Ca,X) E=212 MeV/nucleon (1979We10); ^{181}Ta(^{48}Ca,X) (1989Le16) and Th(p,X) E=800 MeV (1991Zh24), followed by measurement of fragment spectra. Measured (1989Le16) %β^-n, $T_{1/2}$.
Mass measurement: 2009Ri12, 2007Ju03, 2000Sa21, 1991Zh24.
Mean-square radius from energy-integrated cross sections: 2006Kh08.
Structure calculations: 2011Ka03, 2010Ga15, 2009Ha02.

^{43}S Levels

Cross Reference (XREF) Flags

A	^{43}S IT decay (415 ns)	*D*	^{9}Be(^{48}Ca,Xγ)
B	^{9}Be(^{44}S,Xγ)	*E*	Coulomb excitation
C	^{9}Be(^{45}Cl,Xγ)		

Nuclear Level Sequence
A Ground state rotational band.

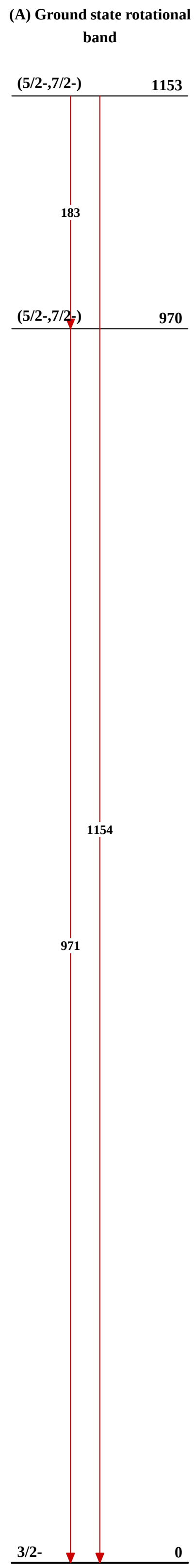
Seq.	E(level)†	J$^\pi$	$T_{1/2}$	XREF	Comments
A	0	3/2-	265 ms *15*	*ABCDE*	%β^-=100 . %β^-n=40 *10*. %β^-n: from 1989Le16. Configuration=$\nu p_{3/2}$. This state is found to be part of well deformed K=1/2 decoupled rotational band. J$^\pi$: 3/2- proposed from shell model (2000Sa21, 2009Ri11, 2009Ga05); 7/2- proposed (1999Ib01,1997Au04) from syst. $T_{1/2}$: weighted average of 282 ms *27* (2004Gr20) and 260 ms *15* (1998WiZV), from β(^{43}S) time correlation measurements. Other: 220 ms *+80-50* (1989Le16). Measured mean square radius (r_0^2)=1.22 fm^2 *6* (2006Kh08).
	320.5 *5*	7/2-	415 ns *5*	*A D*	μ=1.095 *14*. $T_{1/2}$: from 2009Ga05. Other: 0.48 μs *5* (2000Sa21). J$^\pi$: 7/2- proposed from shell-model calculations (2000Sa21); from agreement g(Schmidt)=-0.546 for $\nu f_{7/2}$ with the experimental value (2009Ga05). B(E2)=0.517×10^{-4} *52* (up or down) quoted by 2000Sa21 seems incorrect. The evaluators get B(E2)(↓)=0.36×10^{-4} *4*; B(E2)(↑)=0.72×10^{-4} *8* if J(g.s.)=3/2, J(319)=7/2.
A	970	(5/2-,7/2-)‡		*BC E*	J$^\pi$: proposed from shell model calculations (2009Ri11).
A	1153	(5/2-,7/2-)‡		*BC*	
	2616	(7/2-)‡		*B*	

† From least-square fit to Eγ data.
‡ Proposed from shell model calculations (2009Ri11).

$\gamma(^{43}S)$

E_i(level)	J^{π}_i	E_f(level)	J^{π}_f	E_{γ}†	I_{γ}†	Mult.	Comments
320.5	7/2-	0	3/2-	319[a]		[E2]	B(E2)(W.u.)=0.040 *4*. This γ either feeds the g.s. or a very close-lying level of energy <50 keV. Mult.: for mult=M1 or E1, deduced hindrance factors are unrealistically large. Mult=E2 would be compatible with the measured lifetime.
970	(5/2-,7/2-)	0	3/2-	971 *6*	100		
1153	(5/2-,7/2-)	970	(5/2-,7/2-)	183 *1*	53 *3*		
		0	3/2-	1154 *7*	100		
2616	(7/2-)			1468 *9*	5 *3*		
				2600 *16*	100 *7*		

† From $^{9}Be(^{44}S,x\gamma)$ unless otherwise noted.
[a] Placement of transition in the level scheme is uncertain.


(A) Ground state rotational band
(5/2-,7/2-) 1153
183
(5/2-,7/2-) 970
1154
971
3/2- 0

^{43}S IT decay (415 ns) 2000Sa21

2000Sa21: ^{43}S produced by fragmentation of ^{48}Ca beam at 60 MeV/nucleon on a tantalum target. Measured magnetic rigidity of particles to deduce mass, tof measurements, ΔE-E measurement with an array of four-element silicon detector telescope. Delayed γ rays measured with 4π NaI array surrounding the detector telescope. Precision mass measurement is reported in addition to a new isomer in ^{43}S. Delayed coincidence was measured using two Ge detectors and a Si telescope.

^{43}S Levels

E(level)	J^π	$T_{1/2}$	Comments
0			J^π: 3/2- proposed from shell model calculations (2000Sa21).
319		0.48 μs *5*	J^π: 7/2- proposed from shell model calculations (2000Sa21). B(E2)=0.517×10^{-4} *52* (up or down) quoted by 2000Sa21 seems incorrect. The evaluators get B(E2)(↓)=0.36×10^{-4} *4*; B(E2)(↑)=0.72×10^{-4} *8* if J(g.s.)=3/2, J(319)=7/2.

γ(^{43}S)

E_γ	E_i(level)	J_i^π	E_f(level)	J_f^π	Mult.	Comments
319[a]	319		0		(E2)	This γ either feeds the g.s. or a very close-lying level of energy <50 keV. Mult.: E1 and M1 give very large hindrance factors. E2 would be compatible with the measured lifetime.

[a] Placement of transition in the level scheme is uncertain.

^{9}Be(^{44}S,Xγ) 2009Ri11

2009Ri11: E=92 MeV/nucleon ^{44}S beam was produced by fragmentation of a 140 MeV/nucleon ^{48}Ca on a ^{9}Be fragmentation target and incident on a target of 376 mg/cm^2 thick ^{9}Be. Fragments (84% ^{44}S, 14% ^{45}Cl) were separated by the A1900 separator and identified by the time-of-flight and energy loss in the S800 ionization chamber; ρ-rays were detected by the Segmented Germanium Array (SeGA). Measured Eγ, Iγ, $\gamma\gamma$-coin. Deduced levels, J, π, branching ratios and rotational band. Comparisons with shell model calculations.

This dataset shares the γ-energies with the dataset of ^{9}Be(45Cl, XG).

^{43}S Levels

Nuclear Level Sequence

A Ground state rotational band.

Seq.	E(level)†	J$^{\pi}$‡
A	0	3/2-
A	970	(5/2-,7/2-)
A	1153	(5/2-,7/2-)
	2616	(7/2-)

† From least-square fit to Eγ data.
‡ From comparisons with shell model calculations.

γ(^{43}S)

E$_i$(level)	J$^{\pi}_i$	E$_f$(level)	J$^{\pi}_f$	Eγ	Iγ
				231 *1*	6 *1*
				459 *3*	7 *2*
				621 *4*	31 *3*
				719 *4*	21 *3*
				770 *5*	12 *3*
				849 *5*	24 *3*
				1203 *7*	21 *3*
				1529 *9*	8 *3*
				1855 *11*	5 *3*
970	(5/2-,7/2-)	0	3/2-	971 *6*	56 *4*
1153	(5/2-,7/2-)	970	(5/2-,7/2-)	183 *1*	53 *3*
		0	3/2-	1154 *7*	100
2616	(7/2-)			1468 *9*	5 *3*
				2600 *16*	98 *7*

^{9}Be(^{45}Cl,Xγ) 2009Ri11

2009Ri11: E=98 MeV/nucleon ^{45}Cl beam was produced by fragmentation of a 140 MeV/nucleon ^{48}Ca on a ^{9}Be fragmentation target and incident on a target of 376 mg/cm^2 thick ^{9}Be. Fragments (84% ^{44}S, 14% ^{45}Cl) were separated by the A1900 separator and identified by the time-of-flight and energy loss in the S800 ionization chamber; ρ-rays were detected by the Segmented Germanium Array (SeGA). Measured Eγ, Iγ, $\gamma\gamma$-coin. Deduced levels, J, π, branching ratios and rotational band. Comparisons with shell model calculations.

This dataset shares the γ-energies with the dataset of ^{9}Be(44S, XG).

^{43}S Levels

Nuclear Level Sequence

A Ground state rotational band.

Seq.	E(level)†	J^{π}‡
A	0	3/2-
A	971	(5/2-,7/2-)
A	1154	(5/2-,7/2-)

† From least-square fit to Eγ data.
‡ From comparisons with shell model calculations.

γ(^{43}S)

E_i(level)	J^{π}_i	E_f(level)	J^{π}_f	Eγ	Iγ
				231 *1*	8 *5*
				459 *3*	10 *7*
				621 *4*	34 *11*
				770 *5*	15 *10*
				849 *5*	23 *12*
				1060 *5*	40 *15*
				1203 *7*	51 *15*
				1529 *9*	93 *22*
971	(5/2-,7/2-)	0	3/2-	971 *6*	62 *17*
1154	(5/2-,7/2-)	971	(5/2-,7/2-)	183 *1*	58 *12*
		0	3/2-	1154 *7*	100

^{9}Be(^{48}Ca,Xγ) 2009Ga05

2009Ga05: E=60 MeV/nucleon ^{48}Ca beam was produced at GANIL. Fragments were separated by the LISE-2000 spectrometer. A 50 μg plastic scintillator at the focal plane was used for g-factor measurement using the Time Dependent Perturbed Angular Distribution (TDPAD); four coaxial Ge detectors for γ detection. Measured Eγ, g factor. Comparison with various calculations such as shell model (Sm), particle+rotor (Pr) model, generator coordinate method (GCM), and Gaussian overlap approximation (GOA).

^{43}S Levels

E(level)	J$^{\pi}$	$T_{1/2}$	Comments
0	3/2-		Configuration=$\nu p_{3/2}$. This state is found to be part of well deformed K=1/2 decoupled rotational band.
320.5 *5*	7/2-	415 ns *5*	μ=1.095 *14*. $T_{1/2}$: from 2009Ga05, from time interval between an event in plastic scintillator and a signal in one of the Ge detectors. μ: from g factor=0.317 *4* (2009Ga05) by TDPAD method, the uncertainty includes the statistical and that in the magnetic field. 2009Ga05 state that their g factor indicated that 320.5,7/2- level is built on $\nu f_{7/2}$ orbital. J$^{\pi}$: from agreement of g(Schmidt)=-0.546 for $\nu f_{7/2}$ with the experimental value.

Coulomb excitation 1999Ib01

^{197}Au(^{43}S,^{43}S′) E=42.0 MeV/nucleon. γ rays detected with an array of 38 cylindrical NaI(Tl) detectors in coin with scattered ^{43}S ions. Comparisons with particle-rotor and particle-vibrator calculations.

^{43}S Levels

E(level)	J$^{\pi}$	Comments
0		
≈940		B(E2)=0.0175 *69*. E(level): probably a multiplet. B(E2) applies to the sum of unresolved levels. Experimental B(E2) is consistent with calculated B(E2) for a multiplet of states generated near 1 MeV in either the particle-rotation (prolate and oblate) or the particle-vibration calculations, assuming Jπ(g.s.)=7/2-.

γ(^{43}S)

E_i(level)	J_i^{π}	E_f(level)	J_f^{π}	E_γ	Comments
≈940		0		≈940	E_γ: probably a multiplet.

Adopted Levels, Gammas

Q(β^-)=7.89×10^3 *13*; S(n)=7.57×10^3 *25*; S(p)=14.02×10^3 *24*; Q(α)=-14.04×10^3 *22* 2011AuZZ

7890 *130* from mass excess (^{43}Cl)=-24120 *130* (2007Ju03, 2000Sa21) and mass excess (^{43}Ar)=-32010 *5* (2003Au03). Other: 7840 *160* (2003Au03,2009AuZZ), 7600 *210* (2011AuZZ).
Other: 7327 *213* (2003Au03, 2009AuZZ).
Other: 13780 *200* (2003Au03, 2009AuZZ).
Other: -13719 *188* (2003Au03, 2009AuZZ).
Q(β^-n)=2182 *130* (deduced from mass excess measurement of ^{43}Cl in 2007Ju03). Others: 2183 *157* (2003Au03, 2009AuZZ), 1943 *205* (2011AuZZ).
First identification of ^{43}Cl nuclide by 1976Ka24.
^{43}Cl production and identification:
1976Ka24: ^{48}Ca(^{3}He,^{8}B) E=74 MeV.
1981Vo04: U,Nb(p,X) E=600 MeV.
1991Zh24, 1990Tu01: Th(p,X) E=800 MeV followed by measurement of fragment spectra.
1998WiZX: fragmentation of ^{48}Ca beam E(^{48}Ca)=70 MeV/nucleon with a Be target. Measured γ, $\gamma\gamma$ coin, $\beta\gamma\gamma$ coin.
2006Wi10: ^{43}Cl isotope produced by fragmentation of a ^{48}Ca beam at 70 MeV/nucleon hitting a ^{9}Be target. The fragments were separated by A1200 fragment separator at NSCL, Michigan facility. Measured Eγ, Iγ, $\gamma\gamma$, β, $\beta\gamma$ coin, half-life using two Ge detectors for γ rays and a plastic scintillator for β rays.
Mass measurements: 1976Ka24, 1990Tu01, 1991Zh24, 2000Sa21 2007Ju03.
Mean-square radius from energy-integrated cross sections: 2006Kh08.
Structure calculations: 2011Ka03, 2009No01, 1987Sa19.

^{43}Cl Levels

Cross Reference (XREF) Flags

A	^{43}S β^- decay (265 ms)
B	^{44}S β^-n decay (100 ms)
C	1H(46AR,XG)
D	^{9}Be(^{48}Ca,Xγ)

E(level)	J$^\pi$†	T$_{1/2}$	XREF	Comments
0	(1/2+)	3.13 s *9*	ABCD	%β^-=100 . Measured mean square radius (r_0^2)=1.184 fm^2 *21* (2006Kh08). T$_{1/2}$: from fit to decay curve (2006Wi10). Earlier result from this group: 3.07 s *7* (1998WiZX). Others: 3.3 s *2* (1981Vo04), 3.4 s *3* (1981HuZT). J$^\pi$: 3/2+ proposed (1997Au04) from syst.
329	(3/2+)		CD	
944	(5/2+)		CD	
1340	(5/2+)		CD	
1829	(7/2+)		CD	

† From transition multipolarities determined from $\gamma(\theta)$ data in ^{9}Be(^{48}Ca,Xγ) and shell-model predictions (2004So30).

γ(^{43}Cl)

E$_i$(level)	J$^\pi_i$	E$_f$(level)	J$^\pi_f$	Eγ	Iγ	Mult.†
329	(3/2+)	0	(1/2+)	329 *4*	100	D
944	(5/2+)	329	(3/2+)	615 *5*	100	D
1340	(5/2+)	0	(1/2+)	1340 *6*	100	(Q)
1829	(7/2+)	944	(5/2+)	885 *5*	100	D

† From $\gamma(\theta)$ in ^{9}Be(^{48}Ca,Xγ); mult=D indicates ΔJ=1 transition.

^{43}S β^- decay (265 ms) 1989Le16,1991Zh24

Complete data for this dataset can be found in the online version

Parent: ^{43}S: E=0; Jπ=3/2-; $T_{1/2}$=265 ms *15*; Q(g.s.)=11.92×10^3 *13*; %β^-=100

^{43}S-$T_{1/2}$: Weighted average of 282 ms *27* (2004Gr20) and 260 ms *15* (1998WiZV), from β(^{43}S) time correlation measurements. Other: 220 ms *+80-50* (1989Le16).

^{43}S-Q(g.s.): From mass excess (^{43}S)=-12196 *5* (2009Ri12) and mass excess (^{43}Cl)=-24120 *130* (2007Ju03,2000Sa21). 2011AuZZ gives 12340 *230*.

%β^-n=40 *10* (1989Le16).

No information is available for population of levels in ^{43}Cl from ^{43}S decay.

^{44}S β^-n decay (100 ms) 1989Le16,1995So03,2004Gr20

Complete data for this dataset can be found in the online version

Parent: ^{44}S: E=0; Jπ=0+; $T_{1/2}$=100 ms *1*; Q(g.s.)=6.95×10^3 *19*; %β^-n=18 *3*

^{44}S-$T_{1/2}$: From timing of β(fragment) correlations (2004Gr20,2003Gr22). Others: 123 ms *10* (1995So03,1993So06), 200 ms *40* (1989Le16). Weighted average of all the three values is 100 ms *2*.

^{44}S-Q(g.s.): Q(β^-n)=6949 *191* (deduced from measured masses in 2007Ju03). Other: 6980 *420* (2003Au03, 2009AuZZ), 7237 *248* (2011AuZZ).

%β^-n=18 *3* (1995So03).

$T_{1/2}$(^{44}S)=100 ms *1* (2004Gr20,2003Gr22), 123 ms *10* (1995So03,1993So06). Other: 200 ms *40* (1989Le16).

No information is available for population of levels in ^{43}Cl from ^{44}S β^-n decay.

1H(46AR,XG) 2006Ga31

2006Ga31: E=76.4 MeV/nucleon ^{46}Ar was produced at the Coupled Cyclotron Facility of the National Superconducting Cyclotron Laboratory (NSCL) at Michigan State University via projectile fragmentation of a 110 MeV/nucleon 48Ca primary beam on a 376 mg/cm^2 ^{9}Be target located at the midtarget position of the A1900 fragment separator. Target of a 191 mg/cm^2 polypropylene [$(C_3H_6)_n$] foil. The fragments were separated by A1900 fragment separator Bρ-ΔE-Bρ method. and identified using the S800 spectrograph. Prompt γ rays were detected by SeGa γ-detector array of 32-fold segmented HPGe detectors.

The level scheme is taken from 2004So30.

^{43}Cl Levels

E(level)†	Jπ†	Comments
0	(1/2+)	
329	(3/2+)	
945	(5/2+)	
1342	(5/2+)	
1833	(7/2+)	A tentative 1509 *10* γ from this level reported by 2004So30 is not seen by 2006Ga31.

† From level scheme proposed by 2004So30.

γ(^{43}Cl)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ
				256 *5*
329	(3/2+)	0	(1/2+)	329 *4*
945	(5/2+)	329	(3/2+)	616 *5*
1342	(5/2+)	0	(1/2+)	1342 *7*
1833	(7/2+)	945	(5/2+)	888 *6*

^{9}Be(^{48}Ca,Xγ) 2004So30

2004So30: E=60.3 MeV/nucleon ^{48}Ca beam was produced at GANIL and incident on a ^{9}Be target of 2.76 mg/cm^2. The SPEG magnetic spectrometer was operated in a dispersive mode to identify the emerging fragments detected at the focal plane. Their energy losses and positions in the focal plane were determined by the combination of ionization and drift chambers. Their residual energies were obtained in a thick plastic scintillator. The time of flight was derived from the timing signals in the plastic scintillator with respect to the cyclotron radio frequency. It was corrected by the use of the position of the fragments in the focal plane of the SPEG spectrometer to obtain a better time resolution and subsequently a better identification of the nuclei. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$ with an array of 74 BaF_2 and 3 segmented Ge clover detectors to identify the γ rays emitted in flight by the excited fragments. The segmented Ge detectors at 85, 122, and 136° to the beam allowed for angular distribution measurements.

^{43}Cl Levels

E(level)	J$^\pi$
0.0	(1/2+)
330	(3/2+)
946	(5/2+)
1338	(5/2+)
1830	(7/2+)

γ(^{43}Cl)

E$_i$(level)	J$^\pi_i$	E$_f$(level)	J$^\pi_f$	Eγ	Iγ	Mult.	Comments
330	(3/2+)	0.0	(1/2+)	330 *5*	100	D	Mult.: ΔJ=1 transition from Iγ(122°)/Iγ(136°)=1.4 *4*; Iγ(85°)/Iγ(136°)=2.0 *4*.
946	(5/2+)	330	(3/2+)	614 *5*	60	D	Mult.: ΔJ=1 transition from Iγ(122°)/Iγ(136°)=1.3 *4*; Iγ(85°)/Iγ(136°)=1.7 *4*.
1338	(5/2+)	0.0	(1/2+)	1338 *6*	30	(Q)	Mult.: ΔJ=2 or 0 transition from Iγ(122°)/Iγ(136°)=1.0 *4*; Iγ(85°)/Iγ(136°)=1.0 *3*.
1830	(7/2+)	946	(5/2+)	881 *5*	50	D	Mult.: ΔJ=1 transition from Iγ(122°)/Iγ(136°)=1.3 *3*; Iγ(85°)/Iγ(136°)=2.0 *5*.
				1509 *10*[a]	20		E$_\gamma$: this γ ray is specified at a 2.5σ confidence level (2004So30).

[a] Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Q(β^-)=4566 *5*; S(n)=5658 *8*; S(p)=14.39×10^3 *14*; Q(α)=-11270 *50* 2011AuZZ,2009AuZZ
Q(β^-n)=-5059 *5* (2011AuZZ).
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.
Structure calculations: 2011Ka03, 2007Sh10, 1991Wa19, 1987Sa19, 1974Gl04.

^{43}Ar Levels

Cross Reference (XREF) Flags

A	^{43}Cl β^- decay (3.13 s)	E	^{48}Ca(α,^{9}Be)
B	1H(43AR,P′)	F	^{208}Pb(^{40}Ar,Xγ)
C	^{9}Be(^{36}S,2PG)		
D	TI(p,5pxn)		

E(level)	J$^\pi$	T$_{1/2}$	XREF	Comments
0	5/2-	5.37 min *6*	ABCDEF	%β^-=100 . 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 (<r^2>)$^{1/2}$=3.4415 fm *23* from δ<r^2>(^{38}Ar,^{43}Ar)=+0.221 fm^2 *14*(stat) *66*(syst) (2008Bl01, laser spectroscopy). 3.4353 fm *46* from 2008 update of 2004An14 by I. Angeli. 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).
201.27 *16*	(7/2-)		C	J$^\pi$: from theoretical predictions in ^{9}Be(^{36}S,2pγ).
762.05 *8*	(3/2-)		A F	J$^\pi$: from theoretical predictions in ^{208}Pb(^{40}Ar,xγ).
1381.74 *7*			A	
1441.48 *10*			A	
1610	(3/2-)		B	β_2=0.25 *3* (1999Ma89). J$^\pi$: from syst (1999Ma89).
1740			E	E(level): this level may correspond to the 1794 level reported in ^{43}Cl β^-.
1793.80 *10*	(3/2+)		A	J$^\pi$: from shell model prediction.
1816.8 *7*			A	
1944.96 *21*			A	
2344.4 *8*			A	
2390.50 *15*			A	
2520.38 *13*			A E	Ref: E: 2550.
2798.8 *5*			A	
3374.8 *5*			A	
3395.8 *3*			A	

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Adopted Levels, Gammas (continued)

^{43}Ar Levels (continued)

E(level)	J^π	$T_{1/2}$	XREF	Comments
3425.5 *5*			A	
3549.4 *7*			A E	Ref: E: 3560.
4247.06 *17*	(1/2+,3/2+)		A	J^π: allowed β-decay from (1/2+) parent, log *ft*=4.98.
4289.0 *5*			A	
4550.8 *4*			A	
4.74×10^3 *10*			E	

$\gamma(^{43}Ar)$

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ	I_γ
201.27	(7/2-)	0	5/2-	201.27 *16*	
762.05	(3/2-)	0	5/2-	761.81 *11*	100
1381.74		762.05	(3/2-)	619.56 *10*	36 *3*
		0	5/2-	1381.79 *7*	100 *6*
1441.48		762.05	(3/2-)	679.24 *10*	100 *7*
		0	5/2-	1441.69 *23*	16 *3*
1793.80	(3/2+)	1441.48		352.13 *14*	2.3 *3*
		1381.74		411.8 *3*	1.37 *21*
		762.05	(3/2-)	1031.84 *9*	100.0 *27*
		0	5/2-	1793.5 *6*	3.03 *19*
1816.8		0	5/2-	1816.5 *3*[a]	100
1944.96		0	5/2-	1944.96 *21*[a]	100
2344.4		1441.48		903[a]	
		0	5/2-	2344[a]	
2390.50		1441.48		948.96 *17*	33 *3*
		1381.74		1008.82 *24*	13.3 *25*
		762.05	(3/2-)	1628.1 *6*[a]	13.5 *27*
		0	5/2-	2390.5 *4*	100 *8*
2520.38		1793.80	(3/2+)	726.58 *8*	100 *5*
		762.05	(3/2-)	1758.2 *5*	6.3 *26*
2798.8		762.05	(3/2-)	2036.4 *4*[a]	100
3374.8		1441.48		1933.3 *5*[a]	100
3395.8		0	5/2-	3395.8 *3*[a]	100
3425.5		1793.80	(3/2+)	1631.8 *5*[a]	100
3549.4		1441.48		2108.0 *7*[a]	100
4247.06	(1/2+,3/2+)	1816.8		2430.0 *5*[a]	42 *5*
		1793.80	(3/2+)	2452.7 *6*	39 *5*
		1441.48		2805.43 *17*	83 *9*
		1381.74		2865.7 *4*	24 *4*
		0	5/2-	4247.0 *7*	100 *20*
4289.0		1944.96		2344.0 *4*[a]	100
4550.8		1441.48		3109.3 *4*[a]	100

[a] Placement of transition in the level scheme is uncertain.

^{43}Cl β^- decay (3.13 s) 2006Wi10,1998WiZX,1981HuZT

Parent: ^{43}Cl: E=0; Jπ=(1/2+); $T_{1/2}$=3.13 s *9*; Q(g.s.)=7.89×10^3 *13*; %β^-=100

^{43}Cl-$T_{1/2}$: From fit to decay curve (2006Wi10). Earlier result from this group: 3.07 s *7* (1998WiZX). Others: 3.3 s *2* (1981Vo04), 3.4 s *3* (1981HuZT).

^{43}Cl-J: From transition multipolarities determined from $\gamma(\theta)$ data in ^{9}Be(^{48}Ca,Xγ) and shell-model predictions (2004So30); 3/2+ is suggested for ^{43}Cl g.s. by 1998WiZX.

2006Wi10: ^{43}Cl isotope produced by fragmentation of a ^{48}Ca beam at 70 MeV/nucleon hitting a ^{9}Be target. The fragments were separated by A1200 fragment separator at NSCL, Michigan facility. Measured Eγ, Iγ, $\gamma\gamma$, β, $\beta\gamma$ coin using two Ge detectors for γ rays and a plastic scintillator for β rays. Comparisons with Shell-model calculations.

1998WiZX (also 1998WiZV): fragmentation of ^{48}Ca beam E(^{48}Ca)=70 MeV/nucleon with a Be target. Measured γ, $\gamma\gamma$ coin, $\beta\gamma\gamma$ coin.

^{43}Cl identification and production: 1991Zh24 (also 1990Tu01), 1981Vo04, 1976Ka24.

Level scheme proposed by 1998WiZX is in general agreement with the earlier tentative scheme proposed by 1981HuZT.

^{43}Ar Levels

E(level)[†]	J$^\pi$	Comments
0.0	5/2(-)	J$^\pi$: from Adopted Levels.1998WiZX suggested 5/2- or 7/2-.
762.02 *8*		
1381.73 *7*		
1441.43 *11*		
1793.77 *11*	(3/2+)	J$^\pi$: from shell model prediction.
1816.65 *23*		
1944.96 *21*		
2344.4 *8*		
2390.47 *15*		
2520.35 *13*		
2798.4 *5*		
3374.8 *5*		
3395.8 *3*		
3425.5 *5*		
3549.4 *7*		
4009.2 *3*		
4247.02 *18*	(1/2+,3/2+)	J$^\pi$: allowed β-decay from (1/2+) parent.
4289.0 *5*		
4550.8 *4*		

[†] From least squares fit to Eγ data.

γ(^{43}Ar)

Eγ[‡]	E$_i$(level)	J$^\pi_i$	E$_f$(level)	J$^\pi_f$	Iγ[†‡]
352.13 *14*	1793.77	(3/2+)	1441.43		2.1 *3*
411.8 *3*	1793.77	(3/2+)	1381.73		1.23 *19*
619.56 *10*	1381.73		762.02		2.25 *22*
679.24 *10*	1441.43		762.02		10.0 *7*
726.58 *8*	2520.35		1793.77	(3/2+)	4.94 *24*
761.81 *11*	762.02		0.0	5/2(-)	100.0 *21*
903[ac]	2344.4		1441.43		
948.96 *17*	2390.47		1441.43		1.69 *17*
1008.82 *24*	2390.47		1381.73		0.68 *13*
1031.84 *9*	1793.77	(3/2+)	762.02		89.7 *24*
1381.79 *7*	1381.73		0.0	5/2(-)	6.3 *4*
1441.69 *23*[c]	1441.43		0.0	5/2(-)	1.6 *3*
1628.1 *6*[c]	2390.47		762.02		0.69 *14*
1631.8 *5*[c]	3425.5		1793.77	(3/2+)	1.29 *23*
1758.2 *5*	2520.35		762.02		0.31 *13*
1793.5 *6*[b]	1793.77	(3/2+)	0.0	5/2(-)	2.72 *17*
1816.5 *3*[c]	1816.65		0.0	5/2(-)	3.18 *24*

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^{43}Cl β^- decay (3.13 s) 2006Wi10,1998WiZX,1981HuZT (continued)

γ(^{43}Ar) (continued)

E_γ[‡]	E_i(level)	J_i^π	E_f(level)	J_f^π	I_γ[†‡]
1933.3 *5*[c]	3374.8		1441.43		0.34 *20*
1944.96 *21*[c]	1944.96		0.0	5/2(-)	3.9 *3*
2036.4 *4*[c]	2798.4		762.02		0.57 *11*
2108.0 *7*[c]	3549.4		1441.43		0.58 *13*
2215.4 *3*[c]	4009.2		1793.77	(3/2+)	1.2 *3*
2344[ac]	2344.4		0.0	5/2(-)	
2344.0 *4*[c]	4289.0		1944.96		2.7 *7*
2390.5 *4*	2390.47		0.0	5/2(-)	5.1 *4*
2430.0 *5*[c]	4247.02	(1/2+,3/2+)	1816.65		1.46 *19*
2452.7 *6*	4247.02	(1/2+,3/2+)	1793.77	(3/2+)	1.38 *17*
2805.43 *17*	4247.02	(1/2+,3/2+)	1441.43		2.9 *3*
2865.7 *4*	4247.02	(1/2+,3/2+)	1381.73		0.83 *14*
3109.3 *4*[c]	4550.8		1441.43		0.93 *15*
3395.8 *3*[c]	3395.8		0.0	5/2(-)	2.24 *20*
4247.0 *7*	4247.02	(1/2+,3/2+)	0.0	5/2(-)	3.5 *7*

† For absolute intensity per 100 decays, multiply by 0.57 *8*.
‡ From 2006Wi10, unless otherwise stated.
[a] From 1981HuZT only.
[b] From 1998WiZX only.
[c] Placement of transition in the level scheme is uncertain.

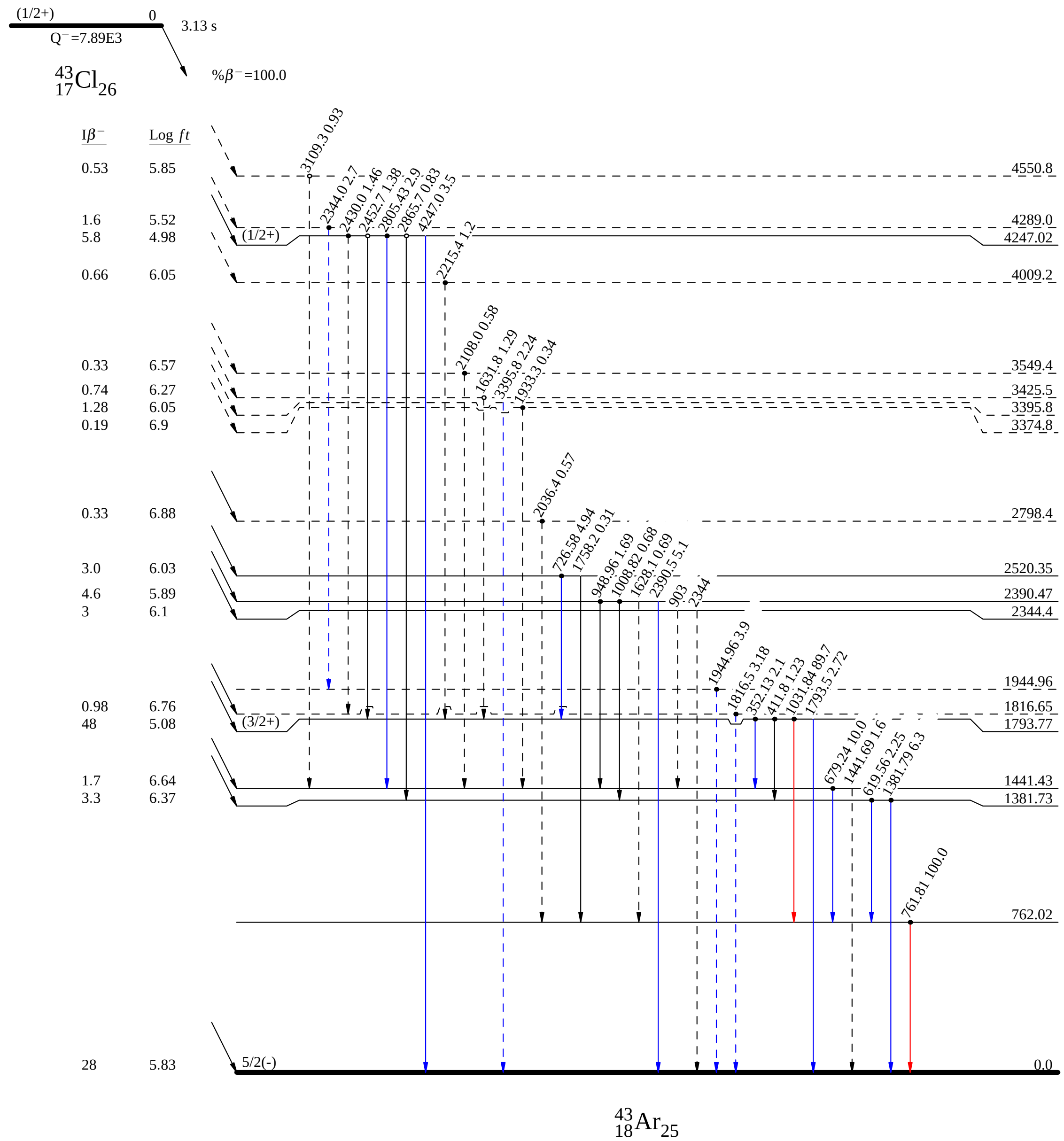
β^- radiations

$E\beta^-$	E(level)	$I\beta^-$	Log *ft*	Comments
(3339.2)[†]	4550.8	0.53 *12*	5.85 *13*	av Eβ=1465 *63*.
(3601.0)[†]	4289.0	1.6 *5*	5.52 *16*	av Eβ=1591 *63*.
(3642.98)	4247.02	5.8 *9*	4.98 *10*	av Eβ=1612 *63*.
(3880.8)[†]	4009.2	0.66 *22*	6.05 *16*	av Eβ=1727 *64*.
(4340.6)[†]	3549.4	0.33 *9*	6.57 *14*	av Eβ=1951 *64*.
(4464.5)[†]	3425.5	0.74 *17*	6.27 *12*	av Eβ=2011 *64*.
(4494.2)[†]	3395.8	1.28 *22*	6.05 *10*	av Eβ=2026 *64*.
(4515.2)[†]	3374.8	0.19 *12*	6.9 *3*	av Eβ=2036 *64*.
(5091.6)	2798.4	0.33 *8*	6.88 *12*	av Eβ=2318 *64*.
(5369.65)	2520.35	3.0 *5*	6.03 *9*	av Eβ=2454 *64*.
(5499.53)	2390.47	4.6 *7*	5.89 *9*	av Eβ=2518 *64*.
(5545.6)	2344.4	3	6.1	av Eβ=2540 *64*.
(6073.4)	1816.65	0.98 *23*	6.76 *12*	av Eβ=2799 *64*.
(6096.23)	1793.77	48 *7*	5.08 *8*	av Eβ=2810 *64*.
(6448.57)	1441.43	1.7 *6*	6.64 *16*	av Eβ=2983 *64*.
(6508.27)	1381.73	3.3 *6*	6.37 *9*	av Eβ=3013 *64*.
(7890.00)	0.0	28 *10*	5.83 *16*	av Eβ=3692 *64*. Iβ<28 *10*; log *ft*>5.81 *17* (2006Wi10).

† Placement of transition in the level scheme is uncertain.

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



1H(43AR,P′) 1999Ma89

1999Ma89: ^{43}Ar secondary beam produced by the fragmentation of a ^{48}Ca beam at E=60 MeV/nucleon, provided by the K1200 cyclotron at the National Superconducting Cyclotron Laboratory (NSCL), on a 285 mg/cm2 Be production target on a Be target, followed by a fragment-separator analyzer. Intensity of ^{43}Ar beam=16,000 particles/sec at 33 MeV/nucleon. Target of a thin 2 mg/cm^2 CH_{2n} foil. Recoiling protons were detected by a group of eight particle-detector telescopes (FWHM=850 keV). Measured $\sigma(E_p,\theta)$. Deduced levels, J, π from DWBA analysis.

^{43}Ar Levels

E(level)	J^π	L	Comments
0	(5/2-,7/2-)		J^π: from systematics (1999Ma89). 7/2- is inconsistent with log *ft* values.
1610	(3/2-)	2	L: from $\sigma(\theta)$ and comparison with DWBA calculations. J^π: suggested by syst (1999Ma89). β_2=0.25 *3*, assuming E2 excitation. For analysis of (p,p′) data, $J\pi$(g.s.)=5/2- was assumed by 1999Ma89.

^{9}Be(^{36}S,2PG) 2009Mo09

2009Mo09: E=95 MeV ^{36}S beam was produced from the Tandem Accelerator at Maier-Leibnitz-Laboratorium. Targets of 610 μg/cm^2 Be evaporated on 36 mg/cm^2 Au backing. Charged particles were detected by eleven telescopes and γ-rays by five Compton-suppressed Ge detectors. Measured Eγ, Iγ, (particle)-γ coincidence. Deduced levels.

^{43}Ar Levels

E(level)	J^π	Comments
0	5/2-	J^π: from Adopted Levels.
201.27 *16*	7/2-	J^π: from theoretical predictions.

γ(^{43}Ar)

E_i(level)	J^π_i	E_f(level)	J^π_f	E_γ
201.27	7/2-	0	5/2-	201.27 *16*

TI(p,5pxn) 2008Bl01

2008Bl01: Mass-separated ^{43}Ar ion beam obtained from spallation of Ti by 1.4 GeV proton 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.

^{43}Ar Levels

E(level)	J^π	Comments
0	5/2	μ=-1.021 *6* (2008Bl01). Q=+0.142 *14* (2008Bl01). J^π: from hyperfine structure measurement by 2008Bl01. Q: statistical uncertainty=0.002 and systematic uncertainty of 10% 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. $\Delta\langle r^2\rangle$(^{38}Ar,^{43}Ar)=0.221 fm^2 *67* (2008Bl01); statistical uncertainty=0.014, systematic uncertainty=0.066.

^{48}Ca(α,^{9}Be) 1974Je01

1974Je01: E=77.7 MeV α beam with intensity of $\approx$1 μA was produced from the Lawrence Berkeley Laboratory 88-in cyclotron. Target of a 96.25% isotopically enriched self-supporting ^{48}Ca. Recoiling particles were detected by two counter telescopes, each consisting of two transmission (ΔE) detector, 59 and 35 μm thick, a 260 μm E E detector, and a 500 μm reject detector. Measured σ(E). Deduced levels.

^{43}Ar Levels

E(level)	J$^{\pi}$
0	
1740	
2550	
3560	
4.74×10^{3} *10*	

^{208}Pb(^{40}Ar,Xγ) 2011SzAA

2011SzAA: E=255 MeV ^{40}Ar beam from an ECR ion source accelerated by the superconducting ALPI accelerator of the Laboratory Nazionali di Legnaro. Target=300 μg/cm^{2} ^{208}Pb. Projectile-like fragments identified by spectrometer Prisma by ΔE, E and time of flight measurements. Gamma rays detected by the Clara array, consisting of twenty-four HPGe clover-type detectors. Measured Eγ, Iγ, fragment-γ coincidence. Deduced levels, J, π. Comparison with shell model calculations.

^{43}Ar Levels

E(level)	J$^{\pi}$	Comments
0.0	5/2-	
0+x	(7/2-)	E(level): x $\approx$ 100 keV predicted. Previous assignment of a 200 keV gamma ray from this level (2009Mo09) was not confirmed in the present work.
762.3 *4*	(3/2-)	
1527.4+x *5*	(11/2-)	J$^{\pi}$: 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.
1859+x	(9/2-)	J$^{\pi}$: assignment based on strong $2^{+}\otimes f_{7/2}$ component of the wave function for the state, similar to that in ^{41}Ar.

γ(^{43}Ar)

E$_i$(level)	J$^{\pi}_i$	E$_f$(level)	J$^{\pi}_f$	Eγ	Iγ†
762.3	(3/2-)	0.0	5/2-	762.3 *4*	70
1527.4+x	(11/2-)			1527.4 *5*	100
1859+x	(9/2-)			1859 *2*	45

† Normalized to 100 for the 1527γ. Data read by compilers from figure 6 in 2011SzAA.

Adopted Levels, Gammas

Q(β^-)=1833.5 *5*; S(n)=9624.7 *4*; S(p)=9442 *6*; Q(α)=-9200.1 *18* 2011AuZZ
Q(εp)=-18951 *144* (2011AuZZ).
Q(β^-n)=-6099.4 *4* (2011AuZZ).
Hyperfine studies, isotope shifts, moments: 1982To02, 1982Du06.
Mass Measurements: 2007Ya08.

^{43}K Levels

Cross Reference (XREF) Flags

A	^{43}Ar β^- decay (5.37 min)	F	^{44}Ca(d,^{3}He)
B	^{9}Be(^{36}S,npg)	G	^{44}Ca(t,α)
C	^{40}Ar(α,pγ),^{41}K(t,pγ)	H	^{44}Ca(^{11}B,^{12}C)
D	^{41}K(t,p)		
E	^{44}Ca(μ^-,νnγ)		

E(level)†	J$^{\pi}$#	$T_{1/2}$‡	XREF	Comments
0	3/2+	22.3 h *1*	ABCDEFGH	μ=+0.1633 *8* (2005St24,1989Ra17,1982To02). %β^-=100 . μ: aBLDS method (1982To02,1982Du06). Other: 1959Pe26. Adopted (by 1977En02) spectroscopic factor S=4.0 *15* (proton pickup). The rms charge radius (<r^2>)$^{1/2}$=3.4558 fm *2* from 1989OtZZ evaluation, 3.4555 fm *86* from 2008 update of 2004An14 evaluation by I. Angeli. $T_{1/2}$: weighted average of 21.75 h *50* (1963Ho17), 22.1 h *1* (1972Em01), and 22.6 h *2* (1972Wa20). Other: 1955Ne01, 1969Ta07. J$^{\pi}$: atomic-beam method; L(t,p)=0; L(d,^{3}He)=L(t,α)=2.
561.20 *5*	1/2+	1.4 ps *+17-7*	ABCDEFGH	Adopted (by 1977En02) spectroscopic factor S=1.9 *5* (proton pickup). J$^{\pi}$: L(d,^{3}He)=0.
738.30 *6*	7/2-	200 ns *5*	ABC EFGH	μ=+4.43 *5* (2005St24,1989Ra17,1983Ra37). μ: dPAD method (1983Ra37). Others: 1976We23, 1976De41. J$^{\pi}$: L(d,^{3}He)=L(t,α)=3; 5/2 ruled out by ΔJ=2 to 3/2+ from $\gamma(\theta$,pol) in (α,pγ). $T_{1/2}$: from pγ(t) in (α,pγ). Ef: F: 748.
975.32 *6*	3/2-	1.6 ps *+14-6*	ABCDEFGH	J$^{\pi}$: L(d,^{3}He)=1; L(t,p)=3. Ef: D: 1007. Ef: H: 984.
1109.93 *6*	3/2+	1.0 ps *8*	ABCDEFGH	J$^{\pi}$: L(d,^{3}He)=L(t,α)=L(t,p)=2; 5/2 not allowed by RUL for γ to 1/2+. Ef: F: 1119. Ef: H: 1121.
1206.91 *6*	(5/2,7/2)+	>4.8 ps	ABCD G	J$^{\pi}$: L(t,p)=2 from 3/2+; γ from 7/2+ probably not E2 from RUL; L(t,α)=(2) supports 5/2+.
1509.99 *6*	7/2+	5.7 ps *15*	ABCD	J$^{\pi}$: L(t,p)=2 from 3/2+ and ΔJ=2, E2 to 3/2+ from $\gamma(\theta$,pol) in (α,pγ).
1549.96 *9*	3/2+,5/2+@	0.09 ps *6*	A C FG	J$^{\pi}$: L(d,^{3}He)=2.
1815	(5/2 to 11/2)+		D	J$^{\pi}$: L(t,p)=4 from 3/2+.
1849.57 *8*	11/2-	4.6 ps *12*	BC G	J$^{\pi}$: stretched E2 to 7/2- from $\gamma(\theta$,pol) in (α,pγ).
1865.65 *8*	(1/2,3/2,5/2+)		A C F	J$^{\pi}$: γ to 1/2+.
1956	(5/2 to 11/2)+		C	J$^{\pi}$: L(t,p)=4 from 3/2+.

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Adopted Levels, Gammas (continued)

^{43}K Levels (continued)

E(level)†	J^{π}#	$T_{1/2}$‡	XREF	Comments
1986.57 *8*	(9/2)		BC	J^{π}: ΔJ=1 stretched dipole to 7/2+ from DCO ratios in (^{36}S,npγ). Ef: C: ?
2035	3/2+		D	J^{π}: L(t,p)=0 from 3/2+.
2048.88 *9*	(9/2)	1.7 ps *6*	ABC	J^{π}: γ to 7/2- and RUL; ΔJ=1 stretched dipole to 7/2+ from DCO ratios in (^{36}S,npγ).
2081.0 *4*	(5/2,7/2)+		B D	J^{π}: L(t,p)=4 from 3/2+; γ to 3/2+.
2177.68 *11*	5/2(+)	<0.07 ps	A C fg	J^{π}: γ decays to 3/2-, 3/2+, 7/2- and 7/2+;L(t,α)=(2).
2189.32 *14*	(1/2 to 7/2)		A fg	J^{π}: γ to 3/2+. L(t,α)=(2) for a 2180 group gives (3/2+,5/2+) for one of the levels near this energy.
2218	(3/2 to 9/2)-		D	J^{π}: L(t,p)=3 from 3/2+.
2344.96 *9*	(1/2+,3/2,5/2+)	0.7 ps *+14-4*	A C	J^{π}: γ decays to 1/2+ and (5/2,7/2)+.
2451	1/2+		FG	T=5/2 . J^{π}: L(^{3}He,d)=L(t,α)=0.
2508.34 *10*	(11/2+)	>5 ps	BCD	J^{π}: L(t,p)=(4) from 3/2+ suggests positive parity, γ to 7/2+; ΔJ=2 stretched quadrupole to 7/2+ from DCO ratios and possible positive yrast band member in (^{36}S,npγ).
2548	(1/2,3/2,5/2)-		D	J^{π}: L(t,p)=1 from 3/2+.
2668	3/2+,5/2+@		FG	
2784	(1/2 to 7/2)+		D	J^{π}: L(t,p)=2 from 3/2+.
2879	(1/2 to 7/2)+		D	J^{π}: L(t,p)=2 from 3/2+.
2981			G	
2986.76 *19*	(13/2-)		B	J^{π}: probably high spin formed in coupling an $f_{7/2}$ proton with four $f_{7/2}$ neutrons in a 4^{+} configuration in (^{36}S,npγ).
3057.26 *21*	(5/2)+		A fG	J^{π}: L(d,^{3}He)=2; γ to 7/2-.
3084	3/2+,5/2+		fG	
3114.69 *10*	15/2-	3.5 ps *7*	BC	J^{π}: stretched E2 to 11/2- from $\gamma(\theta$,pol) in (α,pγ).
3139.39 *10*	(13/2)		BC	J^{π}: ΔJ=1 stretched dipole to (11/2) from DCO ratios in (^{36}S,npγ).
3150			G	
3190	(1/2 to 7/2)+		D	J^{π}: L(t,p)=2 from 3/2+.
3229	3/2+,5/2+@		FG	
3264.34 *11*	(1/2,3/2,5/2)+		A D	J^{π}: γ to 1/2+; L(t,p)=2 from 3/2+. Ef: D: 3254.
3309.86 *13*	(1/2,3/2,5/2)+		A D	J^{π}: γ's to 3/2-, 3/2+ and (5/2,7/2)+; L(t,p)=2 from 3/2+.
3342	3/2+,5/2+@		FG	
3393.14 *20*	(1/2 to 7/2)+		A D	J^{π}: L(t,p)=2 from 3/2+.
3455.60 *12*	(1/2,3/2,5/2+)		A G	J^{π}: γ to 1/2+.
3560			G	
3591.28 *10*	(15/2+)		B	J^{π}: ΔJ=2 stretched quadrupole to (11/2+) from DCO ratios possible positive yrast band member in (^{36}S,npγ).
3608.46 *15*	(5/2,7/2)		A	J^{π}: log *ft*=5.1 from (5/2); γ's to 7/2- and 7/2+.
3646.1 *4*	(3/2,5/2,7/2+)		A G	J^{π}: γ's to 3/2+ and (5/2,7/2)+; log *ft*=5.9 from (5/2-).
3714.16 *22*	(3/2+,5/2+)		A FG	J^{π}: γ's to 3/2+, 3/2- and (5/2,7/2)+; log *ft*=5.6 from (5/2-); L(d,^{3}He)=(2). Ef: F: 3730.
3837			G	
3880	(3/2+,5/2+)		FG	J^{π}: L(d,^{3}He)=(2).
3970			G	
3985.28 *25*			B	

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Adopted Levels, Gammas (continued)

^{43}K Levels (continued)

E(level)†	J$^{\pi}$#	$T_{1/2}$‡	XREF	Comments
4018	3/2+,5/2+@		FG	
4070			G	
4124	3/2+,5/2+@		FG	J$^{\pi}$: L(d,^{3}He)=2; but L(t,α)=(0) is inconsistent.
4177			G	
4234			G	
4290			G	
4410			G	
4472	3/2+,5/2+@		FG	
4540			G	
4540.4 *3*			B	
4680			G	
4794	3/2+,5/2+@		FG	
4860			G	
4920			G	
4930.3 *3*	(19/2-)		B	J$^{\pi}$: comparison with negative-parity levels of ^{45}Sc suggests that the 1816 keV transition corresponds to the decay of a 19/2- level to the 15/2- level at 3116 keV (1998Mo16).
5030			G	
5150			G	
5194	3/2+,5/2+@		FG	
5260			G	
5380			G	
5610	3/2+,5/2+@		F	
5900	3/2+,5/2+@		F	
7450	(3/2+,5/2+)		F	J$^{\pi}$: L(d,^{3}He)=(2).

† From least-squares fit to Eγ data for levels populated in γ-ray studies. For others, weighted averages of available values are taken.
‡ From DSAM in (α,pγ),(t,pγ), unless otherwise stated.
# When L-transfer arguments are used, the target is Jπ=0+, except for ^{41}K(t,p), where target Jπ=3/2+.
@ L(d,^{3}He) and/or L(t,α)=2.

γ(^{43}K)

E_i(level)	J_i^{π}	E_f(level)	J_f^{π}	E_γ†	I_γ‡	Mult.§	δ§	Comments
561.20	1/2+	0	3/2+	561.10 *5*	100			
738.30	7/2-	0	3/2+	738.23 *6*	100	M2+E3	-0.13 *2*	B(E3)(W.u.)=7.7 *24*. B(M2)(W.u.)=0.0567 *15*.
975.32	3/2-	561.20	1/2+	414.0 *1*	4.3 *3*	[E1]		B(E1)(W.u.)=0.00020 $+8-18$.
		0	3/2+	975.3 *1*	100.0 *3*	[E1]		B(E1)(W.u.)=0.00036 $+14-32$.
1109.93	3/2+	561.20	1/2+	548.62 *6*	43 *5*			
		0	3/2+	1110.1 *1*	100 *5*			
1206.91	(5/2,7/2)+	0	3/2+	1206.95 *9*	100			
1509.99	7/2+	1206.91	(5/2,7/2)+	303.09 *5*	9 *2*			
		0	3/2+	1510.05 *7*	100 *2*	E2		B(E2)(W.u.)=1.3 *4*.
1549.96	3/2+,5/2+	1109.93	3/2+	439.3 *3*	12 *2*			
		0	3/2+	1550.0 *1*	100 *2*			
1849.57	11/2-	738.30	7/2-	1111.14 *6*	100	E2		B(E2)(W.u.)=8.1 *22*.
1865.65	(1/2,3/2,5/2+)	1109.93	3/2+	755.0 *3*	1.5 *5*			
		975.32	3/2-	890.4 *1*	100 *3*			
		561.20	1/2+	1304.3 *7*	2.6 *5*			
		0	3/2+	1866.1 *2*	59 *3*			
1986.57	(9/2)	1509.99	7/2+	476.58 *6*	100	[D]		

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Adopted Levels, Gammas (continued)

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

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ[‡]	Mult.[§]	δ[§]	Comments
2048.88	(9/2)	738.30	7/2-	1310.58 *7*	100	[D]		
2081.0	(5/2,7/2)+	1206.91	(5/2,7/2)+	873.9 *4*	100 *24*			
		0	3/2+	2081.3 *7*	66 *22*			
2177.68	5/2(+)	1509.99	7/2+	667.5 *3*	0.53 *13*			
		975.32	3/2-	1202.4 *3*	30 *5*			
		738.30	7/2-	1439.8 *2*	100 *5*			
		0	3/2+	2176.2 *7*	0.79 *13*			
2189.32	(1/2 to 7/2)	1549.96	3/2+,5/2+	639.7 *3*	13.5 *14*			
		1109.93	3/2+	1080.0 *3*	22 *4*			
		0	3/2+	2189.2 *3*	100 *4*			
2344.96	(1/2+,3/2,5/2+)	2177.68	5/2(+)	167.1 *2*	1.13 *13*			
		1865.65	(1/2,3/2,5/2+)	479.2 *2*	53 *3*			
		1206.91	(5/2,7/2)+	1138.1 *2*	3.8 *8*			
		1109.93	3/2+	1235.7 *3*	2.8 *5*			
		975.32	3/2-	1369.9 *2*	90 *5*			
		561.20	1/2+	1783.7 *2*	5.6 *5*			
		0	3/2+	2344.5 *2*	100 *5*			
2508.34	(11/2+)	2048.88	(9/2)	460.5 *6*	100 *3*	[D+Q]	-0.2	
		1509.99	7/2+	998.81 *13*	69 *4*			
2986.76	(13/2-)	2508.34	(11/2+)	478.39 *16*	100			
3057.26	(5/2)+	738.30	7/2-	2318.9 *2*	100			
3114.69	15/2-	1849.57	11/2-	1265.09 *7*	100	E2		B(E2)(W.u.)=5.6 *12*.
3139.39	(13/2)	2508.34	(11/2+)	630.86 *12*	13.4 *18*	[D]		
		1849.57	11/2-	1289.62 *8*	100 *12*	[D]		
3264.34	(1/2,3/2,5/2)+	1865.65	(1/2,3/2,5/2+)	1398.7 *1*	63 *4*			
		975.32	3/2-	2287.6 *5*	33 *6*			E_γ: poor fit. $\Delta(E\gamma)$ was increased from 0.2 to 0.5 by evaluators.
		0	3/2+	3264.3 *2*	100 *6*			
3309.86	(1/2,3/2,5/2)+	2189.32	(1/2 to 7/2)	1121.0 *3*	4.0 *18*			
		2177.68	5/2(+)	1132.6 *2*	15 *3*			
		1865.65	(1/2,3/2,5/2+)	1443	60 *12*			
		1206.91	(5/2,7/2)+	2102.3 *5*	12 *3*			
		975.32	3/2-	2333.9 *2*	100 *12*			
		0	3/2+	3309.9 *3*	9.2 *12*			
3393.14	(1/2 to 7/2)+	0	3/2+	3393.0 *2*	100			
3455.60	(1/2,3/2,5/2+)	2177.68	5/2(+)	1277.9 *5*	3.8 *6*			
		1865.65	(1/2,3/2,5/2+)	1590.4 *2*	16.2 *16*			
		1549.96	3/2+,5/2+	1905.9 *6*	6.0 *11*			
		1109.93	3/2+	2345	1.9 *6*			
		975.32	3/2-	2479.9 *2*	100 *3*			
		561.20	1/2+	2894.2 *2*	27 *2*			
		0	3/2+	3455.1 *4*	3.0 *17*			
3591.28	(15/2+)	3139.39	(13/2)	451.82 *4*	72.6 *19*	[D+Q]	-0.2	
		3114.69	15/2-	476.4 *3*	11 *5*	[D]		
		2508.34	(11/2+)	1083.15 *7*	100 *11*	[Q]		
3608.46	(5/2,7/2)	2189.32	(1/2 to 7/2)	1419.3 *2*	100 *9*			
		2048.88	(9/2)	1559.9 *2*[a]	147 *22*			
		1549.96	3/2+,5/2+	2057.9 *3*	83 *9*			
		1509.99	7/2+	2097.8 *5*	76 *15*			
		1206.91	(5/2,7/2)+	2401.8 *3*	22 *5*			
		738.30	7/2-	2870.1 *3*	58 *7*			
3646.1	(3/2,5/2,7/2+)	1206.91	(5/2,7/2)+	2438.9 *5*	100 *5*			
		1109.93	3/2+	2535.7 *7*	18 *5*			
		0	3/2+	3646.4 *5*	7.3 *16*			
3714.16	(3/2+,5/2+)	2344.96	(1/2+,3/2,5/2+)	1369	4.3 *25*			
		1206.91	(5/2,7/2)+	2506.7 *15*	10 *3*			

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Adopted Levels, Gammas (continued)

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

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ[‡]	Mult.[§]	δ[§]	Comments
		1109.93	3/2+	2603.4 *4*	10 *4*			
		975.32	3/2-	2739.5 *7*	22 *4*			
		0	3/2+	3714.3 *3*	100 *6*			
3985.28		2508.34	(11/2+)	1477.0 *3*	100 *20*			
		2048.88	(9/2)	1936.4 *5*	64 *17*			
4540.4		3985.28		555.2 *3*	100 *22*			
		3139.39	(13/2)	1401.0 *5*	86 *22*			
		2986.76	(13/2-)	1553.1 *6*	93 *22*			
4930.3	(19/2-)	3114.69	15/2-	1815.61 *26*	100 *15*			

† From β^- decay, (α,pγ), (t,pγ) and (^{36}S,npγ).
‡ Primarily from β^- decay Weighted averages are taken when available.
§ From (α,pγ),(t,pγ).
a Placement of transition in the level scheme is uncertain.

^{43}Ar β^- decay (5.37 min) 1978Hu10

Parent: ^{43}Ar: E=0; Jπ=5/2-; $T_{1/2}$=5.37 min *6*; Q(g.s.)=4566 *5*; %β^-=100

1978Hu10: ^{43}Ar isotopes were produced in the spallation reaction ^{50}V(p,6pxn) with the proton beam from the 600 MeV external beam of the CERN synchrocyclotron bombarding a vanadium carbide target. Argon nuclides were separated in the ISOLDE on-line mass separator. γ-rays were detected in Ge(Li) detectors. Measured Eγ, Iγ, $\gamma\gamma$. Deduced levels, branching ratios. See also 1970Hu11.

Others:

1969La16: Eγ, $T_{1/2}$.

1969Ha03: $T_{1/2}$.

All data from 1978Hu10 unless otherwise noted.

^{43}K Levels

No evidence was found by 1978Hu10 for a 2892.7 level proposed by 1970Hu11.

E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]
0	3/2+	2189.3 *2*	(1/2 TO 7/2)
561.4 *1*	1/2+	2345.0 *1*	(1/2+,3/2,5/2+)
738.0 *1*	7/2-	3056.9 *3*	(5/2)+
975.4 *1*	3/2-	3264.0 *2*	(1/2,3/2,5/2)+
1110.0 *1*	3/2+	3309.8 *2*	(1/2,3/2,5/2)+
1206.9 *2*	(5/2,7/2)+	3393.1 *2*	(1/2 TO 7/2)+
1509.9 *2*	7/2+	3455.7 *1*	(1/2,3/2,5/2+)
1549.9 *2*	3/2+,5/2+	3608.4 *2*	(5/2,7/2)
1865.6 *1*	(1/2,3/2,5/2+)	3646.2 *4*	(3/2,5/2,7/2+)
2048.5 *1*[#]	(9/2)	3714.2 *2*	(3/2+,5/2+)
2177.6 *1*	5/2(+)		

† From least-squares fit to Eγ's. Since the quoted Δ(Eγ) result in a poor fit, these were increased to 0.2 keV for strong gamma rays and 0.3 keV for weak γ rays (Iγ<1%) in the least-squares adjustment.
‡ From Adopted Levels.
# Level proposed (evaluators) based on (α,pγ) and 1560-1311 coin in 1978Hu10.

^{43}Ar β^- decay (5.37 min) 1978Hu10 (continued)

γ(^{43}K)

E_γ	E_i(level)	J_i^π	E_f(level)	J_f^π	I_γ[†]	Comments
167.1 *1*	2345.0	(1/2+,3/2,5/2+)	2177.6	5/2(+)	2.5	
231.4 *1*					2.8	
236.2 *1*					3.4	
302.9 *2*	1509.9	7/2+	1206.9	(5/2,7/2)+	1.9	
413.9 *1*	975.4	3/2-	561.4	1/2+	42.9	
439.3 *2*	1549.9	3/2+,5/2+	1110.0	3/2+	2.8	
479.2 *1*	2345.0	(1/2+,3/2,5/2+)	1865.6	(1/2,3/2,5/2+)	116.0	
548.5 *1*	1110.0	3/2+	561.4	1/2+	13.4	
561.1 *1*	561.4	1/2+	0	3/2+	94.0	
587.0 *1*					9.0	In coin with 1758γ.
639.7 *3*	2189.3	(1/2 TO 7/2)	1549.9	3/2+,5/2+	2.7	
667.5 *2*	2177.6	5/2(+)	1509.9	7/2+	1.9	
738.1 *1*	738.0	7/2-	0	3/2+	454.8	Mult.: from Adopted Gammas. Mult.: M2+E3. δ: -0.13 *2*.
755.0 *3*	1865.6	(1/2,3/2,5/2+)	1110.0	3/2+	1.8	
812.4 *4*					1.3	
878.2 *8*					0.9	
890.4 *1*	1865.6	(1/2,3/2,5/2+)	975.4	3/2-	118.3	
910.5 *9*					1.0	
922.5 *5*					1.7	
974.9 *1*	975.4	3/2-	0	3/2+	1000	E_γ: level-energy difference=975.4 *1*.
1080.0 *2*	2189.3	(1/2 TO 7/2)	1110.0	3/2+	4.6	E_γ: level-energy difference=1079.3 *2*.
1110.1 *1*	1110.0	3/2+	0	3/2+	31.2	
1121.0 *2*	3309.8	(1/2,3/2,5/2)+	2189.3	(1/2 TO 7/2)	3.2	
1132.6 *1*	3309.8	(1/2,3/2,5/2)+	2177.6	5/2(+)	12.2	
1138.1 *1*	2345.0	(1/2+,3/2,5/2+)	1206.9	(5/2,7/2)+	8.7	
1146.4 *2*					9.1	
1184.3 *3*					5.1	
1202.4 *3*	2177.6	5/2(+)	975.4	3/2-	98.3	
1207.1 *3*	1206.9	(5/2,7/2)+	0	3/2+	75.8	
1235.7 *2*	2345.0	(1/2+,3/2,5/2+)	1110.0	3/2+	6.3	E_γ: level-energy difference=1235.0 *2*.
1255.6 *3*					3.2	
1277.9 *5*	3455.7	(1/2,3/2,5/2+)	2177.6	5/2(+)	2.5	
1304.3 *7*	1865.6	(1/2,3/2,5/2+)	561.4	1/2+	3.1	
1311.4 *1*[a]	2048.5	(9/2)	738.0	7/2-	22.7	
1369	3714.2	(3/2+,5/2+)	2345.0	(1/2+,3/2,5/2+)	0.4	
1369.9 *1*	2345.0	(1/2+,3/2,5/2+)	975.4	3/2-	200.0	
1398.7 *1*	3264.0	(1/2,3/2,5/2)+	1865.6	(1/2,3/2,5/2+)	9.5	
1419.3 *1*	3608.4	(5/2,7/2)	2189.3	(1/2 TO 7/2)	12.9	
1439.8 *1*	2177.6	5/2(+)	738.0	7/2-	369.0	
1443	3309.8	(1/2,3/2,5/2)+	1865.6	(1/2,3/2,5/2+)	48.0	
1487.8 *5*					2.7	
1509.7 *1*	1509.9	7/2+	0	3/2+	20.7	
1550.0 *1*	1549.9	3/2+,5/2+	0	3/2+	22.9	
1559.9 *1*[a]	3608.4	(5/2,7/2)	2048.5	(9/2)	15.9	Placement (evaluator) based on 1560-1310 $\gamma\gamma$ coin.
1590.4 *2*	3455.7	(1/2,3/2,5/2+)	1865.6	(1/2,3/2,5/2+)	10.6	
1605.7 *8*					2.6	
1621.7 *5*					5.5	
1713.3 *6*					3.2	
1724.6 *2*					9.3	
1750.0 *5*					2.0	
1758.2 *2*					10.2	In coin with 587γ.
1783.7 *2*	2345.0	(1/2+,3/2,5/2+)	561.4	1/2+	12.6	

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^{43}Ar β^- decay (5.37 min) 1978Hu10 (continued)

γ(^{43}K) (continued)

E_γ	E_i(level)	J_i^π	E_f(level)	J_f^π	I_γ[†]	Comments
1849.6 *8*					2.5	
1866.1 *1*	1865.6	(1/2,3/2,5/2+)	0	3/2+	70.4	E_γ: level-energy difference=1865.6 *1*.
1889.2 *7*					3.0	
1905.9 *6*	3455.7	(1/2,3/2,5/2+)	1549.9	3/2+,5/2+	3.9	
1950.8 *3*					10.0	
2057.9 *3*	3608.4	(5/2,7/2)	1549.9	3/2+,5/2+	10.7	
2097.8 *5*	3608.4	(5/2,7/2)	1509.9	7/2+	9.8	
2102.3 *5*	3309.8	(1/2,3/2,5/2)+	1206.9	(5/2,7/2)+	9.8	
2176.2 *7*	2177.6	5/2(+)	0	3/2+	2.5	
2189.2 *3*	2189.3	(1/2 TO 7/2)	0	3/2+	20.4	
2287.6 *2*	3264.0	(1/2,3/2,5/2)+	975.4	3/2-	4.7	E_γ: poor fit. Level-energy difference=2288.6 *2*.
2318.9 *2*	3056.9	(5/2)+	738.0	7/2-	31.0	
2333.9 *2*	3309.8	(1/2,3/2,5/2)+	975.4	3/2-	81.9	
2344.5 *2*	2345.0	(1/2+,3/2,5/2+)	0	3/2+	217.3	
2345	3455.7	(1/2,3/2,5/2+)	1110.0	3/2+	1.2	
2401.8 *3*	3608.4	(5/2,7/2)	1206.9	(5/2,7/2)+	2.8	
2438.9 *5*	3646.2	(3/2,5/2,7/2+)	1206.9	(5/2,7/2)+	6.4	
2479.9 *1*	3455.7	(1/2,3/2,5/2+)	975.4	3/2-	65.5	
2506.7 *15*	3714.2	(3/2+,5/2+)	1206.9	(5/2,7/2)+	1.0	
2535.7 *7*	3646.2	(3/2,5/2,7/2+)	1110.0	3/2+	1.2	
2603.4 *4*	3714.2	(3/2+,5/2+)	1110.0	3/2+	0.9	
2701.9 *5*	3264.0	(1/2,3/2,5/2)+	561.4	1/2+	1.3	
2739.5 *7*	3714.2	(3/2+,5/2+)	975.4	3/2-	2.1	
2870.1 *2*	3608.4	(5/2,7/2)	738.0	7/2-	7.5	
2894.2 *2*	3455.7	(1/2,3/2,5/2+)	561.4	1/2+	17.9	
2976.2 *3*					2.8	
3264.3 *2*	3264.0	(1/2,3/2,5/2)+	0	3/2+	14.7	
3309.9 *2*	3309.8	(1/2,3/2,5/2)+	0	3/2+	7.4	
3380.6 *7*					0.8	
3393.0 *2*	3393.1	(1/2 TO 7/2)+	0	3/2+	11.2	
3455.1 *4*	3455.7	(1/2,3/2,5/2+)	0	3/2+	2.0	
3646.4 *5*	3646.2	(3/2,5/2,7/2+)	0	3/2+	0.5	
3714.3 *2*	3714.2	(3/2+,5/2+)	0	3/2+	9.5	

[†] For absolute intensity per 100 decays, multiply by 0.034 *4*.
[a] Placement of transition in the level scheme is uncertain.

β^- radiations

$E\beta^-$	E(level)	$I\beta^-$	Log *ft*	Comments
(852)	3714.2	0.47 *6*	5.6 *2*	av $E\beta$=331 *31*.
(920)	3646.2	0.28 *4*	5.9 *2*	av $E\beta$=360 *31*.
(958)	3608.4	2.2 *3*	5.1 *1*	av $E\beta$=376 *31*.
(1110)	3455.7	3.5 *5*	5.1 *1*	av $E\beta$=443 *32*.
(1173)	3393.1	0.38 *5*	6.2 *1*	av $E\beta$=470 *32*.
(1256)	3309.8	5.5 *7*	5.1 *1*	av $E\beta$=507 *32*.
(1302)	3264.0	1.0 *1*	5.9 *1*	av $E\beta$=528 *32*.
(1509)	3056.9	1.1 *1*	6.2 *1*	av $E\beta$=622 *33*.
(2221)	2345.0	19 *2*	5.6 *1*	av $E\beta$=953 *34*.
(2377)	2189.3	0.39 *5*	7.4 *1*	av $E\beta$=1026 *34*.
(2388)	2177.6	16 *2*	5.8 *1*	av $E\beta$=1032 *34*.
(2518)[‡]	2048.5	0.23 *3*	7.8 *1*	av $E\beta$=1105 *34*.
(2700)	1865.6	0.32 *4*	7.7 *1*	av $E\beta$=1180 *34*.

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^{43}Ar β^- decay (5.37 min) 1978Hu10 (continued)

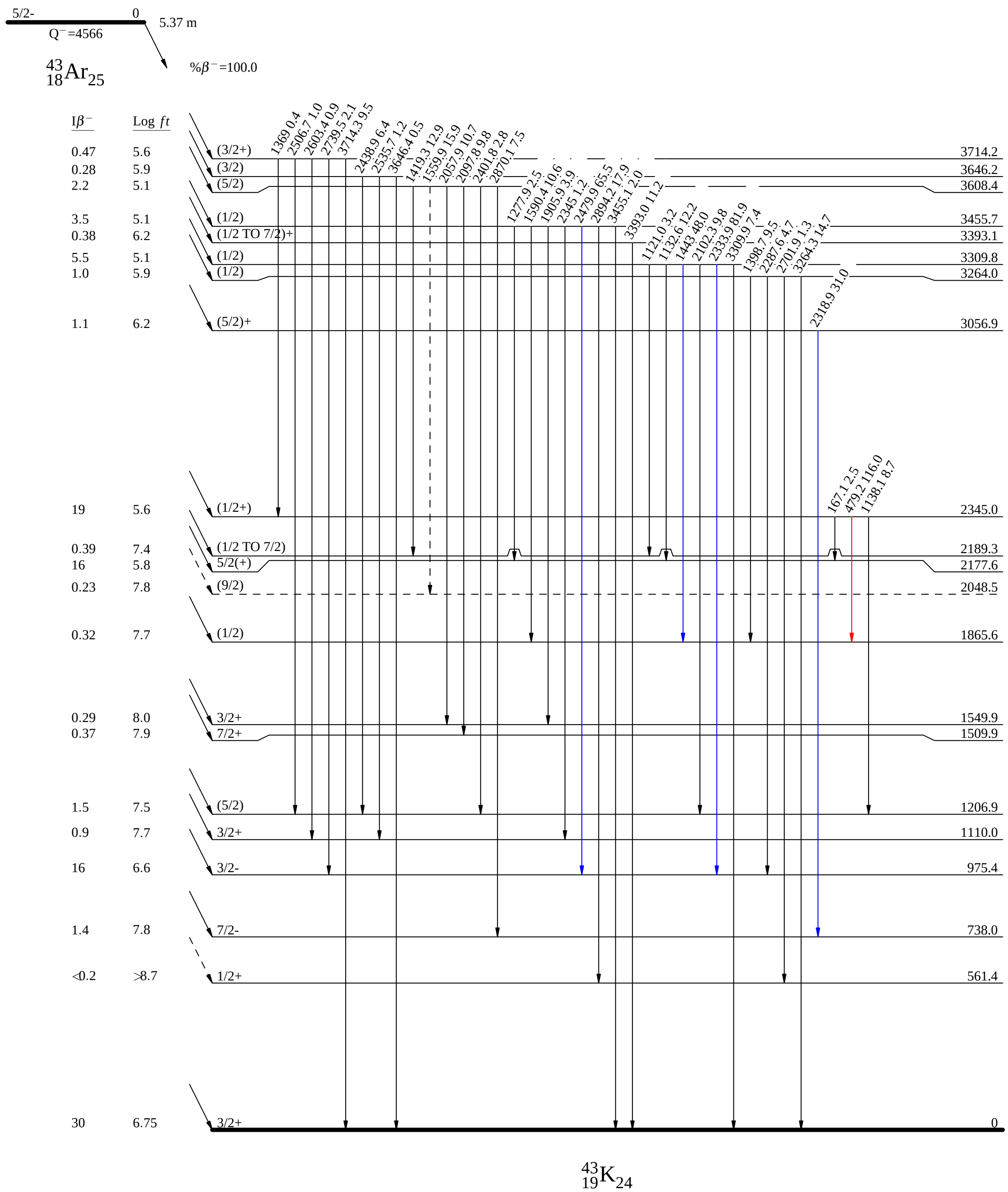
β^- radiations (continued)

Eβ^-	E(level)	Iβ^-	Log *ft*	Comments
(3016)	1549.9	0.29 *4*	8.0 *1*	av Eβ=1332 *35*.
(3056)	1509.9	0.37 *5*	7.9 *1*	av Eβ=1351 *35*.
(3359)	1206.9	1.5 *2*	7.5 *1*	av Eβ=1497 *35*.
(3456)	1110.0	0.9 *1*	7.7 *1*	av Eβ=1544 *35*.
(3591)	975.4	16 *2*	6.6 *1*	av Eβ=1609 *35*.
(3828)	738.0	1.4 *2*	7.8 *1*	av Eβ=1724 *35*.
(4005)‡	561.4	<0.2	>8.7	av Eβ=1810 *35*.
(4566)	0	30 *7*†	6.75 *11*	av Eβ=2084 *35*.

† Estimated (by 1978Hu10) from a comparison of the observed ^{43}Ar-^{43}K (parent-daughter) activities with those expected from series decay.
‡ Placement of transition in the level scheme is uncertain.

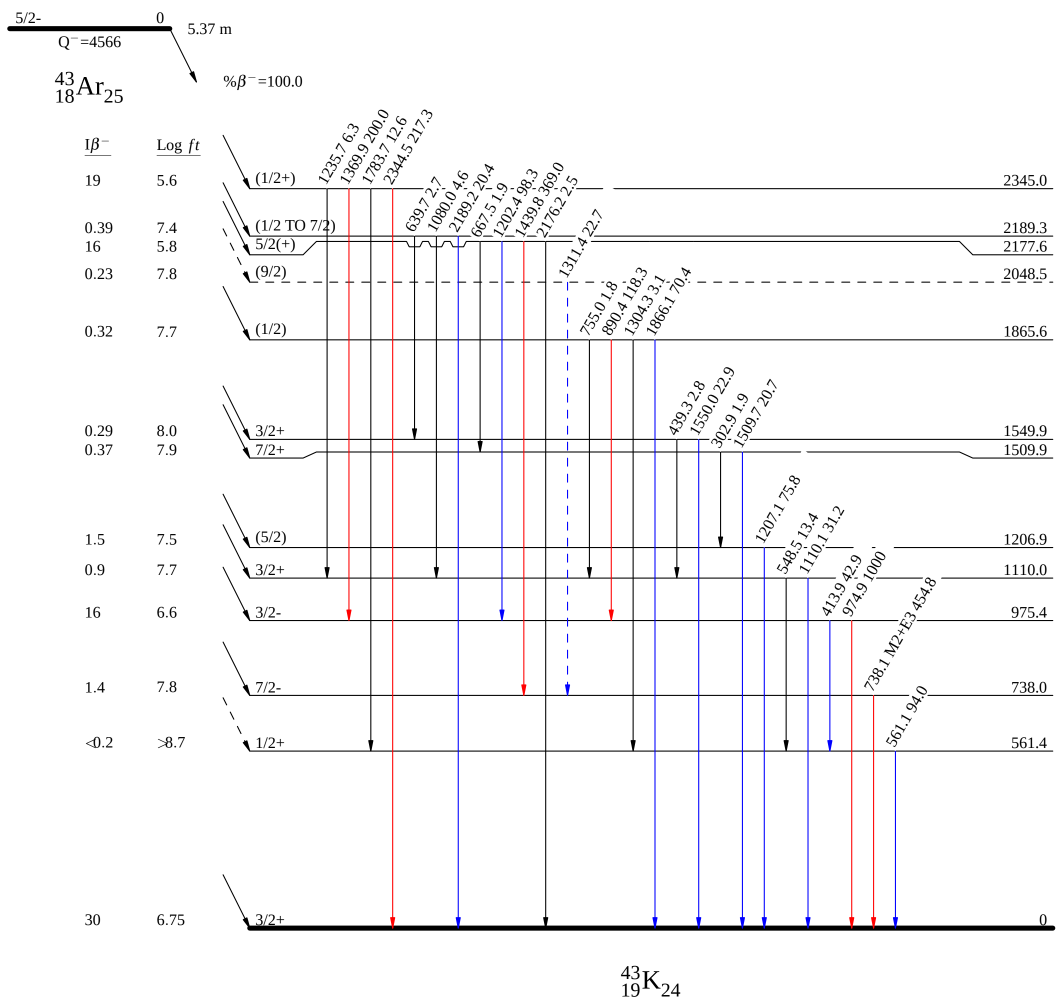
Decay Scheme

Intensities: I_γ per 100 parent decays



Decay Scheme (continued)

Intensities: I_γ per 100 parent decays



^{9}Be(^{36}S,npg) 1992Ko15,1998Mo16

1992Ko15: E=100 MeV ^{36}S beam was produced from the Argonne-Notre BGO γ-ray facility at the Argonne Tandem-Linac Accelerator System (ATLAS). Target of a 2.34 mg/cm^2 thick rolled ^{9}Be foil evaporated onto a 10 mg/cm^2 Pb backing. Charged particles were detected by two Si surface-barrier detector telescopes at forward angles and γ-rays were detected by eight Compton-suppressed Ge detectors (CSGs). Measured Eγ, Iγ, $\gamma\gamma(\theta)$, DCO. Deduced levels, J, π, branching ratios.

1998Mo16: E=90-110 MeV ^{36}S beam was produced from the TANDEM accelerator of the University and Technical University Munich and impinged on beryllium targets. Recoils were identified by the Munich high-frequency recoil spectrometer and detected in ionization chamber. γ-rays were detected by an annular Compton-suppressed HPGe detector positioned at 180° relative to the beam direction, FWHM=2.8 keV at 1.3 MeV. Measured Eγ, Iγ, $\gamma\gamma(\theta)$, pγ-coin, (recoil)γ-coin. Deduced levels, branching ratios. Comparisons with shell-model calculations.

^{43}K Levels

Nuclear Level Sequences

A Possible positive yrast decay (1992Ko15).
B Possible negative yrast decay (1992Ko15).

Seq.	E(level)	J$^{\pi}$†	Comments
	0	3/2+	
A	561.13 *4*	1/2+	
B	738.28 *5*	7/2-	
	975.09 *4*	3/2-	
	1109.83 *6*	3/2+	
	1206.97 *7*	(5/2,7/2)+	
A	1510.07 *7*	7/2+	
B	1850.43 *7*	11/2-‡	
	1986.66 *10*	(9/2)#	
	2048.89 *7*	(9/2)#	
	2081.0 *4*	(5/2,7/2)+	
A	2508.84 *7*	(11/2+)#	
	2987.26 *17*	(13/2-)	J$^{\pi}$: probably high spin formed in coupling an $f_{7/2}$ proton with four $f_{7/2}$ neutrons in a 4^+ configuration (1992Ko15).
B	3115.53 *10*	15/2-‡	
	3140.04 *8*	(13/2)#	
A	3591.90 *8*	(15/2+)#	
	3985.69 *24*		
	4540.9 *3*		
	4931.2 *3*	(19/2-)	J$^{\pi}$: comparison with negative-parity levels of ^{45}Sc suggests that the 1816 keV transition corresponds to the decay of a 19/2- level to the 15/2- level at 3116 keV (1998Mo16).

† From Adopted Levels unless otherwise noted.
‡ Indicated by R_{DCO} as a ΔJ=2 transition (1992Ko15).
# Indicated by R_{DCO} as a ΔJ=1 transition (1992Ko15).

γ(^{43}K)

Unplaced gamma-rays from 1998Mo16.
DCO ratios measured as I(90°)/I(147°), statistical uncertainties only (1992Ko15). 1.2-1.4 for stretched dipole and 0.8-0.9 for stretched quadrupole.

E_i(level)	J_i^{π}	E_f(level)	J_f^{π}	Eγ†	Iγ‡	Mult.$^{\phi}$	δ§	Comments
				540.7 *4*	4.6 *13*			
				543.1 *5*	4.0 *13*			
				1798.5 *4*	4.5 *12*			

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^{9}Be(^{36}S,npg) 1992Ko15,1998Mo16 (continued)

γ(^{43}K) (continued)

E_i(level)	J^π_i	E_f(level)	J^π_f	E_γ[†]	I_γ[‡]	Mult.[φ]	δ[§]	Comments
				1810.0 *6*	4.5 *13*			
				2124.9 *4*	7.0 *14*			
				2219.8 *6*	4.0 *10*			
				2442.3 *6*	2.9 *10*			
				2521.6 *5*	4.3 *11*			
561.13	1/2+	0	3/2+	561.10 *5*	7.7 *6*			
738.28	7/2-	0	3/2+	738.26 *5*	>18			
975.09	3/2-	561.13	1/2+	413.97 *5*[a]	0.58 *7*[a]			
		0	3/2+	975.06 *5*	9.3 *3*			
1109.83	3/2+	561.13	1/2+	548.65 *5*[a]	6.8 *3*[a]			
		0	3/2+	1110.0 *1*	11.2 *22*			
1206.97	(5/2,7/2)+	0	3/2+	1206.94 *9*	13.9 *4*			
1510.07	7/2+	1206.97	(5/2,7/2)+	303.10 *5*	4.42 *14*			
		0	3/2+	1510.18 *18*	38.1 *12*			
1850.43	11/2-	738.28	7/2-	1112.15 *6*	100 *3*	[E2]		R_{DCO}=0.77 *3* gated on 738 to 0 transition.
1986.66	(9/2)	1510.07	7/2+	476.58 *6*	5.2 *3*	[D]		R_{DCO}=1.31 *9* gated on 1510 to 0 transition.
2048.89	(9/2)	738.28	7/2-	1310.56 *7*	25.5 *7*	[D]		R_{DCO}=1.22 *10* gated on 738 to 0 transition.
2081.0	(5/2,7/2)+	1206.97	(5/2,7/2)+	873.9 *4*[b]	4.1 *10*[b]			
		0	3/2+	2081.3 *7*[b]	2.7 *9*[b]			
2508.84	(11/2+)	2048.89	(9/2)	459.93 *4*	21.2 *6*	[D+Q]	-0.2	R_{DCO}=0.92 *3* gated on 2049 to 738 transition.
		1510.07	7/2+	998.77 *8*	14.7 *8*	[Q]		
2987.26	(13/2-)	2508.84	(11/2+)	478.39 *16*	2.36 *10*			R_{DCO}=1.04 *11* gated on 2509 to 1510 transition; 0.90 *3* gated on 2509 to 2049 transition.
3115.53	15/2-	1850.43	11/2-	1265.09 *7*	34.4 *11*	[E2]		R_{DCO}=0.93 *4* gated on 1850 to 738 transition.
3140.04	(13/2)	2508.84	(11/2+)	630.86 *12*[a]	1.5 *2*[a]	[D]		R_{DCO}=1.42 *22* gated on 2509 to 1510 transition; 1.32 *3* gated on 2509 to 2049 transition.
		1850.43	11/2-	1289.62 *8*	11.2 *13*	[D]		R_{DCO}=1.5 *1* gated on 1850 to 738 transition.
3591.90	(15/2+)	3140.04	(13/2)	451.82 *4*	7.7 *2*	[D+Q]	-0.2	R_{DCO}=0.89 *5* gated on 3140 to 1850 transition; 1.06 *12* gated on 3140 to 2509 transition.
		3115.53	15/2-	476.4 *3*[a]	1.2 *5*[a]	[D]		R_{DCO}=0.77 *10* gated on 3116 to 1850 transition.
		2508.84	(11/2+)	1083.15 *7*	10.6 *12*	[Q]		R_{DCO}=0.64 *7* gated on 2509 to 1510 transition.
3985.69		2508.84	(11/2+)	1477.0 *3*[b]	5.9 *12*[b]			
		2048.89	(9/2)	1936.4 *5*[b]	3.8 *10*[b]			
4540.9		3985.69		555.2 *3*[b]	1.4 *3*[b]			
		3140.04	(13/2)	1401.0 *5*[b]	1.2 *3*[b]			
		2987.26	(13/2-)	1553.1 *6*[b]	1.3 *3*[b]			
4931.2	(19/2-)	3115.53	15/2-	1815.61 *26*[b]	18.3 *27*[b]			

† Weighted average from 1992Ko15 and 1998Mo16 unless otherwise noted.
‡ Weighted or unweighted average from 1992Ko15 and 1998Mo16 unless otherwise noted.
§ From 1992Ko15.
φ From 1992Ko15.
a From 1992Ko15 only.
b From 1998Mo16 only.

^{40}Ar(α,pγ),^{41}K(t,pγ) 1979Be28,1978MeZX

Includes ^{4}He(^{40}Ar,pγ) from 1983Ra37.

1979Be28: E=7-17 MeV α beam. Target of 2-5 mg/cm^2 solid natural Ar at 12-17 K on a 250 μm thick Ta backing. Compton-suppressed Ge(Li) detectors for detecting γ-rays. Measured Eγ, γγ, γ(θ), γ(lin pol). Deduced levels, J, π, $T_{1/2}$ from DSAM.

1978MeZX: E=11.7 MeV α beam. Measured Eγ, Iγ, pγ(t). Deduced levels, $T_{1/2}$ by DSA M.

Others:

1984Ra23 and 1983Ra37: ^{4}He(^{40}Ar,pγ) E=185, 190 MeV ^{40}Ar beam was produced the VICKSI accelerator. Helium gas target. NaI detector. Measured γ(θ,H,t). Deduced g factor and $T_{1/2}$, hyperfine interactions.

1980OlZX: E=116-11.9 MeV α beam. Measured γ(θ), γγ, $T_{1/2}$ by DSAM.

1977Po07: E=10.4 MeV α beam. Argon gas target. Protons were detected by a surface-barrier detector and γ-rays were detected by a 5 cm by 5cm NaI(Tl). Measured γ(t). Deduced $T_{1/2}$.

1976We23: E=15 MeV α beam was produced from the Triangle Universities Nuclear Laboratory FN tandem accelerator facility. Argon gas target. Two 7.6 by 7.6 cm NaI detectors for detecting γ-rays. Measured γγ(θ,H,t). Deduced g factor, $T_{1/2}$.

1976De41: E=12.7 MeV. Measured pγ(θ,H,t). Deduced g factor, $T_{1/2}$.

1975Bo30: E=11.7 MeV α beam. Pure natural argon gas target. Two surface barrier detectors for detecting scattered α-particles; a 84 cm^3 Ge(Li) detector for detecting γ-rays. Measured γ(θ), p-γ(t), $T_{1/2}$(level).

1964La14: E≈20 MeV α beam was produced from the Copenhagen cyclotron. Pure argon gas target. Protons were detected in a ionization chamber or a proportional counter; γ-rays were detected by a NaI crystal. Measured σ(E_p), pγ.

^{43}K Levels

E(level)[†]	J^{π}[#]	$T_{1/2}$	Comments
0	3/2+		
561.7 *4*[@]	1/2+	1.4 ps *+17-7*[@]	
738.2 *5*	7/2-	200 ns *5*	$T_{1/2}$: from pγ(t). Weighted average of 202 ns *4* (1983Ra37,1984Ra23), 184 ns *10* (1977Po07), 165 ns *17* (1976De41), 205 ns *10* (1975Bo30,1978MeZX).
975.3 *4*[@]	3/2-	1.6 ps *+14-6*[@]	
1110.7 *4*[@]	3/2+	1.0 ps *8*[@]	
1207.0 *4*	(5/2,7/2)+	>4.8 ps[&]	$T_{1/2}$: >2.1 ps (1978MeZX).
1510.1 *4*	7/2+	5.7 ps *15*[&]	$T_{1/2}$: 1.7 ps *+11-6* (1978MeZX).
1549.8 *5*[@]	3/2+,5/2+	0.09 ps *6*[@]	
1850.0 *6*[‡]	11/2-	4.6 ps *12*[&]	
1866.2 *4*	(1/2,3/2,5/2+)		E(level): from 1978MeZX.
1987[‡]	(9/2)		
2048.4 *5*[‡]	(9/2)	1.7 ps *6*[&]	
2177.4 *7*[@]	5/2(+)	<0.07 ps[@]	
2343.8 *7*[@]		0.7 ps *+14-4*[@]	
2509.5 *5*[‡]	(11/2+)	>5 ps[&]	
3115.2 *7*[‡]	15/2-	3.5 ps *7*[&]	
3139[‡]	(13/2)		

[†] From least-squares fit to Eγ data, assuming Δ(Eγ)=0.5 or 1 keV when not given by the authors.
[‡] From 1979Be28.
[#] From Adopted Levels.
[@] From 1978MeZX. Lifetime from DSAM.
[&] From DSAM (1979Be28).

γ(^{43}K)

A_2, A_4 and polarization coefficients are from 1979Be28.

E_i(level)	J_i^{π}	E_f(level)	J_f^{π}	E_γ[†]	I_γ[‡]	Mult.[§]	δ[§]	Comments
561.7	1/2+	0	3/2+	561.6[a]				
738.2	7/2-	0	3/2+	738.4[a]		M2+E3	-0.13 *2*	A_2=+0.17 *2*, A_4=-0.04 *2*. Pol=-0.23 *4*.
975.3	3/2-	561.7	1/2+	413.3[a]	8 *5*			

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^{40}Ar(α,pγ),^{41}K(t,pγ) 1979Be28,1978MeZX (continued)

γ(^{43}K) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ†	I_γ‡	Mult.§	δ§	Comments
		0	3/2+	975.4[a]	92 *5*			
1110.7	3/2+	561.7	1/2+	549.1[a]	40 *10*			
		0	3/2+	1110.5[a]	60 *10*			
1207.0	(5/2,7/2)+	0	3/2+	1206.9 *5*				
1510.1	7/2+	1207.0	(5/2,7/2)+	303.1 *2*	7 *4*			
		0	3/2+	1509.9 *6*	93 *4*	E2		A_2=+0.29 *2*, A_4=-0.07 *2*. Pol=+0.53 *16*.
1549.8	3/2+,5/2+	0	3/2+	1549.8[a]				
1850.0	11/2-	738.2	7/2-	1111.8 *4*		E2		A_2=+0.35 *2*, A_4=-0.21 *3*. Pol=+0.47 *6*.
1866.2	(1/2,3/2,5/2+)	975.3	3/2-	890.6[a]				
		0	3/2+	1866.4[a]				
1987	(9/2)	1510.1	7/2+	477[b]				
2048.4	(9/2)	738.2	7/2-	1310.4 *6*				
2177.4	5/2(+)	738.2	7/2-	1439.1[a]				
2343.8		1866.2	(1/2,3/2,5/2+)	477.6[a]				
2509.5	(11/2+)	2048.4	(9/2)	461.1 *2*				
		1510.1	7/2+	999.3 *3*				
3115.2	15/2-	1850.0	11/2-	1265.1 *4*		E2		A_2=+0.46 *2*, A_4=-0.19 *2*. Pol=+0.88 *20*.
3139	(13/2)	1850.0	11/2-	1289				

† From 1979Be28, unless otherwise stated.
‡ From 1978MeZX.
§ From γ(θ) and γ(lin pol) (1979Be28).
[a] From 1978MeZX.
[b] Placement of transition in the level scheme is uncertain.

^{41}K(t,p) 1984Mo17

Target ^{41}K Jπ=3/2+.

1984Mo17: E=15 MeV triton beam was produced from the University of Pennsylvania FN tandem accelerator. Target of 55 μg/cm^2 thick KCl enriched to 99.35% in ^{41}K. Protons were momentum analyzed with a multi-angle spectrograph and recorded in 7.5° intervals in the angular range 3.75°-86.25° (lab), FWHM=20 keV. Measured σ(E_p,θ). Deduced levels, J, π, L from DWBA analysis.

1978MeZX: ^{41}K(t,pγ) E=11.7 MeV.

All data from 1984Mo17.

^{43}K Levels

E(level)†	L‡	E(level)†	L‡	E(level)†	L‡
0	0	1956	4	2784	2
560	2	2035	0	2879	2
1007	3	2086	4	3190	2
1113	2	2218	3	3254	2
1214	2	2512	(4)	3312	2
1517	2	2548	1	3399	2
1815	4				

† Uncertainty of 10 keV assigned by 1990En08.
‡ From comparison of σ(θ) data with DWBA calculations.

^{44}Ca(μ^-,νnγ) 2006Me08

2006Me08: the μ^- beam obtained from decay of π^- beam at 90 MeV/c from the M9B beamline at TRIUMF, including a 6-m, 1.2-T superconducting solenoid, beam rate 2×10^5 s^{-1}. Target of pure natural calcium with some oxide on the surface was contained in plastic containers with polyethylene walls. Three plastic scintillation counters were sued for defined the muon beam; two HPGe detectors for detecting γ-rays, FWHM=3 keV at 1.2 MeV. Measured Eγ, Iγ, $\gamma\gamma$, γ-p. Deduced levels.

^{43}K Levels

Muonic Lyman series for natural Calcium

μ x ray	Energy	Intensity in percent
2p-1s	783.659 *25*	83.8 *10*
3p-1s	940.63 *10*	6.2 *2*
4p-1s	995.48 *10*	2.0 *1*
5p-1s	1020.81 *10*	2.0 *1*
6p-1s	1034.62 *10*	1.8 *1*
7p-1s	1042.71 *20*	1.4 *1*
(8-∞)p-1s	1046-1063	2.8 *4*

Muonic Balmer series for natural Calcium

μ x ray	Energy	Intensity in percent
3d-2p	157.35 *13*	64.5 *9*
4d-2p	212.03 *10*	8.85 *20*
5d-2p	237.31 *10*	4.34 *20*
6d-2p	251.06 *10*	3.29 *20*
7d-2p	259.45 *10*	1.37 *20*
(8-∞)d-2p	261-277	1.4 *3*

E(level)†	J$^{\pi}$†
0	3/2+
561.2	1/2+
738.1	7/2-
975.0	3/2-
1110.3	3/2+

† From Adopted Levels,Gammas.

γ(^{43}K)

E$_i$(level)	J$^{\pi}_i$	E$_f$(level)	J$^{\pi}_f$	E$_\gamma$†	Percent γ-ray yield.
561.2	1/2+	0	3/2+	561.4	0.3 *1*
738.1	7/2-	0	3/2+	738.1	0.45 *12*
975.0	3/2-	0	3/2+	974.9	0.2 *1*
1110.3	3/2+	561.2	1/2+	548.5	$<$0.1
		0	3/2+	1110.1	$<$0.2

† From Adopted Levels,Gammas.

^{44}Ca(d,^{3}He) 1976Do05

1976Do05 (also 1975Wa17): E=52 MeV deuteron beam was produced from the Karlsruhe isochronous cyclotron and impinged on an 98.55% enriched self-supporting ^{44}Ca foil. ^{3}He particles were detected by counter telescopes consisting of 300 μm ΔE and 2000 μm E surface barrier counters, FWHM=120 keV. Measured σ(E(^{3}He),θ). Deduced levels, J, π, L, spectroscopic factors from DWBA analysis.

1974De36, E=19 MeV deuteron beam was produced from the University of Minnesota MP Tandem and impinged on a 60 μg/cm^2 target prepared by evaporating a 98.5% enriched ^{44}Ca onto a 15 μg/cm^2 carbon foil. ^{3}He particles were detected by solid state position detectors placed in the focal plane of an Enge split-pole spectrometer, FWHM=15 keV. Measured σ(E(^{3}He),θ). Deduced, levels, J, π, L, spectroscopic factors from DWBA analysis.

1969Yn01: E=22 MeV deuteron beam was produced from the Argonne cyclotron and impinged on enriched ^{44}Ca target on Formvar backing. ^{3}He particles were detected with a ΔE-E telescope of surface-barrier detectors, FWHM=70-130 keV. Measured σ(E(^{3}He),θ). Deduced, levels, J, π, L, spectroscopic factors from DWBA analysis.

Target ^{44}Ca Jπ=0+.

All data from 1976Do05 unless otherwise noted.

^{43}K Levels

E(level)	J$^\pi$	L	C^{2}S‡	Comments
0		2	3.15	S: 2.90 (1974De36), 4.5 (1969Yn01).
566†		0	1.15	S: 1.55 (1974De36), 2 (1969Yn01).
748†		3	0.85	S: 0.98 (1974De36).
982†		1	0.16	S: 0.27 (1974De36).
1119†		2	0.36	S: for d5/2. C^{2}S=0.50 for d3/2. Other: 0.30 (1974De36).
1540		2	0.24	
1870				
2180				
2450		0	0.32	
2670		2	0.41	
3070		2	0.16	
3230		2	0.20	
3340		2	0.56	
3730		(2)	0.13	
3880		(2)	0.1	
4020		2	0.15	
4120		2	0.31	
4470		2	0.17	
4790		2	0.14	
5190		2	0.23	
5610		2	0.23	
5900		2	0.30	
7450		(2)	0.1	

† From weighted average of 1974De36 and 1976Do05.

‡ From 1976Do05. 1978En02 give S factors which are adjusted upwards by ≈19% using standard normalization factors as discussed in 1977En02.

^{44}Ca(t,α) 1968Sa09,1970Aj01

Target ^{44}Ca Jπ=0+.

1968Sa09: E=13 MeV triton beam was produced from the Aldermaston tandem accelerator and impinged on an enriched target of ^{44}Ca. Alpha particles were momentum analyzed in the multi-angle spectrograph and detected in Ilford K1 emulsions. Measured $\sigma(E_\alpha,\theta)$. Deduced levels, J, π, spectroscopic factors from DWBA analysis.

1970Aj01: E=20 MeV triton beam was produced from the Los Alamos MEG Tandem facility and impinged on a ^{44}Ca target of a 205 μg/cm^2 layer of calcium metal deposited on a 50 μg/cm^2 carbon foil, oriented at 30° to the beam. Alpha particles were analyzed in an Elbek-type spectrograph and detected with Ilford K-minus-one nuclear plates. Measured $\sigma(E_\alpha,\theta)$. Deduced levels.

^{43}K Levels

E(level)†	L‡	S‡#	E(level)†	L‡	S‡#
0	2	2.2	3837		
560	(0)	1.3	3890&		
740	3	0.48	3970&		
967	(1)	0.10	4015@		0.24
1107	2	0.20	4070&		
1202	(2)	0.06	4127@	(0)	0.06
1544			4177		
1847			4234		
2177	(2)	0.05	4290&		
2446	0	0.24	4410&		
2666	2	0.45	4490&		
2981			4540&		
3056			4680&		
3084@			4820&		
3150			4860&		
3228	2	0.19	4920&		
3344	2	0.45	5030&		
3460&			5150&		
3580&			5200&		
3670&			5260&		
3717			5380&		

† From weighted average of 1968Sa09 and 1970Aj01.

‡ From 1968Sa09.

1978En02 point out that absolute S-factors given by 1968Sa09 are quite large; therefore, 1978En02 prefer to give relative S-factors, normalized to 3.8 for the ground state.

@ From 1968Sa09 only.

& Reported by 1970Aj01 only.

^{44}Ca(^{11}B,^{12}C) 1978DeZD

1978DeZD (also 1976DeXS): E=50 MeV. Measured $\sigma(\theta)$.

^{43}K Levels

E(level)	J$^{\pi}$†	S‡
0#	3/2+	2.9
567#	1/2+	1.2
741@	7/2-	1.5
984@	3/2-	0.30
1121	3/2+	0.30

† From Adopted Levels.
‡ From bar chart shown in figure 2 of 1978DeZD.
# $\sigma(\theta)$ distribution fits well with DWBA calculations.
@ Poor fit of $\sigma(\theta)$ distribution with DWBA calculations.

Adopted Levels, Gammas

Q(β^-)=-2220.8 *19*; S(n)=7932.95 *17*; S(p)=10675.9 *3*; Q(α)=-7592 *5* 2011AuZZ
Q(β^-n)=-14359.05 *20* (2011AuZZ).
Hyperfine structure measurements: 2011Av01, 2004Mo21, 2000Mu17.

^{43}Ca Levels

Cross Reference (XREF) Flags

A	^{43}K β^- decay (22.3$\hbar$)	I	^{42}Ca(n,γ):resonance	Q	^{44}Ca(d,t)
B	^{43}Sc ε decay (3.891$\hbar$)	J	^{42}Ca(d,p)	R	^{44}Ca(^{3}He,α),(pol ^{3}He,α)
C	^{27}Al(^{19}F,2pnγ)	K	^{42}Ca(α,^{3}He)	S	^{44}Ca(^{3}He,$\alpha\gamma$)
D	^{30}Si(^{18}O,αnγ)	L	^{43}Ca(p,p′)	T	^{45}Sc(μ^-,2nγ)
E	^{40}Ar(α,nγ)	M	^{43}Ca(p,p′γ)	U	^{45}Sc(d,α)
F	^{41}K(^{3}He,p)	N	^{43}Ca(d,d′)	V	Coulomb excitation
G	^{41}K(α,d)	O	^{43}Ca(α,α′)		
H	^{42}Ca(n,γ) E=thermal	P	^{44}Ca(p,d)		

Nuclear Level Sequences
A 3/2+ band.
B 5/2+ band.

Seq.	E(level)†‡	J$^{\pi}$#	$T_{1/2}$@	XREF	Comments
	0	7/2-	STABLE	ABCDEFGH JKLMNOPQRSTUV	μ=-1.31726 *60* (1989Ra17,1972Ol01). Q=-0.043 *9* (1991Si14). μ: optical method (1972Ol01). Other: -1.317643 *7* (NMR,1973Lu08). Q: from CFBLS method. Others: -0.049 *5* (1983Ar25), -0.062 *12* (ABMR-LIRF, 1982Ay02), -0.065 *20* (1979Gr05), -0.040 *8* (calculated by 1981Ar15 from data in 1980Be13).

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Adopted Levels, Gammas (continued)

^{43}Ca Levels (continued)

Seq.	E(level)†‡	Jπ#	$T_{1/2}$@	XREF	Comments
					Δ<r^2>(^{43}Ca-^{40}Ca)=0.117 fm^2 *25* (1980Wo02), 0.1254 fm^2 *32* (1984Pa12), 0.1215 fm^2 *4* (1991Si14). The rms charge radius (<r^2>)$^{1/2}$=3.495 fm *19* from 2004An14 evaluation. Adopted (by 1977En02) spectroscopic factor S=0.58 *6* (neutron stripping); 3.1 *3* (neutron pickup). Jπ: L(d,p)=L(d,t)=L(α,^{3}He)=L(p,d)=L(pol ^{3}He,α)=3; J from optical spectroscopy (1954Ke14); L(α,d)=5.
	372.762 *5*	5/2-	34 ps *3*	ABCDE H JKLMNOPQRSTUV	Adopted (by 1977En02) spectroscopic factor S<0.02 (neutron stripping); 0.17 *8* (neutron pickup). Jπ: L(d,t)=L(α,^{3}He)=L(p,d)=L(d,t)=L(pol ^{3}He,α)=3; $\gamma(\theta)$ and γ(lin pol) in (α,nγ).
	593.394 *5*	3/2-	81 ps *4*	ABCDE H JKLMNOPQRS UV	Adopted (by 1977En02) spectroscopic factor S=0.04 *2* (neutron stripping); 0.10 *3* (neutron pickup). Jπ: L(d,p)=L(α,^{3}He)=L(d,t)=L(p,d)=L(pol ^{3}He,α)=1; ΔJ=2 to 7/2- from $\gamma(\theta)$ and γ(lin pol) in (α,nγ).
A	990.257 *5*	3/2+	49 ps *4*	A CDEF H JKLM PQRS U	Adopted (by 1977En02) spectroscopic factor S=0.11 *2* (neutron stripping); 2.2 *4* (neutron pickup). Jπ: L(d,p)=L(d,t)=L(α,^{3}He)=L(p,d)=L(pol ^{3}He,α)=2; L(^{3}He,p)=0; ΔJ=1 to 5/2- fro m$\gamma(\theta)$ and γ(lin pol) in (α,nγ). $T_{1/2}$: weighted average of 48 ps *4* from (α,nγ) and 51 ps *8* from (^{19}F,2pnγ).
B	1394.473 *8*	5/2+	1.84 ps *35*&	A CDEF H JKLM PQRS U	Jπ: L(d,t)=L(α,^{3}He)=L(p,d)=2; ΔJ=1 to 7/2- from $\gamma(\theta)$ and γ(lin pol) in (α,nγ).
	1677.84 *17*	11/2-	0.85 ps *14*&	CDE JKLMNOPQ S UV	Jπ: L(α,α')=2+4; ΔJ=2 to 7/2- from $\gamma(\theta)$ and γ(lin pol) in (α,nγ).
A	1901.99 *14*	7/2+	0.53 ps *10*&	CDE J LM	Jπ: ΔJ=2 E2 to 3/2+ from $\gamma(\theta)$ and γ(lin pol) in (α,nγ) and RUL.
	1931.53 *14*	5/2-	116 fs *30*&	B E J LMNO S	Jπ: L(α,α')=2+4; ΔJ=0 or 1 to 3/2-, 5/2- and 7/2- from $\gamma(\theta)$ and γ(lin pol) in (α,nγ) and RUL.
	1957.4 *4*	1/2+	1.1 ps *3*	E H JKL PQR	Adopted (by 1977En02) spectroscopic factor S=0.05 *2* (neutron stripping); 1.0 *2* (neutron pickup). Jπ: L(d,p)=L(d,t)=L(p,d)=L(pol ^{3}He,α)=0.
	2046.21 *15*	3/2-	0.8 ps *2*	EFGH JKLMNOPQR	Adopted (by 1977En02) spectroscopic factor S=0.72 *9* (neutron stripping); 0.19 *6* (neutron pickup). Jπ: L(d,p)=L(α,^{3}He)=L(d,t)=L(p,d)=L(pol ^{3}He,α)=1; L(α,α')=2+4 and γ to 7/2- reject 1/2-.
	2067.21 *17*	7/2-	21 fs *7*	E LMNO	Jπ: L(d,d')=4; L(α,α')=2+4; ΔJ=1 to 5/2- from $\gamma(\theta)$ and γ(lin pol) in (α,nγ). $T_{1/2}$: from DSAM in (p,p'γ).

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Adopted Levels, Gammas (continued)

^{43}Ca Levels (continued)

Seq.	E(level)[†‡]	J^{π}[#]	$T_{1/2}$[@]	XREF	Comments
	2093.81 *18*	9/2-	1.4 ps *4*[&]	CDE LMNO	J^π: L(α,α')=2+4; ΔJ=1 to 7/2- from $\gamma(\theta)$ and γ(lin pol) in (α,nγ).
	2102.7 *3*	3/2-	0.33 ps *9*	E H J L	J^π: L(d,p)=1; γ to 7/2-.
	2223.9 *4*	3/2-,5/2-	28 fs *17*	E J LM	J^π: ΔJ=0 or 1 to 3/2- and 5/2- form $\gamma(\theta)$ and γ(lin pol) in (α,nγ); positive sign gives unacceptable M2 strength from (α,nγ).
	2248			JK	
	2249.01 *14*	9/2-	37 fs *8*[&]	E LMNO	J^π: L(α,α')=2+4; L(d,d′)=2; ΔJ=2 to 5/2- from $\gamma(\theta)$ and γ(lin pol) in (α,nγ).
	2272.8 *3*	3/2+,5/2+	0.28 ps *8*	EF H J LM PQ	J^π: L(d,t)=L(p,d)=2. Ref: P: 2250.
B	2409.68 *15*	9/2+	1.2 ps *4*[&]	CDE J LM	J^π: γ decays to 5/2+,7/2+,7/2-; ΔJ=2 to 5/2+ from $\gamma(\theta)$ and γ(lin pol) in (α,nγ).
	2523	(1/2-,3/2-)		J	J^π: L(d,p)=(1).
	2611.1 *3*	1/2-	0.13 ps *5*	E H JKL Q	J^π: L(d,p)=L(α,^{3}He)=1; γ circular polarization from (n,γ) E=thermal rejects 3/2-.
	2674.3 *8*	5/2-,7/2-	36 fs *16*	E JKLM O	J^π: L(d,p)=L(α,^{3}He)=3 A.
	2696.5 *5*	3/2+,5/2+	<38 fs	E J LM OPQ S	J^π: L(d,p)=L(d,t)=L(p,d)=2; L(α,α')=2+4 is presumed to be in error or for a different level at 2694 *5*. Ref: P: 2660. Ref: Q: 2680.
	2748	1/2+		JKl	J^π: L(d,p)=0.
	2754.00 *21*	15/2-	23.6 ps *10*	CDE l O	J^π: ΔJ=2 to 11/2- from $\gamma(\theta)$ and γ(lin pol) in (α,nγ) and from DCO in (^{18}O,αnγ). $T_{1/2}$: weighted average from (^{19}F,2pnγ).
	2769.6 *5*	(1/2,3/2,5/2)	0.10 ps *4*	E	J^π: γ to 3/2+ and 3/2-; RUL.
	2844.7 *5*	(5/2)+	0.55 ps *15*	EFG JKL OPQ	J^π: L(p,d)=L(d,t)=2 and γ to 7/2-. L(d,p)=0 suggests 1/2+. L(α,d)=4+6 from 3/2+ is inconsistent with J=5/2.
	2878.7 *10*	1/2-	107 fs *38*	E H J L S	J^π: L(d,p)=1. γ(circ pol) in (pol n,γ) does not allow 3/2-. $\gamma(\theta)$ of 2504γ in (^{3}He,$\alpha\gamma$) is inconsistent with J=1/2. It is possible that the level seen in (^{3}He,$\alpha\gamma$) is different from that in (n,γ) and (α,nγ).
	2943.5 *3*	3/2-	<60 fs	E H JKl S	J^π: L(d,p)=1. γ(circ pol) in (pol n,γ) does not allow 1/2-.
A	2951.33 *19*	11/2+	4.7 ps *12*	CDE G l O	J^π: L(α,d)=6 from 3/2+; ΔJ=1 to 9/2+ from $\gamma(\theta)$ and γ(lin pol) in (α,nγ).
	3028.7 *8*	(3/2 to 7/2,9/2-)	<60 fs	E J l O S	J^π: γ to 5/2-; ΔJ=1 to 5/2- from $\gamma(\theta)$ in (^{3}He,$\alpha\gamma$).
	3030.4 *7*	(1/2,3/2,5/2)		l S	E(level): not resolved from 3028.6; γ decay seen only in (^{3}He,$\alpha\gamma$) J$$\gamma$ decays to 3/2+,3/2- L(p,d)=0+2 implies the presence of a doublet.
	3049.6 *15*		<60 fs	E JKL P	J^π: probable 1/2+ from L(p,d)=0 or 0(+2). E(level): population in (α,nγ) is considered suspect (evaluators).
	3050.6 *4*	11/2-	<17 fs	E O	J^π: L(α,α')=2+4; ΔJ=2 to 7/2- form $\gamma(\theta)$ and γ(lin pol) in (α,nγ).
	3076.0 *15*	(5/2)+	<17 fs	E G JkL Q	J^π: L(d,t)=2 and γ to 7/2-. L(d,p)=0 gives 1/2+. L(α,d)=4+6 is inconsistent with J=5/2.
	3096.0 *7*		<17 fs	Ef jkl o	J^π: (1/2-,3/2,5/2,7/2-) from γ to 3/2- and 5/2-; RUL.

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Adopted Levels, Gammas (continued)

^{43}Ca Levels (continued)

Seq.	E(level)†‡	$J^{\pi\#}$	$T_{1/2}$$^{@}$	XREF	Comments
	3097.0 *6*	(5/2 TO 11/2)+	0.76 ps *21*	Ef j l o	J^π: (5/2+,7/2,9/2,11/2+) from γ to 7/2+ and 9/2+; RUL.
	3195.6 *5*	7/2+,9/2+	118 fs *42*	E G JKL O	J^π: L(α,α')=3+5; L(α,^{3}He)=4.
	3278	(5/2,7/2)+		G KL Opq S	J^π: (7/2)+ from L(α,d)=6 from 3/2+, L(α,α')=(3+5) and probable γ to 3/2+. However, $\alpha\gamma(\theta)$(2288γ) favors 5/2.
	3285.7 *6*	3/2-	<60 fs	Ef H J L Opq	J^π: L(d,p)=1. γ(circ pol) in (pol n,γ) does not allow 1/2-. L(α,α')=3+5 for 3277+3297 is inconsistent with π=-.
	3315.2 *7*	1/2-,3/2-	0.13 ps *6*	Ef H J	J^π: L(d,p)=1.
B	3371.19 *19*	13/2+	<14 ps	CDE G O	J^π: L(α,α')=3+5 and ΔJ=2 to 9/2+ from $\gamma(\theta)$ and γ(lin pol) in (α,nγ). $T_{1/2}$: from (^{19}F,2pnγ). >3.5 ps from (α,nγ). Ref: γ: 3372. Ref: O: 3377.
	3376.6 *10*			E JK	
	3415	5/2-,7/2-		JKL	J^π: L(d,p)=L(α,^{3}He)=3.
	3469			O	
	3505.3 *3*	13/2+	73 fs *24*	DE G K O	J^π: L(α,d)=4+6 from 3/2+; L(α,α')=3+5; ΔJ=1 to 11/2- from $\gamma(\theta)$ and γ(lin pol) in (α,nγ).
	3572.2 *5*	3/2-		H J	J^π: L(d,p)=1. γ(circ pol) in (pol n,γ) does not allow 1/2-.
	3604	(1/2)+		J PQ	J^π: L(d,p)=0. However, L(p,d)=2 giving 3/2+,5/2+ may suggest a doublet near this energy.
	3649	(3/2+,5/2+)		JK	J^π: L(d,p)=(2).
	3662.5 *4*	13/2-	49 fs *21*	E O	J^π: ΔJ=1 to 11/2- from $\gamma(\theta)$ and γ(lin pol) in (α,nγ) and γ to 9/2-.
	3705			J	
	3737			J	
	3772	1/2-,3/2-		J	J^π: L(d,p)=1.
	3783			J	
	3816.1 *8*	(7/2-)	69 fs *38*	E JK	J^π: from L(d,p)=L(α,^{3}He)=(3) and γ to 9/2+. Ref: K: 3803.
	3837	(3/2 TO 13/2)+		G O	J^π: L(α,d)=4 from 3/2+.
	3864	(1/2-,3/2-)		J	J^π: L(d,p)=(1).
	3898			J	
	3918	+		F JK O	J^π: L(^{3}He,p)=2 from 3/2+; L(α,α')=3+5. L(d,p)=(1) may define a separate level near 3918, but L(d,p)=4 is also suggested.
	3943.81 *24*	15/2+	0.76 ps *21*	CDE G O	J^π: ΔJ=1 to 13/2+ fro m$\gamma(\theta)$ and γ(lin pol) in (α,nγ); L(α,d)=6 from 3/2+.
	3958			J	
	3978	3/2+,5/2+		J PQ	J^π: L(d,p)=L(p,d)=L(d,t)=2. Ref: P: 3950.
	4017			J	
	4044	3/2+,5/2+		JK	J^π: L(d,p)=2.
	4078			J	
	4089	(5/2-,7/2-)		J	J^π: L(d,p)=(3).
	4135.9 *7*	7/2+,9/2+	<260 fs	E G JK O	J^π: L(d,p)=4. Ref: J: 4124. Ref: K: 4123.
	4148	1/2+		J	J^π: L(d,p)=0.

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Adopted Levels, Gammas (continued)

^{43}Ca Levels (continued)

Seq.	E(level)†‡	Jπ#	$T_{1/2}$@	XREF	Comments
	4174.8 *11*			E	
	4186.5 *4*	15/2+	125 fs *50*	DE G	Jπ: ΔJ=1 to 13/2+ from γ(θ) and γ(lin pol) in (α,nγ); L(α,d)=6 from 3/2+.
	4207.2 *5*	1/2-		H JK	Jπ: L(d,p)=L(α,^{3}He)=1. γ(circ pol) in (pol n,γ) does not allow 3/2-. Not compatible with L(d,t)=2 or L(p,d)=(2,3). Ref: J: 4196. Ref: K: 4193.
	4210	3/2+,5/2+		PQ	Jπ: L(d,t)=2 and L(p,d)=(2,3). E(level): this level corresponds to 4207.1 if L transfer in (d,t) and (p,d) is ignored (1978En02).
	4239	1/2-,3/2-		J	Jπ: L(d,p)=1.
	4268			J Q	Jπ: L(d,p)=1 suggests 1/2-,3/2-, but L(d,p)=2, implying 3/2+ or 5/2+, is also possible. Also L(d,t)=2.
	4291	(7/2 TO 13/2)+		G	Jπ: L(α,d)=4+6 from 3/2+.
	4298	1/2+		J	Jπ: L(d,p)=0.
	4364	(7/2 TO 13/2)+		G J	Jπ: L(α,d)=4+6 from 3/2+.
	4394.8 *5*	15/2-	42 fs *17*	E	Jπ: ΔJ=2 to 11/2- from γ(θ) and γ(lin pol) in (α,nγ).
	4401			J	
	4461	5/2-,7/2-		G JK P	Jπ: L(d,p)=3. Incompatible with (7/2 to 13/2)+ from L(α,d)=4+6 from 3/2+.
	4498			J	
	4533	1/2+		J	Jπ: L(d,p)=0.
	4569			K	
	4585			J	
B	4591.0 *4*	17/2+	0.21 ps *5*	CDE G	Jπ: ΔJ=1 to 15/2- from γ(θ) and γ(lin pol) in (α,nγ); L(α,d)=6 from 3/2+.
	4603.4 *10*	(1/2,3/2,5/2+)		H J	Jπ: γ from 1/2+ capture state.
	4621.2 *4*	15/2+	76 fs *28*	E	Jπ: ΔJ=1 to 13/2+ from γ(θ) and γ(lin pol) in (α,nγ).
	4641.6 *10*	3/2+,5/2+		H J	Jπ: L(d,p)=2.
	4654	1/2+		J	Jπ: L(d,p)=0.
	4703			G J p	
	4736	3/2+,5/2+		J q	Jπ: L(d,t)=2.
	4758			J	
	4783			J	
	4796			J	
	4826	(5/2-,7/2-)		JK	Jπ: L(α,^{3}He)=(3).
	4854			J	
	4878	(7/2 TO 17/2)+		G JK	Jπ: L(α,d)=6 from 3/2+.
	4901.2 *6*	1/2-,3/2-		H J	Jπ: L(d,p)=1. Jπ=1/2- is preferred by γ(circ pol) in (pol n,γ).
	4922			J	
	4944			J	
	4982			J	Jπ: L(d,p)=2 suggests 3/2+,5/2+; but L(d,p)=1 is also possible.
	5004	(5/2-,7/2-)		JK	Jπ: L(α,^{3}He)=(3).
	5037.5 *11*	1/2-,3/2-		H Jk	Jπ: L(d,p)=1. Jπ=1/2- is preferred by γ(circ pol) in (pol n,γ).
	5047	1/2-,3/2-		Jk	Jπ: L(d,p)=1.

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Adopted Levels, Gammas (continued)

^{43}Ca Levels (continued)

Seq.	E(level)†‡	J$^{\pi}$#	$T_{1/2}$@	XREF	Comments
	5072	1/2-,3/2-		J	J$^{\pi}$: L(d,p)=1.
	5100	1/2+		J	J$^{\pi}$: L(d,p)=0.
	5155.4 *6*	13/2-,17/2-	76 fs *28*	E	J$^{\pi}$: γ decays to 13/2- and 15/2- give 11/2-,13/2,17/2-; positive parity gives an unacceptably large M2 strength; 11/2- is ruled out due to large octupole mixing, in (α,nγ).
	5170	3/2+,5/2+		J	J$^{\pi}$: L(d,p)=2.
	5189	(7/2 TO 13/2)+		G	J$^{\pi}$: L(α,d)=4+6 from 3/2+.
	5193	1/2+		JK p	J$^{\pi}$: L(d,p)=0. L(α,^{3}He)=(3) and L(p,d)=(2,3) is inconsistent.
	5215	1/2+		J pQ	J$^{\pi}$: L(d,p)=0. L(p,d)=(2,3) is inconsistent.
	5249	(7/2 TO 13/2)+		G K	J$^{\pi}$: L(α,d)=4+6 from 3/2+.
	5351	(7/2 TO 13/2)+		G Q	J$^{\pi}$: L(α,d)=4+6 from 3/2+.
	5394.7 *11*		0.104 ps *31*	E K	E(level): 5410 group in (α,^{3}He) may define a different level. J$^{\pi}$: γ to 15/2-.
	5430			P	
	5548			K	
A	5555.4 *6*	(15/2,19/2)+	1.4 ps *4*	DE	J$^{\pi}$: $\gamma(\theta$,pol) in (α,nγ) and RUL.
	5647			K	
	5696	(7/2 TO 13/2)+		G	J$^{\pi}$: L(α,d)=4+6 from 3/2+.
	5728	3/2+,5/2+		K PQ	J$^{\pi}$: L(d,t)=2.
	5805			K	
	5889			K	
	5931.5 *8*	(11/2,15/2,19/2)-	55 fs *17*	E	J$^{\pi}$: ΔJ=1 stretched dipole transition to (13/2,17/2)- from $\gamma(\theta$,lin pol) in (α,nγ);RUL.
	5991	(5/2-,7/2-)		K	J$^{\pi}$: L(α,^{3}He)=(3).
	6015	1/2+		PQ	J$^{\pi}$: L(p,d)=0. L(d,t)=(2) is inconsistent.
	6087			G	
	6177	(3/2+,5/2+)		G PQ	J$^{\pi}$: L(d,t)=(2).
B	6223.6 *8*	(17/2,21/2)+	0.58 ps *15*	DE	J$^{\pi}$: ΔJ=1 stretched dipole transition to (15/2,19/2)+ from $\gamma(\theta$,lin pol) in (α,nγ);RUL.
	6300			F	
	6410			F	
	6460			F	
	6570			F	
	6640			F	
	6680			F	
	6790			F	
	6950			F	
	7040			F	
	7090			F	
	7190			F	
	7500			F	
	7590			F Q	
	7730			F	
	7920			F	
	7990	(3/2)+		F PQR	T=5/2 . J$^{\pi}$: L(p,d)=L(d,t)=L(^{3}He,α)=2. Strong L(^{3}He,p)=0 from 3/2+ indicates IAS of ^{43}K g.s., Jπ=3/2+.
	8160			F	
	8270			F	

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Adopted Levels, Gammas (continued)

^{43}Ca Levels (continued)

Seq.	E(level)†‡	$J^{\pi\#}$	$T_{1/2}$$^{@}$	XREF	Comments
	8470			F	
	8590	1/2+		PQ	T=5/2 . J^π: L(p,d)=L(d,t)=0. Possible IAS of 1/2+, 561 in ^{43}K.
	8767	5/2-,7/2-		PQ	T=5/2 . J^π: L(p,d)=L(d,t)=3. Possible IAS of 7/2-, 738 in ^{43}K.
	8930			F	
	8993	1/2-,3/2-		PQ	T=5/2 . J^π: L(p,d)=L(d,t)=1. Possible IAS of 3/2-, 975 in ^{43}K.
	9145	3/2+,5/2+		PQ	T=5/2 . J^π: L(p,d)=L(d,t)=2. Possible IAS of 3/2+, 1110 in ^{43}K.
	10485	1/2+		PQ	T=5/2 . J^π: L(p,d)=L(d,t)=0. Possible IAS of 1/2+, 2451 in ^{43}K.
	10720	3/2+,5/2+		PQ	J^π: L(d,t)=2.
	11380			PQ	
	12060			P	
	12265	3/2+,5/2+		PQ	J^π: L(d,t)=2.
	13230	(3/2+,5/2+)		PQ	J^π: L(d,t)=(2).
	13700			P	
	13950			P	
	14190			Q	

† See (n,γ):Resonance dataset for levels between 7932 keV and 8492 keV.
‡ From least-squares adjustment to measured Eγ data when such data are available. Otherwise weighted averages of available level energies are taken.
$^{\#}$ When L-transfer arguments are used, the target is Jπ=0+, except for ^{41}K(^{3}He,p) and ^{41}K(α,d), where target Jπ=3/2+.
$^{@}$ From DSAM in (α,nγ), unless otherwise indicated.
$^{\&}$ From DSAM. Weighted average of values in (α,nγ) and (p,p$'\gamma$).

$\gamma(^{43}Ca)$

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ†	I_γ‡	Mult.§	δ§	Comments
372.762	5/2-	0	7/2-	372.760 *7*	100	M1+E2	-0.192 *11*	B(E2)(W.u.)=9.2 *13*. B(M1)(W.u.)=0.0121 *11*. δ: from B(E2) and $T_{1/2}$; sign from $\gamma(\theta)$ in (α,nγ).
593.394	3/2-	372.762	5/2-	220.632 *5*	42.3 *8*	M1+E2	-0.09 *4*	B(E2)(W.u.)=4 *4*. B(M1)(W.u.)=0.0075 *4*. δ: weighted av. From $\gamma(\theta)$ in (α,nγ) and (^{3}He,$\alpha\gamma$).
		0	7/2-	593.390 *6*	100.0 *4*	E2(+M3)	≈0	B(E2)(W.u.)=3.7 *2*.
990.257	3/2+	593.394	3/2-	396.861 *6*	14.93 *13*	E1(+M2)	-0.1 *1*	B(E1)(W.u.)=(2.31×10^{-5} *20*). B(M2)(W.u.)=(7 +*14* −*7*).
		372.762	5/2-	617.490 *6*	100.00 *14*	E1(+M2)	-0.015 *17*	B(E1)(W.u.)=(4.1×10^{-5} *4*). B(M2)(W.u.)=(0.11 +*26* −*11*). δ: weighted av. From $\gamma(\theta)$ in (α,nγ) and (^{3}He,$\alpha\gamma$).
		0	7/2-	990.245 *8*	0.36 *5*	[M2]		B(M2)(W.u.)=0.17 *3*.
1394.473	5/2+	990.257	3/2+	404.214 *13*	18.7 *7*	M1+E2	+0.32 *5*	B(E2)(W.u.)=42 *15*. B(M1)(W.u.)=0.023 *5*.
		593.394	3/2-	801.070 *13*	7.5 *7*	E1(+M2)	-0.03 *4*	B(E1)(W.u.)=(3.3×10^{-5} *7*). B(M2)(W.u.)=(0.21 +*57* −*21*).
		372.762	5/2-	1021.698 *13*	100.0 *9*	E1(+M2)	+0.11 *12*	B(E1)(W.u.)=(0.00021 *4*). B(M2)(W.u.)=(11 +*24* −*11*).
		0	7/2-	1394.448 *14*	6.7 *4*	E1(+M2)	≈0	B(E1)(W.u.)=2.3×10^{-6} *6*.
1677.84	11/2-	0	7/2-	1677.8 *2*	100	E2(+M3)	-0.02 *2*	B(E2)(W.u.)=(5.6 *10*). B(M3)(W.u.)=($6.\times10^3$ +*12* −*6*).
1901.99	7/2+	1394.473	5/2+	507.8 *3*	24 *3*	[M1]		B(M1)(W.u.)=0.053 *13*.
		990.257	3/2+	911.6 *3*	19 *6*	E2(+M3)	-0.02 *3*	B(E2)(W.u.)=(25 *10*). B(M3)(W.u.)=($8.\times10^4$ +*26* −*8*).
		0	7/2-	1901.8 *2*	100 *6*	E1(+M2)	+0.03 *4*	B(E1)(W.u.)=(0.000106 *22*). B(M2)(W.u.)=(0.12 +*33* −*12*).
1931.53	5/2-	593.394	3/2-	1338.3 *5*	11.7 *11*	M1+E2	+2.2 *25*	B(E2)(W.u.)=7 *4*. B(M1)(W.u.)=0.0009 +*18* −*9*.
		372.762	5/2-	1558.8 *2*	59 *2*	M1+E2	+0.28 *14*	B(E2)(W.u.)=1.5 *15*. B(M1)(W.u.)=0.016 *5*.
		0	7/2-	1931.4 *2*	100 *2*	M1+E2	-0.8 *3*	B(E2)(W.u.)=4.6 *25*. B(M1)(W.u.)=0.009 *4*.
1957.4	1/2+	990.257	3/2+	967.1 *4*	28 *1*	[M1]		B(M1)(W.u.)=0.0048 *14*.
		593.394	3/2-	1364.0 *5*	100 *1*	[E1]		B(E1)(W.u.)=0.00015 *5*.
2046.21	3/2-	1394.473	5/2+	651.2 *4*	2 *1*	[E1]		B(E1)(W.u.)=3.2×10^{-5} *18*.
		990.257	3/2+	1056.0 *5*	11 *1*	E1(+M2)	0.00 *3*	B(E1)(W.u.)=(4.1×10^{-5} *11*).
		593.394	3/2-	1453.0 *3*	13 *2*			
		372.762	5/2-	1673.5 *4*	32 *3*	[M1]		B(M1)(W.u.)=0.0012 *4*.
		0	7/2-	2046.2 *3*	100 *6*	E2(+M3)	0.00 *2*	B(E2)(W.u.)=(1.4 *4*).
2067.21	7/2-	372.762	5/2-	1694.3 *3*	28.0 *12*	M1+E2	-0.90 *24*	B(E2)(W.u.)=21 *10*.

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Adopted Levels, Gammas (continued)

γ(^{43}Ca) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ†	I_γ‡	Mult.§	δ§	Comments
								B(M1)(W.u.)=0.026 11.
		0	7/2-	2067.2 2	100.0 12	M1+E2	-0.10 6	B(E2)(W.u.)=0.6 +8−6.
2093.81	9/2-	0	7/2-	2093.8 2	100	M1+E2	-5.9 11	B(M1)(W.u.)=0.09 3. B(E2)(W.u.)=1.1 4.
2102.7	3/2-	593.394	3/2-	1509.2 5	50 30	M1+E2	+2.0 17	B(M1)(W.u.)=4.8×10^{-5} 22. B(E2)(W.u.)=5 4.
		372.762	5/2-	1730.0 6	100 40	[M1]		B(M1)(W.u.)=0.0010 +15−10. B(M1)(W.u.)=0.006 4.
		0	7/2-	2102.8 5	50 30	[E2]		B(E2)(W.u.)=1.2 9.
2223.9	3/2-,5/2-	593.394	3/2-	1630.4 5	100.0 23	M1+E2		δ: -0.50 25 for J=5/2; +0.8 +4-10 for J=3/2.
		372.762	5/2-	1851.2 4	74.5 23	M1+E2		δ: -0.20 5 for J=5/2; >+11, or <-5.6 for J=3/2.
2249.01	9/2-	1677.84	11/2-	570.7 5	2.3 6			
		372.762	5/2-	1876.3 2	12.6 11	E2(+M3)	-0.01 3	B(E2)(W.u.)=(8.1 19). B(M3)(W.u.)=(1.6×10^3 +96−16).
		0	7/2-	2248.9 2	100.0 11	M1+E2	-0.75 12	B(E2)(W.u.)=9 3. B(M1)(W.u.)=0.029 8.
2272.8	3/2+,5/2+	1394.473	5/2+	877.8 4	19 4	M1+E2		δ: -10 +4-13 for J=5/2; +0.1 4 for J=3/2.
		990.257	3/2+	1283.3 5	100 4	M1+E2		δ: -11 +2-4 for J=5/2; -0.26 5 for J=3/2.
2409.68	9/2+	1901.99	7/2+	508.0 7	24 4			
		1394.473	5/2+	1015.2 2	98 9	[E2]		B(E2)(W.u.)=22 8.
		0	7/2-	2409.6 3	100 9	E1(+M2)	-0.03 4	B(E1)(W.u.)=(1.5×10^{-5} 6). B(M2)(W.u.)=(0.011 +29−11).
2611.1	1/2-	2046.21	3/2-	564.9 3	54 16	[M1]		B(M1)(W.u.)=0.33 17.
		593.394	3/2-	2017.6 5	100 16	[M1]		B(M1)(W.u.)=0.013 6.
2674.3	5/2-,7/2-			1276.0 10[a]				
		372.762	5/2-	2301.5 8	100			
		0	7/2-	2674.6 8[a]				
2696.5	3/2+,5/2+	990.257	3/2+	1706.2 6	57.7 14			
		593.394	3/2-	2103.1	27 14			
		372.762	5/2-	2324.4 9	100.0 14	[E1]		B(E1)(W.u.)=0.00062 .
2754.00	15/2-	1677.84	11/2-	1076.14 15	100	E2(+M3)	-0.02 2	B(E2)(W.u.)=(1.86 8). B(M3)(W.u.)=(4.×10^3 +9−4).
2769.6	(1/2,3/2,5/2)	990.257	3/2+	1779.1 6				
		593.394	3/2-	2176.6 8				
2844.7	(5/2)+	1901.99	7/2+	942.1 6				
		1394.473	5/2+	1450.2				
		0	7/2-	2845.7 11				
2878.7	1/2-	2046.21	3/2-	831.4 10[a]				γ seen in (n,γ) only.
		1957.4	1/2+	922.1 6[a]				E_γ: γ seen in (α,nγ) only.
		593.394	3/2-	2285.2 10				γ reported in (n,γ) and (α,nγ).
		372.762	5/2-	2505.9[a]				γ seen in (^{3}He,αγ) only.

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Adopted Levels, Gammas (continued)

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

E_i(level)	J^π_i	E_f(level)	J^π_f	E_γ[†]	I_γ[‡]	Mult.[§]	δ[§]	Comments
2943.5	3/2-	2102.7	3/2-	840.9 10	12 8			
		990.257	3/2+	1953.2	35 13			
		593.394	3/2-	2350.3 4	100 12			
		372.762	5/2-	2570.1 8				
		0	7/2-	2943.4	12 7			
2951.33	11/2+	2409.68	9/2+	541.5 3	21.5 15	M1+E2	-0.04 2	B(E2)(W.u.)=0.06 $+7-6$. B(M1)(W.u.)=0.0041 11.
		2093.81	9/2-	857.6 3	100.0 15	E1(+M2)	0.00 2	B(E1)(W.u.)=(0.00012 3).
		1901.99	7/2+	1049.0 4	32.3 15	[E2]		B(E2)(W.u.)=2.2 6.
3028.7	(3/2 to 7/2,9/2-)	372.762	5/2-	2655.9 8	100	(D+Q)		
3030.4	(1/2,3/2,5/2)	990.257	3/2+	2040.1	45 13			
		593.394	3/2-	2436.9	100			
3049.6		0	7/2-	3049.5 15[a]	100			
3050.6	11/2-	2249.01	9/2-	801.7 7	23 2	[M1]		B(M1)(W.u.)=0.30 .
		1677.84	11/2-	1373.0 6	100 4	M1+E2	+0.30 5	B(E2)(W.u.)=23 . B(M1)(W.u.)=0.23 .
		0	7/2-	3049.7 11	69 4	E2(+M3)	-0.02 2	B(E2)(W.u.)=5.1 .
3076.0	(5/2)+	0	7/2-	3075.9 15	100			
3096.0		593.394	3/2-	2502.4 8				
		372.762	5/2-	2723.4 11				
3097.0	(5/2 TO 11/2)+	2409.68	9/2+	687.3 7				
		1901.99	7/2+	1195.0 10				
3195.6	7/2+,9/2+	2844.7	(5/2)+	350.7 4				
		1901.99	7/2+	1294.1 7				
3278	(5/2,7/2)+	1394.473	5/2+	1883.5[a]	35			
		990.257	3/2+	2287.7[a]	100	D+Q	+0.07 5	
		0	7/2-	3277.9[a]	69	D(+Q)	-0.13 13	
3285.7	3/2-	2046.21	3/2-	1239.6 9	100 30	[M1]		B(M1)(W.u.)=0.096 .
		593.394	3/2-	2692.2	50 20			I_γ: quoted by 1978En02.
		372.762	5/2-	2912.8	50 20			I_γ: quoted by 1978En02.
3315.2	1/2-,3/2-	2046.21	3/2-	1269.0 6	100	[M1]		B(M1)(W.u.)=0.08 4.
3371.19	13/2+	2951.33	11/2+	419.6 3	51 3			
		2754.00	15/2-	617.1 7	63 3			
		2409.68	9/2+	961.6 2	100 3	E2(+M3)	0.00 2	B(E2)(W.u.)=2.3 .
		1677.84	11/2-	1693.7 9	29 3			
3376.6		2093.81	9/2-	1282.8 9				
3505.3	13/2+	2951.33	11/2+	554.1 5	16 3	M1+E2	-0.06 2	B(E2)(W.u.)=7 6. B(M1)(W.u.)=0.21 8.
		2754.00	15/2-	751.1 6	17 3	[E1]		B(E1)(W.u.)=0.0023 9.
		1677.84	11/2-	1827.4 9	100 3	E1(+M2)	-0.03 3	B(M2)=1.1 11. B(E1)(W.u.)=(0.0009 3). B(M2)(W.u.)=(1.1 $+24-11$).
3572.2	3/2-	2046.21	3/2-	1525.4 10	58 17			

Continued on next page (footnotes at end of table)

$^{43}_{19}K_{24}$-27

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

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ†	I_γ‡	Mult.§	δ§	Comments
		593.394	3/2-	2978.9 *7*	100 *25*			
		372.762	5/2-	3199.3	25 *17*			
3662.5	13/2-	3050.6	11/2-	612.0 *7*	20 *3*	[M1]		B(M1)(W.u.)=0.24 *11*.
		2754.00	15/2-	908.0 *9*	21 *3*	[M1]		B(M1)(W.u.)=0.08 *4*.
		2249.01	9/2-	1412.9 *7*	23 *3*	[E2]		B(E2)(W.u.)=32 *15*.
		1677.84	11/2-	1984.8 *9*	100 *3*	M1+E2	-0.60 *4*	B(E2)(W.u.)=7 *3*. B(M1)(W.u.)=0.026 *12*.
3816.1	(7/2-)	2409.68	9/2+	1406.4 *7*	100			
3943.81	15/2+	3505.3	13/2+	438.5 *4*	67 *14*	M1(+E2)	0.00 *2*	B(M1)(W.u.)=(0.12 *5*).
		3371.19	13/2+	572.6 *2*	100 *14*	[M1]		B(M1)(W.u.)=0.08 *3*.
		2754.00	15/2-	1189.8 *7*	29 *14*	[E1]		B(E1)(W.u.)=$6.\times10^{-5}$ *4*.
4135.9	7/2+,9/2+	2951.33	11/2+	1184.6 *6*	100			
4174.8		2272.8	3/2+,5/2+	1902.0 *10*	100			
4186.5	15/2+	3505.3	13/2+	681.1 *4*	16 *4*	[M1]		B(M1)(W.u.)=0.08 *4*.
		3371.19	13/2+	815.4 *6*	100 *4*	M1+E2	-0.15 *2*	B(E2)(W.u.)=27 *13*. B(M1)(W.u.)=0.27 *11*.
4207.2	1/2-	2046.21	3/2-	2161.1 *6*	45 *23*			
		593.394	3/2-	3613.4 *8*	100 *23*			
4394.8	15/2-	3662.5	13/2-	731.9 *5*	54 *7*	[M1]		B(M1)(W.u.)=0.30 *13*.
		2754.00	15/2-	1641.1 *7*	90 *7*	M1+E2	-0.50 *14*	B(E2)(W.u.)=9 *6*. B(M1)(W.u.)=0.035 *15*.
		1677.84	11/2-	2717.4 *12*	100 *7*	E2(+M3)	0.00 *2*	B(E2)(W.u.)=(4.2 *18*).
4591.0	17/2+	4186.5	15/2+	404.4 *4*	49 *10*	[M1]		B(M1)(W.u.)=0.38 *13*.
		3943.81	15/2+	647.2 *3*	100 *10*	M1(+E2)	0.00 *2*	B(M1)(W.u.)=(0.19 *6*).
		2754.00	15/2-	1837.4 *9*	55 *10*	E1(+M2)	0.00 *2*	B(E1)(W.u.)=(0.00011 *4*).
4603.4	(1/2,3/2,5/2+)	593.394	3/2-	4009.8[a]				
4621.2	15/2+	3943.81	15/2+	677.4 *4*	39 *6*	[M1]		B(M1)(W.u.)=0.26 *11*.
		3371.19	13/2+	1249.9 *7*	100 *6*	M1(+E2)	-0.02 *3*	B(E2)(W.u.)=(0.08 $+24-8$). B(M1)(W.u.)=(0.11 *4*).
4641.6	3/2+,5/2+	2046.21	3/2-	2595.3[a]				
4901.2	1/2-,3/2-	2272.8	3/2+,5/2+	2628.3	67 *33*			
		2102.7	3/2-	2798.4	100 *67*			
		2046.21	3/2-	2854.9	100 *50*			
		593.394	3/2-	4307.6	67 *50*			
5037.5	1/2-,3/2-	2046.21	3/2-	2991.2	75 *25*			
		1957.4	1/2+	3080.0[a]	75 *25*			
		990.257	3/2+	4047.0[a]	100 *38*			
5155.4	13/2-,17/2-	4394.8	15/2-	760.4 *5*	100 *5*	M1+E2	-0.11 *4*	B(E2)(W.u.)=25 *21*. B(M1)(W.u.)=0.42 *16*. δ: from -0.15 *2* (for Jπ=13/2-) and -0.08 *2* (for Jπ=17/2-).
		3662.5	13/2-	1493.1 *5*	54 *5*			

Continued on next page (footnotes at end of table)

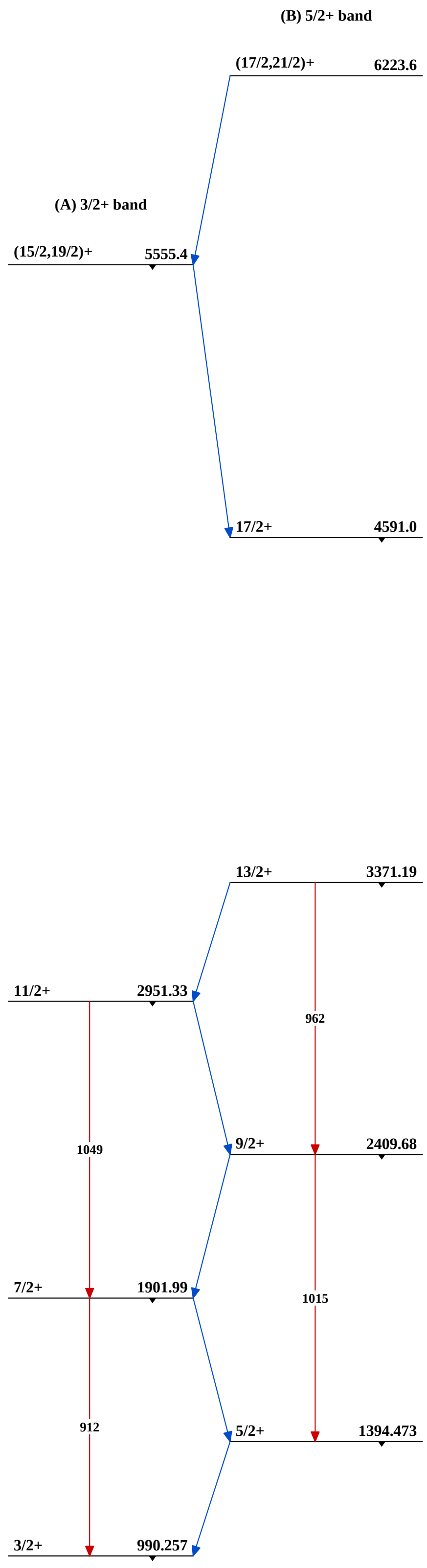
$^{43}_{19}K_{24}$-28

Adopted Levels, Gammas (continued)

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

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ†	I_γ‡	Mult.§	δ§	Comments
5394.7		2754.00	15/2-	2640.6 *10*	100			
5555.4	(15/2,19/2)+	4591.0	17/2+	964.5 *6*	66			
		3943.81	15/2+	1611.4 *7*	100	M1,E2		
5931.5	(11/2,15/2,19/2)-	5155.4	13/2-,17/2-	776.1 *5*	100	M1(+E2)		B(M1)(W.u.)=0.9 .
6223.6	(17/2,21/2)+	5555.4	(15/2,19/2)+	668.2 *5*	100	M1(+E2)		

† From weighted average of measured Eγ′s in different reactions and decays, when such data are available. Otherwise, the values represent level-energy differences.
‡ Weighted average of available data from different reactions.
§ From $\gamma(\theta$,pol) in (α,nγ) and (^{3}He,$\alpha\gamma$), unless otherwise noted.
^{a} Placement of transition in the level scheme is uncertain.


(B) 5/2+ band
(17/2,21/2)+ 6223.6
(A) 3/2+ band
(15/2,19/2)+ 5555.4
17/2+ 4591.0
13/2+ 3371.19
11/2+ 2951.33
962
1049
9/2+ 2409.68
7/2+ 1901.99
1015
912
5/2+ 1394.473
3/2+ 990.257

^{43}K β^- decay (22.3$\hbar$) 1988Wa28,1972Wa20

Parent: ^{43}K: E=0; Jπ=3/2+; $T_{1/2}$=22.3 h *1*; Q(g.s.)=1833.5 *5*; %β^-=100

1988Wa28: ^{43}K was produced via the ^{44}Ca(t,α) reaction with tritons of 3.2 MeV from the Brookhaven National Laboratory Van de Graaff accelerator. γ-rays were detected by a Ge(Li) detector. Measured Eγ, Iγ, β^- spectra. Deduced levels, β^- and γ branching ratios. Shell-model calculations.

1972Wa20: measured Eγ, Iγ, $T_{1/2}$.

Others:

γ: 1970La11, 1969Ta07, 1968Ch12, 1967Cl05, 1959Be72, 1957Ba07, 1955Ne01, 1954Li42.

β: 1959Be72, 1954Li42, 1949Ov01.

$\gamma\gamma$: 1957Ba07, 1959Be72.

$\beta\gamma$: 1959Be72.

$\beta\gamma$(t): 1970Ho26.

$\gamma\gamma(\theta)$, $\beta\gamma(\theta)$: 1957Li39.

$T_{1/2}$ and isotopic assignment: 1972Em01, 1963Ho17, 1954An25, 1954Li42, 1954Co70, 1949Ov01.

^{43}Ca Levels

E(level)[†]	Jπ[‡]
0	7/2-
372.762 *5*	5/2-
593.394 *5*	3/2-
990.257 *5*	3/2+
1394.473 *8*	5/2+

[†] From least-squares fit to Eγ data.
[‡] From Adopted Levels.

γ(^{43}Ca)

Eγ[‡]	E_i(level)	J_i^π	E_f(level)	J_f^π	Iγ[†‡]	Mult.[§]	δ[§]	Comments
220.632 *5*	593.394	3/2-	372.762	5/2-	5.53 *7*	M1+E2	-0.09 *4*	
372.760 *7*	372.762	5/2-	0	7/2-	100.0	M1+E2	-0.192 *11*	Eγ: recoil correction removed from Eγ=372.762 (1988Wa28).
396.861 *6*	990.257	3/2+	593.394	3/2-	13.65 *9*	E1(+M2)	-0.1 *1*	
404.214 *13*	1394.473	5/2+	990.257	3/2+	0.420 *15*	M1+E2	+0.32 *5*	
593.390 *6*	593.394	3/2-	0	7/2-	12.97 *9*	E2(+M3)	≈0	
617.490 *6*	990.257	3/2+	372.762	5/2-	91.2 *7*	E1(+M2)	-0.015 *17*	
801.070 *13*	1394.473	5/2+	593.394	3/2-	0.170 *15*	E1(+M2)	-0.03 *4*	
990.245 *8*	990.257	3/2+	0	7/2-	0.33 *4*			
1021.698 *13*	1394.473	5/2+	372.762	5/2-	2.26 *3*	E1(+M2)	+0.11 *12*	
1394.448 *14*	1394.473	5/2+	0	7/2-	0.151 *9*	E1(+M2)	≈0	

[†] For absolute intensity per 100 decays, multiply by 0.8680 *20*.
[‡] From 1988Wa28.
[§] From Adopted Gammas.

β^- radiations

Eβ^-	E(level)	Iβ^-	Log *ft*	Comments
(439.0)	1394.473	2.60 *4*	6.105 *8*	av Eβ=143.13 *19*.
(843.2)	990.257	90.9 *6*	5.596 *4*	av Eβ=304.89 *21*.
(1240.1)	593.394	4.06 *13*	7.596 *14*	av Eβ=476.70 *23*.
(1460.7)	372.762	0.9 *6*	8.5 *3*	av Eβ=575.64 *23*. Iβ: from 1988Wa28.
(1833.5)	0	1.54 *18*	9.73 *5*	av Eβ=769.22 *23*. From magnetic spectrometer measurements (1988Wa28), the Kurie plot has the expected unique first-forbidden shape.

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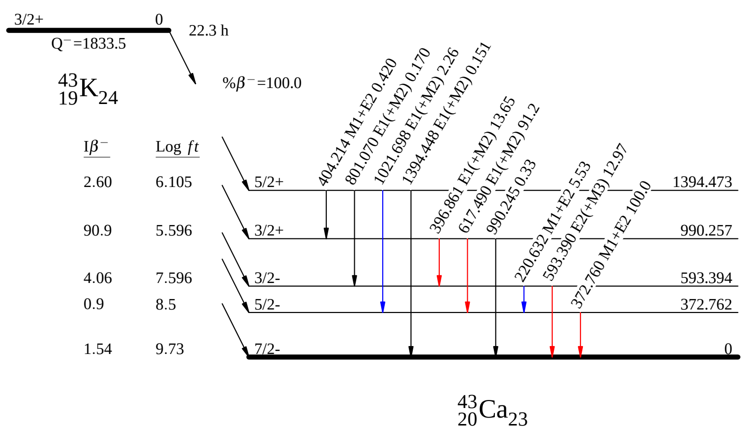
^{43}K β^- decay (22.3ℏ) 1988Wa28,1972Wa20 (continued)

β^- radiations (continued)

Eβ^-	E(level)	Iβ^-	Log *ft*	Comments
				Iβ: from Iβ(g.s.)/Iβ(990)=0.017 *2* (adopted by 1988Wa28 as the average of 0.019 (1954Li42) and 0.15 (1959Be72)).

Decay Scheme

Intensities: I_γ per 100 parent decays



^{43}Sc ε decay (3.891$\hbar$) 1975Yo03

Parent: ^{43}Sc: E=0; Jπ=7/2-; $T_{1/2}$=3.891 h *12*; Q(g.s.)=2220.8 *19*; %ε=100

1975Yo03: Activity of ^{43}Sc was produced via the ^{40}ca(α,p) reaction using a 12 MeV α beam from the University of Pennsylvania tandem accelerator. γ-rays were detected using a 65 cm^3 Ge(Li) detector. Measured Eγ,Iγ. Deduced levels, branchings.

Others:

γ: 1968Ch12, 1964Ba46, 1954Li42, 1954Nu22, 1953Nu08, 1952Ha44.

β^+: 1964Ba46, 1954Li42, 1952Ha44, 1945Hi04, 1945Hi05.

$\beta\gamma$: 1954Li42.

$T_{1/2}$ and isotopic assignment: 1969Ra16, 1963Du11, 1945Hi05, 1945Hi04. Others: 1954An25, 1953Du22, 1952Ha44, 1940Wa01, 1937Wa07, 1935Fr04.

All data is from 1975Yo03, unless otherwise noted.

^{43}Ca Levels

E(level)†	J$^{\pi}$‡
0	7/2-
372.9 *3*	5/2-
593.2 *5*	3/2-
1931.0 *4*	5/2-

† From least-squares fit to Eγ data.
‡ From Adopted Levels.

γ(^{43}Ca)

Eγ	E_i(level)	J_i^{π}	E_f(level)	J_f^{π}	Iγ†	Mult.‡	δ‡	Comments
220.4	593.2	3/2-	372.9	5/2-	0.0036			Iγ: from adopted branching.
372.9 *3*	372.9	5/2-	0	7/2-	100	M1+E2	-0.192 *11*	
593.3 *7*	593.2	3/2-	0	7/2-	0.0095 *32*	E2(+M3)	≈0	
1337.9 *7*	1931.0	5/2-	593.2	3/2-	0.0080 *10*			
1558.3 *6*	1931.0	5/2-	372.9	5/2-	0.0375 *22*	M1+E2	+0.28 *14*	
1930.7 *6*	1931.0	5/2-	0	7/2-	0.0672 *34*	M1+E2	-0.8 *3*	

† For absolute intensity per 100 decays, multiply by 0.225 *7*.
‡ From Adopted Gammas.

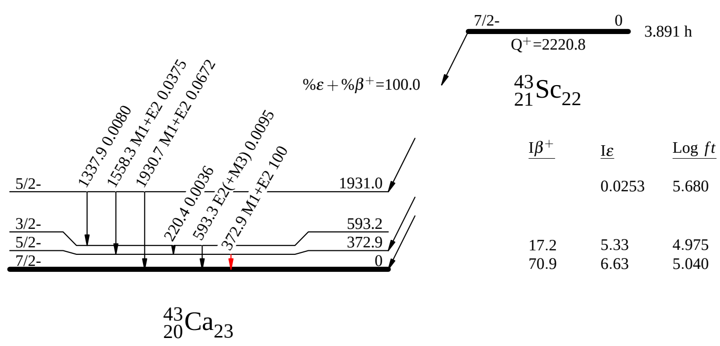
^{43}Sc ε decay (3.891h) 1975Yo03 (continued)

ε,β+ radiatons

Eε	E(level)	Iε	Log *ft*	I(ε+β+)	Comments
(289.8)	1931.0	0.0253 *10*	5.680 *19*	0.0253 *10*	εK=0.8941 . εL=0.09061 *2*. εM+=0.015261 *3*.
(1847.9)	372.9	5.33 *17*	4.975 *14*	22.5 *7*	av Eβ=344.50 *83*. εK=0.2123 *13*. εL=0.02107 *13*. εM+=0.003540 *21*.
(2220.8)	0	6.63 *9*	5.040 *5*	77.5 *7*	av Eβ=508.14 *85*. εK=0.0767 *4*. εL=0.00761 *4*. εM+=0.001278 *6*.

Decay Scheme

Intensities: I_γ per 100 parent decays



^{27}Al(^{19}F,2pnγ) 1976Po03

Includes ^{28}Si(^{18}O,n2pγ) from 1974Li06.

1976Po03 (also 1974Po10): E=40 MeV ^{19}F beam was produced at the Brookhaven National Laboratory. Target of aluminum evaporated onto a tungsten backing. γ-rays were detected by Ge(Li) detectors. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$, γ(lin pol). Deduced levels, $T_{1/2}$ by recoil distance method. 1974Po10 also use ^{27}Al(^{18}O,pnγ) E=30 MeV reaction.

1974Li06: ^{28}Si(^{18}O,n2pγ). Measured $T_{1/2}$ by recoil-distance method for the level at 2755 keV.

^{43}Ca Levels

Nuclear Level Sequence

A 3/2+ band.

Seq.	E(level)	J^{π}†	$T_{1/2}$‡	Comments
	0	7/2-		
	372.81 *5*	5/2-		
	593.39 *8*	3/2-		
A	990.32 *7*	3/2+	51 ps *8*	
A	1394.60 *9*	5/2+		
	1677.80 *20*	11/2-		
A	1901.80 *20*	7/2+		
	2093.90 *20*	9/2-		
A	2409.80 *20*	9/2+		
	2753.96 *25*	15/2-	23.6 ps *10*	$T_{1/2}$: 27 ps *4* from 1974Li06.
A	2951.5 *3*	11/2+	<14 ps	
A	3371.2 *4*	13/2+	<14 ps	
A	3943.8 *5*	15/2+	<3.5 ps	
A	4591.0 *6*	17/2+		

† From Adopted Levels.

‡ Recoil-distance method in 1976Po03, unless otherwise noted.

γ(^{43}Ca)

When A_4=0, it indicates that the fit was not improved by the inclusion of P_4 term.

E_i(level)	J_i^{π}	E_f(level)	J_f^{π}	$E\gamma$†	$I\gamma$	Comments
372.81	5/2-	0	7/2-	372.81	≈24.0	
593.39	3/2-	372.81	5/2-	220.58	1.33	A_2=-0.11 *5*, A_4=0.
990.32	3/2+	593.39	3/2-	396.93	1.70	
		372.81	5/2-	617.51	6.44	A_2=-0.21 *4*, A_4=0. Pol=+0.11 *9*.
1394.60	5/2+	990.32	3/2+	404.15	1.98	A_2=-0.25 *5*, A_4=0.
		372.81	5/2-	1021.78	4.15	A_2=+0.08 *4*, A_4=0.
1677.80	11/2-	0	7/2-	1677.76	47 *16*	A_2=+0.23 *2*, A_4=-0.08 *2* for unresolved γ. Pol=+0.30 *8*.
1901.80	7/2+	990.32	3/2+	911.49	≈0.63	A_2=+0.28 *2*, A_4=-0.16 *2*. Pol=+0.53 *14*.
		0	7/2-	1901.75	3.40	A_2=+0.17 *6*, A_4=-0.13 *6*.
2093.90	9/2-	0	7/2-	2093.85	<8.5	A_2=-0.11 *3*, A_4=+0.11 *3*. Pol=-0.05 *22*.
2409.80	9/2+	1394.60	5/2+	1015.19	≈3.6	A_2=+0.35 *2*, A_4=-0.12 *2*. Pol=+0.19 *15*.
		0	7/2-	2409.73	3.71	A_2=-0.23 *5*, A_4=0.
2753.96	15/2-	1677.80	11/2-	1076.15 *15*	27.0	A_2=+0.25 *2*, A_4=-0.11 *2*. Pol=+0.43 *7*.
2951.5	11/2+	2409.80	9/2+	541.6 *3*	0.98	A_2=-0.46 *19*, A_4=0.
		2093.90	9/2-	857.65 *25*	3.30	A_2=-0.09 *10*, A_4=0.
		1901.80	7/2+	1049.1 *4*	≈1.0	
3371.2	13/2+	2951.5	11/2+	419.7 *3*	2.50	A_2=-0.16 *12*, A_4=0. Pol=-0.41 *13*.

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^{27}Al(^{19}F,2pnγ) 1976Po03 (continued)

γ(^{43}Ca) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	$E\gamma$†	$I\gamma$	Comments
		2753.96	15/2-	617.23	≈1.3	
		2409.80	9/2+	961.60 *20*	4.13	A_2=+0.23 *5*, A_4=-0.10 *5*.
		1677.80	11/2-	1693.36	≈1.0	
3943.8	15/2+	3371.2	13/2+	572.64 *20*	4.03	A_2=-0.25 *5*, A_4=0. Pol=-0.08 *5*.
4591.0	17/2+	3943.8	15/2+	647.2 *3*	1.35	A_2=-0.17 *7*, A_4=0.

† From level-energy differences, when no uncertainty is quoted.

^{30}Si(^{18}O,αnγ) 1998Be29

1998Be29 (also 1997Be09,1996Be39): E=60 MeV ^{18}O beam was produced from the XTU Tandem of Laboratori Nazionali di Legnaro (LNL). Target of 360 μg/cm^2 SiO^2. γ-rays were detected in the multidetector 4π ρ-ray array GASP of 36 Compton-suppressed HPGe detectors and 80 BGO detectors and heavy recoils were separated by the Recoil Mass Spectrometer (RMS). Measured Eγ, Iγ, $\gamma\gamma$. Deduced levels.

^{43}Ca Levels

Nuclear Level Sequences

A 3/2+ band.
B 5/2+ band.

Seq.	E(level)	J^π†
	0	7/2-
	373	5/2-
	593	3/2-
A	990	3/2+
B	1394	5/2+
	1678	11/2-
A	1902	7/2+
	2094	9/2-
B	2410	9/2+
	2754	15/2-
A	2951	11/2+
B	3371	13/2+
	3505	13/2+
A	3944	15/2+
	4187	15/2+
B	4591	17/2+
A	5555	(19/2+)
B	6223	(21/2+)

† As proposed by 1998Be29 and 1996Be39 based on DCO ratio analysis.

^{30}Si(^{18}O,αnγ) 1998Be29 (continued)

γ(^{43}Ca)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ	I_γ
373	5/2-	0	7/2-	373	33.9
593	3/2-	373	5/2-	220	1.0
		0	7/2-	593	2.0
990	3/2+	593	3/2-	397	3.6
		373	5/2-	617	
1394	5/2+	990	3/2+	404	2.6
		593	3/2-	801	0.3
		373	5/2-	1021	10.1
1678	11/2-	0	7/2-	1678	100
1902	7/2+	1394	5/2+	508	1.2
		990	3/2+	912	1.1
2094	9/2-	0	7/2-	2094	13.9
2410	9/2+	1902	7/2+	508	1.2
		1394	5/2+	1016	8.2
		0	7/2-	2410	7.5
2754	15/2-	1678	11/2-	1076	75.4
2951	11/2+	2410	9/2+	541	2.9
		2094	9/2-	857	10.5
		1902	7/2+	1049	1.0
3371	13/2+	2951	11/2+	420	6.5
		2754	15/2-	617	4.9
		2410	9/2+	961	14.0
3505	13/2+	2951	11/2+	554	1.9
		2754	15/2-	751	3.6
3944	15/2+	3505	13/2+	439	2.0
		3371	13/2+	573	19.6
		2951	11/2+	993	1.9
		2754	15/2-	1190	4.5
4187	15/2+	3371	13/2+	815	4.6
4591	17/2+	4187	15/2+	404	2.9
		3944	15/2+	647	9.6
		2754	15/2-	1837	4.5
5555	(19/2+)	4591	17/2+	964	12.3
		3944	15/2+	1611	18.6
6223	(21/2+)	5555	(19/2+)	668	5.4

^{40}Ar(α,nγ) 1979Be27

1979Be27 (also 1978Be16): E=5.5-19 MeV α beam was produced at the Oliver Lodge Laboratory of University of Liverpool. Target of solid natural argon (3-5 mg/cm^2) on 250 μm thick Au or Ta backings. γ-rays were detected in a Ge(Li) detector. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$, γ(lin pol). Deduced levels, J, π, γ-branching ratios, $T_{1/2}$ by DSAM.

Others:
1974Sc09: E=8.5 MeV. Measured $T_{1/2}$ by DSAM.
1972Al12: E=13.5 MeV. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$.
1972Bi13: E=5.5-8 MeV. Measured γ, ce, $T_{1/2}$ by DSAM.
1972Ka41, 1969Ka18: E=6.3-8.0 MeV. Measured $T_{1/2}$ by DSAM.
1976Fi08: ^{40}Ar(α,n) E=24.1 MeV. Measured $\sigma(E_n,\theta)$.
1987Wa29: ^{40}Ar(α,n) E=26 MeV. Measured $\sigma(E_n,\theta)$.

^{43}Ca Levels

A 1984.8 level (decaying by a 1985γ) proposed by 1972Al12 is not supported by the $\gamma\gamma$ coin and excitation function data of 1979Be27. From $\gamma\gamma$ data, the 1985γ is assigned by 1979Be27 from 3663 level.

E(level)†	J$^{\pi}$‡	$T_{1/2}$#	Comments
0.0	7/2-		
372.76 *14*	5/2-	34 ps *3*	$T_{1/2}$: weighted average of 29 ps *6* (1974Sc09), 35 ps *3* (1972Bi13).
593.48 *14*	3/2-	81 ps *4*	$T_{1/2}$: weighted average of 98 ps *10* (1974Sc09), 80 ps *4* (1972Bi13), 71 ps *9* (1972Ka41).
990.31 *18*	3/2+	48 ps *4*	$T_{1/2}$: weighted average of 64 ps *7* (1974Sc09), 46 ps *3* (1972Bi13), 45 ps *6* (1972Ka41).
1394.78 *20*	5/2+	2.4 ps *8*	$T_{1/2}$: 3.4 ps *6* (1972Ka41).
1677.7 *4*	11/2-	1.5 ps *9*	
1902.06 *25*	7/2+	0.50 ps *13*	
1931.85 *24*	5/2-	0.125 ps *35*	
1957.4 *4*	1/2+	1.07 ps *32*	
2046.1 *3*	3/2-	0.83 ps *24*	
2067.5 *5*	7/2-	<28 fs	$T_{1/2}$: <12 ps (1972Ka41).
2094.0 *5*	9/2-	1.5 ps *4*	
2102.8 *4*	3/2-	0.33 ps *9*	
2223.8 *4*	(3/2,5/2)-	28 fs *17*	
2249.4 *4*	9/2-	24 fs *17*	
2273.0 *4*	(3/2,5/2)+	0.28 ps *8*	
2409.8 *4*	9/2+	1.1 ps *4*	
2611.1 *4*		0.13 ps *5*	
2675.0 *8*		87 fs *42*	
2696.9 *6*		<38 fs	
2753.9 *5*	15/2-		
2769.7 *5*		0.10 ps *4*	
2844.8 *5*		0.55 ps *15*	
2879.2 *6*		0.107 ps *38*	
2943.6 *5*		<60 fs	
2951.3 *4*	11/2+	4.7 ps *12*	
3028.7 *9*		<60 fs	
3049.6 *15*		<60 fs	
3050.7 *5*	11/2-	<17 fs	
3076.0 *15*		<17 fs	
3096.1 *7*		<17 fs	
3097.1 *7*		0.76 ps *20*	
3195.7 *5*		0.12 ps *4*	
3286.0 *10*		<60 fs	
3315.6 *11*		0.13 ps *6*	
3371.1 *4*	13/2+	>3.5 ps	
3376.8 *10*			
3505.2 *5*	13/2+	73 fs *24*	
3662.5 *5*	13/2-	49 fs *21*	

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^{40}Ar(α,nγ) 1979Be27 (continued)

^{43}Ca Levels (continued)

E(level)†	J$^{\pi}$‡	$T_{1/2}$#	Comments
3816.2 *8*		69 fs *38*	
3943.6 *5*	15/2+	0.76 ps *21*	
4135.9 *7*		<0.26 ps	
4175.0 *11*			
4186.4 *5*	15/2+	0.13 ps *5*	
4394.8 *6*	15/2-	42 fs *17*	
4590.8 *5*	17/2+	0.21 ps *5*	
4621.0 *6*	15/2+	76 fs *28*	
5155.4 *6*	13/2-,17/2-	76 fs *28*	J$^{\pi}$: no observed transitions to J≤11/2 and excitation function favors 17/2.
5394.6 *11*		0.104 ps *31*	
5555.2 *7*	(15/2,19/2)+	1.4 ps *4*	
5931.5 *8*	(11/2,15/2,19/2)-	55 fs *17*	J$^{\pi}$: no observed transitions to J<11/2 and excitation function favors 19/2.
6223.4 *9*	(17/2,21/2)+	0.58 ps *15*	J$^{\pi}$: no observed transitions to J<13/2 and excitation function favors 21/2.

† From least-squares fit to Eγ data.
‡ From $\gamma(\theta)$ and γ(lin pol) (1979Be27).
# From DSAM method (1979Be27).

$\gamma(^{43}Ca)$

E_i(level)	J_i^{π}	E_f(level)	J_f^{π}	E_γ	I_γ	Mult.†	δ†	Comments
372.76	5/2-	0.0	7/2-	372.7 *2*	100	M1+E2	-0.192 *11*	Mult.: from Adopted Gammas; sign(δ) from γ(θ,pol). A_2=+0.01 *1*, A_4=-0.02 *1*. Pol=-0.06 *1*.
593.48	3/2-	372.76	5/2-	220.7 *2*	29.1 *5*	M1(+E2)	-0.07 *7*	A_2=+0.01 *1*, A_4=-0.03 *1*. Pol=-0.08 *3*.
		0.0	7/2-	593.5 *2*	70.9 *5*	E2(+M3)	≈0	A_2=+0.08 *1*, A_4=-0.02 *1*. Pol=+0.08 *1*.
990.31	3/2+	593.48	3/2-	396.9 *2*	12.6 *3*	E1		δ: -0.1 *1*. A_2=+0.07 *1*, A_4=-0.02 *1*. Pol=-0.16 *5*.
		372.76	5/2-	617.1 *4*	87.4 *3*	E1		δ: -0.02 *2*. A_2=-0.05 *1*, A_4=+0.01 *1*. Pol=+0.09 *1*.
1394.78	5/2+	990.31	3/2+	404.3 *3*	11.7 *4*	M1+E2	+0.32 *5*	A_2=+0.14 *1*, A_4=+0.02 *1*. Pol=-0.47 *6*.
		593.48	3/2-	801.2 *4*	5.7 *4*	E1		δ: -0.03 *4*. A_2=-0.21 *2*, A_4=+0.02 *2*. Pol=+0.35 *12*.
		372.76	5/2-	1021.6 *4*	77.6 *4*	E1		δ: +0.11 *12*. A_2=+0.25 *1*, A_4=-0.02 *1*. Pol=-0.31 *3*.
		0.0	7/2-	1394.8 *4*	11.7 *4*	E1		δ: 0 A_2=-0.25 *3*, A_4=+0.09 *3*. Pol=+0.12 *19*.
1677.7	11/2-	0.0	7/2-	1677.7 *6*	100	E2		δ(O/Q)=-0.02 *2*. A_2=+0.33 *2*, A_4=-0.10 *2*. Pol=+0.53 *2*.
1902.06	7/2+	1394.78	5/2+	507	17 *4*			
		990.31	3/2+	911.6 *3*	13 *4*	E2		δ(O/Q)=-0.02 *3*. A_2=+0.54 *4*, A_4=-0.25 *4*.
		0.0	7/2-	1902.1 *5*	70 *4*[a]	E1		δ: +0.03 *4*. A_2=+0.33 *1*, A_4=-0.01 *1*. Pol=-0.45 *12*.
1931.85	5/2-	593.48	3/2-	1338.4 *5*	6.6 *10*	M1+E2	+2.2 *25*	A_2=+0.52 *8*, A_4=+0.12 *7*.
		372.76	5/2-	1559.6 *5*	35.1 *10*	M1+E2	+0.28 *14*	A_2=+0.43 *2*, A_4=-0.03 *1*. Pol=+0.48 *17*.
		0.0	7/2-	1931.6 *3*	58.3 *10*	M1+E2	-0.8 *3*	A_2=+0.31 *1*, A_4=+0.02 *1*. Pol=-0.36 *12*.
1957.4	1/2+	990.31	3/2+	967.1 *4*	28 *1*			
		593.48	3/2-	1364.0 *5*	100 *1*			
2046.1	3/2-	1394.78	5/2+	651.0 *4*	2			
		990.31	3/2+	1056.0 *5*	7	E1		δ: 0.00 *3*. A_2=+0.40 *5*, A_4=-0.11 *4*.
		593.48	3/2-	1451	8			
		372.76	5/2-	1675	20			
		0.0	7/2-	2046.6 *9*	63[a]	E2		δ(O/Q)=0.00 *2*. A_2=+0.08 *1*, A_4=0.00 *1*. Pol=+0.25 *7*.
2067.5	7/2-	372.76	5/2-	1694.7 *6*	21.9 *9*	M1+E2	-0.90 *24*	A_2=-0.94 *3*, A_4=+0.12 *3*. Pol=+0.25 *11*.
		0.0	7/2-	2067.5 *6*	78.1 *9*	M1+E2	-0.10 *6*	A_2=+0.32 *1*, A_4=+0.01 *1*. Pol=+0.96 *12*.
2094.0	9/2-	0.0	7/2-	2094.2 *8*	100	M1+E2	-5.9 *11*	A_2=-0.19 *2*, A_4=+0.16 *2*. Pol=+0.09 *5*.
2102.8	3/2-	593.48	3/2-	1509.2 *5*	25	M1+E2	+2.0 *17*	δ: +0.3 to +3.7. A_2=+0.27 *2*, A_4=-0.05 *3*. Pol=-0.03 *12*.
		372.76	5/2-	1730.1 *6*	50			A_2=+0.09 *2*, A_4=-0.07 *2*. Pol=-0.20 *8*.
		0.0	7/2-	2102.9 *5*	25			
2223.8	(3/2,5/2)-	593.48	3/2-	1630.3 *5*	57.3 *13*	M1+E2		δ: -0.50 *25* for J=5/2; +0.8 *+4-10* for J=3/2. A_2=-0.48 *1*, A_4=+0.01 *1*. Pol=+0.01 *5*.
		372.76	5/2-	1851.0 *6*	42.7 *13*	M1+E2		δ: -0.20 *5* for J=5/2; >+11, or <-5.6 for J=3/2. A_2=+0.11 *2*, A_4=+0.01 *2*. Pol=+0.35 *9*.

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γ(^{43}Ca) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ	I_γ	Mult.†	δ†	Comments
2249.4	9/2-	372.76	5/2-	1876.8 6	11 1	E2		δ(O/Q)=-0.01 3. A_2=+0.40 6, A_4=-0.34 8. Pol=+1.0 5.
		0.0	7/2-	2249.5 7	89 1	M1+E2	-0.75 12	A_2=-0.85 2, A_4=+0.05 3. Pol=+0.15 7.
2273.0	(3/2,5/2)+	1394.78	5/2+	877.8 4	16 3	M1+E2		δ: -10 +4-13 for J=5/2; +0.1 4 for J=3/2. A_2=-0.10 1, A_4=0.00 1. Pol=-0.05 3.
		990.31	3/2+	1283.3 5	84 3	M1+E2		δ: -11 +2-4 for J=5/2; -0.26 5 for J=3/2. A_2=+0.01 2, A_4=-0.03 2. Pol=+0.24 8.
2409.8	9/2+	1902.06	7/2+	508.0 7	44 4			
		1394.78	5/2+	1015	11 2			
		0.0	7/2-	2409.8 6	45 4[a]	E1		δ: -0.03 4. A_2=-0.26 1, A_4=+0.01 1. Pol=+0.15 10.
2611.1		2046.1	3/2-	565.0 3				
		593.48	3/2-	2017.5 6				
2675.0		372.76	5/2-	2302.2 7				
		0.0	7/2-	2674.6 8[b]				γ not seen in (p,p′γ).
2696.9		990.31	3/2+	1706.2 6	36.6 9			
		372.76	5/2-	2324.9 9	63.4 9			A_2=+0.26 2, A_4=+0.02 2. Pol=-0.61 12.
2753.9	15/2-	1677.7	11/2-	1076.0 5	100	E2		δ(O/Q)=-0.02 2. A_2=+0.36 1, A_4=-0.14 1. Pol=+0.60 3.
2769.7		990.31	3/2+	1779.1 6				
		593.48	3/2-	2176.6 8				
2844.8		2094.0	9/2-	750.9[b]				γ treated as uncertain (by evaluators) in view of adopted Jπ(2844)= (5/2)+ and Jπ(2094)=9/2-.
		1902.06	7/2+	942.1 6				
		1394.78	5/2+	1450.0				
		0.0	7/2-	2845.7 11				
2879.2		1957.4	1/2+	922.1 6				
		593.48	3/2-	2285.0 10				
2943.6		593.48	3/2-	2350.4 6				
		372.76	5/2-	2570.1 8				
2951.3	11/2+	2409.8	9/2+	541.5 3	14 1	M1+E2	-0.04 2	A_2=-0.16 1, A_4=+0.03 1. Pol=-0.20 13.
		2094.0	9/2-	857.4 4	65 1	E1		δ: 0.00 2. A_2=-0.15 1, A_4=+0.01 1. Pol=+0.39 3.
		1902.06	7/2+	1048.9 5	21 1			
3028.7		372.76	5/2-	2655.9 8	100			A_2=+0.32 2, A_4=-0.05 2. Pol=+0.48 10.
3049.6		0.0	7/2-	3049.5 15	100			
3050.7	11/2-	2249.4	9/2-	801.7 7	12 2			
		1677.7	11/2-	1373.0 6	53 2	M1+E2	+0.30 5	A_2=+0.42 2, A_4=-0.02 1. Pol=+0.50 10.
		0.0	7/2-	3049.7 11	36 2	E2		δ(O/Q)=-0.02 2.
3076.0		0.0	7/2-	3075.9 15	100			A_2=+0.37 2, A_4=-0.04 2. Pol=-0.50 16.
3096.1		593.48	3/2-	2502.4 8				
		372.76	5/2-	2723.4 11				
3097.1		2409.8	9/2+	687.3 7				

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^{40}Ar(α,nγ) 1979Be27 (continued)

γ(^{43}Ca) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ	I_γ	Mult.†	δ†	Comments
		1902.06	7/2+	1195.0 *10*				Pol=+0.45 *10*.
3195.7		2844.8		350.7 *4*				
		1902.06	7/2+	1294.1 *7*				
3286.0		2046.1	3/2-	1239.9 *9*				
3315.6		2046.1	3/2-	1269.5 *10*				
3371.1	13/2+	2951.3	11/2+	419.5 *5*	21.0 *12*			
		2753.9	15/2-	617.1 *7*	26.0 *12*			
		2409.8	9/2+	961.6 *8*	41.0 *12*	E2		δ(O/Q)=0.00 *2*. A_2=+0.27 *2*, A_4=-0.13 *2*. Pol=+0.55 *7*.
		1677.7	11/2-	1693.7 *9*	12.0 *12*			
3376.8		2094.0	9/2-	1282.8 *9*				
3505.2	13/2+	2951.3	11/2+	554.1 *5*	12 *2*	M1+E2	-0.06 *2*	A_2=-0.30 *3*, A_4=-0.07 *4*. Pol=0.00 *3*.
		2753.9	15/2-	751.1 *6*	13 *2*			
		1677.7	11/2-	1827.4 *9*	75 *2*	E1		δ: -0.03 *3*. A_2=-0.15 *1*, A_4=0.00 *1*. Pol=+0.41 *6*.
3662.5	13/2-	3050.7	11/2-	612.0 *7*	12 *2*			
		2753.9	15/2-	908.0 *9*	13 *2*			
		2249.4	9/2-	1412.9 *7*	14 *2*			
		1677.7	11/2-	1984.8 *9*	61 *2*	M1+E2	-0.60 *14*	A_2=-0.92 *3*, A_4=+0.11 *4*. Pol=-0.03 *10*.
3816.2		2409.8	9/2+	1406.4 *7*				
3943.6	15/2+	3505.2	13/2+	438.5 *4*	51 *7*	M1(+E2)	0.00 *2*	A_2=-0.24 *2*, A_4=-0.01 *2*. Pol=-0.34 *5*.
		3371.1	13/2+	572.2 *6*	34 *7*			
		2753.9	15/2-	1189.8 *7*	15 *7*			
4135.9		2951.3	11/2+	1184.6 *6*				
4175.0		2273.0	(3/2,5/2)+	1902.0 *10*				
4186.4	15/2+	3505.2	13/2+	681.1 *4*	14 *3*			
		3371.1	13/2+	815.4 *6*	86 *3*	M1+E2	-0.15 *2*	A_2=-0.50 *2*, A_4=-0.01 *2*. Pol=-0.28 *5*.
4394.8	15/2-	3662.5	13/2-	731.9 *5*	22 *3*			
		2753.9	15/2-	1641.1 *7*	37 *3*	M1+E2	-0.50 *14*	A_2=+0.43 *7*, A_4=-0.17 *7*. Pol=+0.56 *25*.
		1677.7	11/2-	2717.4 *12*	41 *3*	E2		δ(O/Q)=0.00 *2*. A_2=+0.49 *7*, A_4=-0.18 *6*. Pol=+0.96 *30*.
4590.8	17/2+	4186.4	15/2+	404.4 *4*	24 *5*			
		3943.6	15/2+	647.2 *5*	49 *5*	M1(+E2)	0.00 *2*	A_2=-0.30 *1*, A_4=-0.03 *2*. Pol=-0.47 *7*.
		2753.9	15/2-	1837.4 *9*	27 *5*	E1		δ: 0.00 *2*.
4621.0	15/2+	3943.6	15/2+	677.4 *4*	28 *4*			
		3371.1	13/2+	1249.9 *7*	72 *4*	M1(+E2)	-0.02 *3*	A_2=-0.26 *5*, A_4=+0.07 *6*. Pol=-0.47 *20*.
5155.4	13/2-,17/2-	4394.8	15/2-	760.4 *5*	65 *3*	M1+E2		δ: -0.08 *2* or -0.15 *2*. A_2=-0.36 *2*, A_4=-0.05 *2*. Pol=-0.20 *10*.
		3662.5	13/2-	1493.1 *6*	35 *3*			δ: 0.00 *2* for 17/2 to 13/2, but no γ(θ) data quoted.
5394.6		2753.9	15/2-	2640.6 *10*				
5555.2	(15/2,19/2)+	4590.8	17/2+	964.5 *6*	<60			
		3943.6	15/2+	1611.4 *7*	>40	M1,E2		δ: 0.00 *2* for 19/2+ to 15/2+; +0.7 *1* for 15/2+ to 15/2+. A_2=+0.37 *5*, A_4=-0.19 *6*. Pol=+0.37 *25*.

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γ(^{43}Ca) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ	I_γ	Mult.[†]	δ[†]	Comments
5931.5	(11/2,15/2,19/2)-	5155.4	13/2-,17/2-	776.1 *5*	100	M1(+E2)		δ: -0.03 *2*; +0.07 *3*; -0.11 *2* for different Jπ′s. A_2=-0.28 *3*, A_4=-0.01 *4*. Pol=-0.33 *18*.
6223.4	(17/2,21/2)+	5555.2	(15/2,19/2)+	668.2 *5*	100	M1(+E2)		δ: -0.02 *3*; +0.06 *3*; +0.09 *3* for different Jπ′s. A_2=-0.27 *4*, A_4=-0.05 *5*. Pol=-0.40 *17*.

[†] From γ(θ) and γ(lin pol) (1979Be27).
[a] Quoted by 1979Be27 from 1978En02.
[b] Placement of transition in the level scheme is uncertain.

$^{43}_{19}K_{24}$-43

^{41}K(^{3}He,p) 1968Do02

Jπ(^{41}K g.s.)=3/2+.

1968Do02: E=13.0 MeV ^{3}He beam was produced at the Laboratory for Nuclear Science. Target of enriched ^{41}KI (99.18%) on a thin carbon backing, thickness of 78 μg/cm^{2}. Protons were analyzed with the MIT multiple gap spectrograph. Measured $\sigma(E_p,\theta)$ for transitions up to 9 MeV excitation. A total of 28 groups reported up to 9 MeV excitation. Deduced levels, J, π, L from DWBA analysis.

^{43}Ca Levels

E(level)	Jπ	L	dσ/dΩ (μb/sr)†	Comments
0‡			10‡	
990		0	18	Weak population is consistent with configuration=$1f^4_{7/2}1d_{3/2}{}^{-1}$, J=3/2, T=3/2 as proposed by 1966Do02 in (d,p).
1393			<4	Very weak population suggests a configuration more complicated than $1f^4_{7/2}1d_{3/2}{}^{-1}$; J=3/2,T=3/2, proposed by 1966Do02 in (d,p).
2050‡			10‡	
2270‡			15‡	
2843		0	46	Strongest transition below 6 MeV. Strong population relative to the 990 group is consistent with configuration=$1f^4_{7/2}1d_{3/2}{}^{-1}$; Jπ=3/2+, T=3/2.
3100‡			15‡	
3300‡			30‡	
3916‡		2	10‡	Similarity to 4984, 9/2+ state in ^{41}Ca indicates 4p-1h component in this level.
6300‡			40‡	
6410‡			30‡	
6460‡			45‡	
6570‡			30‡	
6640‡			60‡	
6680‡			60‡	
6790‡			100‡	
6950‡			80‡	
7040‡			50‡	
7090‡			80‡	
7190‡			160‡	
7500‡			190‡	
7570‡			80‡	
7730‡			80‡	
7920‡			95‡	
8033‡		0	640‡	T=5/2 . IAS of ^{43}K ground state.
8160‡			35‡	
8270‡			45‡	
8470‡			110‡	
8930‡			90‡	

† At θ=7.5°.
‡ Approximate value read from a plot (in 1968Do02) of excitation energy versus dσ/dΩ. Uncertainty in level energy is estimated at ≈30 keV.

^{41}K(α,d) 1977Na30

Jπ(^{41}K g.s.)=3/2+.

1977Na30 (also 1975Na18): E=40 MeV α beam was produced from the Michigan State University Cyclotron. Enriched ^{41}K target (98%) on a thin carbon foil, thickness of $\approx$100 μg/cm^2. Deuteron particles were analyzed with a split-pole magnetic spectrograph (FWHM=40 keV) and detected by a proportional-counter in the focal plane. Measured $\sigma(E_d,\theta)$ from 6° to 55°. Deduced levels, J, π, L from DWBA analysis. Absolute differential cross sections are accurate to 30%.

For transferred proton-neutron pair, proposed configurations are: ($d_{3/2}p_{3/2}$) for L=3, [$(f_{7/2})^2{}_5$+$(f_{7/2}p_{3/2})_5$] for L=4, ($d_{3/2}f_{7/2}$) for L=5, [$(f_{7/2})^2{}_5$+$(f_{7/2}p_{3/2})_5$+$(f_{7/2})^2{}_7$] for L=4+6, and ($f^2_{7/2}{}_7$) for L=6.

^{43}Ca Levels

E(level)	J$^{\pi\ddagger}$	L	dσ/dΩ (μb/sr)†	Comments
0	7/2-#	5	150	
2045	3/2-#	3	65	
2850	(11/2+,13/2+)	4+6	23, 20	
2951		6	76	
3072	(11/2+,13/2+)	4+6	10, 18	
3196				Very weakly populated.
3278	(11/2+ TO 17/2+)	6	24	
3372		6	79	
3500	(11/2+,13/2+)	4+6	130, 110	
3838	(7/2+ TO 13/2+)	4	60	
3944		6	135	
4134	(11/2+,13/2+)	6	78	
4191	(11/2+ TO 17/2+)	6	220	
4291	(11/2+,13/2+)	4+6	32, 21	
4357	(11/2+,13/2+)	4+6	58, 25	
4462	(11/2+,13/2+)	4+(6)	33, 6	
4591		6	510	
4701				
4888	(11/2+ TO 17/2+)	6	105	
5189	(11/2+,13/2+)	4+6	20,35	
5246	(11/2+,13/2+)	4+6	110, 28	
5351	(11/2+,13/2+)	4+6	78, 34	
5696	(11/2+,13/2+)	4+6	42, 37	
6087				
6173				

† At 10°.

‡ Above 2045, the assignments are from 1977Na30, based on L(α,d) from 3/2+. For transferred proton-neutron pair, proposed configurations are: ($d_{3/2}p_{3/2}$) for L=3, [$(f_{7/2})^2{}_5$+$(f_{7/2}p_{3/2})_5$] for L=4, ($d_{3/2}f_{7/2}$) for L=5, [$(f_{7/2})^2{}_5$+$(f_{7/2}p_{3/2})_5$+$(f_{7/2})^2{}_7$] for L=4+6, and $(f_{7/2})^2{}_7$ for L=6.

From Adopted Levels.

^{42}Ca(n,γ) E=thermal 1969Gr08,1978Ve06

1969Gr08: Thermal neutron beam was produced from the Dutch High Flux Reactor, with intensity of 10^7 $cm^{-2}s^{-1}$ on enriched ^{42}Ca target. γ-rays were detected by a 6.5 cm^3 planar Ge(Li) detector. Measured Eγ, Iγ, $\gamma\gamma$. Deduced levels, J, γ-branching ratios.
1978Ve06: Polarized thermal neutron beam was produced from the HFR at Petten, with intensity of 2×10^7 $cm^{-2}s^{-1}$ on enriched ^{42}Ca target. γ-rays were detected Ge(Li) detectors. Measured γ(circ pol). Deduced levels, J.
Others:
1971BiZH: E=thermal. Measured Eγ, Iγ, $\gamma\gamma$.
1971Cr02: E=thermal. Measured Eγ, Iγ. Data for three secondary γ rays.
1989Ra06: E=thermal.

^{43}Ca Levels

E(level)‡	Jπ†	Comments
0.0	7/2-	
372.72 *17*	5/2-	
593.31 *23*	3/2-#	
990.4 *3*	3/2+	
1394.5 *5*	5/2+	
1957.3 *8*	1/2+	
2046.33 *21*	3/2-#	
2102.8 *5*	3/2-	
2272.8 *12*		
2610.9 *4*	1/2-#	
2878.2 *5*	1/2-#	
2943.5 *4*	3/2-#	
3286.1 *6*	3/2-#	
3315.4 *6*	1/2-,3/2-	
3572.6 *4*	3/2-#	
4207.3 *4*	1/2-#	
4602.6 *11*	(1/2,3/2,5/2+)	
4641.5 *11*	3/2+,5/2+	
4901.2 *6*	1/2-,3/2-#	
5037.8 *6*	1/2-,3/2-#	
7932.7 *3*	1/2+	E(level): 7933.0 *3* (1995Au04). Observed deexcitation intensity is 88% *8* of g.s. feeding. Jπ: s-wave capture in ^{42}Ca g.s.

† From Adopted Levels, unless otherwise stated.
‡ Least-squares fit to Eγ data.
# From (pol n,γ) measurements (1978Ve06).

γ(^{43}Ca)

Asymmetry ratios from (pol n,γ) are given under comments as R.

E_i(level)	J^π_i	E_f(level)	J^π_f	Eγ†‡	Iγ†	Comments
				878.2 *6*	0.9 *2*	
				1370.5 *10*	1.1 *2*	
				3654.7 *6*	0.9 *3*	
				4836.8 *9*	≈0.1	
				5420.7 *12*	≈0.2	
372.72	5/2-	0.0	7/2-	372.70 *20*	38 *4*	
593.31	3/2-	372.72	5/2-	220.6 *3*	11 *1*	
		0.0	7/2-	593.4 *6*	23 *2*	
990.4	3/2+	593.31	3/2-	396.9 *4*	0.9 *2*	
		372.72	5/2-	617.7 *3*	6.6 *7*	
1394.5	5/2+	990.4	3/2+	404.0 *8*	0.5 *2*	

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^{42}Ca(n,γ) E=thermal 1969Gr08,1978Ve06 (continued)

γ(^{43}Ca) (continued)

E_i(level)	J^π_i	E_f(level)	J^π_f	Eγ[†‡]	Iγ[†]	Comments
		372.72	5/2-	1021.5 *10*	1.4 *4*	
1957.3	1/2+	990.4	3/2+	967.5 *15*	≈0.2	
		593.31	3/2-	1363.9 *10*	1.5 *10*	
2046.33	3/2-	1394.5	5/2+	651.6 *6*	0.9 *5*	
		990.4	3/2+	1055.9 *6*	4.2 *6*	
		593.31	3/2-	1453.0 *3*	4.9 *5*	
		372.72	5/2-	1673.5 *4*	11.9 *12*	
		0.0	7/2-	2046.3 *3*	38 *4*	
2102.8	3/2-	372.72	5/2-	1729.9 *10*	1.2 *4*	
		0.0	7/2-	2102.7 *6*	1.2 *5*	
2610.9	1/2-	2046.33	3/2-	564.4 *6*	1.5 *5*	
		593.31	3/2-	2017.8 *8*	2.8 *3*	
2878.2	1/2-	2046.33	3/2-	831.4 *10*	0.4 *2*	
		593.31	3/2-	2285.4 *10*	1.4 *3*	
2943.5	3/2-	2102.8	3/2-	840.9 *10*	0.3 *2*	
		593.31	3/2-	2350.3 *4*	2.5 *3*	
3286.1	3/2-	2046.33	3/2-	1239.1 *12*	1.0 *2*	
3315.4	1/2-,3/2-	2046.33	3/2-	1268.9 *6*	0.7 *2*	
3572.6	3/2-	2046.33	3/2-	1525.4 *10*	0.7 *2*	
		593.31	3/2-	2978.9 *7*	1.2 *3*	
		372.72	5/2-	3199.4	0.3 *2*	
4207.3	1/2-	2046.33	3/2-	2161.1 *6*	2.1 *3*	
		593.31	3/2-	3613.4 *8*	4.7 *12*	
4602.6	(1/2,3/2,5/2+)	593.31	3/2-	4009.8[a]		
4641.5	3/2+,5/2+	2046.33	3/2-	2595.3[a]		
4901.2	1/2-,3/2-	2272.8		2628.4		Iγ(2628)/Iγ(2855)=0.67 *47* (quoted by 1990En08).
		2102.8	3/2-	2798.4		Iγ(2798)/Iγ(2855)=1.00 *85* (quoted by 1990En08).
		2046.33	3/2-	2854.8		
		593.31	3/2-	4307.6		Iγ(4308)/Iγ(2855)=0.67 *60* (quoted by 1990En08).
5037.8	1/2-,3/2-	2046.33	3/2-	2992.4 *10*	0.6 *3*	
7932.7	1/2+	5037.8	1/2-,3/2-	2895.1 *5*	2.0 *3*	R=+2.1 *9* (1978Ve06).
		4901.2	1/2-,3/2-	3031.3 *10*	1.1 *3*	R=+0.9 *5* (1978Ve06).
		4641.5	3/2+,5/2+	3291.1		
		4602.6	(1/2,3/2,5/2+)	3330.0		
		4207.3	1/2-	3725.3 *3*	8.3 *12*	R=+0.98 *15* (1978Ve06).
		3572.6	3/2-	4359.5 *5*	2.9 *4*	R=-0.4 *2* (1978Ve06).
		3315.4	1/2-,3/2-	4616.6 *9*	0.6 *3*	
		3286.1	3/2-	4646.2 *6*	2.4 *5*	R=-0.3 *2* (1978Ve06).
		2943.5	3/2-	4989.2 *5*	3.6 *5*	R=-0.55 *18* (1978Ve06).
		2878.2	1/2-	5054.2 *5*	2.4 *4*	R=+0.6 *3* (1978Ve06).
		2610.9	1/2-	5321.4 *5*	4.1 *6*	R=+0.79 *19* (1978Ve06).
		2102.8	3/2-	5828.6 *15*	0.9 *3*	
		2046.33	3/2-	5886.0 *4*	53 *8*	R=-0.50 *3* (1978Ve06).
		1957.3	1/2+	5975.2 *15*	0.6 *3*	
		593.31	3/2-	7339.0 *7*	5.7 *9*	R=-0.50 *11* (1978Ve06).

[†] From 1969Gr08. Recoil correction, applied by 1969Gr08, has been removed by the evaluators.
[‡] Gamma energies in 1969Gr08 have been compared with those in the PGAA-LBL Budapest database (2007ChZX).
[a] Placement of transition in the level scheme is uncertain.

^{42}Ca(n,γ):resonance 2006MuZX

2006MuZX: Compilation of thermal neutron induced σ and resonance parameter data for nuclei of Z=1-100.
1977Mu02: E(n)>2.5 keV. Measured parameters for about 60 resonances (24 s-wave and 21 p-wave) between 9.143 keV and 229.6 keV.
1971Ch56: E(n)=10-100 keV. Measured Eγ, resonances.
1966Fa02: E(n)=30-600 keV. Measured resonances Others: 1971Ch56, 1966Go38.

^{43}Ca Levels

$g\Gamma_n=(2J+1)\Gamma_n/2$.
All resonance parameters including resonance neutron energies, Jπ, L, $g\Gamma_n$ and Γ_γ are directly adopted from the compilation in 2006MuZX unless otherwise indicated.

E(level)[†]	Jπ	$T_{1/2}$	L	E_n(lab) (keV)	Comments
7929.2		1.06 eV	0	-3.85	
7941.88 *17*		0.56 eV *10*	1	9.143 *4*	$g\Gamma_n$=1.0 eV 5. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.36 eV *4*.
7942.08 *17*		0.645 eV *80*	0	9.345 *4*	$g\Gamma_n$=3 eV 1. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.53 eV *6*.
7951.56 *17*			1	19.06 *1*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.13 eV *1*.
7955.13 *17*		0.435 eV *50*	0	22.71 *1*	$g\Gamma_n$=20 eV 5. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.42 eV *5*.
7956.17 *17*			1	23.78 *1*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.022 eV *4*.
7958.62 *17*		0.68 eV *10*	0	26.29 *1*	$g\Gamma_n$=3 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.56 eV *6*.
7968.91 *17*		0.56 eV *5*	1	36.82 *1*	$g\Gamma_n$=2 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.53 eV *6*.
7969.51 *17*		1.36 eV *15*	0	37.44 *1*	$g\Gamma_n$=1000 eV 300.
7972.10 *17*			1	40.09 *1*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.33 eV *4*.
7977.9			0	46	$g\Gamma_n$=300 eV.
7980.06 *17*		0.61 eV *6*	0	48.24 *2*	$g\Gamma_n$=15 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.59 eV *6*.
7981.48 *17*			1	49.70 *2*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.15 eV *2*.
7981.65 *17*		0.31 eV *5*	1	49.87 *2*	$g\Gamma_n$=10 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.30 eV *3*.
7989.92 *17*		0.79 eV *8*	0	58.34 *2*	$g\Gamma_n$=5 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.68 eV *7*.
7991.80 *17*		0.8 eV *1*	0	60.26 *2*	$g\Gamma_n$=20 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.77 eV *8*.
7996.59 *17*		0.38 eV *5*	0	65.17 *3*	$g\Gamma_n$=50 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.38 eV *5*.
8002.12 *17*			1	70.83 *3*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.21 eV *4*.
8006.45 *17*			1	75.27 *3*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.44 eV *5*.
8007.62 *17*		1.19 eV *15*	0	76.46 *3*	$g\Gamma_n$=10 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=1.06 eV *12*.
8013.64 *17*		0.44 eV *5*	0	82.63 *4*	$g\Gamma_n$=200 eV 50. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.44 eV *5*.
8014.25 *17*		0.5 eV *1*	1	83.25 *4*	$g\Gamma_n$=10 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.83 eV *10*.
8020.16 *17*				89.31 *4*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.79 eV *10*.
8020.52 *17*				89.68 *4*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.69 eV *10*.
8023.49 *19*				92.72 *8*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.51 eV *7*.

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^{42}Ca(n,γ):resonance 2006MuZX (continued)

^{43}Ca Levels (continued)

E(level)†	Jπ	$T_{1/2}$	L	E_n(lab) (keV)	Comments
8023.77 *19*				93.00 *8*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.71 eV *8*.
8025.59 *19*				94.87 *8*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.47 eV *6*.
8028.55 *19*		0.98 eV *15*	0	97.90 *8*	$g\Gamma_n$=5 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.82 eV *10*.
8033.83 *20*			1	103.3 *1*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.40 eV *6*.
8047.20 *20*		1.60 eV *15*	0	117.0 *1*	$g\Gamma_n$=20 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=1.50 eV *15*.
8049.25 *20*		0.41 eV *8*	1	119.1 *1*	$g\Gamma_n$=10 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.76 eV *12*.
8052.1 *10*		1.55 eV	0	122 *1*	$g\Gamma_n$=3750 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=1.55 eV.
8055.99 *20*		0.70 eV *8*	1	126.0 *1*	$g\Gamma_n$=10 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=1.23 eV *15*.
8057.0 *10*			0	127 *1*	$g\Gamma_n$=11000 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=1.5.
8057.07 *20*			1	127.1 *1*	$g\Gamma_n\Gamma_\gamma/\Gamma$=1.03 eV *13*.
8057.46 *20*				127.5 *1*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.72 eV *10*.
8058.34 *20*				128.4 *1*	$g\Gamma_n\Gamma_\gamma/\Gamma$=1.26 eV *15*.
8061.1 *3*		0.56 eV *8*	1	131.2 *2*	$g\Gamma_n$=5 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.50 eV *8*.
8062.2 *3*			0	132.4 *2*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.87 eV *10*.
8066.1 *3*		0.41 eV *8*	1	136.3 *2*	$g\Gamma_n$=5 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.38 eV *6*.
8073.9 *3*		0.94 eV *15*	0	144.3 *2*	$g\Gamma_n$=75 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.93 eV *13*.
8074.6 *3*		0.47 eV *8*	1	145.1 *2*	$g\Gamma_n$=20 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.89 eV *13*.
8075.5 *3*				146.0 *2*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.67 eV *9*.
8078.4 *3*			0	148.9 *2*	$g\Gamma_n\Gamma_\gamma/\Gamma$=1.44 eV *17*.
8081.0 *3*				151.6 *3*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.90 eV *12*.
8086.1 *3*		1.63 eV *18*	0	156.8 *3*	$g\Gamma_n$=300 eV 50. $g\Gamma_n\Gamma_\gamma/\Gamma$=1.62 eV *18*.
8089.4 *3*				160.2 *3*	$g\Gamma_n\Gamma_\gamma/\Gamma$=1.20 eV *14*.
8090.3 *4*				161.1 *4*	$g\Gamma_n\Gamma_\gamma/\Gamma$=1.53 eV *18*.
8099.3 *4*				170.4 *4*	$g\Gamma_n\Gamma_\gamma/\Gamma$=1.15 eV *14*.
8103.3 *10*		1.9 eV *2*	0	174.4 *10*	$g\Gamma_n$=2500 eV 500. $g\Gamma_n\Gamma_\gamma/\Gamma$=1.9 eV *2*.
8106.1 *4*		1.70 eV *18*	0	177.3 *4*	$g\Gamma_n$=200 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=1.69 eV *18*.
8113.7 *4*				185.1 *4*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.78 eV *11*.
8115.4 *4*		0.56 eV *10*	0	186.8 *4*	$g\Gamma_n$=300 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.56 eV *10*.
8128.3 *5*		1.02 eV *14*		200.0 *5*	$g\Gamma_n$=300 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=1.02 eV *14*.
8132.9 *5*				204.8 *5*	$g\Gamma_n\Gamma_\gamma/\Gamma$=1.25 eV *15*.

Continued on next page (footnotes at end of table)

^{42}Ca(n,γ):resonance 2006MuZX (continued)

^{43}Ca Levels (continued)

E(level)†	J^π	$T_{1/2}$	L	E_n(lab) (keV)	Comments
8134.1 *5*				206.0 *5*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.87 eV *11*.
8138.2 *5*				210.2 *5*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.40 eV *6*.
8139.9 *5*		1.30 eV *18*	0	211.9 *5*	$g\Gamma_n$=1750 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=1.33 eV *18*.
8141.6 *5*		0.49 eV *10*	1	213.7 *5*	$g\Gamma_n$=20 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.94 eV *15*.
8144.3 *5*				216.4 *5*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.63 eV *10*.
8149.0 *5*		0.33 eV *5*	1	221.2 *5*	$g\Gamma_n$=260 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.67 eV *10*.
8152.3 *5*		0.325 eV *60*	1	224.6 *5*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.31 eV *6*.
8157.2 *5*		1.08 eV *18*	0	229.6 *5*	$g\Gamma_n$=50 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=1.06 eV *18*.
8165.9			>1	238.5	$g\Gamma_n$=500 eV.
8176.1			>1	249	
8181.0			1	254	$g\Gamma_n$=800 eV.
8186.4			0	259.5	$g\Gamma_n$=750 eV.
8201.0			0	274.5	$g\Gamma_n$=750 eV.
8201.5			>1	275	
8204.9			0	278.5	$g\Gamma_n$=1500 eV.
8206.9			1	280.5	$g\Gamma_n$=750 eV.
8223.0			>1	297	$g\Gamma_n$=238 eV.
8259.1			>1	334	$g\Gamma_n$=460 eV.
8263.0			>1	338	$g\Gamma_n$=550 eV.
8281.1			0	356.5	$g\Gamma_n$=1500 eV.
8302.6			>1	378.5	$g\Gamma_n$=295 eV.
8308.9			>1	385	
8323.1			0	399.5	$g\Gamma_n$=500 eV.
8341.1			0	418	$g\Gamma_n$=400 eV.
8348.0			0	425	$g\Gamma_n$=300 eV.
8367.5			>1	445	
8369.5			>1	447	$g\Gamma_n$=1000 eV.
8372.9			0	450.5	$g\Gamma_n$=1750 eV.
8399.7			0	478	$g\Gamma_n$=750 eV.
8412.9			0	491.5	$g\Gamma_n$=1000 eV.
8418.8			>1	497.5	
8430.0			>1	509	
8434.4			0	513.5	$g\Gamma_n$=5500 eV.
8452.5			0	532	$g\Gamma_n$=6500 eV.
8465.6			0	545.5	$g\Gamma_n$=2000 eV.
8474.9			0	555	$g\Gamma_n$=300 eV.
8479.8			0	560	$g\Gamma_n$=500 eV.
8484.2			>1	564.5	
8490.1			0	570.5	$g\Gamma_n$=10000 eV.
8492.0			>1	572.5	

† From $E_{c.m.}$+S(n) where S(n)=7932.95 *17* (2011AuZZ) and $E_{c.m.}$ deduced from E_n(lab) in 2006MuZX.

^{42}Ca(d,p) 1966Do02,1974Br19,1977Sc05

Target ^{42}Ca Jπ=0+.

1966Do02: E=7.0, 7.1, 7.2 MeV deuteron beam was produced from the MIT-ONR electrostatic generator. Targets of 93.7 enriched $CaCO_3$ on carbon and Formvar foils. proton were analyzed by a multiple-gap spectrograph (FWHM=12 keV) and detected by nuclear emulsions. Measured $\sigma(E_p,\theta)$ from 10° to 180°. A total of 83 groups reported. Deduced levels, L, spectroscopic factors from DWBA analysis.

1974Br19 (also 1971Br14): E=7, 8, 10, 12 MeV deuteron beam was produced at AWRE, Aldermastron. Target of 93.7% enriched $CaCO_3$ on a carbon backing. Proton were analyzed by a multigap spectrograph (FWHM=12 keV). Measured s(E_p,θ). Deduced levels, L, spectroscopic factors from DWBA analysis.

1977Sc05: E=2.5 MeV. FWHM=20-25 keV. Measured E(p), $\sigma(\theta)$, deduced ex, L and (2J+1)s for 20 levels up to 5028 keV. DWBA code DWUCK results are given here. Results using code LOLA differ considerably for weakly-populated levels.

Others:

1991NaZZ: E=25 MeV. $\sigma(\theta)$, deduced L-transfers and s factors for a large number of states up to 9 MeV excitation. Plots of excitation energy and (2J+1)S values are provided for 1d, 2s, 1f, 2p, 1g, 2d and 3s orbitals. No numerical (tabulated) data are available from this work.

1982En06: E=2, 3, 4, 4.5 MeV. Measured $\sigma(\theta)$ for 0, 373 and 593 levels.

1970Br27: E=10, 12 MeV. Measured $\sigma(\theta)$. Deduced L and (2J+1)s for 0, 2040, 2610 and 2940 states.

1968Be36: E=7.0, 7.2 MeV. Measured $\sigma(\theta)$; data for four states at 0, 990, 1899 and 2041 compared with other calc isotopes.

1968An10: E=9.99 MeV. Measured $\sigma(\theta$=35). Comparison of 7/2- g.s. And 3/2- state strengths among calc isotopes.

1968De04, 1968De09: E=8, 10 MeV. Measured $\sigma(\theta)$. Studied J-dependence for g.s. and 990 transitions in ^{43}Ca and other f-shell nuclides.

1965Be23: E=7.0,7.2 MeV. $\sigma(\theta)$ for g.s. and 374 level.

1957Br19: E=5.0, 6.5, 7.4 MeV. θ=90, 130. *26* groups reported up to 3420 keV excitation.

1957Bo99 (also 1957Bp01): E=7 MeV. Measured $\sigma(\theta)$, deduced L, strengths relative to ^{41}Ca g.s. 35 groups reported up to 3584 keV excitation. L-transfers measured for 10 states.

Other: 1964Le02.

^{43}Ca Levels

E(level)†	J$^\pi$	L‡	(2J+1)S‡	Comments
0		3	4.5	
373@		3	3.9	
593@		1	0.16	
990		2	0.28	L: from 1968Be36.
1393		(2)	0.03	
1676				
1899				
1928				
1954		0	0.10	
2041		1	2.9	
2096		1	0.04	
2219				
2246				
2269		(2)	0.01	
2404				
2523		(1)	0.01	
2607		1	0.28	
2669		3	0.08	
2693		2	0.02	
2758		0	0.002	
2843		0	0.001	
2874		1	0.18	
2939		1	0.19	
3022				
3045				
3071		0	0.003	
3091				
3191				
3287		1	0.12	
3314		1	0.03	
3352				
3376				

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^{42}Ca(d,p) 1966Do02,1974Br19,1977Sc05 (continued)

^{43}Ca Levels (continued)

E(level)†	J^{π}	L‡	(2J+1)S‡	Comments
3417		3	0.19	
3566		1	0.19	
3604		0	0.001	
3655		(2)	0.01	
3705				
3737				
3772		1	0.01	
3783				
3810		(3)	0.16	L: from 1966Do02.
3864		(1)	0.05	L: 1 (1966Do02).
3898				
3916		(1)	0.04	L: L=4, S=1.19 (1966Do02).
3958				
3978		2	0.01	
4017				
4048		2	0.01	
4078				
4089		(3)	0.08	
4124		4	0.19	
4148		0	0.003	
4196		1	0.86	
4239		1	0.10	
4268		1	0.04	L: 2 (1966Do02).
4298		0	0.003	
4324#				
4370				
4401				
4429#				
4460		3	0.36	L: from 1966Do02.
4498				
4533		0	0.002	
4585				
4609				
4638		2	0.06	
4654		0	0.002	E(level): from 1974Br19.
4705				
4736				
4758				
4783				
4796				
4826				
4854				
4874				
4897		1	0.14	
4922				
4944				
4982		2	0.07	L: L=1, S=0.05 (1966Do02).
5008				
5028		1	0.16	
5047		1	0.06	
5072		1	0.04	
5100		0	0.003	
5170		2	0.04	
5193		0	0.006	
5215		0	0.015	

† From 1966Do02 up to 5028 keV and from 1974Br19 above this energy.

‡ From 1974Br19, unless otherwise stated.
# The existence of this level is considered unlikely by 1978En02.
@ Principally populated via two-step processes (1982En06).

^{42}Ca(α,^{3}He) 1982Ho17

Target ^{42}Ca Jπ=0+.

1982Ho17: E=36 MeV α beam was produced from the Orsay MP tandem. Target of 95% enriched ^{42}Ca backed by a 10 μg/cm^2 carbon film, thickness of 160 μg/cm^2. ^{3}He particles were analyzed by a split-pole magnetic spectrograph and detected by six position sensitive silicon detectors in the focal plane, FWHM=20 keV. Measured σ(E(^{3}He),θ) from 4° to 42°. Uncertainty in cross sections ≈15%. Deduced levels, L, spectroscopic factors from DWBA and coupled-reaction-channel (CRC) analysis.

^{43}Ca Levels

E(level)	J$^\pi$	L	(2J+1)S†	Comments
0		3	5.40	
373		3	0.15	
593		1	0.17	
990#		2	0.87	σ(exp)/σ(theory-CRC)=8.5.
1395		2	0.06	
1678#				σ(exp)/σ(theory-CRC)=0.04.
1957#		(0)		σ(exp)/σ(theory-CRC)=3.
2046		1	4.26	
2249#				σ(exp)/σ(theory-CRC)=0.70.
2611		1	0.33	
2674		3	0.28,0.18	
2741#				σ(exp)/σ(theory-CRC)=1.
2850#		2	0.32,0.27	σ(exp)/σ(theory-CRC)=2.1.
2948‡		(1)	0.74	11/2+ component considered in CRC calculations. σ(exp)/σ(theory-CRC)=0.5 (for 11/2+ component).
3044#				σ(exp)/σ(theory-CRC)=0.06.
3085		2	0.70,0.55	
3193		4	0.10	
3278‡		(4)	0.13	
3371#				σ(exp)/σ(theory-CRC)=0.11.
3413		3	0.43,0.29	
3504#				σ(exp)/σ(theory-CRC)=0.13.
3645#				σ(exp)/σ(theory-CRC)=3.
3803		(3)	0.20	
3913‡		(4)	0.14	
4041				
4123		(4)	0.04	
4193		1	0.44	
4463		(3)	1.45	
4569				
4826		(3)	0.90	
4880				
5001		(3)	1.16	
5040				
5200		(3)	2.80	
5251#				σ(exp)/σ(theory-CRC)=3.2.
5410				
5548‡				
5647‡				
5727‡				
5805				

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^{42}Ca(α,^{3}He) 1982Ho17 (continued)

^{43}Ca Levels (continued)

E(level)	J$^\pi$	L	(2J+1)S†	Comments
5889‡				
5991		(3)	2.75	

† Normalization factor N=46 used in the DWBA formula relating experimental and DW cross sections. When two values are quoted, these correspond to J=L-1/2 and J=L+1/2, respectively.
‡ Doublet.
$^\#$ Considered in coupled-reaction-channel (CRC) analysis. Multiplets considered are: f7/2 neutron coupled to 2+ at 1520, 4+ at 2750 and 3- at 3440 in ^{42}Ca.

^{43}Ca(p,p$'$) 1957Br19

1957Br19: E=6.5, 7.0 MeV proton beam was produced from the MIT-ONR electrostatic generator. Target of enriched $CaCo_3$ (67.95% ^{43}Ca). Scattered protons were analyzed with a broad-range spectrograph. Measured $\sigma(E_p)$. Deduced levels.
1980Fa07: (p,p) E=35.2 MeV proton beam was produced from the Milan sector-focused cyclotron. Target of $CaCO_3$ enriched to 49.1% in ^{43}Ca. Scattered protons were detected by silicon surface-barrier detectors in rotatable counter telescopes. Measured $\sigma(E_p,\theta)$. Deduced deformation parameter.
All data is from 1957Br19 unless otherwise noted.

^{43}Ca Levels

E(level)†	J$^\pi$	E(level)†	J$^\pi$	E(level)†	J$^\pi$	E(level)†	J$^\pi$
0$^\#$		2046		2671		3073	
371		2067		2694		3093	
591		2093		2751		3193	
990		2105		2842		3278	
1394		2223		2878		3292‡	
1677		2248‡		2946		3368‡	
1903		2271‡		3026		3397‡	
1931		2407		3047		3418	
1956		2604					

† Uncertainty is probably 5-10 keV (by evaluators).
‡ Unresolved from impurities peaks from ^{40}Ca or ^{44}Ca.
$^\#$ β_2 (electromagnetic)=0.25 (1980Fa07).

^{43}Ca(p,p′γ) 1972Gr04

1972Gr04: E=4.235 MeV proton beam was produced from the Groningen 5 MV Van de Graaff accelerator. Target consisted of a layer of 87 $\mu g/cm^2$ *9* CaO evaporated onto a 185 $\mu g/cm^2$ carbon foil, 81% in ^{43}Ca. γ-rays were detected by a 30 cm^3 true-coaxial Ge(Li) detector. Measured Eγ, Iγ, pγ coin. Deduced levels, J, π, γ-branching, $T_{1/2}$ by DSAM.

Other:

1968Ch12: 2.550, 3.235, 3.605 MeV. Measured γ, γγ, excitation functions.

1967Fo01: Measured $T_{1/2}$ of the 593 keV level from decay curve.

1985Ki07: Measured thick target relative γ-yields.

^{43}Ca Levels

E(level)†	Jπ‡	$T_{1/2}$#
0	7/2-	
372.76 *7*	5/2-	>3.5 ps
593.38 *8*	3/2-	160 ps *10*@
990.27 *9*	3/2+	>4.9 ps
1394.55 *9*	5/2+	1.73 ps *35*
1677.89 *19*	11/2-	0.83 ps *14*
1901.99 *16*	7/2+	0.55 ps *10*
1931.48 *15*	5/2-	0.11 ps *3*
2045.9 *6*	3/2-	>0.49 ps
2067.10 *17*	7/2-	21 fs *7*
2093.85 *20*	9/2-	1.2 ps *4*
2224.1 *4*	3/2-,5/2-	>49 fs
2248.95 *14*	9/2-	40 fs *8*
2272.4 *5*	3/2+,5/2+	>0.35 ps
2409.74 *18*	9/2+	1.2 ps *+6-4*
2673.5 *3*	5/2-,7/2-	31 fs *13*
2695.7 *15*	3/2+,5/2+	<70 fs

† From least-squares fit to Eγ data.
‡ From Adopted Levels.
# From DSAM (1972Gr04).
@ From decay curve (1967Fo01).

γ(^{43}Ca)

```
 Measured limits of Iγ's of γ's (involving ΔJ>2 or
ΔJ=2, ΔPI=yes) from different levels are as follows:
  990 level: Iγ<1.5 to g.s.
 1678 level: Iγ<2 to 373 level, Iγ<1 to 593 level, Iγ<0.5 to 990
             and 1395 levels
 1901 level: Iγ<4 to 1678 level, Iγ<3 to 593 level
 1931 level: Iγ<7 to 1678 level
 2067 level: Iγ<5 to 990 level
2093 level: Iγ<1 to 1395 level, Iγ<2 to 990 level, Iγ<4 to 593 levl

 2249 level: Iγ<1.3 to 1395 level, Iγ<2.5 to 990 and 593 levels
 2409 level: Iγ<6.7 to 990 level, Iγ<4.4 to 593 level,
             Iγ<9 to 373 level
```

E_i(level)	J^π_i	E_f(level)	J^π_f	Eγ†	Iγ
372.76	5/2-	0	7/2-	372.83 *10*	100
593.38	3/2-	372.76	5/2-	220.66 *10*	33 *2*
		0	7/2-	593.36 *10*	67 *2*
990.27	3/2+	593.38	3/2-	396.9 *2*	13 *2*
		372.76	5/2-	617.51 *7*	87 *2*
1394.55	5/2+	990.27	3/2+	404.3 *2*	13 *1*
		593.38	3/2-	801.1 *16*	6 *1*
		372.76	5/2-	1021.80 *7*	77 *2*
		0	7/2-	1394.5 *2*	3.7 *6*

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^{43}Ca(p,p′γ) 1972Gr04 (continued)

γ(^{43}Ca) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ
1677.89	11/2-	0	7/2-	1677.8 *2*	100
1901.99	7/2+	1394.55	5/2+	507.8 *3*[a]	17 *2*
		990.27	3/2+	911.7 *5*	13 *4*
		372.76	5/2-	1529[b]	<3
		0	7/2-	1901.8 *2*	70 *4*
1931.48	5/2-	1394.55	5/2+	537[b]	<8.6
		990.27	3/2+	941[b]	<19
		593.38	3/2-	1339.5 *16*[a]	9 *4*
		372.76	5/2-	1558.7 *2*	33 *5*
		0	7/2-	1931.4 *2*	58 *5*
2045.9	3/2-	0	7/2-	2045.8 *6*	100
2067.10	7/2-	1677.89	11/2-	389[b]	<2.5
		1394.55	5/2+	672[b]	<2.5
		593.38	3/2-	1474[b]	<6.3
		372.76	5/2-	1694.2 *3*	20 *2*
		0	7/2-	2067.1 *2*	80 *2*
2093.85	9/2-	1677.89	11/2-	416[b]	<1
		372.76	5/2-	1721[b]	<5
		0	7/2-	2093.8 *2*	100
2224.1	3/2-,5/2-	593.38	3/2-	1632 *2*	60 *8*
		372.76	5/2-	1851.3 *4*	40 *8*
2248.95	9/2-	1901.99	7/2+	347[b]	<1.3
		1677.89	11/2-	570.7 *5*[a]	2.0 *5*
		372.76	5/2-	1876.2 *2*	18 *5*
		0	7/2-	2248.9 *2*	80 *5*
2272.4	3/2+,5/2+	1394.55	5/2+	877.8 *5*[a]	100
2409.74	9/2+	1901.99	7/2+	508.0 *10*[a]	11 *2*
		1677.89	11/2-	732[b]	<6.7
		1394.55	5/2+	1015.2 *2*	44 *4*
		0	7/2-	2409.6 *3*	45 *4*
2673.5	5/2-,7/2-	1394.55	5/2+	1276.0 *10*[b]	20
		372.76	5/2-	2300.7 *3*	100
2695.7	3/2+,5/2+	372.76	5/2-	2322.9 *15*[a]	100

[†] Recoil correction applied by 1972Gr04 is removed (evaluators).
[a] From coin spectra.
[b] Placement of transition in the level scheme is uncertain.

^{43}Ca(d,d′) 1965Be11

Target ^{43}Ca Jπ=7/2-.

1965Be11: E=8.522 MeV deuteron beam was produced from the tandem electrostatic generator of the Atomic Weapons Research Establishment (AWRE), Aldermaston, England. Target of enriched ^{43}Ca (>99.9%). Deuteron spectra recorded with a multi-gap magnetic spectrometer, FWHM=15 keV. Measured $\sigma(\theta)$. Deduced levels, J, π, L, deformation parameters from DWBA analysis.

^{43}Ca Levels

E(level)	J^{π}	L	β_2
0			
369		2	0.114
595		2	0.087
1675		2	0.13
1932		(2)	0.06
2051		(2)	0.08
2070		4	
2098		2	0.09
2252		2	0.114

^{43}Ca(α,α') 1974De42

1974De42: E=24.0, 28.5, 31.0 MeV of 250-400 nA α beam was produced from the University of Rochester MP tandem Van de Graaff accelerator. Target of a isotopically separated metallic calcium evaporated onto a 20 μg/cm^2 carbon backing. Scattered α particles were analyzed with an Enge split-pole magnetic spectrograph and detected in the focal plane by a 30 cm long position sensitive proportional detector or 5cm silicon detectors or K-1, 50 μm photographic emulsions. Measured $\sigma(E_\alpha,\theta)$. Deduced levels, J, π, L, transition probabilities from analysis with DWBA and coupled-channel calculations.

^{43}Ca Levels

E(level)	J$^{\pi}$†	L	BE(L))↑ (isoscalar)‡	Comments
0	7/2-			
373	5/2-	2+4	0.0055	L: 76%(L=2), 24%(L=4).
593	3/2-	2+4	0.0027	L: 73%(L=2), 27%(L=4).
1676	11/2-	2+4	0.0068	L: 80%(L=2), 20%(L=4).
1930	5/2-	2+4	0.0020	L: 86%(L=2), 14%(L=4).
2045	3/2-	2+4	0.0015	L: 62%(L=2), 38%(L=4).
2066	7/2-	2+4	0.00073	L: 58%(L=2), 42%(L=4).
2094	9/2-	2+4	0.0026	L: 70%(L=2), 30%(L=4).
2248	9/2-	2+4	0.0068	L: 83%(L=2), 17%(L=4).
2668		2+4	0.0011	L: 75%(L=2), 25%(L=4).
2694		2+4	0.00075	L: 65%(L=2), 35%(L=4).
2756		(4+6)		L: 57%(L=4), 43%(L=6).
2850		3+5	0.00019	L: 73%(L=3), 27%(L=5).
2948	11/2+	3+5	0.00063	L: 80%(L=3), 20%(L=5).
3025				
3048	11/2-	2+4	0.0048	L: 83%(L=2), 17%(L=4).
3091		3+5	0.00068	L: 77%(L=3), 23%(L=5).
3194	7/2+,9/2+	3+5	0.000615	L: 78%(L=3), 22%(L=5).
3277	(5/2,7/2)+	3+5	0.00177	L: 74%(L=3), 26%(L=5) for 3277+3297.
3297		3+5	0.00177	L: for 3277+3297.
3377	13/2+	3+5	0.00116	L: 72%(L=3), 28%(L=5).
3469				
3502	13/2+	3+5	0.00129	L: 79%(L=3), 21%(L=5).
3660	13/2-	(2+4)	0.00092	L: 31%(L=2), 69%(L=4).
3836				
3929		3+5	0.00191	L: 68%(L=3), 32%(L=5) for 3929+3942. L: for 3929+3942.
3942	15/2+	3+5	0.00191	L: for 3929+3942.
4140	7/2+,9/2+	3+5	0.00062	L: 61%(L=3), 39%(L=5).

† From Adopted Levels.

‡ BE(L)↑ (isoscalar) for L=2 in case of L=2+4, and for L=3 for L=3+5 transitions. BE(L)↑ for L=4 and L=5 are given under comments. Statistical uncertainties are ≈15%.

^{44}Ca(p,d) 1972Ma23,1968Sm05

Target ^{44}Ca Jπ=0+.

1972Ma23 (also 1972MaXL): E=40 MeV proton beam was produced from the the Grenoble variable-energy cyclotron. Targets of natural and enriched ^{44}Ca metal foils. Deuterons sere detected with ΔE-E counter telescope, FWHM=120 keV. Measured $\sigma(E_d,\theta)$ from 10° to 60° in 4° steps. Overall accuracy on absolute cross sections ≈10%. Deduced levels, J, π, L, spectroscopic factors from DWBA analysis.

1968Sm05: E=26.5 MeV proton beam was produced from the University of Colorado Cyclotron. Target of 98.61% enriched ^{44}Ca. Deuterons were detected with ΔE-E (silicon surface barrier, 211 μm and 1090 μm) counter telescope, FWHM=110 keV. Measured $\sigma(\theta)$ from 21° to 76° in 5° steps. Overall accuracy on absolute cross sections ≈25%. Deduced levels, J, π, L spectroscopic factors from DWBA analysis.

1966Co06: E=17.5 MeV proton beam was produced from the Princeton FM cyclotron. Target of 98.6% enriched ^{44}Ca. Deuterons were detected with ΔE-E (solid-state detector) counter telescope, FWHM=80-100 keV. Measured $\sigma(E_d,\theta)$ from 20° to 160° (ϵM system) in 10° steps. Overall accuracy on absolute cross sections ≈25%. Deduced levels, J, π, L spectroscopic factors from DWBA analysis. Levels up to 2050 reported.

^{43}Ca Levels

Spectroscopic factor C^{2}s:N*C^{2}S=$\sigma(\theta)^{exp}/\sigma(\theta)^{DWBA}$, where n is the normalization factor. N==2.25 (1968Sm05).

E(level)†	Jπ‡	L#	C^{2}S@	Comments
0	7/2-	3	2.8	S: 3.7 (1968Sm05), 2.4 (1966Co06).
374	5/2-	3	0.05	S: 0.15 (1968Sm05).
594	3/2-	1	0.04	S: 0.10 (1968Sm05), 0.06 (1966Co06).
993	3/2+	2	2.4	S: 2.5 (1968Sm05), 0.8 (1966Co06).
1389	(3/2)+	2	0.34	S: 0.16 for 3/2, 0.12 for 5/2 (1968Sm05).
1680				
1960	1/2+	0	1.0	S: 0.62 (1968Sm05).
2050	3/2-	1	0.05	S: 0.18 (1968Sm05).
2250	(5/2)+	2	0.26	S: 0.20 for 5/2, 0.28 for 3/2 (1968Sm05).
2660	(5/2)+	2	0.26	S: 0.26 for 5/2, 0.36 for 3/2 (1968Sm05).
2840	(5/2)+	2	0.34	S: 0.22 for 5/2, 0.37 for 3/2 (1968Sm05).
3050	(5/2)+&1/2+	2+0	0.47,0.13	L: from 1972Ma23. Other: L=0, S=0.22 (1968Sm05).
3260		(2,3)		L: from 1972Ma23. Other: L=3, S=0.28 for 7/2- in 1968Sm05.
3620	(5/2)+	2	0.05	L: from 1972Ma23. Other: L=(1), S=0.02 in 1968Sm05.
3950	(5/2)+	2	0.26	S: 0.28 for 5/2, 0.40 for 3/2 (1968Sm05).
4210		(2,3)		L: from 1972Ma23. Other: L=(2), S=0.75 for 3/2, 0.53 for 5/2 (1968Sm05).
4460				This group is assigned to ^{39}Ca g.s. in 1972Ma23. 1968Sm05 assign this group as L=2, S=0.53 for 3/2,0.37 for 5/2 in ^{43}Ca.
4720&				
5020&				
5210&		(2,3)		
5430&		(2,3)		
5730&		(2,3)		
6010&	1/2+	0	0.05	
6200&				
7970	(3/2)+	2	0.31	S: 1.1 (1968Sm05). 1978En02 quote S=1.9 (C^2=1/6 for T=5/2). IAS of ^{43}K g.s., 3/2+ (1972Ma23).
8590	1/2+	0	0.15	L: from 1972Ma23. 1978En02 quote S=0.9 (C^2=1/6 for T=5/2). Possible IAS of 561 in ^{43}K (1972Ma23).
8760	(7/2)-	3	0.07	L: from 1972Ma23. 1978En02 quote S=0.42 (C^2=1/6 for T=5/2). Possible IAS of 738 in ^{43}K (1972Ma23).

Continued on next page (footnotes at end of table)

^{44}Ca(p,d) 1972Ma23,1968Sm05 (continued)

^{43}Ca Levels (continued)

E(level)[†]	Jπ[‡]	L[#]	C^2S[@]	Comments
9000[&]	(3/2)-	1	0.006	1978En02 quote S=0.04 (C^2=1/6 for T=5/2). Possible IAS of 975 in ^{43}K (1972Ma23).
9150[&]	(5/2)+	2	0.05	1978En02 quote S=0.30 (C^2=1/6 for T=5/2). Possible IAS of 1110 in ^{43}K (1972Ma23).
10500[&]	1/2+	0	0.03	1978En02 quote S=0.18 (C^2=1/6 for T=5/2). Possible IAS of 2451 in ^{43}K (1972Ma23).
10730[&]				Possible IAS of 2670 in ^{43}K (1972Ma23).
11390[&]				Possible IAS of 3393 in ^{43}K (1972Ma23).
12060[&]				Possible IAS of 4022 in ^{43}K (1972Ma23).
12280[&]				Possible IAS of 4270 in ^{43}K (1972Ma23).
13260[&]				Possible IAS of 5240 in ^{43}K (1972Ma23).
13700[&]				
13950[&]				

† From 1966Co06 for levels up to 2050. From 1972Ma23 above 2050.
‡ As given by 1972Ma23.
# From 1972Ma23.
@ From 1972Ma23 for specified J (typically uncertainty 20%), unless otherwise stated. 1968Sm05 give two sets of values: for zero-range local and for finite-range non-local. The values from the latter set are quoted below under comments. 1978En02 give S factors (C^2=1 for T=3/2, 1/6 for T=5/2).
& From 1972Ma23 only.

^{44}Ca(d,t) 1976Do05,1969Yn01

Target ^{44}Ca Jπ=0+.

1976Do05: E=52 MeV deuteron beam was produced from the Karlsruhe isochronous cyclotron. Target of a 840 μg/cm^2 self-supporting isotopically enriched ^{44}Ca (98.55%). Tritons were detected by ΔE-E counter telescopes consisting of surface-barrier detectors, FWHM=90 keV. Measured $\sigma(E_t,\theta)$. Deduced levels, J, π, L, spectroscopic factors from DWBA analysis.

1969Yn01: E=21.4, 22.6 MeV deuteron beam was produced from the Argonne cyclotron. Target of isotopically enriched $CaCO_3$ onto a Formvar backing. Tritons were detected by ΔE-E counter telescopes consisting of surface-barrier detectors, FWHM=70-130 keV. Measured $\sigma(E_t,\theta)$. Deduced levels, J, π, L, spectroscopic factors from DWBA analysis. Data for 12 levels up to 3330.

Others:

1975BrYQ: E=52 MeV. Measured σ.

1982KuZU: E=5.8-10 MeV. σ(θ), DWBA analysis. Deduced 1f7/2 neutron-orbital rms radius.

^{43}Ca Levels

Spectroscopic factor C^2S:N*$C^2S=\sigma(\theta)^{exp}/\sigma(\theta)^{DWBA}$, where N is the normalization factor. N=3.33 (1976Do05).

E(level)[†]	Jπ	L[†]	C^2S[‡]	Comments
0		3	3.20	S: 4.0 (1969Yn01).
370		3	0.15	S: <0.12 (1969Yn01). S: for 1f5/2.
590		1	0.07	S: 0.18 (1969Yn01).
990		2	2.10[#]	S: 2.2 (1969Yn01).
1390		2	0.11[#]	S: 0.06 (1969Yn01).
1670				
1960		0	0.75	S: 0.9 (1969Yn01).
2050		1	0.11	S: 0.2 (1969Yn01).

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^{44}Ca(d,t) 1976Do05,1969Yn01 (continued)

^{43}Ca Levels (continued)

E(level)†	J^π	L†	C^2S‡	Comments
2260		2	0.15	S: 0.2 for 2300 *40* (1969Yn01).
2610				
2680		2	0.14	S: 0.22 for 2740 *40* (1969Yn01).
2850		2	0.23	S: 0.3 for 2900 *40* (1969Yn01).
3070		2	0.56	L: L=0, S=0.3 for 3150 *40* (1969Yn01).
3270		(2)	0.25	S: 0.4 for 3330 *40* (1969Yn01).
3610				
3960		2	0.21	
4210		2	0.2	
4270		2	0.15	
4730		2	0.19	
5220				
5360				
5730		2	0.18	
6020		(2)	0.2	
6170		(2)	0.24	
7590				
7980		2	1.0#	1978En02 quote S=6.0 (C^2=1/6 for T=5/2).
8590		0	0.25	1978En02 quote S=1.5 (C^2=1/6 for T=5/2).
8770		3	0.35	1978En02 quote S=2.1 (C^2=1/6 for T=5/2).
8990		1	0.14	1978En02 quote S=0.84 (C^2=1/6 for T=5/2).
9140		2	0.2	S: 0.3 for 1d3/2. 1978En02 quote S=1.8 for d3/2 (C^2=1/6 for T=5/2).
10470		0	0.12	1978En02 quote S=0.72 (C^2=1/6 for T=5/2).
10710		2	0.2	
11370				
12250		2	0.2	
13200		(2)	0.2	
14190				

† From 1976Do05.
‡ From 1976Do05. Orbitals used for DWBA calculations are: 2s1/2 for L=0, 2p3/2 for L=1, 1d5/2 for L=2 and 1f7/2 for L=3, unless otherwise stated. 1978En02 give S factors (C^2=1 for T=3/2, 1/6 for T=5/2).
# For 1d3/2.

^{44}Ca(^{3}He,α),(pol ^{3}He,α) 1967LyZY,1985Ha08

Target ^{44}Ca Jπ=0+.

1967LyZY (also 1968Ly01,1968Ly02): E=18 MeV ^{3}He beam was produced from the Heidelberg Emperor-Tandem accelerator. α particles were analyzed with a broad-range magnetic spectrograph (FWHM≈50 keV) and detected with a ΔE-E counter telescope. Measured $\sigma(E_\alpha,\theta)$. Deduced levels, J, π, L, spectroscopic factors from DWBA analysis.

1985Ha08: E=33.1 MeV polarized ^{3}He beam was produced from the University of Birmingham Radial Ridge Cyclotron. Target of pure self-supporting ^{44}Ca. α particles were detected by telescopes of ΔE-E detectors. Measured $\sigma(E_\alpha,\theta)$ and Ay(θ) for g.s. and 990 level. Deduced levels, J, π, spectroscopic factors from DWBA analysis.

Others:

1970Pe07: E=10 MeV. Measured $\sigma(\theta)$. Reported six levels with energy (cross section in mb) at 0 (1.60), 370 (0.16), 590 (0.18), 990 (0.65), 1390 (0.07) and 1960 (0.64).

1971Ra35: E=13.0 MeV. Measured $\sigma(\theta)$ for g.s. and 990 level. DWBA analysis.

1981Gr05: E=50.4 MeV. Measured $\sigma(\theta)$ for g.s. and 990 level. DWBA analysis.

^{43}Ca Levels

E(level)†	J$^\pi$	L†	S†	Comments
0	7/2-‡	3	4.1	S: others: 3.0 *2* or 2.4 *1* (1985Ha08), 4.2 (1981Gr05), 3.4 (1971Ra35), 3.5 (1968Ly01).
370		3	0.32	
590		1	0.16	
990	3/2+‡	2	3.3	S: others: 1.9 *3* or 1.3 *2* (1985Ha08), 3.9 (1981Gr05), 2.1 (1971Ra35), 1.9 (1968Ly01).
1390				E(level): from 1970Pe07.
1960		0	1.6	
2050		1	0.36	
7990		2	9.9	S: for T=5/2.

† From 1978En02 (original data from 1967LyZY). 1978En02 state that many L=1 and L=3 transitions to, mostly unresolved, states reported by 1967LyZY in the 2.1-7.9 MeV region are not observed in other studies.

‡ From Ay(θ) in (pol ^{3}He,α) (1985Ha08).

^{44}Ca(^{3}He,$\alpha\gamma$) 1976Ta04

1976Ta04: E=15 MeV ^{3}He beam was produced at the University of Pennsylvania. Target of 0.4 mg/cm^2 enriched ^{44}Ca metal sandwiched between a 0.3 mg/cm^2 gold backing and a 0.1 mg/cm^2 gold window. α particles were detected by a surface-barrier position-sensitive detector and γ-rays were detected with an array of 7.6 by 10.2 cm NaI(Tl) crystals. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\alpha\gamma(\theta)$. Deduced levels, γ-branching ratios, mixing ratios.

Other: 1971HoYN.

^{43}Ca Levels

E(level)	J$^{\pi}$†
0	7/2-
373	5/2-
593	3/2-
990	3/2+
1394	5/2+
1678	11/2-
1931	5/2-
2695	3/2+,5/2+
2877	1/2-
2943	3/2-
3027	
3030	
3270	(5/2,7/2)+

† From Adopted Levels.

^{44}Ca(^{3}He,$\alpha\gamma$) 1976Ta04 (continued)

γ(^{43}Ca)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ	I_γ	Mult.	δ†	Comments
373	5/2-	0	7/2-	373	100	D+Q	-0.15 *3*	A_2=+0.07 *4*, A_4=+0.01 *7*. δ: other: -0.18 *5* (1971HoYN).
593	3/2-	373	5/2-	220	30	D+Q	-0.10 *5*	A_2=+0.01 *5*, A_4=+0.08 *8*.
		0	7/2-	593	70			
990	3/2+	593	3/2-	397	12			
		373	5/2-	617	88	D(+Q)	-0.012 *17*	A_2=-0.085 *19*, A_4=-0.012 *28*.
		0	7/2-	990	28			
1394	5/2+	990	3/2+	404	13			
		593	3/2-	801	6			
		373	5/2-	1021	77			
		0	7/2-	1394	4			
1678	11/2-	0	7/2-	1678	100			
1931	5/2-	593	3/2-	1338	7			
		373	5/2-	1558	33			
		0	7/2-	1931	60			
2695	3/2+,5/2+	990	3/2+	1705	19 *9*			
		593	3/2-	2102	17 *9*			
		373	5/2-	2322	64 *11*			
2877	1/2-	373	5/2-	2504	≈75			δ(Q/D)=+0.10 *7* for J=3/2, -0.62 *10* for J=5/2. But adopted Jπ(2877)=1/2-. A_2=-0.21 *8*, A_4=-0.12 *14*.
2943	3/2-	990	3/2+	1953	24 *9*			
		373	5/2-	2570	68 *9*			
		0	7/2-	2943	8 *5*			
3027		373	5/2-	2654	100	D+Q		δ(Q/D)=-0.09 *6* for J=3/2, -0.37 *6* for J=5/2. A_2=-0.01 *7*, A_4=+0.21 *10*.
3030		990	3/2+	2040	31 *9*			
		593	3/2-	2437	69 *9*			
3270	(5/2,7/2)+	1394	5/2+	1876	17 *6*			
		990	3/2+	2280	49 *6*	D+Q	+0.07 *5*	A_2=-0.29 *11*, A_4=+0.38 *16*.
		0	7/2-	3270	34 *6*	D+Q	-0.13 *13*	A_2=+0.029 *17*, A_4=+0.18 *26*.

† From $\gamma(\theta)$ data.

^{45}Sc(μ^-,2nγ) 1971Ba10

1971Ba10: Muon beam was produced from the muon channel of the CERN synchrocyclotron. γ-rays were detected by two Ge(Li) detectors. Measured Eγ, Iγ. Deduced levels, neutron multiplicity probability.

^{43}Ca Levels

E(level)	J^π†
0.0	7/2-
372.7	5/2-

† From Adopted Levels.

γ(^{43}Ca)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ	I_γ
372.7	5/2-	0.0	7/2-	372.7 *5*	3.6 *10*

^{45}Sc(d,α) 1964Bj01

1964Bj01: E=3-4.3 MeV deuteron beam was produced from an electrstatic generator. Enriched ^{45}Sc target. α particles detected by broad-range electromagnetic spectrograph, energy resolution=0.4%. Measured $\sigma(E_\alpha)$. Deduced levels, Q values.
Other: 1962Ra11, 1967Ha41.

^{43}Ca Levels

E(level)	J^π
0	
385	
607	
1009	
1407	
1693	

Coulomb excitation 1971HoYN

1971HoYN: (^{32}S,^{32}S$'\gamma$) E=45 MeV. Thick calcium fluoride (enriched in ^{43}Ca) target. Measured γ-ray yields, deduced B(E2)$'$s for 373 and 1678 levels, normalized to measured B(E2) for 5/2+, 197 level to 1/2+, g.s. in ^{19}F.

^{43}Ca Levels

E(level)‡	J^{π}†	Comments
0	7/2-	
373	5/2-	B(E2)=0.0065 *5*.
593	3/2-	
1678	11/2-	B(E2)=0.0115 *28*.

† From Adopted Levels.
‡ Rounded-off values from Adopted Levels.

γ(^{43}Ca)

E_i(level)	J^π_i	E_f(level)	J^π_f	E_γ†	Mult.	δ	Comments
373	5/2-	0	7/2-	373	(M1+E2)	0.192 *11*	δ: from B(E2)=0.0086 *7* (1971HoYN) and $T_{1/2}$(373)=33 ps *3*.
593	3/2-	373	5/2-	221			
		0	7/2-	593			B(E2)=0.0071 *3* (1971HoYN), calculated from known lifetime of 593 level and measured (but not quoted) branching ratio.
1678	11/2-	0	7/2-	1678			B(E2)=0.0077 *19* (1971HoYN).

† Rounded-off values from Adopted Gammas.

Adopted Levels, Gammas

Q(β^-)=-6867 *7*; S(n)=12138.3 *19*; S(p)=4929.8 *19*; Q(α)=-4805.9 *19* 2011AuZZ
Q(β^-n)=-19154.8 *19* (2011AuZZ).
Other reactions:
^{42}Ca(p,p): 1976Wi16, 1974Ma39. See ^{42}Ca(p,p): Resonances for a list of about 190 resonances in the region: E(p)(lab)=1249-3220 keV.
^{42}Ca(p,γ): 1977Di17, 1969Wa19. See ^{42}Ca(p,γ): Resonances for a list of about 210 resonances in the region: E(p)(lab)=1013-2758 keV.
^{42}Ca(p,p$'\gamma$): 1984Ka27. See ^{42}Ca(p,p$'\gamma$): Resonances for a list of 13 resonances in the region: E(p)(lab)=3165-3341 keV.
Production cross section measurements:
^{41}Ca(d,γ): 1984Pi07: E=16 MeV, measured Eγ, Iγ.
(^{6}Li,^{3}He): 1982Ne02: measured $\sigma(\theta)$.
^{27}Al(^{16}O,γ): 1978Br33: measured yields.
^{30}Si(^{14}N,nγ): 1976Ze01: measured yields.
(p,X); 2011Ti03, 2011Ti04, 2009Da05, 2009Kh03, 2008Ti05, 2006Ja11, 2006Za11, 2003Ya20, 1997Vo03, 1993Ko16, 1993Ko36.
(^{7}Li,X),(^{3}He,X),(d,X): 2004De41, 2000Di15, 1997Ta08.
(γ,X): 2000Ma75.

^{43}Sc Levels

See (p,γ), (p,p) and (p,p$'\gamma$) resonance datasets for additional levels between 5919 keV and 8193 keV.

Cross Reference (XREF) Flags

A	^{43}Ti ε decay (509 ms)	I	^{40}Ca(α,pγ)	Q	^{42}Ca(^{16}O,^{15}N)
B	Be(^{58}Ni,Xγ):isomers	J	^{40}Ca(^{6}Li,^{3}He)	R	^{43}Ca(p,n)
C	^{24}Mg(^{24}Mg,αpγ)	K	^{42}Ca(p,γ) E=res	S	^{43}Ca(^{3}He,t)
D	^{27}Al(^{18}O,2nγ)	L	^{42}Ca(p,γ):resonances	T	^{45}Sc(p,t)
E	^{27}Al(^{19}F,p2nγ)	M	^{42}Ca(p,p):resonances	U	^{46}Ti(p,α), (pol p,α)
F	^{28}Si(^{20}Ne,apg)	N	^{42}Ca(p,p$'\gamma$):resonances	V	^{45}Sc(p,p2n):moments
G	^{29}Si(^{16}O,pnγ)	O	^{42}Ca(d,n)		
H	^{40}Ca(α,p)	P	^{42}Ca(^{3}He,d)		

Nuclear Level Sequences

A γ sequence based on g.s.
B γ sequence based on 7/2-.
C γ sequence based on 19/2+.
D γ sequence based on 3/2+.
E γ sequence based on 5/2+.

Seq.	E(level)†	J$^{\pi\#}$	T$_{1/2}$‡	XREF	Comments
A	0	7/2-	3.891 h *12*	ABCDEFGHIJK OPQRSTUV	μ=+4.507 *10*. Q=-0.222 *22*. %ε+%β+=100 . μ: weighted average from 2011Av01, 2006Ga47 (laser spectroscopy) and 1966Co13 (atomic-beam method 3). Adopted (by 1977En02) spectroscopic factor S=0.81 *12* (proton stripping). δ<r^2>(^{45}Sc,^{43}Sc)=+0.082 fm^2 *14*(stat) *88*(syst) (2011Av01). The rms charge radius (<r^2>)$^{1/2}$=3.5467 fm *89* from 2008 update of 2004An14 evaluation by I. Angeli. J$^\pi$: spin from atomic-beam spectroscopy (1966Co13), parity from L(^{3}He,d)=L(d,n)=3. T$_{1/2}$: weighted average of 3.92 h *2* (1945Hi04), 3.95 h *2* (1963Du11), and 3.885 h *5* (1969Ra16).

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Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

Seq.	E(level)†	J^{π}#	$T_{1/2}$‡	XREF	Comments
D	151.79 8	3/2+	438 μs 7	ABCD GHI KL N	μ=+0.348 6 (2005St24,1989Ra17,1977Mi10). %IT=100 . μ: dPAD method (1977Mi10). Adopted (by 1977En02) spectroscopic factor S=0.35 6 (proton stripping). $T_{1/2}$: 435 μs 30 (1964Br27). J^{π}: L(^{3}He,d)=L(d,n)=2, primary γ from 1/2- resonances in (p,γ).
	472.60 14	3/2-	158 ps 13	A E HIJK OPQRSTU	Adopted (by 1977En02) spectroscopic factor S=0.13 3 (proton stripping). J^{π}: L(^{3}He,d)=L(d,n)=1; E2 γ to 7/2-.
	845.18 9	5/2-	0.15 ps 1	A C F HI K P STU	J^{π}: L(p,t)=2 from 7/2-; M1+E2 γ to 7/2-; primary γ from 3/2- resonance in (p,γ). 7/2 ruled out by $\gamma(\theta)$ in (α,pγ) and RUL.
	855.65 25	1/2+	22 ps 3	HI K OP RS U	Adopted (by 1977En02) spectroscopic factor S=0.08 2 (proton stripping). J^{π}: L(^{3}He,d)=L(d,n)=0.
E	880.64 8	5/2+	4.6 ps 10	C EF HI K P RS U	J^{π}: M1+E2 γ to 3/2+; γ to 7/2-. Anisotropic $\gamma(\theta)$ rules out 1/2+.
	1158.76 24	3/2+	4.4 ps 10	D G	J^{π}: M1+E2 γ to 3/2+; dipole γ to 1/2+. 1/2+ ruled out by anisotropic 1006$\gamma(\theta)$.
	1178.98 22	3/2-	0.28 ps 11	HIJK OPQRSTU	Adopted (by 1977En02) spectroscopic factor S=0.24 4 (proton stripping). J^{π}: L(^{3}He,d)=L(d,n)=1, γ to 7/2-.
D	1337.53 7	7/2+	0.83 ps 35	C EF HI K R	J^{π}: stretched E2 γ to 3/2+.
B	1408.09 10	7/2-	0.19 ps 6	A C F HIJK O RSTU	J^{π}: L(p,t)=0 from 7/2-; stretched M1 to 5/2-. Ref: R: 1424.
	1651.22 25	5/2+	0.18 ps 3	HI K P R U	J^{π}: M1 γ to 3/2+; γ to 7/2-. Ref: R: 1677.
	1811.1 4	3/2-	16 fs 6	HIJK OPQ ST	J^{π}: L(^{3}He,d)=L(d,n)=1. Anisotropic $\gamma(\theta)$ rules out 1/2.
A	1830.33 11	11/2-	0.20 ps 3	CDEFGHIJ ST	J^{π}: stretched E2 γ to 7/2-. J=3/2 ruled out by $\gamma(\theta$,lin pol).
	1882.8 3	(5/2,9/2)-	35 fs 17	A HI K ST	J^{π}: L(p,t)=2 from 7/2-; D+Q γ to 7/2-. J=7/2 ruled out by $\gamma(\theta)$ in (α,pγ) and RUL.
	1912			H	
E	1932.55 9	9/2+	2.4 ps 6	C EF HI K T	J^{π}: L(p,t)=5 from 7/2-; stretched E2 to 5/2+; M1+E2 γ to 7/2+.
	1962.89 20	(3/2,5/2)-	70 fs 11	A HI K OP	J^{π}: M1+E2 γ to 3/2-. $\gamma(\theta)$ in (p,γ) prefers 5/2 over 3/2, L(^{3}He,d)=L(d,n)=1 support 3/2-. Ref: O: 1947.
	2094.8 3	3/2-	0.28 ps 7	HI K P t	J^{π}: L(^{3}He,d)=1; γ to 5/2+. J=1/2 ruled out by $\gamma(\theta)$.
	2106.6 5	(3/2,5/2)	0.21 ps 7	HI K o t	J^{π}: γ's to 3/2+ and 5/2+; 1/2+ and 7/2+ are possible but, with B(E2)(W.u.)≈75, less likely.
	2114.5 5			K oP tu	J^{π}: L(p,t)=(3+5) from 7/2- implies positive parity for 2114 and/or 2106; whereas L(d,n)=(1) implies negative parity for one of these levels. Ref: P: ?
	2142.0 3	(3/2-,5/2+)	0.19 ps 4	HI K u	J^{π}: γ's to 1/2+ and 7/2-. $\gamma(\theta)$ in (p,γ) prefers 7/2 over 5/2, but γ to 1/2+ and RUL exclude 7/2.

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Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

Seq.	E(level)†	J^{π}#	$T_{1/2}$‡	XREF	Comments
	2242.8 *6*	(3/2,5/2,7/2)-	0.19 ps *9*	HI STu	J^{π}: L(p,t)=2 from 7/2-; γ's to 3/2- and 7/2-.
	2288.65 *8*	5/2-	<21 fs	A HIJK P ST	J^{π}: L(^{3}He,d)=3; γ to 3/2+.
	2335.47 *10*	5/2-	28 fs *14*	A HI K OP ST	J^{π}: L(d,n)=3; L(p,t)=2 from 7/2-. J=7/2 not allowed by γ(θ) in (α,pγ) and RUL.
	2383.1 *4*	3/2(+)	>0.31 ps	HI K P	J^{π}: (M1+E2) γ to 1/2+ and γ(θ) in (α,pγ).
	2458.68 *10*	(5/2,9/2)-	38 fs *14*	A HI ST	J^{π}: L(p,t)=2 from 7/2-; γ to 7/2-; log *ft*=4.5 from 7/2-.
D	2553.54 *11*	11/2+	0.51 ps *7*	C EF HI K T	J^{π}: M1 γ to 9/2+, E2 γ to 7/2+.
	2580.8 *4*	(5/2)	0.10 ps *3*	HI K	J^{π}: primary transitions from 3/2 and 7/2 resonances in (p,γ).
	2606			P	
B	2635.35 *13*	11/2-	0.21 ps *7*	C F HIJ STu	J^{π}: L(p,t)=2 from 7/2-; L(^{6}Li,^{3}He)=5; E2 γ to 7/2-.
	2657	1/2+		I oP u	J^{π}: L(^{3}He,d)=0. E(level): since γ to 5/2- is unlikely, placement of 1805.3γ from a 2650 level in (α,pγ) may suggest a different level.
	2670.5 *4*	3/2-		HI K oP STu	J^{π}: L(p,t)=2 from 7/2-; γ to 1/2+.
	2760.10 *10*	(5/2,9/2)-	<28 fs	A HI ST	J^{π}: L(p,t)=4 from 7/2-; γ to 7/2-; log *ft*=4.94 from 7/2-.
	2795.4 *5*	(3/2 to 9/2)-	0.28 ps *16*	I K T	J^{π}: L(p,t)=2 from 7/2-; γ decays to 5/2- and 7/2-.
	2811.1 *6*	(5/2,7/2,9/2)	<62 fs	HI K	J^{π}: γ transitions to 7/2- and 7/2+.
	2840.7 *5*	(5/2,7/2)+		HI K o T	J^{π}: L(p,t)=5 from 7/2-; γ transitions to 7/2- and (3/2)+; inconsistent with L(d,n)=1+3.
	2846.2 *8*			I K o	J^{π}: L(d,n)=1+3 for a 2830 group suggests a doublet with Jπ=1/2-,3/2- and 5/2-,7/2- near this energy.
	2860.8 *4*	(1/2,3/2,5/2)+		I K T	J^{π}: L(p,t)=3 from 7/2-; γ transitions to 3/2- and 3/2+.
	2874.7 *6*	(5/2+,9/2+)		K P U	J^{π}: fit to σ(θ) and Ay in (pol p,α). Ref: U: 2870.
	2930	3/2+,5/2+		H	J^{π}: L(d,n)=2.
	2985.0 *5*	(3/2,5/2)	54 fs *11*	I K OP St	J^{π}: γ transitions to 3/2+, 5/2-, 5/2+ and 3/2-.
A	2988.12 *12*	15/2-	5.6 ps *7*	BCDEFGHIJ tU	J^{π}: stretched E2 γ to 11/2-; L(^{6}Li,^{3}He)=7.
A	3123.73 *15*	19/2-	472 ns *4*	BCDEFGHIJ STU	μ=+3.122 *7* (2005St24,1989Ra17,1978Ha07). Q=0.199 *14* (2005St24,1989Ra17,1981Da06). J^{π}: L(p,t)=6 from 7/2-; stretched quadrupole γ to 15/2-; L(α,p)=L(^{6}Li,^{3}He)=(9). μ: dPAD method (1978Ha07,1981Da06). Others: μ=3.108 *18* (1994Zh43), 3.15 *2* (1971Na10).
E	3142.05 *12*	13/2+	>0.55 ps	C EF HI	J^{π}: stretched E2 γ to 9/2+; M1 γ to 11/2+.
	3159.3 *5*	(3/2-,5/2,7/2+)	<0.42 ps	I K	J^{π}: γ transitions to 7/2- and 3/2+.
	3198.2 *10*	(1/2 to 7/2-)	<0.28 ps	I P T	J^{π}: 1/2,3/2,5/2,7/2- from γ to 3/2-.
	3260.1 *8*	(7/2,9/2)-	42 fs *25*	A HI K P ST	J^{π}: L(p,t)=4 from 7/2-; log *ft*=5.9 from 7/2-; possible γ to 11/2-.
	3292.4 *3*	7/2-		C F HI K T	J^{π}: L(p,t)=2 from 7/2-; γ transitions to 3/2- and 9/2+; E1 γ to 9/2+. $T_{1/2}$: values <3.5 fs from (p,γ) and >55 fs from (α,pγ) are discrepant.

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Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

Seq.	E(level)[†]	J^{π}[#]	$T_{1/2}$[‡]	XREF	Comments
	3326.8 *8*	(3/2- to 11/2-)		K op St	J^{π}: γ to 7/2-. 3/2+ and 11/2+ are unlikely. L(^{3}He,d)=3 for a 3328 group gives 5/2-, 7/2- for 3327 or 3332 level. L(p,t)=2 from 7/2- gives negative parity for one or both these levels.
	3332.2 *4*	(1/2-,3/2,5/2)	0.13 ps *10*	I K op t	J^{π}: γ transitions to 3/2-, 5/2- and 3/2+. 1/2- and 3/2+ are unlikely if ground-state transition exists. L(d,n)=3 for a 3330 group suggests 5/2-,7/2- for one of the levels near this energy.
	3375.3 *5*	(7/2,9/2)-	$<$62 fs	I K T	J^{π}: L(p,t)=2 from 7/2-; γ transitions to 7/2-, 7/2+ and 11/2-.
	3452.1 *5*	5/2+	$<$2.1 fs	hI K Op T	J^{π}: L(p,t)=5 from 7/2-; γ to 5/2+; possible γ's to 3/2-, 3/2+ and 7/2-. L(d,n)=2.
	3463.3 *6*	5/2-		hI K P s U	J^{π}: L(^{3}He,d)=3; γ to 3/2+. Ref: P: 3474.
	3480	($\leq$ 13/2)+		H M s u	J^{π}: L(p,t)=3 from 7/2-.
	3503.2 *6*	7/2-		K P T	J^{π}: L(p,t)=0 from 7/2-.
	3613			oP	
	3631.7 *10*	(5/2-,7/2-,9/2-)		A o	J^{π}: possible allowed ε feeding from 7/2-.
	3645.6 *5*	(3/2,5/2,7/2-)		K	J^{π}: γ transitions to 5/2+,5/2- and 3/2-.
	3683.2 *5*	(3/2,5/2,7/2)		H K OP ST	E(level): L(p,t)=3 from 7/2- implying positive parity and L(^{3}He,d)= L(d,n)=3 implying 5/2-,7/2- require two separate levels near this energy. 7/2- is not likely from γ to 3/2+.
	3700	(5/2 TO 19/2)-		T	J^{π}: L(p,t)=6 from 7/2-.
	3734.0 *5*			K	
D	3755.43 *16*	15/2+		C EF	J^{π}: ΔJ=1 γ to 13/2+; ΔJ=2 γ to 11/2+.
	3756.5 *5*	(3/2-,5/2,7/2+)		K	J^{π}: γ transitions to 3/2+ and 7/2-.
	3771	(3/2 to 17/2)+		T	J^{π}: L(p,t)=5 fro 7/2-.
	3807.2 *4*	7/2-	$<$3.5 fs	H K P TU	J^{π}: ΔJ=1 γ to 5/2+; γ transitions to 3/2- and 7/2+; 3/2+ excluded by RUL. L(p,t)=5 from 7/2- for 3807 group is incompatible. Ref: P: 3786.
	3843.0 *6*	($\leq$ 9/2)		h K St	J^{π}: γ to 5/2-. L(p,t)=5 from 7/2- implies positive parity for 3843 or 3860 level.
	3860.1 *6*	($\leq$ 7/2)		h K t	J^{π}: γ to 3/2+. See also comment for 3843 level.
	3894			S	
	3939	5/2-,7/2-		h OP S	J^{π}: L(^{3}He,d)=L(d,n)=3.
	3949	($\leq$ 13/2)+		hI T	J^{π}: L(p,t)=3 from 7/2-. Ref: I: 3956. Ref: T: 3949.
B	3959.87 *12*	15/2-		C F	J^{π}: E2 γ to 11/2-; M1 γ to 15/2-.
	3985			H P	
	4007.3 *5*	(3/2,5/2)+		K O T	J^{π}: L(p,t)=5 from 7/2-; γ transitions to 1/2+ and 5/2+.
	4038.8 *6*	7/2-		K T	J^{π}: L(p,t)=4 from 7/2-; γ transitions to 3/2- and 9/2+.
	4132	(3/2 TO 17/2)+		ST	J^{π}: L(p,t)=5 from 7/2-. E(level): population uncertain in (^{3}He,t).
	4158.6 *10*	(9/2,11/2,13/2)-		CD M	J^{π}: L(p,t)=4 from 7/2-; γ to 11/2+.
	4211	(9/2,13/2)+		TU	J^{π}: L(p,t)=3 from 7/2-; $\sigma(\theta)$ and Ay in (pol p,α). Ref: U: 4180.
	4236	7/2-		OP STU	T=3/2 .

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Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

Seq.	E(level)†	J$^{\pi}$#	$T_{1/2}$‡	XREF	Comments
					J$^{\pi}$: L(p,t)=0 from 7/2-; L(^{3}He,d)=L(d,n)=3.
	4276			K S	Ref: K: 4272.
	4301.2 *5*	(5/2+ to 13/2+)		C F	J$^{\pi}$: γ to 9/2+.
	4343			S	
	4360	(17/2-)		U	J$^{\pi}$: $\sigma(\theta)$ and Ay in (pol p,α).
	4371.5 *5*	5/2-,7/2-		H K P S	J$^{\pi}$: L(^{3}He,d)=3. $\gamma(\theta)$ in (p,γ) preferred 7/2+. Ref: P: 4363.
	4383	5/2-,7/2-		OP	J$^{\pi}$: L(^{3}He,d)=L(d,n)=3.
	4383.03 *23*	17/2(-)	40 fs *17*	C EF	J$^{\pi}$: ΔJ=1 γ to 15/2-; ΔJ=0 or 1 γ to 19/2-.
	4430.2 *5*	(1/2+,3/2,5/2)		K	J$^{\pi}$: γ transitions to 3/2-, 3/2+ and 5/2+.
	4455.3 *8*	(5/2,9/2)	<3.5 fs	G	J$^{\pi}$: ΔJ=1 γ to 7/2-.
	4511			S	
	4555	(11/2+,13/2-)		P U	J$^{\pi}$: $\sigma(\theta)$ and Ay in (pol p,α).
	4583			P U	
	4633.6 *19*	(17/2,21/2)	<110 fs	E	J$^{\pi}$: ΔJ=1 γ to 19/2-.
	4660	1/2-,3/2-		H OP ST	J$^{\pi}$: L(^{3}He,d)=L(d,n)=1. Ref: H: 4630.
	4700	(15/2+)		U	J$^{\pi}$: $\sigma(\theta)$ and Ay in (pol p,α).
	4719	1/2-,3/2-		OP	J$^{\pi}$: L(^{3}He,d)=L(d,n)=1.
	4766	1/2-,3/2-		P S	J$^{\pi}$: L(^{3}He,d)=1.
	4817	1/2-,3/2-		P S	J$^{\pi}$: L(^{3}He,d)=1.
	4873			P S	
	4893	1/2-,3/2-		OP	J$^{\pi}$: L(^{3}He,d)=1.
	4927			H P	
	5018	1/2-,3/2-		OP	J$^{\pi}$: L(^{3}He,d)=L(d,n)=1.
	5187			P	E(level): due to improbable L(^{3}He,d)=8 required for 17/2+, the 5187 level in (^{3}He,d) is considered as different from 5200.
	5200	(17/2+)		U	J$^{\pi}$: $\sigma(\theta)$ and Ay in (pol p,α).
E	5231.33 *17*	17/2+		C EF	J$^{\pi}$: M1 γ to 15/2+.
	5236			H TU	
	5258	1/2-,3/2-		OP	J$^{\pi}$: L(^{3}He,d)=L(d,n)=1.
	5317			H P	
	5446			P	
	5502	1/2-,3/2-		OP	J$^{\pi}$: L(^{3}He,d)=L(d,n)=1.
D	5519.00 *15*	19/2+	<62 fs	C EFG	J$^{\pi}$: E2 γ to 15/2+; E1 γ to 19/2-.
	5530	1/2-,3/2-		P	J$^{\pi}$: L(^{3}He,d)=1.
	5641	1/2-,3/2-		OP	J$^{\pi}$: L(^{3}He,d)=L(d,n)=1.
	5719	1/2-,3/2-		H OP	J$^{\pi}$: L(^{3}He,d)=L(d,n)=1.
	5793.51 *24*	(11/2- to 19/2-)		C F	J$^{\pi}$: γ to 15/2-.
	5823			OP	
	5871			P	
	5919.4 *4*	3/2		KL P	J$^{\pi}$: $\gamma(\theta)$ in (p,γ).
	5950.5 *3*	(3/2,5/2)		KL	J$^{\pi}$: $\gamma(\theta)$ in (p,γ).
	5977			OP	
	6033	1/2-,3/2-		OP	J$^{\pi}$: L(^{3}He,d)=L(d,n)=1.
	6060.5 *10*	(5/2)		KL	J$^{\pi}$: $\gamma(\theta)$ in (p,γ).
B	6067.23 *14*	19/2-	55 fs *12*	C EF	J$^{\pi}$: E2 γ to 15/2-.
	6079			H P	
	6103.2 *3*	(3/2-,5/2+)		KL P	J$^{\pi}$: from γ decay of resonance in (p,γ).

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Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

Seq.	E(level)†	$J^{\pi\#}$	$T_{1/2}$‡	XREF	Comments
	6136.2 *3*	3/2		KL	J^π: from $\gamma(\theta)$ in (p,γ).
	6143.4 *3*	3/2-		KL	J^π: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
	6146	1/2-,3/2-		L OP	T=3/2 . J^π: L(^{3}He,d)=L(d,n)=1.
	6151	3/2-		LM O	Γ=125 *15*. J^π: from fit to resonance in (p,p).
C	6172.98 *17*	19/2+		C F	J^π: E2 γ to 15/2+; M1 γ to 17/2+.
	6184.2 *10*	5/2		KL	J^π: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
	6198.1 *4*	(3/2,5/2+)		KL	J^π: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
	6217.4 *3*	(3/2-,5/2+)		KL	J^π: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
	6223	1/2+		M U	T=3/2 . Γ=50 *10*. J^π: fit to resonance in (p,p).
	6228			H L	
	6247.2 *4*	(3/2,5/2)		KL	J^π: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
	6280			L P	
E	6283.49 *17*	21/2+	110 fs *38*	C EF	J^π: E2 γ to 17/2+; E1 γ to 19/2-.
	6320.4 *3*	5/2+		KL	J^π: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
	6384			L P	
D	6431.04 *17*	23/2+	16.3 ps *15*	C EFG	J^π: E2 γ to 19/2+; M2 γ to 19/2-.
	6439	1/2+		LM P	Γ=1.5 *5*. J^π: fit to resonance in (p,p).
	6685.1 *4*	1/2-		KL	T=1/2&3/2 . J^π: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
	6696.2 *3*	5/2		KL	J^π: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
	6709	1/2-		KLM P	T=1/2&3/2 . Γ=900 *90*. J^π: γ decay of resonance in (p,γ).
	6777.3 *3*	5/2		KL O	J^π: γ decay of resonance and $\gamma(\theta)$ in (p,γ); L(d,n)=1 is inconsistent.
	6811			P	
	6818.42 *17*	(21/2+)		C F	J^π: E2 γ to 17/2+; M1 γ to 19/2+.
	6918.6 *4*	7/2		KL P	J^π: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
	7027.7	1/2-		M O	Γ=150 *5*. J^π: fit to resonance in (p,p); L(d,n)=1.
C	7106.88 *17*	23/2+		C EF	J^π: M1 γ to 23/2+; E2 γ to 19/2+.
	7118.8 *11*	(11/2+ to 19/2+)		C F	J^π: γ to 15/2+.
	7159	3/2+,5/2+		L O	J^π: L(d,n)=2.
	7273.5 *7*	(11/2+ to 19/2+)		C F	J^π: γ to 15/2+.
	7344.1 *3*	3/2-,5/2		KL	J^π: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
E	7359.16 *17*	25/2+	340 fs *21*	C EFG	J^π: M1 γ to 23/2+; E2 γ to 21/2+.
	7380	1/2-,3/2-		O	J^π: L(d,n)=1.
	7394.18 *23*	3/2-,5/2+		KL	J^π: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
	7512.3 *4*	(5/2+,7/2,9/2)		KL	J^π: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
	7530	1/2-,3/2-		LM O	J^π: L(d,n)=1; (3/2-) from (p,p).
	7581.4 *4*	(3/2-,5/2,7/2+)		KL	J^π: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
	7700	5/2-,7/2-		O	J^π: L(d,n)=3.
	7900	5/2-,7/2-		O	J^π: L(d,n)=3.
	8010.1 *4*	(15/2+ to 23/2+)		C F	J^π: γ to 19/2+.
	8111	5/2-,7/2-		O	J^π: L(d,n)=3.

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Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

Seq.	E(level)†	Jπ#	$T_{1/2}$‡	XREF	Comments
	8380	5/2-,7/2-		O	Jπ: L(d,n)=3.
	8434.37 *17*	23/2-		C F	Jπ: E2 γ to 19/2-.
B	8555.56 *19*	23/2-		C F	Jπ: E2 γ to 19/2-.
	8690	5/2-,7/2-		O	Jπ: L(d,n)=3.
	8703.06 *18*	25/2(+)		C EF	Jπ: ΔJ=1 γ to 23/2+.
D	8831.84 *18*	27/2+	74 fs *15*	C EF	Jπ: M1 γ to 25/2+; E2 γ to 23/2+.
	8910	5/2-,7/2-		O	Jπ: L(d,n)=3.
	9170	5/2-,7/2-		O	Jπ: L(d,n)=3.
	9218.8 *4*	(21/2-)		C F	Jπ: (M1) γ to 19/2-.
	9450	5/2-,7/2-		O	Jπ: L(d,n)=3.
	9578.86 *20*	(27/2+)		C F	Jπ: M1 γ to 25/2+; E2 γ to 23/2+.
	9750	5/2-,7/2-		O	Jπ: L(d,n)=3.
	9995.10 *20*	25/2(-)		C F	Jπ: M1 γ to 23/2-; E1 γ 23/2+.
	10040	5/2-,7/2-		O	Jπ: L(d,n)=3.
	10084.47 *17*	27/2-		C F	Jπ: E1 γ to 25/2(+); E2 γ to 23/2-.
	10178.6 *6*	(19/2+ to 27/2+)		C F	Jπ: γ to 23/2+.
	10230	3/2+,5/2+		O	Jπ: L(d,n)=2.
C	10436.84 *23*	(25/2+)		C F	Jπ: M1 γ to 23/2+.
	10613.21 *19*	(27/2-)		C F	Jπ: (E1) γ to 25/2+; E2 γ to 23/2-.
	10750	5/2-,7/2-		O	Jπ: L(d,n)=3.
	10856.18 *19*	(27/2-)		C F	Jπ: (E1) γ to 25/2+.
	10910	5/2-,7/2-		O	Jπ: L(d,n)=3.
	11252.0 *4*			C F	
	11260	5/2-,7/2-		O	Jπ: L(d,n)=3.
B	11355.60 *23*	27/2-		C F	Jπ: E2 γ to 23/2-; E1 γ to 25/2+.
	11560	5/2-,7/2-		O	Jπ: L(d,n)=3.
	11661.0 *5*			C F	
	11807.36 *19*	29/2(-)		C F	Jπ: ΔJ=1 γ to 27/2+; E1 γ to (27/2+).
	11840	1/2-,3/2-		O	Jπ: L(d,n)=1.
	11920.54 *25*	25/2(+)		C F	Jπ: M1 γ to 23/2+; M1 γ to 25/2+.
	12053.33 *19*	29/2(-)		C F	Jπ: (M1) γ to 27/2-; E2 γ to 25/2(-).
	12073.15 *21*	(29/2-)		C F	Jπ: M1 γ to (27/2-).
	12090	1/2-,3/2-		O	Jπ: L(d,n)=1.
	12614.84 *19*	(31/2)-		C F	Jπ: (E2) γ to 27/2-.
	12703.9 *9*			C F	
	12804.39 *24*	(25/2,27/2,29/2)		C F	Jπ: γ transitions to (27/2-), 27/2+.
C	13044.65 *22*	(29/2+)		C F	Jπ: M1 γ to 27/2+; E2 γ to (25/2+).
	13116.57 *21*	(31/2-)		C F	Jπ: E2 to (27/2-); M1 γ to (29/2-).
	13122.7 *6*			C F	
	13584.1 *4*	(29/2+)		C F	Jπ: (M1) γ to 27/2+.
	14405.80 *19*	(33/2-)		C F	Jπ: dipole γ to 31/2(-); (E2) γ to 29/2(-).
	14451.1 *3*	(29/2+)		C F	Jπ: E2 γ to 25/2(+); M1 γ to 27/2+.
B	14561.2 *3*	31/2-		C F	Jπ: M1 γ to 29/2(-); E2 γ to 27/2-.
	14914.3 *3*	31/2		C F	Jπ: ΔJ=2 γ to 27/2+.
C	15910.7 *3*	(33/2+)		C F	Jπ: E2 γ to (29/2+); E1 γ to (31/2)-.
	16703.6 *6*			C F	
	16708.4 *5*			C F	
	16711.2 *6*			C F	
	17767.4 *3*	(35/2)		C F	Jπ: (E2) γ to 31/2.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

Seq.	E(level)†	Jπ#	$T_{1/2}$‡	XREF	Comments
	17921.1 *4*	(31/2+)		C F	Jπ: (M1) γ to (29/2+).
B	18196.8 *5*	35/2-		C F	Jπ: E2 γ to 31/2-.
	18765.3 *4*	(37/2)		C F	Jπ: M1 γ to (35/2).
C	19208.6 *4*	(37/2+)		C F	Jπ: E2 γ to (33/2+).

† From adopted Eγ data when measured γ-ray energies are available. In other cases weighted averages are taken of values available from different reactions.
‡ Weighted averages from (α,pγ), (p,γ), (^{16}O,pnγ) and (^{19}F,p2nγ) unless otherwise noted.
# In particle-transfer reactions, target Jπ=0+ except for ^{45}Sc(p,t) where target Jπ=7/2-. When assigning Jπ to a level based on γ transitions from this level to a level of known Jπ, evaluators use the following rules: if Eγ<4 MeV, transitions are only considered to be E1,M1 or E2; if Eγ>4 MeV, M2 and E3 are considered to be possible.

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

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ†	I_γ‡	Mult.§φ	δφ	Comments
151.79	3/2+	0	7/2-	151.65 17	100	[M2]		B(M2)(W.u.)=0.0719 13. α=0.041 4 (1972Bi13); α(K)=0.031 2, K/L=9.0 7 (1966WaZW).
472.60	3/2-	151.79	3/2+	320.1	4.2 11	[E1]		B(E1)(W.u.)=4.3×10^{-6} 12.
		0	7/2-	472.5 2	100.0 21	E2		B(E2)(W.u.)=16.3 15. α(K)=7.7×10^{-4} 19 (1966WaZW).
845.18	5/2-	472.60	3/2-	373.2	<5			E_γ: as quoted by 1978En02.
		151.79	3/2+	692.3	<4			
		0	7/2-	845.2 1	100	M1+E2	+0.15 4	B(E2)(W.u.)=21 11. B(M1)(W.u.)=0.228 17.
855.65	1/2+	472.60	3/2-	383.1	26 4	[E1]		B(E1)(W.u.)=9.2×10^{-5} 20.
		151.79	3/2+	703.2	100 4			
880.64	5/2+	472.60	3/2-	408.3	<5			E_γ: as quoted by 1978En02.
		151.79	3/2+	728.7 1	100 1	M1+E2	-0.52 7	B(E2)(W.u.)=13 5. B(M1)(W.u.)=0.0092 21.
		0	7/2-	880.5 2	3 1	E1		B(E1)(W.u.)=5.0×10^{-6} 20.
1158.76	3/2+	880.64	5/2+	278.1	36 5	M1(+E2)	+0.2 2	B(E2)(W.u.)=(6.×10^{1} +12−6). B(M1)(W.u.)=(0.041 12).
		855.65	1/2+	303.3	53 16	M1(+E2)	+0.2 2	B(E2)(W.u.)=(6.×10^{1} +12−6). B(M1)(W.u.)=(0.047 19).
		845.18	5/2-	313.2	<6			
		472.60	3/2-	686.4	4 2	[E1]		B(E1)(W.u.)=8.×10^{-6} 5.
		151.79	3/2+	1006.5	100 4	M1+E2	-1.3 +6-15	B(E2)(W.u.)=4.5 19. B(M1)(W.u.)=0.0009 6.
1178.98	3/2-	880.64	5/2+	298.6[ab]	1			
		845.18	5/2-	333.7	18 3	[M1]		B(M1)(W.u.)=0.27 12.
		472.60	3/2-	706.9	100 6	M1+E2	-0.18 13	B(E2)(W.u.)=3.×10^{1} +5−3. B(M1)(W.u.)=0.15 7.
		0	7/2-	1178.9	22 3	[E2]		B(E2)(W.u.)=15 7.
1337.53	7/2+	880.64	5/2+	456.73 10	38.4 15	M1+E2	-0.23 4	B(E2)(W.u.)=45 24. B(M1)(W.u.)=0.06 3.
		151.79	3/2+	1185.6 1	100 2	E2		B(E2)(W.u.)=20 9.
		0	7/2-	1338.0 1	26.9 13	E1+M2	-0.10 8	B(E1)(W.u.)=4.5×10^{-5} 19. B(M2)(W.u.)=1.1 +19−11.
1408.09	7/2-	845.18	5/2-	562.9 2	17.1 12	M1		B(M1)(W.u.)=0.09 3.
		472.60	3/2-	936.0 8	6.3 11	[E2]		B(E2)(W.u.)=24 9.
		0	7/2-	1408.06 12	100 2	M1+E2	+0.15 5	B(E2)(W.u.)=1.1 8. B(M1)(W.u.)=0.033 11.
1651.22	5/2+	1158.76	3/2+	492.4	32 4	M1(+E2)	0.0 2	B(M1)(W.u.)=(0.19 4).
		880.64	5/2+	770.5	12 3			
		855.65	1/2+	795.7	5.4 20	[E2]		B(E2)(W.u.)=34 14.
		151.79	3/2+	1498.9	100 5	M1(+E2)	-0.05 18	B(E2)(W.u.)=(0.07 +48−7).

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γ(^{43}Sc) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ[‡]	Mult.[§ϕ]	δ[ϕ]	Comments
								B(M1)(W.u.)=(0.021 *4*).
		0	7/2-	1650.8	25 *4*	[E1]		B(E1)(W.u.)=9.8×10^{-5} *23*.
1811.1	3/2-	1178.98	3/2-	631.8	100 *7*	M1+E2	-0.22 *7*	B(E2)(W.u.)=7.×10^{2} *6*. B(M1)(W.u.)=2.1 *8*.
		855.65	1/2+	955.6	41 *10*	[E1]		B(E1)(W.u.)=0.006 *3*.
		472.60	3/2-	1338.7	85 *7*	M1+E2	-0.22 *7*	B(E2)(W.u.)=14 *11*. B(M1)(W.u.)=0.18 *8*.
		151.79	3/2+	1658.8	26 *8*	[E1]		B(E1)(W.u.)=0.0008 *4*.
1830.33	11/2-	0	7/2-	1830.10 *13*	100	E2		B(E2)(W.u.)=15.4 *24*.
1882.8	(5/2,9/2)-	880.64	5/2+	1002.3[ab]	21			
		845.18	5/2-	1038.4[b]	<5			I_γ: from (α,pγ), Iγ=16 in (p,γ).
		0	7/2-	1882.5 *3*	100 *14*	M1+E2	-0.19 *2*	B(E2)(W.u.)=2.2 *12*. B(M1)(W.u.)=0.07 *4*. δ: for J=9/2, +0.42 *3* for J=5/2 in (α,pγ).
1932.55	9/2+	1337.53	7/2+	595.1 *1*	37.2 *15*	M1+E2	-0.19 *4*	B(E2)(W.u.)=3.3 *16*. B(M1)(W.u.)=0.011 *3*.
		880.64	5/2+	1051.9 *1*	100 *3*	E2		B(E2)(W.u.)=15 *4*.
		0	7/2-	1931.4[ab]	1			
1962.89	(3/2,5/2)-	1178.98	3/2-	784.0	15 *2*	M1(+E2)	-0.04 *25*	B(E2)(W.u.)=(0.6 +*77* −*6*). B(M1)(W.u.)=(0.082 *18*).
		1158.76	3/2+	804.5	4 *1*	[E1]		B(E1)(W.u.)=0.00051 *15*.
		472.60	3/2-	1490.2 *2*	100 *2*	M1+E2	+0.21 *6*	B(E2)(W.u.)=4.4 *25*. B(M1)(W.u.)=0.077 *13*.
		0	7/2-	1962.5[ab]				
2094.8	3/2-	1178.98	3/2-	915.4	100 *9*	M1(+E2)	0.00 *10*	B(M1)(W.u.)=(0.034 *10*).
		880.64	5/2+	1214.0[a]	30 *6*	[E1]		B(E1)(W.u.)=0.00011 *4*.
		855.65	1/2+	1239.2	55 *6*	[E1]		B(E1)(W.u.)=0.00019 *6*.
		845.18	5/2-	1249.1[a]	33 *6*			
		472.60	3/2-	1622.3	33 *9*			
		151.79	3/2+	1942.4	52 *9*	[E1]		B(E1)(W.u.)=4.6×10^{-5} *15*.
2106.6	(3/2,5/2)	1651.22	5/2+	455.4[b]	17 *9*			
		1158.76	3/2+	947.6	33 *8*			
		880.64	5/2+	1225.7	100 *6*			
		151.79	3/2+	1954.1[b]	10			
2114.5		1158.76	3/2+	955.9[a]	79 *9*			
		151.79	3/2+	1962.4[a]	100 *13*			
2142.0	(3/2-,5/2+)	1651.22	5/2+	490.9	38 *6*			
		1178.98	3/2-	962.8	6 *3*			
		1158.76	3/2+	983.3	15 *6*			
		880.64	5/2+	1261.4	100 *9*	(D+Q)	+0.27 *10*	
		855.65	1/2+	1286.6	12 *6*			

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$^{43}_{21}$Sc$_{22}$-10

Adopted Levels, Gammas (continued)

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

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ[‡]	Mult.[§φ]	δ[φ]	Comments
		472.60	3/2-	1669.7	50 6			
		151.79	3/2+	1989.8	74 6			
		0	7/2-	2141.6	18 7	D(+Q)	0.00 4	
2242.8	(3/2,5/2,7/2)-	845.18	5/2-	1397.4	44			
		472.60	3/2-	1770.6	100			
		0	7/2-	2242.5	32			
2288.65	5/2-	1408.09	7/2-	880.7 5	1.1 2			
		845.18	5/2-	1443.5 3	1.3 3			
		472.60	3/2-	1815.4 4	0.9 5			
		151.79	3/2+	2137.1 1	2.1 4	[E1]		B(E1)(W.u.)=5.4×10^{-5} .
		0	7/2-	2288.3 1	100 4	M1+E2	+0.08 5	B(M1)(W.u.)=0.082 .
2335.47	5/2-	0	7/2-	2335.4 1	100	M1(+E2)	+0.08 5	B(E2)(W.u.)=(0.21 +28−21). B(M1)(W.u.)=(0.06 3).
2383.1	3/2(+)	1651.22	5/2+	731.9	100			
		855.65	1/2+	1527.6	45	(M1+E2)	+0.49 7	B(E2)(W.u.)=1.8 . B(M1)(W.u.)=0.0053 .
2458.68	(5/2,9/2)-	0	7/2-	2458.6 1	100	M1(+E2)	+0.15 7	B(E2)(W.u.)=(0.4 4). B(M1)(W.u.)=(0.038 14). δ: for J=5/2, -0.02 5 for J=9/2.
2553.54	11/2+	1932.55	9/2+	620.35 15	100 3	M1		B(M1)(W.u.)=0.103 15.
		1337.53	7/2+	1216.07 12	76 3			
2580.8	(5/2)	1158.76	3/2+	1421.6	52 10			
		880.64	5/2+	1699.7	40 8			
		151.79	3/2+	2428.0	100 13			
2635.35	11/2-	1830.33	11/2-	804.4 3	34 3	M1		B(M1)(W.u.)=0.031 11.
		1408.09	7/2-	1227.1 3	89 7	E2		B(E2)(W.u.)=43 16.
		0	7/2-	2636.0 3	100 15	E2		B(E2)(W.u.)=1.1 4.
2670.5	3/2-	1178.98	3/2-	1491.4	16 4			
		880.64	5/2+	1790.0	43 8			
		855.65	1/2+	1815.2	100 4			
		472.60	3/2-	2198.2	45 6			
2760.10	(5/2,9/2)-	0	7/2-	2760.0 1	100			
2795.4	(3/2 to 9/2)-	1408.09	7/2-	1387.2	36			
		845.18	5/2-	1950.0	87			
		151.79	3/2+	2643.8[ab]	29			
		0	7/2-	2795.1	100			
2811.1	(5/2,7/2,9/2)	2106.6	(3/2,5/2)	704.7	76 9			
		1337.53	7/2+	1473.9	100 11			
		0	7/2-	2810.6	41 11			
2840.7	(5/2,7/2)+	2383.1	3/2(+)	457.3	41			
		1337.53	7/2+	1503.2	100			
		880.64	5/2+	1959.7[ab]	37			
		0	7/2-	2839.9	86			
2846.2		0	7/2-	2846.1	100			

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$^{43}_{21}Sc_{22}$-11

γ(^{43}Sc) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ†	I_γ‡	Mult.§φ	δφ	Comments
2860.8	(1/2,3/2,5/2)+	1651.22	5/2+	1210.2	14 *5*			
		1178.98	3/2-	1682.1	16 *5*			
		1158.76	3/2+	1702.6	23 *7*			
		880.64	5/2+	1980.7	100 *5*			
		151.79	3/2+	2709.0	75 *7*			
2874.7	(5/2+,9/2+)	151.79	3/2+	2723				
2985.0	(3/2,5/2)	1337.53	7/2+	1648.1[b]				I_γ: 84 in (α,pγ) but this branch is either absent (see 1977Di17) in (p,γ) or at the most Iγ=16.
		1178.98	3/2-	1806.0	34 *8*			
		880.64	5/2+	2104.5	71 *5*			
		845.18	5/2-	2139.6	58 *8*			
		151.79	3/2+	2832.9	100 *8*			
2988.12	15/2-	1830.33	11/2-	1157.5 *1*	100	E2		B(E2)(W.u.)=5.4 *7*.
3123.73	19/2-	2988.12	15/2-	135.6 *1*	100	E2		B(E2)(W.u.)=2.92 *3*.
3142.05	13/2+	2553.54	11/2+	588.2 *1*	9.4 *3*	M1		B(M1)(W.u.)=0.017 .
		1932.55	9/2+	1209.8 *1*	100 *3*	E2		B(E2)(W.u.)=41 .
3159.3	(3/2-,5/2,7/2+)	880.64	5/2+	2278.4	50			
		151.79	3/2+	3006.8	88			
		0	7/2-	3158.7	100			
3198.2	(1/2 to 7/2-)	472.60	3/2-	2725.5	100			
3260.1	(7/2,9/2)-	1830.33	11/2-	1432[b]	4.2			E_γ: from (α,pγ) only.
		0	7/2-	3259.6 *10*	100			
3292.4	7/2-	1932.55	9/2+	1360.6 *4*	100 *9*	E1		
		1811.1	3/2-	1479.9[ab]	17			
		1178.98	3/2-	2113.9	81			
		880.64	5/2+	2412.5	31			
		845.18	5/2-	2447.6	100			
3326.8	(3/2- to 11/2-)	0	7/2-	3327.1				
3332.2	(1/2-,3/2,5/2)	1962.89	(3/2,5/2)-	1369	4 *2*			
		1811.1	3/2-	1521	13 *4*			
		1178.98	3/2-	2153	100 *4*			
		1158.76	3/2+	2174	44 *4*			
		845.18	5/2-	2487	29 *6*			
		472.60	3/2-	2860	19 *4*			
3375.3	(7/2,9/2)-	1882.8	(5/2,9/2)-	1492.6	53			
		1830.33	11/2-	1545.3	63			
		1408.09	7/2-	1967.2	100			
		1337.53	7/2+	2038.3	40	[E1]		B(E1)(W.u.)=0.00013 .
		0	7/2-	3375.1	77			
3452.1	5/2+	1811.1	3/2-	1640.8[b]	270			γ from (α,pγ) only.
		880.64	5/2+	2571.1	100			
		845.18	5/2-	2606.2[ab]	45 *7*			
		151.79	3/2+	3299.9[ab]	55 *7*			
		0	7/2-	3451.3[ab]	27 *9*			

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$^{43}_{21}Sc_{22}$-12

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

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ[‡]	Mult.[§ϕ]	δ[ϕ]	Comments
3463.3	5/2-	880.64	5/2+	2582.9	37 *4*			
		151.79	3/2+	3311.3	100 *7*			
3503.2	7/2-	845.18	5/2-	2658	100 *10*			
		0	7/2-	3503	100 *10*			
3631.7	(5/2-,7/2-,9/2-)	0	7/2-	3631.5 *10*	100			
3645.6	(3/2,5/2,7/2-)	1962.89	(3/2,5/2)-	1682.5	34 *11*			
		1651.22	5/2+	1994.5	66 *13*			
		1178.98	3/2-	2466.4	100 *16*			
		880.64	5/2+	2765.0	63 *13*			
3683.2	(3/2,5/2,7/2)	880.64	5/2+	2803	25 *4*			
		845.18	5/2-	2838	56 *6*			
		151.79	3/2+	3531	100 *7*			
3734.0		2288.65	5/2-	1445.5	31			
		1408.09	7/2-	2325.7	83			
		845.18	5/2-	2888.5	100			
3755.43	15/2+	3142.05	13/2+	614.1 *6*	100 *3*	M1(+E2)	-0.11 *8*	
		2988.12	15/2-	766.9 *2*	3.0 *2*	E1		
		2553.54	11/2+	1202.4 *3*	18.9 *6*	E2		
3756.5	(3/2-,5/2,7/2+)	151.79	3/2+	3605	100 *7*			
		0	7/2-	3757	43 *7*			
3807.2	7/2-	1337.53	7/2+	2469.7	24 *6*			
		880.64	5/2+	2926.2	100 *5*			
		472.60	3/2-	3334.5	35 *8*			
3843.0	(≤ 9/2)	845.18	5/2-	2998				
3860.1	(≤ 7/2)	151.79	3/2+	3708				
3959.87	15/2-	2988.12	15/2-	971.5 *1*	14.8 *6*	M1		
		2635.35	11/2-	1324.5 *1*	17.2 *7*	E2		
		1830.33	11/2-	2129.7 *1*	100 *3*	E2		
4007.3	(3/2,5/2)+	880.64	5/2+	3126	83 *20*			
		855.65	1/2+	3152	100 *20*			
		472.60	3/2-	3535	50 *13*			
		151.79	3/2+	3855	100 *17*			
4038.8	7/2-	1932.55	9/2+	2107	100 *13*			
		472.60	3/2-	3566	67 *15*			
4158.6	(9/2,11/2,13/2)-	2553.54	11/2+	1605	100			
4301.2	(5/2+ to 13/2+)	1932.55	9/2+	2368.6 *5*	100 *17*			
4371.5	5/2-,7/2-	2106.6	(3/2,5/2)	2265	37 *7*			
		1651.22	5/2+	2720	32 *10*			
		1408.09	7/2-	2963	49 *12*			
		1337.53	7/2+	3034	100 *10*			
		880.64	5/2+	3491	27 *7*			
4383.03	17/2(-)	3123.73	19/2-	1258.8 *9*	100	D+Q		
		2988.12	15/2-	1394.9 *2*	24	D		
4430.2	(1/2+,3/2,5/2)	1178.98	3/2-	3251	100 *15*			
		1158.76	3/2+	3271	75 *13*			
		880.64	5/2+	3550	75 *10*			

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

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ [†]	I_γ [‡]	Mult. [§φ]	δ [φ]	Comments
4455.3	(5/2,9/2)	0	7/2-	4455	100			
4633.6	(17/2,21/2)	3123.73	19/2-	1509.8 *19*	100	D+Q		
5231.33	17/2+	3755.43	15/2+	1475.5 *6*	100	M1		
5519.00	19/2+	5231.33	17/2+	287.9 *1*	2.3 *1*	M1		B(M1)(W.u.)=0.26 .
		3755.43	15/2+	1763.3 *1*	27.9 *11*	E2		B(E2)(W.u.)=13 .
		3123.73	19/2-	2394.86 *12*	100	E1		B(E1)(W.u.)=0.00050 .
5793.51	(11/2- to 19/2-)	3959.87	15/2-	1833.6 *2*	100			
5919.4	3/2	3292.4	7/2-	2629	33			
		2670.5	3/2-	3249	33			
		2580.8	(5/2)	3338	33			
		2383.1	3/2(+)	3536	67			
		1651.22	5/2+	4268	67			
		1178.98	3/2-	4740	33			
		1158.76	3/2+	4760	67			
		880.64	5/2+	5038	67			
		845.18	5/2-	5074	100			
		472.60	3/2-	5446	67			
		151.79	3/2+	5767	100			
5950.5	(3/2,5/2)	3332.2	(1/2-,3/2,5/2)	2619	62			
		3292.4	7/2-	2660	19			
		2580.8	(5/2)	3369	14			
		2335.47	5/2-	3615	5			
		2288.65	5/2-	3661	5			
		2142.0	(3/2-,5/2+)	3808	10			
		2114.5		3836	5			
		2094.8	3/2-	3856	10			
		1962.89	(3/2,5/2)-	3987	33			
		1811.1	3/2-	4139	5			
		1651.22	5/2+	4299	67			
		1178.98	3/2-	4771	100			
		1158.76	3/2+	4791	14			
		855.65	1/2+	5094	43			
		845.18	5/2-	5105 [b]				
		472.60	3/2-	5477	43			
		151.79	3/2+	5798	43			
6060.5	(5/2)	0	7/2-	6060				
6067.23	19/2-	3959.87	15/2-	2107.3 *1*	100 *3*	E2		B(E2)(W.u.)=21 *5*.
		2988.12	15/2-	3079.0 *1*	30.5 *10*	E2		B(E2)(W.u.)=0.97 *22*.
6103.2	(3/2-,5/2+)	3843.0	(≤ 9/2)	2260	1.6			
		3452.1	5/2+	2651	10			
		3159.3	(3/2-,5/2,7/2+)	2943	1.6			
		2988.12	15/2-	3116	1.6			
		2846.2		3257	1.6			
		2840.7	(5/2,7/2)+	3262	<1.6			
		2142.0	(3/2-,5/2+)	3961	13			
		2106.6	(3/2,5/2)	3996	5			

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Adopted Levels, Gammas (continued)

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

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ[‡]	Mult.[§φ]	δ[φ]	Comments
		1408.09	7/2-	4695	5			
		1337.53	7/2+	4766	8			
		1178.98	3/2-	4924	3			
		855.65	1/2+	5247	1.6			
		845.18	5/2-	5258	3			
		472.60	3/2-	5630	1.6			
		151.79	3/2+	5951	100			
		0	7/2-	6103	5			
6136.2	3/2	2985.0	(3/2,5/2)	3150[b]	30			
		2670.5	3/2-	3466[b]	15			
		2580.8	(5/2)	3555	35			
		2142.0	(3/2-,5/2+)	3994	24			
		2094.8	3/2-	4041	71			
		1962.89	(3/2,5/2)-	4173	100			
		1651.22	5/2+	4485	35			
		1178.98	3/2-	4957	65			
		1158.76	3/2+	4977	53			
		880.64	5/2+	5255	41			
		855.65	1/2+	5280	18			
		845.18	5/2-	5291	24			
		472.60	3/2-	5663	24			
		151.79	3/2+	5984	100			
6143.4	3/2-	3807.2	7/2-	2336	21			
		3292.4	7/2-	2853	21			
		2988.12	15/2-	3156	37			
		2670.5	3/2-	3473	32			
		2094.8	3/2-	4048	32			
		1962.89	(3/2,5/2)-	4180	26			
		1811.1	3/2-	4332	11			
		1178.98	3/2-	4964	68			
		1158.76	3/2+	4984	16			
		880.64	5/2+	5262	11			
		855.65	1/2+	5287	100			
		845.18	5/2-	5298	53			
		472.60	3/2-	5670	16			
		151.79	3/2+	5991	74			
		0	7/2-	6143	11			
6172.98	19/2+	5519.00	19/2+	653.9 *2*	56 *5*	M1		
		5231.33	17/2+	941.4 *1*	94 *4*	M1		
		3755.43	15/2+	2418.3 *2*	100 *5*	E2		
		3123.73	19/2-	3048.6 *8*	33 *8*	E1		
6184.2	5/2	151.79	3/2+	6032				
6198.1	(3/2,5/2+)	3734.0		2464	16			
		2335.47	5/2-	3862	20			
		2142.0	(3/2-,5/2+)	4056	16			
		2094.8	3/2-	4103	52			

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Adopted Levels, Gammas (continued)

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

E_i(level)	J^{π}_i	E_f(level)	J^{π}_f	E_{γ}[†]	I_{γ}[‡]	Mult.[§ϕ]	δ[ϕ]	Comments
		1962.89	(3/2,5/2)-	4235	12			
		1651.22	5/2+	4547	48			
		880.64	5/2+	5317	100			
		855.65	1/2+	5342	60			
		845.18	5/2-	5353	12			
		151.79	3/2+	6046	64			
6217.4	(3/2-,5/2+)	3860.1	(≤ 7/2)	2357	2			
		3645.6	(3/2,5/2,7/2-)	2572	6			
		3452.1	5/2+	2765	6			
		2988.12	15/2-	3230	8			
		2860.8	(1/2,3/2,5/2)+	3357	12			
		2670.5	3/2-	3547	10			
		2142.0	(3/2-,5/2+)	4075	4			
		2106.6	(3/2,5/2)	4110	2			
		2094.8	3/2-	4122	4			
		1811.1	3/2-	4406	6			
		1408.09	7/2-	4809	2			
		1337.53	7/2+	4880	<2			
		880.64	5/2+	5336	6			
		855.65	1/2+	5361	100			
		472.60	3/2-	5744	16			
		151.79	3/2+	6065	8			
		0	7/2-	6217	8			
6247.2	(3/2,5/2)	2142.0	(3/2-,5/2+)	4105	50			
		2094.8	3/2-	4152	17			
		1962.89	(3/2,5/2)-	4284	33			
		1178.98	3/2-	5068	17			
		880.64	5/2+	5366	33			
		845.18	5/2-	5402	83			
		151.79	3/2+	6095	100			
6283.49	21/2+	5519.00	19/2+	764.3 *1*	27.2 *18*	M1		B(M1)(W.u.)=0.07 *3*.
		5231.33	17/2+	1052.9 *4*	3.0 *7*	E2		B(E2)(W.u.)=8 *4*.
		4633.6	(17/2,21/2)	1648[b]	39			
		3123.73	19/2-	3159.8 *2*	100 *5*	E1		B(E1)(W.u.)=$9.\times10^{-5}$ *4*.
6320.4	5/2+	3807.2	7/2-	2513	11			
		3452.1	5/2+	2868	5			
		2985.0	(3/2,5/2)	3333	11	D+Q	-0.02 *4*	
		2580.8	(5/2)	3739	3			
		2383.1	3/2(+)	3937	2	D+Q	-0.18 *8*	
		2142.0	(3/2-,5/2+)	4178	10	D+Q	+0.07 *6*	
		1651.22	5/2+	4669	2			
		1337.53	7/2+	4983	3			
		1178.98	3/2-	5141	6	D+Q	0.00 *3*	
		880.64	5/2+	5439	10	D+Q	+0.14 *5*	
		855.65	1/2+	5464	10			δ(Q/D)=+0.01 *3* or -3.1 *5*.
		845.18	5/2-	5475	8			

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Adopted Levels, Gammas (continued)

γ(^{43}Sc) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ[‡]	Mult.[§φ]	δ[φ]	Comments
		151.79	3/2+	6168	100	D+Q	+0.03 *3*	
6431.04	23/2+	5519.00	19/2+	912.0 *1*	100 *3*	E2		B(E2)(W.u.)=5.7 *6*.
		3123.73	19/2-	3307.4 *4*	8.7 *3*	M2		B(M2)(W.u.)=0.031 *4*.
6685.1	1/2-	2580.8	(5/2)	4104	13			
		2094.8	3/2-	4590	79			
		1962.89	(3/2,5/2)-	4722	42			
		1178.98	3/2-	5506	38			
		880.64	5/2+	5804	33			
		855.65	1/2+	5829	25			
		472.60	3/2-	6212	29			
		151.79	3/2+	6533	100			
6696.2	5/2	3683.2	(3/2,5/2,7/2)	3013	5			
		3326.8	(3/2- to 11/2-)	3369[b]	5			
		2383.1	3/2(+)	4313	9			δ(Q/D)=-0.13 *10* or -4.2 *+10-15* for Jπ(2383)=7/2 and +0.20 *10* for Jπ(2383)=3/2.
		1962.89	(3/2,5/2)-	4733	5	D+Q	-0.47 *8*	
		1651.22	5/2+	5044	11	D+Q	-0.07 *7*	
		1337.53	7/2+	5359	11			δ(Q/D)=-0.14 *6* or -23 +∞-12.
		1178.98	3/2-	5517	7			
		1158.76	3/2+	5537	7			
		880.64	5/2+	5815	32	D+Q	+0.03 *3*	
		845.18	5/2-	5851	7	D+Q	-0.27 *10*	
		472.60	3/2-	6223	2	D+Q	+0.22 *5*	
		151.79	3/2+	6544	100	D+Q	-0.14 *4*	
		0	7/2-	6695	27	D+Q	+0.02 *4*	
6777.3	5/2	4455.3	(5/2,9/2)	2322	64			
		2988.12	15/2-	3790	45			
		2580.8	(5/2)	4196	55			
		2383.1	3/2(+)	4394	36			
		2142.0	(3/2-,5/2+)	4635	82			
		1651.22	5/2+	5125	91			
		1408.09	7/2-	5369	18			
		1337.53	7/2+	5440	27			
		1178.98	3/2-	5598	100			
		880.64	5/2+	5896	91			
		855.65	1/2+	5921	45			
		845.18	5/2-	5932	82			
		472.60	3/2-	6304	91			
		151.79	3/2+	6625	82			
6818.42	(21/2+)	6172.98	19/2+	645.4 *1*	100 *5*	M1		
		5231.33	17/2+	1586.9 *3*	29.2 *27*	E2		
				3691.0 *18*	100			
6918.6	7/2	3843.0	(≤ 9/2)	3076	3			
		3326.8	(3/2- to 11/2-)	3592	6			
		3260.1	(7/2,9/2)-	3658	6			
		2874.7	(5/2+,9/2+)	4044	3			

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γ(^{43}Sc) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ†	I_γ‡	Mult.§ϕ	δϕ	Comments
		2795.4	(3/2 to 9/2)-	4123	3			
		1882.8	(5/2,9/2)-	5034	5			
		1408.09	7/2-	5511	5	D+Q	-0.04 *4*	
		880.64	5/2+	6037	3			
		845.18	5/2-	6074	100	D+Q	0.00 *2*	
		0	7/2-	6917	11	D+Q	-0.29 *8*	
7106.88	23/2+	6818.42	(21/2+)	288.4 *1*	8.0 *4*	M1		
		6431.04	23/2+	675.9 *1*	100 *4*	M1		
		6283.49	21/2+	823.3 *1*	69 *3*	M1		
		6172.98	19/2+	933.0 *5*	13 *1*	E2		
7118.8	(11/2+ to 19/2+)	3755.43	15/2+	3362.2 *10*	100			
7273.5	(11/2+ to 19/2+)	3755.43	15/2+	3516.9 *5*	100			
7344.1	3/2-,5/2	3860.1	(≤ 7/2)	3484	13			
		3807.2	7/2-	3537	39			
		3683.2	(3/2,5/2,7/2)	3661	10			
		3645.6	(3/2,5/2,7/2-)	3698	10			
		3159.3	(3/2-,5/2,7/2+)	4184	19			
		2114.5		5229	6			
		1651.22	5/2+	5692	19			
		1337.53	7/2+	6007	6			
		1178.98	3/2-	6165	6			
		1158.76	3/2+	6185	6			
		880.64	5/2+	6463	100			
		151.79	3/2+	7191	55			
		0	7/2-	7343	32			
7359.16	25/2+	7106.88	23/2+	252.3 *1*	2.8 *2*	M1		B(M1)(W.u.)=0.109 *11*.
		6431.04	23/2+	927.1 *6*	100 *3*	M1		B(M1)(W.u.)=0.078 *6*.
		6283.49	21/2+	1075.6 *3*	0.8 *1*	E2		B(E2)(W.u.)=1.00 *15*.
7394.18	3/2-,5/2+	4430.2	(1/2+,3/2,5/2)	2964	20			
		4007.3	(3/2,5/2)+	3387	28			
		3756.5	(3/2-,5/2,7/2+)	3637	8			
		3463.3	5/2-	3931	12			
		3452.1	5/2+	3942	12			
		2874.7	(5/2+,9/2+)	4519	8			
		2860.8	(1/2,3/2,5/2)+	4534	8			
		2795.4	(3/2 to 9/2)-	4598	4			
		2580.8	(5/2)	4813	4			
		2383.1	3/2(+)	5011	4			
		2142.0	(3/2-,5/2+)	5252	4			
		2114.5		5279	28			
		1811.1	3/2-	5583	8			
		1651.22	5/2+	5742	8			
		1408.09	7/2-	5986	4			
		1337.53	7/2+	6057	4			
		1178.98	3/2-	6215	16			
		1158.76	3/2+	6235	40			

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Adopted Levels, Gammas (continued)

γ(^{43}Sc) (continued)

E_i(level)	J^π_i	E_f(level)	J^π_f	E_γ[†]	I_γ[‡]	Mult.[§ϕ]	δ[ϕ]	Comments
		880.64	5/2+	6513	32			
		855.65	1/2+	6538	20			
		845.18	5/2-	6548	16			
		472.60	3/2-	6921	8			
		151.79	3/2+	7241	100			
		0	7/2-	7393	4			
7512.3	(5/2+,7/2,9/2)	4371.5	5/2-,7/2-	3141	12			
		4038.8	7/2-	3474	3			
		3807.2	7/2-	3705	10			
		2840.7	(5/2,7/2)+	4671	3			
		2811.1	(5/2,7/2,9/2)	4701	3			
		2553.54	11/2+	4960	3			
		1932.55	9/2+	5580	100			
		1882.8	(5/2,9/2)-	5627	3			
		1158.76	3/2+	6353	5			
		845.18	5/2-	6666	3			
		0	7/2-	7511	22			
7581.4	(3/2-,5/2,7/2+)	4430.2	(1/2+,3/2,5/2)	3151	3			
		3683.2	(3/2,5/2,7/2)	3898	18			
		3503.2	7/2-	4078	5			
		3452.1	5/2+	4129	8			
		3375.3	(7/2,9/2)-	4207	5			
		2860.8	(1/2,3/2,5/2)+	4721	3			
		2142.0	(3/2-,5/2+)	5439	13			
		880.64	5/2+	6700	100			
		151.79	3/2+	7428	93			
		0	7/2-	7580	5			
8010.1	(15/2+ to 23/2+)	5519.00	19/2+	2491.0 *3*	100			
8434.37	23/2-	3123.73	19/2-	5310.5 *1*	100	E2		
8703.06	25/2(+)	7106.88	23/2+	1595.2 *3*	11 *1*	M1		
		6431.04	23/2+	2271.8 *2*	100 *4*	D		
8831.84	27/2+	7359.16	25/2+	1472.5 *1*	100 *3*	M1		B(M1)(W.u.)=0.089 *19*.
		7106.88	23/2+	1724.8 *2*	5.0 *9*	E2		B(E2)(W.u.)=2.7 *8*.
9218.8	(21/2-)	6067.23	19/2-	3151.4 *3*	100	(M1)		
9578.86	(27/2+)	7359.16	25/2+	2219.2 *2*	70 *17*	M1		
		6431.04	23/2+	3147.7 *2*	100 *4*	E2		
9995.10	25/2(-)	8555.56	23/2-	1439.5 *1*	100 *4*	M1		
		7106.88	23/2+	2887.4 *6*	44 *10*	E1		
10084.47	27/2-	8703.06	25/2(+)	1381.2 *1*	38 *4*	E1		
		8555.56	23/2-	1529.0 *1*	49 *6*	E2		
		8434.37	23/2-	1650.3 *1*	100 *4*	E2		
		7359.16	25/2+	2725.6 *2*	28.4 *13*	E1		
10178.6	(19/2+ to 27/2+)	7106.88	23/2+	3071.6 *5*	100			
10436.84	(25/2+)	7106.88	23/2+	3329.9 *2*	100	M1		
10613.21	(27/2-)	8434.37	23/2-	2177.8 *6*	4.4 *6*	E2		
		7359.16	25/2+	3253.9 *1*	100 *4*	(E1)		

Continued on next page (footnotes at end of table)

γ(^{43}Sc) (continued)

E_i(level)	J^π_i	E_f(level)	J^π_f	E_γ†	I_γ‡	Mult.§φ	δφ	Comments
10856.18	(27/2-)	10084.47	27/2-	771.6 *4*	10.3 *12*	M1		
		9995.10	25/2(-)	860.4 *2*	12 *2*	M1		
		7359.16	25/2+	3497.0 *1*	100 *4*	(E1)		
11252.0		7359.16	25/2+	3892.6 *3*	100			
11355.60	27/2-	8555.56	23/2-	2799.5 *2*	100 *4*	E2		
		8434.37	23/2-	2920.2 *10*	13 *2*	E2		
		7359.16	25/2+	3997.1 *3*	49 *4*	E1		
11661.0		8555.56	23/2-	3105.3 *4*	100			
11807.36	29/2(-)	10856.18	(27/2-)	951.0 *3*	20 *1*	M1		
		9578.86	(27/2+)	2228.0 *2*	29 *2*	E1		
		8831.84	27/2+	2975.2 *1*	100 *3*	D		
11920.54	25/2(+)	7359.16	25/2+	4560.5 *3*	66 *6*	M1		
		6431.04	23/2+	5489.0 *3*	100 *4*	M1		
12053.33	29/2(-)	10084.47	27/2-	1968.8 *1*	100 *4*	(M1)		
		9995.10	25/2(-)	2058.7 *2*	25 *6*	E2		
12073.15	(29/2-)	10613.21	(27/2-)	1460.1 *1*	100	M1		
12614.84	(31/2)-	10856.18	(27/2-)	1757.9 *7*	14 *1*	E2		
		10084.47	27/2-	2530.6 *1*	100 *3*	(E2)		
12703.9		8555.56	23/2-	4148.1 *8*	100			
12804.39	(25/2,27/2,29/2)	10613.21	(27/2-)	2190.8 *3*	56 *12*			
		8831.84	27/2+	3972.5 *2*	100 *4*			
13044.65	(29/2+)	10436.84	(25/2+)	2607.8 *2*	61 *3*	E2		
		8831.84	27/2+	4213.0 *3*	100 *4*	M1		
		8703.06	25/2(+)	4341.7 *3*	81 *8*	E2		
		7359.16	25/2+	5684.9 *4*	83 *4*	E2		
13116.57	(31/2-)	12073.15	(29/2-)	1043.6 *1*	32 *2*	M1		
		10613.21	(27/2-)	2503.1 *1*	100 *4*	E2		
13122.7		10084.47	27/2-	3038.1 *5*	100			
13584.1	(29/2+)	8831.84	27/2+	4752.0 *3*	100 *6*	(M1)		
14405.80	(33/2-)	13116.57	(31/2-)	1289.2 *3*	7.9 *7*	M1		
		12614.84	(31/2)-	1791.2 *1*	100 *4*	D		
		12053.33	29/2(-)	2353.2 *3*	27 *2*	E2		
		11807.36	29/2(-)	2598.0 *1*	48 *2*	(E2)		
14451.1	(29/2+)	11920.54	25/2(+)	2530.4 *1*	100 *4*	E2		
		11807.36	29/2(-)	2644.5 *5*	41 *9*	E1		
		8831.84	27/2+	5620.1 *5*	61 *13*	M1		
14561.2	31/2-	12053.33	29/2(-)	2508.0 *3*	61 *19*	M1		
		11355.60	27/2-	3205.3 *3*	100 *4*	E2		
14914.3	31/2	8831.84	27/2+	6081.0 *3*	100	Q		
15910.7	(33/2+)	13044.65	(29/2+)	2866.3 *2*	100 *5*	E2		
		12614.84	(31/2)-	3296.0 *4*	35 *2*	E1		
16703.6		13116.57	(31/2-)	3586.9 *5*	100			
16708.4		13584.1	(29/2+)	3124.2 *3*	100			
16711.2		12804.39	(25/2,27/2,29/2)	3906.6 *5*	100			
17767.4	(35/2)	14914.3	31/2	2852.9 *1*	100	(E2)		
17921.1	(31/2+)	14451.1	(29/2+)	3469.8 *2*	100	(M1)		

Continued on next page (footnotes at end of table)

$^{43}_{21}Sc_{22}$-20

Adopted Levels, Gammas (continued)

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

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ[‡]	Mult.[§ϕ]	δ[ϕ]	Comments
18196.8	35/2-	14561.2	31/2-	3635.4 *3*	100	E2		
18765.3	(37/2)	17767.4	(35/2)	997.9 *1*	100	M1		
19208.6	(37/2+)	17767.4	(35/2)	1440.7 *2*	60 *10*	M1		
		15910.7	(33/2+)	3298.8 *3*	100 *5*	E2		

[†] Values with ΔE are primarily from ^{43}Ti ε decay, (^{16}O,pnγ), (^{19}F,p2nγ), (^{20}Ne,αpγ) and (^{24}Mg,αpγ). Weighted averages are taken when available. Others are from level-energy differences.

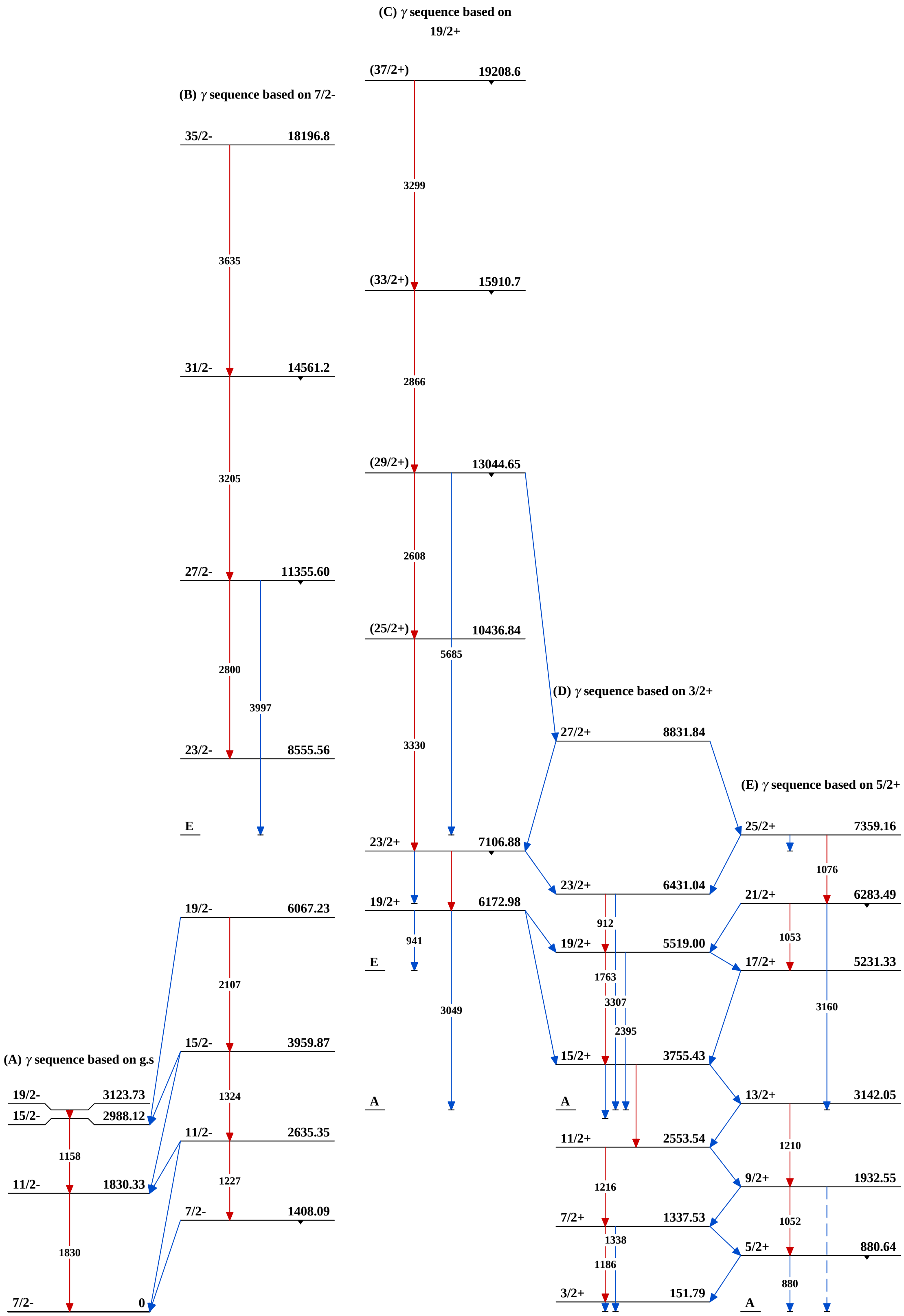
[‡] Weighted average of all available γ-ray data.

[§] From γ(θ), γ(lin pol) or γγ(θ) data in (p,γ), (α,pγ), (^{16}O,pnγ), (^{19}F,p2nγ), (^{20}Ne,αpγ) and (^{24}Mg,αpγ).

[ϕ] Primarily from (α,pγ), (p,γ), (^{16}O,pnγ), (^{19}F,p2nγ). If $T_{1/2}$ is unknown and parity is determined not by polarization measurements, evaluators use D and Q, instead of M1 and E2, or, E1 and M2.

[a] γ seen in (p,γ) only.

[b] Placement of transition in the level scheme is uncertain.


(C) γ sequence based on 19/2+
(37/2+) 19208.6
(B) γ sequence based on 7/2-
35/2- 18196.8
3299
3635
(33/2+) 15910.7
31/2- 14561.2
2866
3205
(29/2+) 13044.65
27/2- 11355.60
2608
(25/2+) 10436.84
5685
2800
3997
(D) γ sequence based on 3/2+
3330
23/2- 8555.56
27/2+ 8831.84
(E) γ sequence based on 5/2+
E
25/2+ 7359.16
23/2+ 7106.88
23/2+ 6431.04
1076
19/2- 6067.23
19/2+ 6172.98
21/2+ 6283.49
912
941
1053
19/2+ 5519.00
E
17/2+ 5231.33
1763
2107
3307
3049
3160
2395
15/2- 3959.87
(A) γ sequence based on g.s
15/2+ 3755.43
19/2- 3123.73
13/2+ 3142.05
1324
15/2- 2988.12
A
A
11/2- 2635.35
11/2+ 2553.54
1158
1210
11/2- 1830.33
1227
1216
9/2+ 1932.55
7/2- 1408.09
7/2+ 1337.53
1830
1338
1052
5/2+ 880.64
1186
880
3/2+ 151.79
7/2- 0
A

^{43}Ti ε decay (509 ms) 1987Ho14

Parent: ^{43}Ti: E=0; Jπ=7/2-; $T_{1/2}$=509 ms *5*; Q(g.s.)=6867 *7*; %ε=100

^{43}Ti-Q(g.s.): From 2011AuZZ.

1987Ho14: ^{43}Ti nuclides were produced by the ^{40}Ca(α,n) reaction with an 18 MeV alpha beam from the MC-20 cyclotron of the University of Jyvaskyla. β-rays were detected by a 500 μm, 300 mm^2 Si(Au) surface-barrier detector and γ-rays by a 15.5% Ge detector. Measured Eγ, Iγ, E(β). Deduced levels, β- and γ-branchings, $T_{1/2}$. Comparison with shell-model calculations.

Others:

$T_{1/2}$ and isotopic identification: 1967Al08, 1963Va37, 1961Ja22 (also 1960Ja12), 1954Ty33, 1948Sc20.

β^+: 1969Va41 (also 1963Va37), 1961Ja22.

γ: 1971BlZH.

^{43}Sc Levels

E(level)†	Jπ‡
0	7/2-
151.25 *14*	3/2+
472.7 *3*#	3/2-
845.17 *9*	5/2-
1408.03 *9*	7/2-
1882.5 *3*	(5/2,9/2)-
1963.0 *4*	(3/2,5/2)-
2288.40 *10*	5/2-
2335.47 *10*	5/2-
2458.68 *10*	(5/2,9/2)-
2760.10 *10*	(5/2,9/2)-
3259.7 *10*	(7/2,9/2)-
3631.7 *10*	(5/2-,7/2-,9/2-)

† From least-squares fit to Eγ data.

‡ From Adopted Levels.

Intensity balance gives apparent β^+ feeding of 0.11% *6*.

γ(^{43}Sc)

Eγ	Ei(level)	J^π_i	Ef(level)	J^π_f	Iγ†	Mult.‡	δ‡
151.9	151.25	3/2+	0	7/2-	2.9 *12*[a]		
472.7 *4*	472.7	3/2-	0	7/2-	4.8 *10*		
562.9 *2*	1408.03	7/2-	845.17	5/2-	2.8 *5*		
845.2 *1*	845.17	5/2-	0	7/2-	62.9 *19*	M1+E2	+0.15 *4*
880.7 *5*	2288.40	5/2-	1408.03	7/2-	1.1 *2*		
936.0 *8*	1408.03	7/2-	472.7	3/2-	1.0 *2*		
1408.0 *1*	1408.03	7/2-	0	7/2-	12.6 *4*	M1+E2	+0.15 *5*
1443.5 *3*	2288.40	5/2-	845.17	5/2-	1.3 *3*		
1490.2 *2*	1963.0	(3/2,5/2)-	472.7	3/2-	0.5 *2*	M1+E2	+0.21 *6*
1815.4 *4*	2288.40	5/2-	472.7	3/2-	0.9 *5*		
1882.5 *3*	1882.5	(5/2,9/2)-	0	7/2-	5.9 *8*		
2137.1 *1*	2288.40	5/2-	151.25	3/2+	2.1 *4*		
2288.3 *1*	2288.40	5/2-	0	7/2-	100 *4*	M1+E2	+0.08 *5*
2335.4 *1*	2335.47	5/2-	0	7/2-	8.7 *7*		
2458.6 *1*	2458.68	(5/2,9/2)-	0	7/2-	20.7 *8*		
2760.0 *1*	2760.10	(5/2,9/2)-	0	7/2-	4.5 *3*		
3259.6 *10*	3259.7	(7/2,9/2)-	0	7/2-	0.24 *4*		
3631.5 *10*	3631.7	(5/2-,7/2-,9/2-)	0	7/2-	0.36 *6*		

† For absolute intensity per 100 decays, multiply by 0.044 *6*.

‡ From Adopted Gammas.

a Estimated (evaluators) from log $f^{1u}t$>8.5 and Iγ(2137γ).

^{43}Ti ε decay (509 ms) 1987Ho14 (continued)

ε,β^+ radiatons

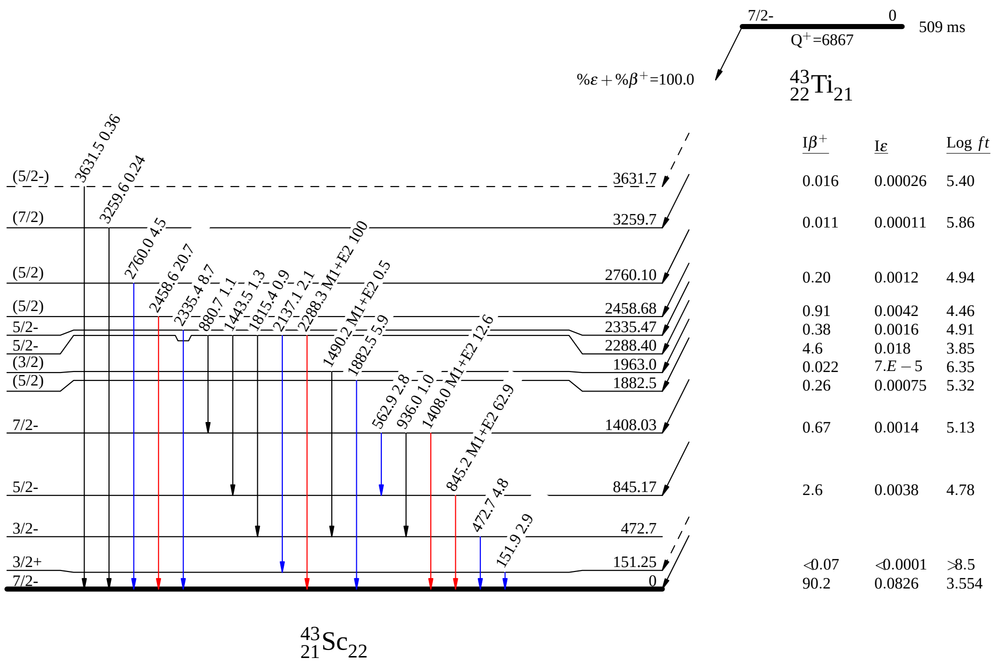
There is an apparent β^+ feeding of 0.11% *6* to the 3/2- at 472.7 giving an unrealistic log *ft*=6.3 for 7/2- to 3/2-. This imbalance is due either to missing γ transitions to the 472.7 level or to intensity problems in the γ rays involved.

Eε	E(level)	Iε	Log *ft*	I(ε+β$^+$)	Comments
(3235)†	3631.7	0.00026 *7*	5.40 *11*	0.016 *4*	av Eβ=974.0 *33*. εK=0.01470 *15*. εL=0.001478 *15*. εM+=0.0002518 *2*.
(3607)	3259.7	0.00011 *2*	5.86 *8*	0.011 *2*	av Eβ=1149.0 *34*. εK=0.00924 *8*. εL=0.000929 *8*. εM+=0.0001583 *1*.
(4107)	2760.10	0.0012 *2*	4.94 *7*	0.20 *3*	av Eβ=1386.5 *34*. εK=0.00546 *4*. εL=0.000549 *4*. εM+=9.34×10^{-5} *7*.
(4408)	2458.68	0.0042 *6*	4.46 *7*	0.91 *13*	av Eβ=1530.9 *34*. εK=0.00414 *3*. εL=0.000416 *3*. εM+=7.08×10^{-5} *5*.
(4532)	2335.47	0.0016 *3*	4.91 *7*	0.38 *6*	av Eβ=1590.1 *34*. εK=0.003718 *23*. εL=0.0003737 *2*. εM+=6.36×10^{-5} *4*.
(4579)	2288.40	0.018 *3*	3.85 *7*	4.6 *7*	av Eβ=1612.7 *34*. εK=0.003574 *21*. εL=0.0003592 *2*. εM+=6.12×10^{-5} *4*.
(4904)	1963.0	7.×10^{-5} *3*	6.35 *20*	0.022 *10*	av Eβ=1769.5 *34*. εK=0.002755 *15*. εL=0.0002768 *1*. εM+=4.71×10^{-5} *3*.
(4985)	1882.5	0.00075 *15*	5.32 *9*	0.26 *5*	av Eβ=1808.4 *34*. εK=0.002592 *14*. εL=0.0002605 *1*. εM+=4.436×10^{-5} *24*.
(5459)	1408.03	0.0014 *2*	5.13 *7*	0.67 *10*	av Eβ=2038.5 *34*. εK=0.001853 *9*. εL=0.0001862 *9*. εM+=3.171×10^{-5} *15*.
(6022)	845.17	0.0038 *6*	4.78 *7*	2.6 *4*	av Eβ=2312.8 *35*. εK=0.001300 *6*. εL=0.0001306 *6*. εM+=2.225×10^{-5} *10*.
(6716)†	151.25	<0.0001	>8.5	<0.07	av Eβ=2663.5 *34*. εK=0.001872 *8*. εL=0.0001883 *8*. εM+=3.207×10^{-5} *13*.
(6867)	0	0.0826 *16*	3.554 *9*	90.3 *14*	av Eβ=2726.7 *35*. εK=0.000819 *3*. εL=8.22×10^{-5} *3*. εM+=1.400×10^{-5} *5*.

† Placement of transition in the level scheme is uncertain.

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



Be(^{58}Ni,Xγ):isomers 2011Ho02

2011Ho02: E(^{58}Ni)=550 MeV/nucleon beam was produced from the UNILAC-SIS accelerator complex at the GSI Helmholtzzentrum fur Schwerionenforschung mbH, Darmstadt, Germany. Target of 4 g/cm^2 Be. Reaction products were separated by a 70 m long fragment separator (FRS) and identified by time-of-flight and energy loss in the MUSIC detectors. γ-rays were detected by 15 high-resoluation and high-efficiency CLUSTER germanium detectors. Measured Eγ, Iγ. Deduced levels.

^{43}Sc Levels

E(level)	$J^{\pi\dagger}$
0	7/2-
151.6 *2*	3/2+
2987	15/2-
3123	19/2-

† From Adopted Levels.

γ(^{43}Sc)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ	Mult.	$\alpha^\dagger$	Comments
151.6	3/2+	0	7/2-	151.6 *2*	M2	0.0406	B(M2)(W.u.)=0.069 *2*.
3123	19/2-	2987	15/2-	135.8 *2*	E2	0.093	B(M2)(W.u.)=2.67 *4*.

† Calculated values from 2008Ki07.

^{24}Mg(^{24}Mg,αpγ) 2007Ch40

2007Ch40: E=94 MeV beam from Berkeley 88-In cyclotron. Target of self-supporting 0.5 mg/cm^2 ^{24}Mg. γ-rays were detected by the Gammasphere array of 102 Compton-suppressed HPGe detectors and charged particles by an array of 95 CsI(T1) detectors with a 65% efficiency for detection α particles and 50% for protons. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$, $\gamma\gamma(\theta)$(DCO). Deduced levels, J, π, γ branching ratios.

A similar experiment was done by 2007Ch40 using the reaction ^{28}Si(^{20}Ne,αpγ). The γ-ray energies and angular distribution/correlation coefficients are averages from the two experiments.

^{43}Sc Levels

Nuclear Level Sequences

- A γ sequence based on g.s.
- B γ sequence based on 7/2-.
- C γ sequence based on 19/2+.
- D γ sequence based on 3/2+.
- E γ sequence based on 5/2+.

Seq.	E(level)†	J$^\pi$	T$_{1/2}$‡
A	0.0	7/2-	
D	152.25 *11*	3/2+	438 μs *7*
	845.42 *20*	5/2-	
E	880.97 *10*	5/2+	
D	1337.85 *9*	7/2+	
B	1408.38 *16*	7/2-	
A	1830.62 *9*	11/2-	
E	1932.83 *10*	9/2+	
D	2554.07 *10*	11/2+	
B	2635.72 *12*	11/2-	
A	2988.74 *11*	15/2-	
A	3124.32 *13*	19/2-	472 ns *4*
E	3142.46 *11*	13/2+	
	3293.5 *5*	7/2-	
D	3756.04 *11*	15/2+	
B	3960.31 *11*	15/2-	
	4301.5 *5*		
	4383.67 *23*	17/2(-)	
E	5232.02 *13*	17/2+	
D	5519.53 *12*	19/2+	
	5793.95 *23*		
B	6067.70 *12*	19/2-	
C	6173.53 *14*	19/2+	
E	6284.04 *14*	21/2+	
D	6431.60 *13*	23/2+	
	6818.98 *15*	(21/2+)	
C	7107.43 *13*	23/2+	
	7118.4 *10*		
	7273.1 *10*		
E	7359.77 *14*	25/2+	
	8010.6 *4*		
	8434.56 *17*	23/2-	
B	8555.89 *14*	23/2-	
	8703.53 *15*	25/2(+)	
D	8832.32 *16*	27/2+	
	9219.2 *4*	(21/2-)	
	9579.35 *18*	(27/2+)	
	9995.34 *16*	25/2(-)	
	10084.85 *14*	27/2-	
	10179.1 *6*		
C	10437.43 *22*	(25/2+)	

Continued on next page (footnotes at end of table)

^{24}Mg(^{24}Mg,αpγ) 2007Ch40 (continued)

^{43}Sc Levels (continued)

Seq.	E(level)†	J$^\pi$	T$_{1/2}$‡
	10613.82 *17*	(27/2-)	
	10856.86 *16*	(27/2-)	
	11252.6 *10*	25/2+	
B	11355.67 *22*	27/2-	
	11661.3 *5*		
	11807.67 *17*	29/2(-)	
	11921.6 *5*	25/2(+)	
	12053.72 *16*	29/2(-)	
	12073.76 *18*	(29/2-)	
	12615.45 *16*	(31/2)-	
	12704.2 *10*		
	12804.7 *4*		
C	13045.3 *3*	(29/2+)	
	13117.20 *18*	(31/2-)	
	13123.1 *6*		
	13584.6 *11*	(29/2+)	
	14406.61 *17*	(33/2-)	
	14452.1 *4*	(29/2+)	
B	14561.4 *3*	31/2-	
	14916.7 *5*	31/2	
C	15911.6 *3*	(33/2+)	
	16704.3 *11*		
	16708.9 *11*		
	16711.5 *11*		
	17769.8 *5*	(35/2)	
	17922.0 *5*	(31/2+)	
B	18197.0 *11*	35/2-	
	18767.7 *5*	(37/2)	
C	19210.5 *4*	(37/2+)	

† From least squares fit to Eγ data (by compilers). The normalized χ^2=5.8 for the uncertainties as quoted by 2007Ch40. This value is much larger than the critical χ^2=1.5. The uncertainties of the following ten γ rays were increased by a factor of 2 or 3 to get an acceptable fit with normalized χ^2=2.5: 287.9, 860.4, 1157.5, 1595.2, 2177.8, 2369.6, 2418.3, 2598.0, 2725.6, 6081.0. It should be that the uncertainties for level energies quoted in table V of 2007Ch40 are much larger than those given here.

‡ From Adopted Levels.

γ(^{43}Sc)

The DCO values are for ≈90° (range of 69.8°-110.2°) and forward/ backward angles (50.1°-129.9° range). The gates are on ΔJ=2, quadrupole or ΔJ=0, dipole transitions, unless otherwise stated. Expected values for ΔJ=1, dipole gate are: 1.6 for ΔJ=2, quadrupole or ΔJ=0, dipole; 1.0 for ΔJ=1, dipole; 0.5 to 1.9 for ΔJ=1, dipole+quadrupole; 1.1 to 1.7 for ΔJ=0, dipole+quadrupole. Expected values for ΔJ=2, quadrupole gate are: 1.0 for ΔJ=2, quadrupole or ΔJ=0, dipole; 0.6 for ΔJ=1, dipole; 0.3 to 1.2 for ΔJ=1, dipole+quadrupole; 0.6 to 1.1 for ΔJ=0, dipole+quadrupole.

E$_i$(level)	J$^\pi_i$	E$_f$(level)	J$^\pi_f$	E$_\gamma$†	I$_\gamma$	Mult.‡§	Comments
845.42	5/2-	0.0	7/2-	845.3 *3*	0.48 *7*	M1	
880.97	5/2+	152.25	3/2+	728.7 *1*	49.1 *16*	M1	a2=-0.35 *5*. a4=+0.13 *6*.
		0.0	7/2-	880.5 *2*	1.95 *12*	E1	
1337.85	7/2+	880.97	5/2+	456.7 *1*	3.72 *16*	M1	
		152.25	3/2+	1185.6 *1*	9.1 *4*	E2	a2=+0.41 *5*. a4=-0.08 *7*.
		0.0	7/2-	1338.0 *1*	2.41 *13*	E1	DCO=1.03 *11*.

Continued on next page (footnotes at end of table)

^{24}Mg(^{24}Mg,αpγ) 2007Ch40 (continued)

γ(^{43}Sc) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ	Mult.[‡§]	Comments
1408.38	7/2-	845.42	5/2-	562.9 2	0.45 6	M1	
		0.0	7/2-	1408.3 2	2.1 5	M1	DCO=1.19 23.
1830.62	11/2-	0.0	7/2-	1830.5 1	37.7 24	E2	DCO=1.04 3. a2=+0.36 3. a4=-0.01 4.
1932.83	9/2+	1337.85	7/2+	595.1 1	10.8 3	M1	
		880.97	5/2+	1051.9 1	29.4 9	E2	a2=+0.25 5. a4=-0.07 7.
2554.07	11/2+	1932.83	9/2+	621.3 1	5.94 21	M1	a2=-0.43 8. a4=-0.01 10.
		1337.85	7/2+	1216.1 1	4.60 20	E2	
2635.72	11/2-	1830.62	11/2-	804.4 3	0.76 10	M1	DCO=0.49 14.
		1408.38	7/2-	1227.1 3	1.90 25	E2	
		0.0	7/2-	2636.0 3	2.3 4	E2	
2988.74	15/2-	1830.62	11/2-	1157.5 1[b]	15.2 5	E2	DCO=1.05 5. a2=+0.38 6. a4=-0.02 8.
3124.32	19/2-	2988.74	15/2-	135.5 1	1.73 8	E2	
3142.46	13/2+	2554.07	11/2+	588.2 1	3.02 11	M1	
		1932.83	9/2+	1209.7 1	31.0 10	E2	a2=+0.27 3. a4=+0.08 5.
3293.5	7/2-	1932.83	9/2+	1360.6 4	0.52 10	E1	
3756.04	15/2+	3142.46	13/2+	613.5 1	32.4 10	M1	a2=-0.42 8. a4=+0.06 10.
		2988.74	15/2-	766.9 2	0.91 7	E1	DCO=0.73 12.
		2554.07	11/2+	1202.1 1	6.32 22	E2	
3960.31	15/2-	2988.74	15/2-	971.5 1	2.28 10	M1	DCO=1.01 18.
		2635.72	11/2-	1324.5 1	2.52 13	E2	DCO=0.96 10.
		1830.62	11/2-	2129.7 1	14.5 5	E2	DCO=1.03 4. a2=+0.32 4. a4=-0.14 5.
4301.5		1932.83	9/2+	2368.6 5	0.54 9		
4383.67	17/2(-)	2988.74	15/2-	1394.9 2	1.43 11	M1	DCO=0.54 5.
5232.02	17/2+	3756.04	15/2+	1476.0 1	5.54 21	M1	
5519.53	19/2+	5232.02	17/2+	287.9 1[a]	1.81 7	M1	a2=-0.43 12. a4=+0.09 17.
		3756.04	15/2+	1763.3 1	23.0 7	E2	a2=+0.50 10. a4=-0.04 10.
		3124.32	19/2-	2394.9 1	79.4 25	E1	DCO=1.02 1. a2=+0.40 1. a4=+0.01 2.
5793.95		3960.31	15/2-	1833.6 2	1.90 18		
6067.70	19/2-	3960.31	15/2-	2107.3 1	15.1 5	E2	DCO=0.96 3. a2=+0.37 4. a4=-0.08 6.
		2988.74	15/2-	3079.0 1	4.76 18	E2	DCO=1.07 5. a2=+0.16 6. a4=-0.27 8.
6173.53	19/2+	5519.53	19/2+	653.9 2	1.08 9	M1	
		5232.02	17/2+	941.4 1	1.82 8	M1	
		3756.04	15/2+	2418.3 2[a]	1.93 10	E2	
		3124.32	19/2-	3048.6 8	0.63 15	E1	
6284.04	21/2+	5519.53	19/2+	764.3 1	2.23 15	M1	DCO=0.70 23.
		5232.02	17/2+	1052.9 4	0.25 6	E2	
		3124.32	19/2-	3159.8 2	8.2 8	E1[d]	DCO=0.91 8.
6431.60	23/2+	5519.53	19/2+	912.0 1	100 3	E2	DCO=1.01 2.

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^{24}Mg(^{24}Mg,αpγ) 2007Ch40 (continued)

γ(^{43}Sc) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ†	I_γ	Mult.‡§	Comments
							a2=+0.37 *3*. a4=+0.03 *4*.
		3124.32	19/2-	3307.6 *2*	8.5 *3*	M2	
6818.98	(21/2+)	6173.53	19/2+	645.4 *1*	2.19 *11*	M1	
		5232.02	17/2+	1586.9 *3*	0.64 *6*	E2	
7107.43	23/2+	6818.98	(21/2+)	288.4 *1*	0.60 *5*	M1	
		6431.60	23/2+	675.9 *1*	7.3 *3*	M1	DCO=1.06 *4*. a2=+0.54 *7*. a4=+0.21 *10*.
		6284.04	21/2+	823.3 *1*	4.86 *20*	M1	DCO=0.60 *15*.
		6173.53	19/2+	933.0 *5*	0.90 *11*	E2	
7118.4		3756.04	15/2+	3362.2 *10*	0.26 *7*		
7273.1		3756.04	15/2+	3516.9 *5*	0.48 *5*		
7359.77	25/2+	7107.43	23/2+	252.3 *1*	2.04 *9*	M1	
		6431.60	23/2+	928.2 *1*	76.2 *24*	M1	DCO=0.68 *1*. a2=-0.18 *3*. a4=+0.10 *4*.
		6284.04	21/2+	1075.6 *3*	0.56 *8*	E2	
8010.6		5519.53	19/2+	2491.0 *3*	2.17 *18*		
8434.56	23/2-	6067.70	19/2-	2369.6 *4*[b]	1.26 *9*		
		3124.32	19/2-	5310.5 *1*	10.7 *12*	E2[c]	DCO=1.42 *22*. a2=+0.19 *9*. a4=-0.08 *12*.
8555.89	23/2-	6067.70	19/2-	2488.2 *1*	13.3 *4*	E2	DCO=1.14 *7*. a2=+0.15 *5*. a4=-0.18 *7*.
8703.53	25/2(+)	7107.43	23/2+	1595.2 *3*[a]	0.95 *9*	M1	
		6431.60	23/2+	2271.8 *1*	8.0 *3*	D	DCO=0.54 *5*. a2=-0.31 *16*. a4=-0.22 *21*.
8832.32	27/2+	7359.77	25/2+	1472.5 *1*	36.1 *11*	M1	DCO=0.73 *3*. a2=-0.15 *3*. a4=+0.10 *4*.
		7107.43	23/2+	1724.8 *2*	1.47 *11*	E2	
9219.2	(21/2-)	6067.70	19/2-	3151.4 *3*	1.62 *9*	(M1)[c]	DCO=1.14 *15*.
9579.35	(27/2+)	7359.77	25/2+	2219.2 *2*	1.28 *11*	M1	
		6431.60	23/2+	3147.7 *2*	2.43 *15*	E2	
9995.34	25/2(-)	8555.89	23/2-	1439.5 *1*	2.02 *11*	M1	DCO=0.66 *4*.
		7107.43	23/2+	2887.4 *6*	1.10 *9*	E1	
10084.85	27/2-	8703.53	25/2(+)	1381.2 *1*	3.37 *14*	E1	DCO=0.47 *3*.
		8555.89	23/2-	1529.0 *1*	4.57 *18*	E2	DCO=1.19 *8*.
		8434.56	23/2-	1650.3 *1*	8.3 *3*	E2	DCO=0.94 *7*. a2=+0.33 *6*. a4=+0.06 *8*.
		7359.77	25/2+	2725.6 *2*[a]	2.36 *11*	E1	DCO=0.68 *14*.
10179.1		7107.43	23/2+	3071.6 *5*	0.57 *8*		
10437.43	(25/2+)	7107.43	23/2+	3329.9 *2*	1.71 *10*	M1	
10613.82	(27/2-)	8434.56	23/2-	2177.8 *6*[a]	0.32 *6*	E2[c]	DCO=1.1 *4*.
		7359.77	25/2+	3253.9 *1*	8.2 *3*	(E1)	DCO=0.55 *3*. a2=-0.15 *4*. a4=-0.08 *6*.
10856.86	(27/2-)	10084.85	27/2-	771.6 *4*	0.42 *9*	M1	
		9995.34	25/2(-)	860.4 *2*[b]	0.64 *6*	M1	DCO=0.43 *10*.
		7359.77	25/2+	3497.0 *1*	4.54 *18*	(E1)	DCO=0.59 *6*. a2=-0.04 *6*. a4=-0.03 *8*.

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^{24}Mg(^{24}Mg,αpγ) 2007Ch40 (continued)

γ(^{43}Sc) (continued)

E_i(level)	J^π_i	E_f(level)	J^π_f	E_γ[†]	I_γ	Mult.[‡§]	Comments
11252.6	25/2+	7359.77	25/2+	3892.6 *3*	2.67 *13*		
11355.67	27/2-	8555.89	23/2-	2799.5 *2*	2.53 *12*	E2	DCO=0.99 *10*.
		8434.56	23/2-	2920.2 *10*	0.25 *6*	E2	
		7359.77	25/2+	3997.1 *3*	1.34 *8*	E1	
11661.3		8555.89	23/2-	3105.3 *4*	0.58 *5*		
11807.67	29/2(-)	10856.86	(27/2-)	951.0 *3*	1.20 *8*	M1	DCO=0.70 *11*.
		9579.35	(27/2+)	2228.0 *2*	1.78 *11*	E1	
		8832.32	27/2+	2975.2 *1*	5.66 *20*	D[c]	DCO=0.71 *5*. a2=-0.35 *12*. a4=+0.10 *16*.
11921.6	25/2(+)	7359.77	25/2+	4560.5 *3*	1.76 *8*	M1	DCO=1.02 *8*.
		6431.60	23/2+	5489.0 *3*	2.43 *11*	M1	DCO=0.84 *11*.
12053.72	29/2(-)	10084.85	27/2-	1968.8 *1*	4.89 *24*	(M1)	DCO=0.92 *12*. a2=-0.14 *9*. a4=+0.06 *12*.
		9995.34	25/2(-)	2058.7 *2*	1.51 *9*	E2	
12073.76	(29/2-)	10613.82	(27/2-)	1460.1 *1*	2.26 *14*	M1[d]	DCO=1.05 *15*.
12615.45	(31/2)-	10856.86	(27/2-)	1757.9 *7*	1.62 *11*	E2	
		10084.85	27/2-	2530.6 *1*	10.6 *4*	(E2)	DCO=1.3 *3*. a2=+0.18 *6*. a4=-0.33 *8*.
12704.2		8555.89	23/2-	4148.1 *8*	0.16 *3*		
12804.7		10613.82	(27/2-)	2190.8 *3*	0.60 *6*		
		8832.32	27/2+	3972.5 *2*	1.37 *7*		
13045.3	(29/2+)	10437.43	(25/2+)	2607.8 *2*	1.11 *6*	E2	
		8832.32	27/2+	4213.0 *3*	1.71 *8*	M1[c]	DCO=0.76 *17*.
		8703.53	25/2(+)	4341.7 *3*	1.25 *7*	E2	
		7359.77	25/2+	5684.9 *4*	1.47 *8*	E2	
13117.20	(31/2-)	12073.76	(29/2-)	1043.6 *1*	0.95 *17*	M1	DCO=0.64 *15*.
		10613.82	(27/2-)	2503.1 *1*	3.00 *14*	E2[d]	DCO=1.73 *20*.
13123.1		10084.85	27/2-	3038.1 *5*	1.04 *10*		
13584.6	(29/2+)	8832.32	27/2+	4752.0 *3*	1.23 *7*	(M1)[c]	DCO=0.48 *9*. a2=-0.28 *21*. a4=+0.2 *3*.
14406.61	(33/2-)	13117.20	(31/2-)	1289.2 *3*	0.44 *7*	M1	
		12615.45	(31/2)-	1791.2 *1*	4.80 *20*	D	DCO=0.47 *7*. a2=-0.52 *13*. a4=-0.17 *18*.
		12053.72	29/2(-)	2353.2 *3*	1.42 *10*	E2[c]	DCO=1.0 *4*.
		11807.67	29/2(-)	2598.0 *1*[b]	2.33 *11*	(E2)	a2=+0.41 *24*. a4=+0.4 *3*.
14452.1	(29/2+)	11921.6	25/2(+)	2530.4 *1*	2.45 *12*	E2	
		11807.67	29/2(-)	2644.5 *5*	1.23 *8*	E1	
		8832.32	27/2+	5620.1 *5*	1.82 *8*	M1	
14561.4	31/2-	12053.72	29/2(-)	2508.0 *3*	0.71 *9*	M1	
		11355.67	27/2-	3205.3 *3*	1.69 *11*	E2[c]	DCO=1.11 *16*.
14916.7	31/2	8832.32	27/2+	6081.0 *3*[a]	4.05 *14*	Q	DCO=1.19 *12*. a2=+0.44 *5*. a4=-0.21 *7*.
15911.6	(33/2+)	13045.3	(29/2+)	2866.3 *2*	2.89 *13*	E2	
		12615.45	(31/2)-	3296.0 *4*	1.01 *7*	E1	
16704.3		13117.20	(31/2-)	3586.9 *5*	0.54 *6*		
16708.9		13584.6	(29/2+)	3124.2 *3*	0.64 *5*		
16711.5		12804.7		3906.6 *5*	0.76 *6*		
17769.8	(35/2)	14916.7	31/2	2852.9 *1*	2.57 *11*	(E2)	a2=+0.10 *18*. a4=-0.4 *3*.

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^{24}Mg(^{24}Mg,αpγ) 2007Ch40 (continued)

γ(^{43}Sc) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ†	I_γ	Mult.‡§	Comments
17922.0	(31/2+)	14452.1	(29/2+)	3469.8 *2*	1.70 *9*	(M1)	DCO=0.77 *10*.
18197.0	35/2-	14561.4	31/2-	3635.4 *3*	0.98 *6*	E2[c]	DCO=1.2 *3*.
18767.7	(37/2)	17769.8	(35/2)	997.9 *1*	0.65 *4*	M1	DCO=0.65 *17*.
19210.5	(37/2+)	17769.8	(35/2)	1440.7 *2*	0.75 *4*	M1	
		15911.6	(33/2+)	3298.8 *3*	1.09 *7*	E2	

† The quoted uncertainties are statistical only. Above 3.5 MeV (maximum range of calibration curve), systematic uncertainties can be 1-2 keV.
‡ Transitions with mult=M1 may include E2 admixture.
§ Transitions with mult=M1 may include E2 admixture.
[a] Poor fit in the level scheme. The uncertainty is increased by a factor of 2 for fitting purposes.
[b] Poor fit in the level scheme. The uncertainty is increased by a factor of 3 for fitting purposes.
[c] DCO value corresponds to an alternative DCO-like analysis.
[d] DCO value corresponds to gate on ΔJ=2, quadrupole transition.

^{27}Al(^{18}O,2nγ) 2008Fe02

2008Fe02: E=75 MeV beam provided by Tandem accelerator at IPN Orsay. Measured γ rays with one clover and three single Ge detectors with BGO Compton suppression. Lifetime of isomer measured by γ(t) as a side measurement (for confirmation purposes of main measurements for ^{139}Nd and ^{140}Nd) as the ^{18}O beam was hitting the target frame made of aluminium.

^{43}Sc Levels

E(level)	J^π†	$T_{1/2}$	Comments
0	7/2-		
1830	11/2-		
2988	15/2-		
3124	19/2-	481 ns *9*	$T_{1/2}$: from γ(t) (2008Fe02).

† From Adopted Levels.

γ(^{43}Sc)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ
1830	11/2-	0	7/2-	1830
2988	15/2-	1830	11/2-	1158
3124	19/2-	2988	15/2-	136

^{27}Al(^{19}F,p2nγ) 2004Mo47,1976Po03

2004Mo47: E=50 MeV beam was produced from the tandem accelerator at the Japan Atomic Energy Research Institute (JAERI). Target of a 0.92 mg/cm^2 ^{27}Al foil on 10 mg/cm^2 natural Pb backing. γ-rays were detected by the GEMINI-II array of 16 HPGe detectors with BGO anti-Comption shields. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$. Deduced levels J, π. Comparison with shell model predictions.

1976Po03: E=40 MeV ^{19}F beam was produced at the Brookhaven National Laboratory. Target of aluminum evaporated onto a tungsten backing. γ-rays were detected by Ge(Li) detectors. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$, γ(lin pol). Deduced levels, $T_{1/2}$ by recoil distance method.

1981Da06: ^{27}Al(^{19}F,p2nγ) E=45.5 MeV. Measured $\gamma\gamma(\theta$,t), deduced Q of the 19/2- isomer at 3123.

1994Zh43: ^{27}Al(^{19}F,2npγ) E=50.06 MeV. Measured isomer g factor by $\gamma(\theta$,H,t) method.

^{43}Sc Levels

Nuclear Level Sequences

A ΔJ=1 sequence.

B γ sequence based on g.s.

Seq.	E(level)†	Jπ‡	$T_{1/2}$@	Comments
B	0.0	7/2-#		
A	151.65 *17*	3/2+#		
	472.50 *20*	3/2-	161 ps *37*&	
A	880.24 *22*	5/2+	4.9 ps *10*&	
A	1337.00 *24*	7/2+		
B	1829.9 *3*	11/2-		
A	1931.8 *4*	9/2+		
A	2552.6 *4*	11/2+		
B	2987.5 *3*	15/2-		
B	3123.4 *4*	19/2-	469 ns *4*&	Q=0.199 *14* (1981Da06). g=0.3279 *19* (1994Zh43). Q: time differential perturbed angular distribution method.
A	3140.8 *4*	13/2+		
A	3755.4 *4*	15/2+		
	4382.2 *8*	(17/2-)	40 fs *17*	
	4633.2 *20*	(17/2-,21/2-)	<110 fs	
A	5230.3 *5*	(17/2+)		
A	5517.9 *4*	(19/2+)		
	6065.5 *16*	(11/2,15/2,19/2)	55 fs *12*	
	6281.4 *10*	(17/2,21/2)	110 fs *38*	
A	6429.4 *6*	(23/2+)		
	6814.5 *19*		94 fs *20*	
	7105.1 *8*	(21/2+,25/2+)		
A	7356.4 *12*	(25/2+)	340 fs *21*	
	8699.5 *12*	(21/2+,25/2+)		
A	8828.4 *16*	(27/2+)	74 fs *15*	

† From least-squares fit to Eγ data.
‡ From $\gamma(\theta)$ and γ(lin pol) of 2004Mo47 and 1976Po03.
# From Adopted Levels.
@ From DSAM, values are from E-mail reply of dec 9, 2004 from the first author, unless otherwise noted.
& From γ(t) in 1976Po03 and 1981Da06.

$\gamma(^{43}Sc)$

ADO=angular distribution ratio (147°/90°), values are from e-mail reply of DEcember 9, 2004 from the first author.

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ[†]	Mult.[‡§]	δ[‡]	Comments
151.65	3/2+	0.0	7/2-	151.68 *17*[a]				
472.50	3/2-	0.0	7/2-	472.50 *20*		E2		E_γ: only seen in 1976Po03. I_γ: 6.35 (1976Po03). A_2=+0.09 *3*, A_4=-0.09 *3*. Pol=+0.11 *19* (1976Po03).
880.24	5/2+	151.65	3/2+	728.64 *15*[a]	35.6	M1+E2		I_γ: 31.7 (1976Po03). A_2=-0.52 *2*. Pol=+0.23 *6* (1976Po03). ADO=0.55 *5*.
1337.00	7/2+	880.24	5/2+	456.78 *12*[a]	19.0	D+Q		I_γ: 5.29 (1976Po03). A_2=-0.27 *10* (1976Po03). ADO=0.80 *6*.
		151.65	3/2+	1185.0 *5*[a]	67.0	Q		I_γ: 11.1 (1976Po03). Mult.: γ(lin pol) result disagrees with expected mult=E2 (1976Po03). A_2=+0.10 *3*. Pol=-0.21 *21* (1976Po03). ADO=1.33 *7*.
		0.0	7/2-	1336.8 *15*	20.0	D		ADO=1.060 *10*; ΔJ=0, dipole.
1829.9	11/2-	0.0	7/2-	1829.8 *3*[a]	100	E2		A2=+0.16 *1*, A4=-0.06 *1*. POL=+0.43 *9* (1976Po03). ADO=1.39 *3*.
1931.8	9/2+	1337.00	7/2+	594.6 *5*	86.0	M1+E2		A_2=-0.41 *9*. Pol=-0.19 *12* (1976Po03). ADO=0.46 *4*.
		880.24	5/2+	1051.7 *4*[a]	35.9	E2		I_γ: 22.8 (1976Po03). A_2=+0.23 *3*, A_4=-0.05 *3*. Pol=+0.16 *9* (1976Po03). ADO=1.23 *10*.
2552.6	11/2+	1931.8	9/2+	620.8 *3*[a]	9.0	D+Q		I_γ: 4.11 (1976Po03). A_2=-0.51 *15* (1976Po03). ADO=0.49 *9*.
		1337.00	7/2+	1215.6 *4*[a]	14.0	Q		I_γ: 2.79 (1976Po03). A_2=+0.37 *10* (1976Po03). ADO=1.17 *8*.
2987.5	15/2-	1829.9	11/2-	1157.55 *15*[a]	87.2	E2		I_γ: 113.6 (1976Po03). A2=+0.22 *4*, A4=-0.18 *4*. POL=+0.26 *6* (1976Po03). ADO=1.41 *3*.
3123.4	19/2-	2987.5	15/2-	135.8 *2*[a]	40.6	E2		I_γ: 34.3 (1976Po03). ADO=2.18 *17*.
3140.8	13/2+	2552.6	11/2+	588.4 *3*	13.0	D+Q		ADO=0.30 *13*.
		1931.8	9/2+	1209.1 *5*[a]	19.1	E2		I_γ: 13.5 (1976Po03). A_2=+0.29 *5*, A_4=-0.08 *5*. Pol=+0.63 *28* (1976Po03). ADO=1.29 *6*.
3755.4	15/2+	3140.8	13/2+	614.75 *25*[a]	18.6	M1+E2	-0.11 *8*	I_γ: 6.35 (1976Po03). Mult.: A_2=-0.73 *10*, A_4=+0.28 *10*. Pol=-0.23 *15* (1976Po03).

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$^{43}_{21}Sc_{22}$-34

γ(^{43}Sc) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ[†]	Mult.[‡§]	δ[‡]	Comments
								ADO=0.47 *6*.
		2552.6	11/2+	1202.7 *3*	21.0	Q		ADO=1.11 *14*.
4382.2	(17/2-)	3123.4	19/2-	1258.8 *9*	29.0	D+Q		ADO=0.86 *10*.
		2987.5	15/2-	1394.6 *13*	7.0	D+Q		ADO=0.66 *17*.
4633.2	(17/2-,21/2-)	3123.4	19/2-	1509.8 *19*	13.0	D+Q		ADO=0.86 *11*.
5230.3	(17/2+)	3755.4	15/2+	1474.9 *5*	6.0	D+Q		ADO=0.59 *16*.
5517.9	(19/2+)	5230.3	(17/2+)	287.7 *5*	2.0	D+Q		ADO=0.83 *16*.
		3755.4	15/2+	1762.6 *3*	44.0	Q		ADO=1.30 *16*.
		3123.4	19/2-	2394.3 *5*	29.2	D		ADO=1.55 *15*; ΔJ=0, dipole.
6065.5	(11/2,15/2,19/2)	2987.5	15/2-	3077.9 *15*	10.0	D,Q		ADO=1.49 *18*; ΔJ=0, dipole or ΔJ=2, quadrupole.
6281.4	(17/2,21/2)	5517.9	(19/2+)	764[b]	2.0			
		4633.2	(17/2-,21/2-)	1648[b]	13.0			
		3123.4	19/2-	3157.8 *20*	33.0	D+Q		ADO=0.54 *8*.
6429.4	(23/2+)	5517.9	(19/2+)	911.5 *6*	41.7	Q		ADO=1.32 *10*.
		3123.4	19/2-	3305.8 *7*	38.0	Q+O		ADO=1.93 *22*.
6814.5		3123.4	19/2-	3691.0 *18*	16.0			ADO=0.90 *22*.
7105.1	(21/2+,25/2+)	6429.4	(23/2+)	675.7 *5*	5.0	D+Q		ADO=0.82 *9*.
		6281.4	(17/2,21/2)	823.7 *7*	8.6			
7356.4	(25/2+)	6429.4	(23/2+)	927.0 *10*	22.1	D+Q		ADO=0.83 *8*.
8699.5	(21/2+,25/2+)	6429.4	(23/2+)	2270.0 *10*	54.0	D+Q		ADO=0.65 *12*.
8828.4	(27/2+)	7356.4	(25/2+)	1472.0 *10*	78.0	D+Q		ADO=0.66 *7*.

† From e-mail reply of December 9, 2004 from the first author (T. Morikawa) of 2004Mo47. Intensities from 1976Po03 relative to 100 for 1830γ are given under comments. Unless otherwise noted.

‡ From $\gamma(\theta)$ and γ(lin pol) of 2004Mo47 and 1976Po03.

§ Mult=Q implies ΔJ=2, mult=D+Q implies ΔJ=1 transition.

a Weighted average from 2004Mo47 and 1976Po03.

b Placement of transition in the level scheme is uncertain.

^{28}Si(^{20}Ne,apg) 2007Ch40

2007Ch40: E=84 MeV beam from ATLAS accelerator at Argonne National Laboratory. Target of self-supporting 0.5 mg/cm^2 ^{28}Si on Ta foil. γ-rays were detected by the Gammasphere array of 102 Compton- suppressed HPGe detectors and charged particles by an array of 95 CsI(T1) detectors with a 65% efficiency for detection α particles and 50% for protons. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$, $\gamma\gamma(\theta)$(DCO). Deduced levels, J, π, γ branching ratios.

A similar experiment was done by 2007Ch40 using the reaction ^{24}Mg(^{24}Mg,αpγ). The γ-ray energies and angular distribution/correlation coefficients are averages from the two experiments.

^{43}Sc Levels

Nuclear Level Sequences

- A γ sequence based on g.s.
- B γ sequence based on 7/2-.
- C γ sequence based on 19/2+.
- D γ sequence based on 3/2+.
- E γ sequence based on 5/2+.

Seq.	E(level)†	J$^\pi$	T$_{1/2}$‡
A	0.0	7/2-	
D	152.25 *11*	3/2+	438 μs *7*
	845.42 *20*	5/2-	
E	880.97 *10*	5/2+	
D	1337.85 *9*	7/2+	
B	1408.38 *16*	7/2-	
A	1830.62 *9*	11/2-	
E	1932.83 *10*	9/2+	
D	2554.07 *10*	11/2+	
B	2635.72 *12*	11/2-	
A	2988.74 *11*	15/2-	
A	3124.32 *13*	19/2-	472 ns *4*
E	3142.46 *11*	13/2+	
	3293.5 *5*	7/2-	
D	3756.04 *11*	15/2+	
B	3960.31 *11*	15/2-	
	4301.5 *5*		
	4383.67 *23*	17/2(-)	
E	5232.02 *13*	17/2+	
D	5519.53 *12*	19/2+	
	5793.95 *23*		
B	6067.70 *12*	19/2-	
C	6173.53 *14*	19/2+	
E	6284.04 *14*	21/2+	
D	6431.60 *13*	23/2+	
	6818.98 *15*	(21/2+)	
C	7107.43 *13*	23/2+	
	7118.4 *10*		
	7273.1 *10*		
E	7359.77 *14*	25/2+	
	8010.6 *4*		
	8434.56 *17*	23/2-	
B	8555.89 *14*	23/2-	
	8703.53 *15*	25/2(+)	
D	8832.32 *16*	27/2+	
	9219.2 *4*	(21/2-)	
	9579.35 *18*	(27/2+)	
	9995.34 *16*	25/2(-)	
	10084.85 *14*	27/2-	
	10179.1 *6*		
C	10437.43 *22*	(25/2+)	

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^{28}Si(^{20}Ne,apg) 2007Ch40 (continued)

^{43}Sc Levels (continued)

Seq.	E(level)†	Jπ	$T_{1/2}$‡
	10613.82 *17*	(27/2-)	
	10856.86 *16*	(27/2-)	
	11252.6 *10*	25/2+	
B	11355.67 *22*	27/2-	
	11661.3 *5*		
	11807.67 *17*	29/2(-)	
	11921.6 *5*	25/2(+)	
	12053.72 *16*	29/2(-)	
	12073.76 *18*	(29/2-)	
	12615.45 *16*	(31/2)-	
	12704.2 *10*		
	12804.7 *4*		
C	13045.3 *3*	(29/2+)	
	13117.20 *18*	(31/2-)	
	13123.1 *6*		
	13584.6 *11*	(29/2+)	
	14406.61 *17*	(33/2-)	
	14452.1 *4*	(29/2+)	
B	14561.4 *3*	31/2-	
	14916.7 *5*	31/2	
C	15911.6 *3*	(33/2+)	
	16704.3 *11*		
	16708.9 *11*		
	16711.5 *11*		
	17769.8 *5*	(35/2)	
	17922.0 *5*	(31/2+)	
B	18197.0 *11*	35/2-	
	18767.7 *5*	(37/2)	
C	19210.5 *4*	(37/2+)	

† From least squares fit to Eγ data (by compilers). The normalized χ^2=5.8 for the uncertainties as quoted by 2007Ch40. This value is much larger than the critical χ^2=1.5. The uncertainties of the following ten γ rays were increased by a factor of 2 or 3 to get an acceptable fit with normalized χ^2=2.5: 287.9, 860.4, 1157.5, 1595.2, 2177.8, 2369.6, 2418.3, 2598.0, 2725.6, 6081.0. It should be that the uncertainties for level energies quoted in table V of 2007Ch40 are much larger than those given here.
‡ From Adopted Levels.

γ(^{43}Sc)

The DCO values are for ≈90° (range of 69.8°-110.2°) and forward/ backward angles (50.1°-129.9° range). The gates are on ΔJ=2, quadrupole or ΔJ=0, dipole transitions, unless otherwise stated. Expected values for ΔJ=1, dipole gate are: 1.6 for ΔJ=2, quadrupole or ΔJ=0, dipole; 1.0 for ΔJ=1, dipole; 0.5 to 1.9 for ΔJ=1, dipole+quadrupole; 1.1 to 1.7 for ΔJ=0, dipole+quadrupole. Expected values for ΔJ=2, quadrupole gate are: 1.0 for ΔJ=2, quadrupole or ΔJ=0, dipole; 0.6 for ΔJ=1, dipole; 0.3 to 1.2 for ΔJ=1, dipole+quadrupole; 0.6 to 1.1 for ΔJ=0, dipole+quadrupole.

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ†	I_γ	Mult.‡§	Comments
845.42	5/2-	0.0	7/2-	845.3 *3*	0.29 *4*	M1	
880.97	5/2+	152.25	3/2+	728.7 *1*	50.8 *19*	M1	a2=-0.35 *5*. a4=+0.13 *6*.
		0.0	7/2-	880.5 *2*	1.65 *10*	E1	
1337.85	7/2+	880.97	5/2+	456.7 *1*	3.60 *14*	M1	
		152.25	3/2+	1185.6 *1*	9.2 *4*	E2	a2=+0.41 *5*. a4=-0.08 *7*.
		0.0	7/2-	1338.0 *1*	2.51 *12*	E1	DCO=1.03 *11*.

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^{28}Si(^{20}Ne,apg) 2007Ch40 (continued)

γ(^{43}Sc) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ	Mult.[‡§]	Comments
1408.38	7/2-	845.42	5/2-	562.9 *2*	0.57 *4*	M1	
		0.0	7/2-	1408.3 *2*	3.3 *8*	M1	DCO=1.19 *23*.
1830.62	11/2-	0.0	7/2-	1830.5 *1*	22.9 *14*	E2	DCO=1.04 *3*. a2=+0.36 *3*. a4=-0.01 *4*.
1932.83	9/2+	1337.85	7/2+	595.1 *1*	10.8 *3*	M1	
		880.97	5/2+	1051.9 *1*	28.5 *9*	E2	a2=+0.25 *5*. a4=-0.07 *7*.
2554.07	11/2+	1932.83	9/2+	621.3 *1*	5.73 *19*	M1	a2=-0.43 *8*. a4=-0.01 *10*.
		1337.85	7/2+	1216.1 *1*	4.45 *17*	E2	
2635.72	11/2-	1830.62	11/2-	804.4 *3*	0.90 *8*	M1	DCO=0.49 *14*.
		1408.38	7/2-	1227.1 *3*	2.37 *19*	E2	
		0.0	7/2-	2636.0 *3*	2.6 *4*	E2	
2988.74	15/2-	1830.62	11/2-	1157.5 *1*[b]	15.2 *6*	E2	DCO=1.05 *5*. a2=+0.38 *6*. a4=-0.02 *8*.
3124.32	19/2-	2988.74	15/2-	135.5 *1*	3.19 *18*	E2	
3142.46	13/2+	2554.07	11/2+	588.2 *1*	2.88 *10*	M1	
		1932.83	9/2+	1209.7 *1*	30.9 *9*	E2	a2=+0.27 *3*. a4=+0.08 *5*.
3293.5	7/2-	1932.83	9/2+	1360.6 *4*	0.65 *6*	E1	
3756.04	15/2+	3142.46	13/2+	613.5 *1*	31.3 *9*	M1	a2=-0.42 *8*. a4=+0.06 *10*.
		2988.74	15/2-	766.9 *2*	0.97 *5*	E1	DCO=0.73 *12*.
		2554.07	11/2+	1202.1 *1*	5.76 *19*	E2	
3960.31	15/2-	2988.74	15/2-	971.5 *1*	2.18 *8*	M1	DCO=1.01 *18*.
		2635.72	11/2-	1324.5 *1*	2.57 *11*	E2	DCO=0.96 *10*.
		1830.62	11/2-	2129.7 *1*	15.1 *5*	E2	DCO=1.03 *4*. a2=+0.32 *4*. a4=-0.14 *5*.
4301.5		1932.83	9/2+	2368.6 *5*	0.99 *7*		
4383.67	17/2(-)	2988.74	15/2-	1394.9 *2*	1.75 *8*	M1	DCO=0.54 *5*.
5232.02	17/2+	3756.04	15/2+	1476.0 *1*	5.49 *20*	M1	
5519.53	19/2+	5232.02	17/2+	287.9 *1*[a]	1.96 *7*	M1	a2=-0.43 *12*. a4=+0.09 *17*.
		3756.04	15/2+	1763.3 *1*	22.0 *7*	E2	a2=+0.50 *10*. a4=-0.04 *10*.
		3124.32	19/2-	2394.9 *1*	82 *3*	E1	DCO=1.02 *1*. a2=+0.40 *1*. a4=+0.01 *2*.
5793.95		3960.31	15/2-	1833.6 *2*	2.85 *13*		
6067.70	19/2-	3960.31	15/2-	2107.3 *1*	16.5 *5*	E2	DCO=0.96 *3*. a2=+0.37 *4*. a4=-0.08 *6*.
		2988.74	15/2-	3079.0 *1*	4.92 *17*	E2	DCO=1.07 *5*. a2=+0.16 *6*. a4=-0.27 *8*.
6173.53	19/2+	5519.53	19/2+	653.9 *2*	0.66 *6*	M1	
		5232.02	17/2+	941.4 *1*	1.11 *5*	M1	
		3756.04	15/2+	2418.3 *2*[a]	1.18 *6*	E2	
		3124.32	19/2-	3048.6 *8*	0.38 *9*	E1	
6284.04	21/2+	5519.53	19/2+	764.3 *1*	2.29 *12*	M1	DCO=0.70 *23*.
		5232.02	17/2+	1052.9 *4*	0.07 *4*	E2	
		3124.32	19/2-	3159.8 *2*	10.0 *5*	E1[d]	DCO=0.91 *8*.
6431.60	23/2+	5519.53	19/2+	912.0 *1*	100 *3*	E2	DCO=1.01 *2*.

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^{28}Si(^{20}Ne,apg) 2007Ch40 (continued)

γ(^{43}Sc) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ	Mult.[‡§]	Comments
							a2=+0.37 *3*. a4=+0.03 *4*.
		3124.32	19/2-	3307.6 *2*	8.9 *3*	M2	
6818.98	(21/2+)	6173.53	19/2+	645.4 *1*	1.33 *7*	M1	
		5232.02	17/2+	1586.9 *3*	0.39 *4*	E2	
7107.43	23/2+	6818.98	(21/2+)	288.4 *1*	0.58 *3*	M1	
		6431.60	23/2+	675.9 *1*	7.33 *24*	M1	DCO=1.06 *4*. a2=+0.54 *7*. a4=+0.21 *10*.
		6284.04	21/2+	823.3 *1*	5.24 *19*	M1	DCO=0.60 *15*.
		6173.53	19/2+	933.0 *5*	0.93 *7*	E2	
7118.4		3756.04	15/2+	3362.2 *10*	0.40 *5*		
7273.1		3756.04	15/2+	3516.9 *5*	0.55 *4*		
7359.77	25/2+	7107.43	23/2+	252.3 *1*	2.26 *8*	M1	
		6431.60	23/2+	928.2 *1*	75.4 *24*	M1	DCO=0.68 *1*. a2=-0.18 *3*. a4=+0.10 *4*.
		6284.04	21/2+	1075.6 *3*	0.70 *7*	E2	
8010.6		5519.53	19/2+	2491.0 *3*	2.69 *16*		
8434.56	23/2-	6067.70	19/2-	2369.6 *4*[b]	1.26 *7*		
		3124.32	19/2-	5310.5 *1*	13.8 *10*	E2[c]	DCO=1.42 *22*. a2=+0.19 *9*. a4=-0.08 *12*.
8555.89	23/2-	6067.70	19/2-	2488.2 *1*	13.9 *4*	E2	DCO=1.14 *7*. a2=+0.15 *5*. a4=-0.18 *7*.
8703.53	25/2(+)	7107.43	23/2+	1595.2 *3*[a]	1.09 *7*	M1	
		6431.60	23/2+	2271.8 *1*	9.9 *3*	D	DCO=0.54 *5*. a2=-0.31 *16*. a4=-0.22 *21*.
8832.32	27/2+	7359.77	25/2+	1472.5 *1*	35.9 *11*	M1	DCO=0.73 *3*. a2=-0.15 *3*. a4=+0.10 *4*.
		7107.43	23/2+	1724.8 *2*	2.10 *10*	E2	
9219.2	(21/2-)	6067.70	19/2-	3151.4 *3*	1.53 *7*	(M1)[c]	DCO=1.14 *15*.
9579.35	(27/2+)	7359.77	25/2+	2219.2 *2*	2.43 *10*	M1	
		6431.60	23/2+	3147.7 *2*	2.80 *11*	E2	
9995.34	25/2(-)	8555.89	23/2-	1439.5 *1*	2.66 *10*	M1	DCO=0.66 *4*.
		7107.43	23/2+	2887.4 *6*	0.90 *6*	E1	
10084.85	27/2-	8703.53	25/2(+)	1381.2 *1*	3.52 *12*	E1	DCO=0.47 *3*.
		8555.89	23/2-	1529.0 *1*	4.63 *16*	E2	DCO=1.19 *8*.
		8434.56	23/2-	1650.3 *1*	10.7 *4*	E2	DCO=0.94 *7*. a2=+0.33 *6*. a4=+0.06 *8*.
		7359.77	25/2+	2725.6 *1*[a]	1.93 *10*	E1	DCO=0.68 *14*.
10179.1		7107.43	23/2+	3071.6 *5*	0.90 *6*		
10437.43	(25/2+)	7107.43	23/2+	3329.9 *2*	2.04 *9*	M1	
10613.82	(27/2-)	8434.56	23/2-	2177.8 *6*[a]	0.40 *5*	E2[c]	DCO=1.1 *4*.
		7359.77	25/2+	3253.9 *1*	8.5 *3*	(E1)	DCO=0.55 *3*. a2=-0.15 *4*. a4=-0.08 *6*.
10856.86	(27/2-)	10084.85	27/2-	771.6 *4*	0.53 *6*	M1	
		9995.34	25/2(-)	860.4 *2*[b]	0.51 *4*	M1	DCO=0.43 *10*.
		7359.77	25/2+	3497.0 *1*	4.99 *18*	(E1)	DCO=0.59 *6*. a2=-0.04 *6*. a4=-0.03 *8*.

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^{28}Si(^{20}Ne,apg) 2007Ch40 (continued)

γ(^{43}Sc) (continued)

E$_i$(level)	J$_i^\pi$	E$_f$(level)	J$_f^\pi$	E$_\gamma$[†]	I$_\gamma$	Mult.[‡§]	Comments
11252.6	25/2+	7359.77	25/2+	3892.6 *3*	2.96 *12*		
11355.67	27/2-	8555.89	23/2-	2799.5 *2*	2.70 *10*	E2	DCO=0.99 *10*.
		8434.56	23/2-	2920.2 *10*	0.39 *5*	E2	
		7359.77	25/2+	3997.1 *3*	1.23 *7*	E1	
11661.3		8555.89	23/2-	3105.3 *4*	0.70 *4*		
11807.67	29/2(-)	10856.86	(27/2-)	951.0 *3*	1.23 *6*	M1	DCO=0.70 *11*.
		9579.35	(27/2+)	2228.0 *2*	1.76 *8*	E1	
		8832.32	27/2+	2975.2 *1*	6.45 *21*	D[c]	DCO=0.71 *5*. a2=-0.35 *12*. a4=+0.10 *16*.
11921.6	25/2(+)	7359.77	25/2+	4560.5 *3*	1.89 *8*	M1	DCO=1.02 *8*.
		6431.60	23/2+	5489.0 *3*	3.19 *12*	M1	DCO=0.84 *11*.
12053.72	29/2(-)	10084.85	27/2-	1968.8 *1*	6.30 *25*	(M1)	DCO=0.92 *12*. a2=-0.14 *9*. a4=+0.06 *12*.
		9995.34	25/2(-)	2058.7 *2*	1.23 *7*	E2	
12073.76	(29/2-)	10613.82	(27/2-)	1460.1 *1*	3.12 *13*	M1[d]	DCO=1.05 *15*.
12615.45	(31/2)-	10856.86	(27/2-)	1757.9 *7*	1.71 *9*	E2	
		10084.85	27/2-	2530.6 *1*	12.7 *4*	(E2)	DCO=1.3 *3*. a2=+0.18 *6*. a4=-0.33 *8*.
12704.2		8555.89	23/2-	4148.1 *8*	0.32 *3*		
12804.7		10613.82	(27/2-)	2190.8 *3*	1.19 *6*		
		8832.32	27/2+	3972.5 *2*	1.75 *7*		
13045.3	(29/2+)	10437.43	(25/2+)	2607.8 *2*	1.12 *5*	E2	
		8832.32	27/2+	4213.0 *3*	1.88 *7*	M1[c]	DCO=0.76 *17*.
		8703.53	25/2(+)	4341.7 *3*	1.66 *7*	E2	
		7359.77	25/2+	5684.9 *4*	1.52 *7*	E2	
13117.20	(31/2-)	12073.76	(29/2-)	1043.6 *1*	1.19 *6*	M1	DCO=0.64 *15*.
		10613.82	(27/2-)	2503.1 *1*	3.68 *14*	E2[d]	DCO=1.73 *20*.
13123.1		10084.85	27/2-	3038.1 *5*	1.27 *9*		
13584.6	(29/2+)	8832.32	27/2+	4752.0 *3*	1.33 *6*	(M1)[c]	DCO=0.48 *9*. a2=-0.28 *21*. a4=+0.2 *3*.
14406.61	(33/2-)	13117.20	(31/2-)	1289.2 *3*	0.46 *4*	M1	
		12615.45	(31/2)-	1791.2 *1*	6.06 *21*	D	DCO=0.47 *7*. a2=-0.52 *13*. a4=-0.17 *18*.
		12053.72	29/2(-)	2353.2 *3*	1.57 *8*	E2[c]	DCO=1.0 *4*.
		11807.67	29/2(-)	2598.0 *1*[b]	2.91 *11*	(E2)	a2=+0.41 *24*. a4=+0.4 *3*.
14452.1	(29/2+)	11921.6	25/2(+)	2530.4 *1*	3.02 *12*	E2	
		11807.67	29/2(-)	2644.5 *5*	0.97 *6*	E1	
		8832.32	27/2+	5620.1 *5*	1.45 *7*	M1	
14561.4	31/2-	12053.72	29/2(-)	2508.0 *3*	1.67 *8*	M1	
		11355.67	27/2-	3205.3 *3*	2.09 *9*	E2[c]	DCO=1.11 *16*.
14916.7	31/2	8832.32	27/2+	6081.0 *3*[a]	4.69 *16*	Q	DCO=1.19 *12*. a2=+0.44 *5*. a4=-0.21 *7*.
15911.6	(33/2+)	13045.3	(29/2+)	2866.3 *2*	3.50 *12*	E2	
		12615.45	(31/2)-	3296.0 *4*	1.24 *7*	E1	
16704.3		13117.20	(31/2-)	3586.9 *5*	0.47 *3*		
16708.9		13584.6	(29/2+)	3124.2 *3*	1.03 *5*		
16711.5		12804.7		3906.6 *5*	0.58 *5*		
17769.8	(35/2)	14916.7	31/2	2852.9 *1*	3.06 *11*	(E2)	a2=+0.10 *18*. a4=-0.4 *3*.

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^{28}Si(^{20}Ne,apg) 2007Ch40 (continued)

γ(^{43}Sc) (continued)

E_i(level)	J^{π}_i	E_f(level)	J^{π}_f	E_γ[†]	I_γ	Mult.[‡§]	Comments
17922.0	(31/2+)	14452.1	(29/2+)	3469.8 *2*	1.74 *8*	(M1)	DCO=0.77 *10*.
18197.0	35/2-	14561.4	31/2-	3635.4 *3*	1.31 *6*	E2[c]	DCO=1.2 *3*.
18767.7	(37/2)	17769.8	(35/2)	997.9 *1*	0.87 *4*	M1	DCO=0.65 *17*.
19210.5	(37/2+)	17769.8	(35/2)	1440.7 *2*	0.79 *4*	M1	
		15911.6	(33/2+)	3298.8 *3*	1.58 *7*	E2	

[†] The quoted uncertainties are statistical only. Above 3.5 MeV (maximum range of calibration curve), systematic uncertainties can be 1-2 keV.
[‡] Transitions with mult=M1 may include E2 admixture.
[§] Transitions with mult=M1 may include E2 admixture.
[a] Poor fit in the level scheme. The uncertainty is increased by a factor of 2 for fitting purposes.
[b] Poor fit in the level scheme. The uncertainty is increased by a factor of 3 for fitting purposes.
[c] DCO value corresponds to an alternative DCO-like analysis.
[d] DCO value corresponds to gate on ΔJ=2, quadrupole transition.

^{29}Si(^{16}O,pnγ) 1980Sh09

1980Sh09: E=40, 42 MeV ^{16}O beam. Target of a 200 μg/cm^2 ^{29}Si (enriched to 95%) on a 250 μm gold backing. γ-rays were detected by Ge(Li) detectors. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma$(t), $\gamma(\theta)$, γ(lin pol). Deduced levels, J, π, mixing ratios, γ-branchings, $T_{1/2}$ by Doppler-shift attenuation method (DSAM).

^{43}Sc Levels

E(level)†	J$^{\pi}$‡	$T_{1/2}$	Comments
0.0	7/2-		
1829.94 *20*	11/2-		
2987.5 *4*	15/2-		
3123.3 *5*	19/2-		
5517.3 *8*	19/2+	<62 fs	$T_{1/2}$: dSAM (1980Sh09).
6428.6 *9*	23/2+	16.3 ps *15*	$T_{1/2}$: rDM (1980Sh09).
7354.8 *11*	25/2+	0.42 ps *11*	$T_{1/2}$: dSAM (1980Sh09).

† From least-squares fit to Eγ data.
‡ From Adopted Levels.

γ(^{43}Sc)

E_i(level)	J^{π}_i	E_f(level)	J^{π}_f	Eγ†	Iγ‡	Mult.§	δ§	Comments
1829.94	11/2-	0.0	7/2-	1829.9 *2*	100 *3*	E2		A_2=+0.26 *2*, A_4=-0.10 *2*. Pol=+0.45 *9* (1980Sh09). δ(M3/E2)=0.00 *1*.
2987.5	15/2-	1829.94	11/2-	1157.5 *3*	71 *2*	E2		A_2=+0.30 *2*, A_4=-0.12 *2*. Pol=+0.48 *7* (1980Sh09). δ(M3/E2)=0.00 *1*.
3123.3	19/2-	2987.5	15/2-	135.8 *3*	14 *1*	E2		A_2=+0.36 *5*, A_4=-0.09 *5* (1980Sh09). δ(O/Q)=0.00 *1*.
5517.3	19/2+	3123.3	19/2-	2393.9 *7*	14 *1*	E1(+M2)	0.0 *1*	Mult.: A_2=+0.43 *3*, A_4=0.00 *4*. Pol=-0.8 *4* (1980Sh09).
6428.6	23/2+	5517.3	19/2+	911.3 *5*	11 *1*	E2		A_2=+0.32 *2*, A_4=-0.25 *2*. Pol=+0.67 *9* (1980Sh09). δ(M3/E2)=0.00 *2*.
		3123.3	19/2-	3305.5 *15*	1.0 *5*	M2+E3	+0.27 *9*	Iγ(3305)/Iγ(911)=0.07 *1*. Mult.: A_2=+0.69 *15*, A_4=+0.24 *11* (1980Sh09).
7354.8	25/2+	6428.6	23/2+	926.2 *5*	4.0 *5*	M1(+E2)	-0.1 *1*	Mult.: from A_2=-0.14 *5*, A_4=0.00 *5*. Pol=-0.4 *5* (1980Sh09).

† From 1980Sh09, unless otherwise stated.
‡ From 1980Sh09.
§ From $\gamma(\theta)$ and γ(lin pol) of 1980Sh09.

^{40}Ca(α,p) 1981Sm03,1970Gi10,1967Sc08

1981Sm03: E=35.6 MeV α beam was produced from the University of Colorado cyclotron. Target of natural calcium on a 20 μg/cm^2 carbon foil, thickness of 280 μg/cm^2. Protons were momentum analyzed with a magnetic spectrograph and detected in the helical focal plane counter backed by a plastic scintillator, overall FWHM=25-30 keV. Measured $\sigma(E_p,\theta)$. Deduced levels, J, π from DWBA analysis.

1970Gi10 (also 1966GiZZ): E=31 MeV α beam was produced from the MIT cyclotron. Target of 1 mg/cm^2 97% enriched self-supporting ^{40}Ca foil. Protons were detected by a ΔE-E solid-state counter telescope, FWHM=90 keV. Measured $\sigma(E_p,\theta)$. Deduced levels, J, π, L from DWBA analysis.

1967Sc08: E=12 MeV α beam was produced from the tandem Van de Graaff accelerator at Argonne National Laboratory. Target of 10 μg/cm^2 natural calcium on a 1- μg/cm^2 carbon backing. Protons were momentum analyzed with a 75 cm broad-range magnetic spectrograph and detected in nuclear emulsions. Measured $\sigma(E_p,\theta)$. Deduced levels.

1987Fr09: E=12 MeV α beam was produced from the 6 MV Van de Graaff accelerator of the National Accelerator Center (NAC) at Faure. Target of natural CaO on a thin carbon backing. Particles scattered at 90° and 120° to the beam were detected by a ΔE-E detector telescope. Measured relative cross sections compared to those calculated from Hauser-Feshbach analysis for possible Jπ assignments. Deduced levels.

1979Th03: E=25 MeV α beam was produced from the Niels Bohr Institute FN tandem Van de Graaff accelerator. Target of a 15 μg/cm^2 81.9% enriched ^{41}Ca (81.9% in ^{41}Ca and 18.1% in ^{40}Ca) on a carbon backing. Protons were analyzed with a single-gap magnetic spectrograph and detected in nuclear emulsions. Measured $\sigma(E_p,\theta)$. Deduced levels, J, π from DWBA analysis for 0, 1179, 1811 and 1830 levels. In the spectrum, 13 groups assigned to ^{43}Sc.

1985Ba77: E=25.8 MeV. Measured $\sigma(\theta)$, DWBA analysis. Data for 0, 472, 1179 levels.

1970Ba51: E=11.94 MeV. FWHM=50 keV. Particle spectrum in coin with γ rays.

1983HaZJ: E=60 MeV. Measured $\sigma(\theta)$. DWBA calculations.

1974Ho39: E-4-10 MeV (εM system). Measured cross section.

1972Fi20: E=28.5 MeV. Measured $\sigma(\theta)$. DWBA calculations.

1971Po03: E=9.5, 11 MeV. Measured proton spectrum FWHM≈150 keV. DWBA calculations.

1966Cu01: E=9, 10 MeV. Measured $\sigma(\theta)$. FWHM≈25 keV. DWBA calculations.

1963La04: E=20 MeV or less. Measured $\sigma(\theta)$ for selected groups. A total of 14 groups reported.

1961Ma03: E=21 MeV. Measured Q-value.

^{43}Sc Levels

E(level)[‡]	Jπ[†]	L[d]	σ(DWBA)/σ(exp)[c]	Comments
0	7/2-	3	0.258	
151[b]				
473[a]	3/2-	1	0.358	S-factor=0.267, 0.280 (relative to 1 for g.s.) (1985Ba77).
844[a]	5/2-		0.265	
855[&]				
882[b]				
1156[a]				
1178[a]	3/2-	1		S-factor=1.22, 1.28 (relative to 1 for g.s.) (1985Ba77), 1.39 (1981Sm03).
1335[b]				
1418[a]	7/2-	3	0.024	
1646[b]				
1810[a]			0.394	Jπ: 1981Sm03 assign 1/2-, but adopted Jπ=3/2-. Also σ(θ) fitted well to 3/2- by 1979Th03.
1827[a]	11/2-	5	0.168	
1877[b]				
1912[#]				
1928[a]				
1963[@]				
2094[@]				
2106[@]				
2141[@]				
2243[@]				
2289	5/2-	3		
2335[@]				
2382[@]				
2459[@]				

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^{40}Ca(α,p) 1981Sm03,1970Gi10,1967Sc08 (continued)

^{43}Sc Levels (continued)

E(level)[‡]	J^{π}[†]	L[d]	σ(DWBA)/σ(exp)[c]	Comments
2551[@]				
2580[@]				
2634	(9/2-)		0.110	J^{π}: adopted Jπ=(9/2,11/2)-.
2669[@]				
2762[@]				
2810[&]				
2839[&]				
2987	15/2-	7[e]	0.379	J^{π}: 1970Gi10 fit a 2980 group to J=1/2.
3123	(19/2-)	9[e]	1.0	
3141[&]				
3250				
3289[&]				
3450				
3485[&]				
3677[&]				
3807[&]				
3850				E(level): from 1963La04 only.
3955[&]				
3990[&]				
4157[&]				
4370				
4630				
4940				
5230				
5340				
5690				
6080				
6230				

† From comparison of $\sigma(\theta)$ data with cluster transfer DWBA calculations (1981Sm03, 1970Gi10).
‡ From 1981Sm03 up to 3200 and from 1970Gi10 above 3200, unless otherwise stated.
# From 1966Cu01.
@ From 1987Fr09.
& From 1970Ba51, protons detected in coin with γ rays.
a From 1967Sc08.
b Weighted average of 1966Cu01 and 1967Sc08.
c From 1981Sm03, normalized to 1.0 for 19/2- state.
d From 1970Gi10, unless otherwise indicated.
e From 1983HaZJ.

^{40}Ca(α,pγ) 1987Fr09,1972Ba04,1971Po03

1987Fr09: E=12 MeV α beam was produced from the 6 MV Van de Graaff accelerator of the National Accelerator Center (NAC) at Faure. Target of natural CaO on a thin carbon backing. γ-rays were detected by Ge(Li) detectors and protons were detected at forward angles by two surface barrier detectors. Measured Eγ, Iγ, pγ-coin. Deduced levels, γ-branching ratios, mixing ratios, $T_{1/2}$ by DSAM.

1972Ba04, 1970Ba51: E=7-12 MeV (1972Ba04), E=11.8-15.5 MeV (1970Ba51) α beam was produced from the Chalk River MP Tandem accelerator. Targets of 400 μg/cm^2 natural Ca on thick gold backings.γ-rays were detected in a 44 cm^3 Ge(Li) detector inside a split annular NaI(Tl) detector and protons were detected by an annular surface barrier detector. Measured Eγ, Iγ, p$\gamma(\theta)$, pγ-coin. Deduced levels, J, π, mixing ratios, γ-branching ratios, $T_{1/2}$ by DSAM.

1971Po03: E=9.5 MeV and 11.0 MeV α beam was produced from the Utrecht 2×6-MV tandem Van de Graaff, current of up to 0.25 μA. Target of natural $CaCO_3$ on a thick carbon backing. γ-rays were detected in a 36-cc Ge(Li) detector and protons by two silicon surface barrier detectors. Measured Eγ, pγ-coin. Deduced levels, $T_{1/2}$ by DSAM.

Others:
1987Ar18: E=20 MeV. Isomer production and decay.
1980ShZN: measured Eγ, Iγ, pγ coin, $\gamma(\theta)$, γ(lin pol), lifetimes by DSAM.: details of this work are not available.
1978Ha07: E=21 MeV. Measured g factor and lifetime of 19/2- state by $\gamma(\theta$,H,t) (TDPAD method).
1977Mi10: E=20 MeV. Measured g factor of 152 level by $\gamma(\theta$,H,t).
1974Br04 (also 1974BrYR): E=14.0 MeV. Measured lifetime of 2987 level by recoil-distance method.
1973Sa10: E=12.2, 13.2, 14.2 MeV. Measured Eγ, $\gamma\gamma$, lifetimes by Doppler-shift method.
1971Na10: E=19 MeV. Measured lifetime and g factor of 19/2- level by $\alpha\gamma(\theta$,H,t).
1971Ba92: E=10.6 MeV. Measured lifetime of four levels by recoil-distance method:
1970Sa24: E=10-26 MeV. Measured decay mode and lifetime of 19/2- level.
1970Fo06: E=7-12 MeV. Measured Eγ, $\gamma(\theta)$, lifetimes of four levels by Doppler-shift attenuation method.
1968Me14: E=10 MeV. Measured lifetime of 472 level by pγ(t).
1967Ph01: E=9.00, 9.35 MeV. Measured Eγ, $\gamma(\theta)$.
1967Cr08: E=9.5 MeV. Measured lifetime of 472 level by RDM.
1967Sc08: E=12 MeV. Measured Eγ, Iγ, pγ-coin. Deducled levels.
1965De15: E=22 MeV. Measured lifetime of 150-keV isomer.
1964Ho14: E=8 MeV. Also ^{43}Ca(p,nγ) E=6 MeV. Measured lifetime of the 150-keV isomer.
1964Sa26: measured Eγ, $\gamma\gamma$, deduced resonances.

^{43}Sc Levels

E(level)†	J$^{\pi}$‡	$T_{1/2}$#	Comments
0.0	7/2-		
151.6 *3*	3/2+	438 μs *7*	g=+0.232 *4* (1977Mi10). $T_{1/2}$: 470 μs *20* (1965De15), 435 μs *7* (1964Ho14).
471.9 *2*	3/2-	158 ps *13*	$T_{1/2}$: 152 ps *21* (RDM,1971Ba92), 360 ps *104* (RDM,1967Cr08), 157 ps *13* (1968Me14), >7.6 ps (1971Po03).
843.9 *3*	5/2-	0.17 ps *6*	$T_{1/2}$: 166 fs *35* (1971Po03), 0.31 ps *6* (1972Ba04), 76 fs *+69-42* (1987Fr09).
853.4 *9*	1/2+	22 ps *3*	$T_{1/2}$: from 22.2 ps *28* (RDM,1971Ba92). Others: >0.43 ps (1971Po03), >4.2 ps (1972Ba04).
879.9 *4*	5/2+	4.2 ps *10*	$T_{1/2}$: from 4.2 ps *10* (RDM,1971Ba92). Others: 4.0 ps *+18-10* (DSAM,1970Fo06,1972Ba04), 0.56 ps *+19-13* (1971Po03), >1.73 ps (1987Fr09).
1158.0 *5*	3/2+	4.4 ps *10*	$T_{1/2}$: from 4.4 ps *10* (RDM,1971Ba92). Others: 2.1 ps *+25-8* (1971Po03); 236 fs *+388-125* (1987Fr09), 3.5 ps *+14-8* (1972Ba04).
1177.0 *8*	3/2-	0.49 ps *14*	$T_{1/2}$: 0.34 ps *+16-11* (1971Po03), 0.59 ps *10* (1972Ba04).
1336.8 *2*	7/2+	0.83 ps *35*	$T_{1/2}$: 1.39 ps *28* (DSAM,1970Fo06,1972Ba04), 0.58 ps *+24-14* (1971Po03).
1406.1 *3*	7/2-	0.19 ps *6*	$T_{1/2}$: 166 fs *31* (1971Po03); 0.27 ps *4* (1972Ba04), 159 fs *+118-55* (1987Fr09).
1650.3 *6*	5/2+	0.17 ps *3*	$T_{1/2}$: 204 fs *+87-65* (1971Po03), 0.159 ps *35* (1972Ba04).
1810.7 *8*	3/2-	<55 fs	$T_{1/2}$: from 1972Ba04.
1829.3 *3*	11/2-	0.20 ps *3*	$T_{1/2}$: 80 fs *+104-74*; 211 fs *44* (1971Po03); 0.26 ps *4* (1972Ba04), 132 fs *+69-42* (1987Fr09).

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^{40}Ca(α,pγ) 1987Fr09,1972Ba04,1971Po03 (continued)

^{43}Sc Levels (continued)

E(level)†	Jπ‡	$T_{1/2}$#	Comments
1882.3 *5*	(5/2,9/2)-	35 fs *17*	$T_{1/2}$: <21 fs; 57 fs *+42-36* (1971Po03); 0.055 ps *21* (1972Ba04), 17 fs *14* (1987Fr09). Jπ: 7/2 choice does not seem allowed from p$\gamma(\theta)$ (1970Ba51).
1930.6 *5*	9/2+	2.4 ps *6*	$T_{1/2}$: from DSAM (1970Fo06,1972Ba04). Others: 0.83 ps +∞-50; 1.0 ps *+27-4* (1971Po03); >1.39 ps (1987Fr09).
1962.5 *5*	(3/2,5/2)-	<83 fs	$T_{1/2}$: from 1987Fr09, 1972Ba04. Jπ: 5/2 is preferred in p$\gamma(\theta)$ (1970Ba51).
2093.9 *12*	3/2-	0.30 ps *7*	$T_{1/2}$: 0.34 ps *+15-10* (1971Po03), 0.32 ps *9* (1972Ba04).
2105.7 *5*	(3/2,5/2)	0.21 ps *7*	$T_{1/2}$: 121 fs *+69-42* (1987Fr09), 0.28 ps *6* (1972Ba04).
2141.2 *6*	(3/2-,5/2+)	0.21 ps *4*	$T_{1/2}$: 0.19 ps *+11-9* (1971Po03); 0.24 ps *10* (1972Ba04), 159 fs *+395-111* (1987Fr09).
2242.6 *4*	(3/2,5/2,7/2)-	0.19 ps *9*	$T_{1/2}$: 0.30 ps *11* (1972Ba04), 194 fs *+118-63* (1987Fr09).
2288.8 *4*	5/2-	<21 fs	$T_{1/2}$: from 1972Ba04. Other: <2.1 fs (1987Fr09).
2335.4 *4*	5/2-	28 fs *14*	$T_{1/2}$: from 1987Fr09. Other: <0.042 ps (1972Ba04).
2382.1 *11*	3/2(+)	>0.31 ps	$T_{1/2}$: from 1987Fr09.
2458.6 *5*	(5/2,9/2)-	38 fs *14*	$T_{1/2}$: from 1987Fr09. Other: <0.042 ps (1972Ba04).
2550.7 *6*	11/2+	0.51 ps *7*	$T_{1/2}$: from DSAM (1970Fo06,1972Ba04). Other: 270 fs *+242-111* (1987Fr09).
2579.9 *4*	(5/2)	0.19 ps *+19-9*	$T_{1/2}$: from 1987Fr09.
2635.5 *7*	11/2-	0.21 ps *7*	$T_{1/2}$: from 0.21 ps *7* (1972Ba04). Other: 520 fs *+1143-243* (1987Fr09).
2650.5 *16*	1/2+		
2669	3/2-		
2762.2 *4*	(5/2,9/2)-	<28 fs	$T_{1/2}$: from 1987Fr09. Other: <0.042 ps (1972Ba04).
2795.2 *5*		0.28 ps *+21-10*	$T_{1/2}$: from 1987Fr09.
2810.7 *8*	(5/2,7/2,9/2)	<62 fs	$T_{1/2}$: from 1987Fr09. Other: <0.083 ps (1972Ba04).
2840.0 *5*	(5/2,7/2)+		
2846			
2862.7 *18*	(1/2,3/2,5/2)+		
2984.1 *8*	(3/2,5/2)	62 fs *28*	$T_{1/2}$: from 1972Ba04. Other: 97 fs *+159-73* (1987Fr09).
2987.6 *4*	15/2-	5.6 ps *7*	$T_{1/2}$: from 1974Br04, other: >0.55 ps (1987Fr09).
3123.2 *3*	19/2-	473 ns *5*	g=+0.3286 *7* (1978Ha07). $f^3_{7/2}$ state. $T_{1/2}$: from 1978Ha07. Others: 450 ns *14* (1971Na10), 0.5 μs *1* (1970Sa24). γ: other: +0.331 *2* (1971Na10).
3139.9 *7*	13/2+	>0.55 ps	$T_{1/2}$: from 1987Fr09.
3158.8 *13*	(3/2-,5/2,7/2+)	<0.42 ps	$T_{1/2}$: from 1987Fr09.
3197.6 *18*		<0.28 ps	$T_{1/2}$: from 1987Fr09.
3264.0 *6*	(7/2,9/2)-	42 fs *+28-21*	$T_{1/2}$: from 1987Fr09.
3293.7 *6*	7/2-	>55 fs	$T_{1/2}$: from 1987Fr09.
3334		0.13 ps *+12-7*	$T_{1/2}$: from 1987Fr09.
3375.2 *5*	(7/2,9/2)-	<62 fs	$T_{1/2}$: from 1987Fr09.
3451.2 *9*	5/2+	<2.1 fs	$T_{1/2}$: from 1987Fr09.
3463.3 *14*	5/2-		
4157			E(level): from 1970Ba51 only.

† From 1987Fr09.

‡ From Adopted Levels.
\# Weighted averages of values given in comments, unless otherwise stated.

					γ(^{43}Sc)			
E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ†	I_γ‡	Mult.§	δ§	Comments
151.6	3/2+	0.0	7/2-	151.6	100			
471.9	3/2-	151.6	3/2+	320.3	4 *2*			
		0.0	7/2-	471.9	96			A_2=+0.075 *34* (1967Ph01).
843.9	5/2-	151.6	3/2+	692.3	<4			
		0.0	7/2-	843.9	100	M1+E2	+0.11 *2*	δ: average of +0.09 *2* (1987Fr09), +0.12 *3* (1970Ba51). Other: 0.13 (1967Ph01). A_2=-0.30 *3* (1967Ph01).
853.4	1/2+	471.9	3/2-	381.5	30 *6*			Iγ(383)/Iγ(703)=25/75 (1987Fr09).
		151.6	3/2+	701.8	70 *6*			
879.9	5/2+	151.6	3/2+	728.3	100	M1+E2	-0.61 *24*	δ: from 1970Ba51. Others: -1.18 *7* (1987Fr09), 0.16 (1967Ph01). A_2=-0.703 *14*, -0.44 *3* (1967Ph01).
		0.0	7/2-	879.9	2 *1*			
1158.0	3/2+	879.9	5/2+	278.1	19 *4*			Iγ(278)/Iγ(1006)=17/55 (1987Fr09).
		853.4	1/2+	304.6	33 *5*			Iγ(303)/Iγ(1006)=28/55 (1987Fr09).
		843.9	5/2-	314.1	<3			
		151.6	3/2+	1006.4	48 *6*	M1+E2	-1.3 *+6-15*	δ: from 1970Ba51. Others: -0.51 *5* or -4.5 *+12-25* (1987Fr09), 0.85 or 2.2 (1967Ph01). A_2=-0.51 *6* (1967Ph01).
1177.0	3/2-	843.9	5/2-	333.1	19 *6*			Iγ(334)/Iγ(707)=8/68 (1987Fr09).
		471.9	3/2-	705.1	68 *4*	M1+E2	-0.18 *13*	δ: -0.18 *13* or <-22 or >+4.9 (1970Ba51).
		0.0	7/2-	1177.0	13 *4*			Iγ(1179)/Iγ(707)=19/73 (1987Fr09).
1336.8	7/2+	879.9	5/2+	456.9	19 *3*	M1+E2	-0.23 *4*	Iγ(457)/Iγ(1185)=23/64 (1987Fr09). δ: from 1970Fo06. Others: -0.28 *10* or -1.20 *18* (1970Ba51).
		151.6	3/2+	1185.2	61 *3*	E2		δ: +0.02 *3* (1987Fr09) for 7/2 to 3/2. A_2=+0.48 *6*, A_4=-0.27 *7* (1967Ph01).
		0.0	7/2-	1336.8	20 *3*	E1+M2	-0.10 *8*	Iγ(1337)/Iγ(1185)=13/64 (1987Fr09). δ: from 1970Ba51. Others: -0.03 *7* (1987Fr09), +1.8 *+7-5* (1970Ba51).
1406.1	7/2-	843.9	5/2-	562.2	10 *2*			Iγ(563)/Iγ(1406)=10/82 (1987Fr09).
		471.9	3/2-	934.2	3 *1*			Iγ(936)/Iγ(1406)=9/82 (1987Fr09).
		0.0	7/2-	1406.1	90 *2*	M1+E2	+0.15 *5*	δ: from 1970Ba51. Others: -0.16 *5* (1987Fr09), 0.02 (1967Ph01). A_2=+0.50 *4* (1967Ph01).
1650.3	5/2+	1158.0	3/2+	492.3	22 *3*			Iγ(492)/Iγ(1499)=21/58 (1987Fr09). Iγ=12 (1967Ph01).
		879.9	5/2+	770.4	7			Iγ(771)/Iγ(1499)=7/58 (1987Fr09).
		853.4	1/2+	796.9	4 *2*			
		471.9	3/2-	1178.4				E_γ: unresolved from 1179γ from 1179 level. Iγ=12 (1967Ph01).
		151.6	3/2+	1498.7	57 *5*	M1(+E2)	0.06	δ: from 1967Ph01. A_2=+0.55 *4* (1967Ph01).
		0.0	7/2-	1650.3	17 *3*			δ: 0.0 (1967Ph01). Iγ(1651)/Iγ(1499)=14/58 (1987Fr09). A_2=+0.19 *5* (1967Ph01).
1810.7	3/2-	1177.0	3/2-	633.7	55 *4*	M1+E2	-0.22 *7*	δ: from 1970Ba51. Other: >+8 or <-19 (1970Ba51).

Continued on next page (footnotes at end of table)

^{40}Ca(α,pγ) 1987Fr09,1972Ba04,1971Po03 (continued)

γ(^{43}Sc) (continued)

E$_i$(level)	J$_i^\pi$	E$_f$(level)	J$_f^\pi$	E$_\gamma$[†]	I$_\gamma$[‡]	Mult.[§]	δ[§]	Comments
		471.9	3/2-	1338.8	45 *4*	M1+E2	-0.22 *7*	δ: from 1970Ba51. Other: >+8 or <-19 (1970Ba51). Iγ(1339)/Iγ(632)=43/42 (1987Fr09).
		151.6	3/2+	1659.1	16			
		0.0	7/2-	1810[ab]				
1829.3	11/2-	879.9	5/2+	949[ab]				
		151.6	3/2+	1677[ab]				
		0.0	7/2-	1830.1 *5*	100			E$_\gamma$: from 1970Sa24.
1882.3	(5/2,9/2)-	843.9	5/2-	1038.4[b]	<5			
		151.6	3/2+	1730[a]				
		0.0	7/2-	1882.3	100	M1+E2		δ: -0.19 *2* for 9/2 to 7/2, +0.42 *3* or +4.1 *5* for 5/2 to 7/2 (1970Ba51); -0.22 *3* or -1.37 *6* for 9/2 to 7/2 (1987Fr09).
1930.6	9/2+	1336.8	7/2+	593.8	31 *3*	M1+E2	-0.21 *4*	Iγ(595)/Iγ(1051)=25/75 (1987Fr09). δ: weighted average of -0.14 *6* (1970Ba51), -0.24 *4* (1970Fo06).
		879.9	5/2+	1050.7	69 *3*	E2		δ: -0.02 *2* (1987Fr09) for 9/2 to 5/2.
		151.6	3/2+	1779[ab]				
1962.5	(3/2,5/2)-	1177.0	3/2-	785.5	20			
		471.9	3/2-	1490.6	80	M1+E2	+0.21 *6*	δ: from 1970Ba51. Other: >+9 or <-17 (1970Ba51).
2093.9	3/2-	1177.0	3/2-	916.9	58 *7*			
		843.9	5/2-	1250.0[b]	7 *7*			
		471.9	3/2-	1622.0	31			
		151.6	3/2+	1942.3	35 *6*			Iγ(1942)/Iγ(915)=16/52 (1987Fr09).
2105.7	(3/2,5/2)	1650.3	5/2+	455.4[b]	10 *5*			
		1158.0	3/2+	947.7	32 *5*			Iγ(948)/Iγ(1226)=19/73 (1987Fr09).
		879.9	5/2+	1225.8	58 *6*			
		151.6	3/2+	1954.1[b]	6			
2141.2	(3/2-,5/2+)	1158.0	3/2+	983.2	21			
		879.9	5/2+	1261.3	55 *5*			
		471.9	3/2-	1669.3	19 *3*			
		151.6	3/2+	1989.6	16 *3*			Iγ(1990)/Iγ(1261)=26/53 (1987Fr09).
		0.0	7/2-	2141.1	10 *4*			
2242.6	(3/2,5/2,7/2)-	843.9	5/2-	1398.7	25			
		471.9	3/2-	1770.7	57			δ: +0.58 *13* for 5/2 to 3/2, +0.14 *8* or +2.5 *+6-4* for 3/2 to 3/2 (1970Ba51).
		0.0	7/2-	2242.5	18			
2288.8	5/2-	0.0	7/2-	2288.7	100.0 *7*	M1+E2	+0.08 *5*	δ: from 1970Ba51. Others: +0.35 *4* (1987Fr09), -12 *+4-12* (1970Ba51).
2335.4	5/2-	0.0	7/2-	2335.3	100	M1(+E2)		δ: +0.12 *3* for 5/2 to 7/2 (1987Fr09), +0.03 *3* or -6.9 *+21-14* for 5/2 to 7/2 and +0.07 *2* or >+6 or <-29 for 9/2 to 7/2 (1970Ba51).
2382.1	3/2(+)	1650.3	5/2+	731.8	69			
		853.4	1/2+	1528.7	31	M1+E2	+0.49 *7*	δ: from 1987Fr09.
2458.6	(5/2,9/2)-	0.0	7/2-	2458.5	100	M1(+E2)		δ: +0.15 *7* or >+19 or <-11 for 5/2 to 7/2 and -0.02 *5* for 9/2 to 7/2 (1970Ba51).
2550.7	11/2+	1930.6	9/2+	620.1	61 *4*			δ: -0.06 *4* or -2.6 *3* (1987Fr09) for 11/2 to 9/2; -0.20 *7* for 11/2 to 9/2 (1970Fo06).

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^{40}Ca(α,pγ) 1987Fr09,1972Ba04,1971Po03 (continued)

γ(^{43}Sc) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ[‡]	Mult.[§]	δ[§]	Comments
		1336.8	7/2+	1213.9	39 *4*			δ: 0.00 *4* (1987Fr09) for 11/2 to 7/2. Iγ(1215)/Iγ(621)=46/54 (1987Fr09).
2579.9	(5/2)	1158.0	3/2+	1421.9	36			
		879.9	5/2+	1700.0	16			
		151.6	3/2+	2428.2	48			
2635.5	11/2-	1829.3	11/2-	806.2	17			
		1406.1	7/2-	1229.4	23			
		0.0	7/2-	2635.4	60			δ: +0.15 *15* for 7/2 to 7/2, +0.49 *7* for 9/2 to 7/2 (1987Fr09); -0.42 *14* or -1.5 *+5-7* for 5/2 to 7/2, -0.15 *9* or +2.0 *+5-4* for 7/2 to 5/2 and +0.36 *7* for 9/2 to 7/2 (1970Ba51).
2650.5	1/2+	843.9	5/2-	1806.6				
2669	3/2-	853.4	1/2+	1816	56			
		471.9	3/2-	2197.0	44			
2762.2	(5/2,9/2)-	0.0	7/2-	2762.1	100			δ: +0.30 *3* for 9/2 to 7/2 (1987Fr09); +0.16 *3* for 9/2 to 7/2 and -0.09 *5* or -3.8 *5* for 5/2 to 7/2 (1970Ba51).
2795.2		1406.1	7/2-	1389.1	16			
		843.9	5/2-	1951.3	39			
		0.0	7/2-	2795.1	45			
2810.7	(5/2,7/2,9/2)	2105.7	(3/2,5/2)	705.0	35 *4*			Iγ(705)/Iγ(1474)=37/46 (1987Fr09).
		1336.8	7/2+	1473.9	46 *5*			δ: +0.02 *4* for 9/2 (1987Fr09).
		0.0	7/2-	2810.6	19 *5*			Iγ(2811)/Iγ(1474)=17/46 (1987Fr09).
2840.0	(5/2,7/2)+	2382.1	3/2(+)	457.9	18			
		1336.8	7/2+	1503.2	44			
		0.0	7/2-	2839.9	38			
2846		0.0	7/2-	2846	100			
2862.7	(1/2,3/2,5/2)+	1650.3	5/2+	1212.4	21			
		879.9	5/2+	1982.8	29			
		151.6	3/2+	2711.0	50			
2984.1	(3/2,5/2)	1930.6	9/2+	1053.5[b]				Iγ(1052)/Iγ(2104)=22 *3*/34 *5* (1970Ba51).
		1336.8	7/2+	1647.3	27			Iγ(1647)/Iγ(2104)=35 *5*/34 *5* (1970Ba51).
		879.9	5/2+	2104.1	28			
		843.9	5/2-	2140.1	13			
		151.6	3/2+	2832.4	32			Iγ: weak γ in 1970Ba51, but the most intense γ from this level in 1987Fr09. Iγ(2833)/Iγ(2104)=9 *4*/34 *5* (1970Ba51).
2987.6	15/2-	1829.3	11/2-	1157.1 *2*	100			δ: +0.01 *5* for 15/2 to 11/2 and +0.74 *+17-14* for 11/2 to 11/2 (1987Fr09), +0.04 *+110-21* for 11/2 to 11/2 (1970Ba51). Eγ: from 1970Sa24.
3123.2	19/2-	2987.6	15/2-	135.8 *2*	100			Eγ: from 1970Sa24.
3139.9	13/2+	1930.6	9/2+	1209.3	100			δ: -0.48 *12* or -1.4 *4* for 7/2 to 9/2; -0.08 *10* or +1.27 *23* for 9/2 to 9/2 and +0.41 *7* for 11/2 to 9/2 (1970Ba51). But the adopted Jπ for the 3140 level is 13/2+.
3158.8	(3/2-,5/2,7/2+)	879.9	5/2+	2278.8	21			
		151.6	3/2+	3007.1	37			

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^{40}Ca(α,pγ) 1987Fr09,1972Ba04,1971Po03 (continued)

γ(^{43}Sc) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ†	I_γ‡	Mult.§	δ§	Comments
		0.0	7/2-	3158.7	42			
3197.6		471.9	3/2-	2725.6	100			
3264.0	(7/2,9/2)-	1829.3	11/2-	1434.7	4			
		0.0	7/2-	3263.9	96			
3293.7	7/2-	1930.6	9/2+	1363.1	32			
		1177.0	3/2-	2116.6	26			
		879.9	5/2+	2413.7	10			
		843.9	5/2-	2449.7	32			
3334		1177.0	3/2-	2157	22			
		843.9	5/2-	2490	21			
		471.9	3/2-	2862	26			
		0.0	7/2-	3334	31			
3375.2	(7/2,9/2)-	1882.3	(5/2,9/2)-	1492.9	16			
		1829.3	11/2-	1545.9	19			
		1406.1	7/2-	1969.1	30			
		1336.8	7/2+	2038.3	12			
		0.0	7/2-	3375.1	23			
3451.2	5/2+	1810.7	3/2-	1640.5	73			
		879.9	5/2+	2571.2	27			
3463.3	5/2-	151.6	3/2+	3311.6	100			
4157		2550.7	11/2+	1606	100			

† Level-energy differences.
‡ Values quoted with uncertainties are from 1970Ba51 and/or 1972Ba04, others are from 1987Fr09.
§ From $\gamma(\theta)$ and RUL (for E2 and M2).
[a] Only seen in 1967Sc08.
[b] Placement of transition in the level scheme is uncertain.

^{40}Ca(^{6}Li,^{3}He) 1974Li01

1974Li01: E=34, 36 MeV ^{6}Li beam of 300-400 nA was produced from the University of Rochester MP Tandem accelerator. Targets of $\approx$75μg/cm^2 ^{40}Ca prepared by evaporating natural calcium onto thin carbon and gold backings. ^{3}He particles were detected in a spark counter mounted in the focal plane of a magnetic spectrograph, FWHM$\approx$50 keV. Measured $\sigma(\theta)$. Deduced levels, J, π, L from DWBA analysis.

1986Pl01: E=156 MeV. Measured (fragment)(γ) coin following breakup, deduced projectile breakup cross section.

All data is from 1974Li01.

^{43}Sc Levels

E(level)	J$^{\pi @}$	L	Σ\ (σ(exp))/Σ\ (σ(DWBA))$^{\#}$
0	7/2-	3	0.36
470‡	3/2-		
1180	3/2-	1	1.5
1410‡	7/2-		
1810†	3/2-	1	0.67
1830†	11/2-	(5)	0.38
2290	5/2-	3	0.85
2620	11/2-	5	0.25
2990	15/2-	7	0.16
3120	(19/2)-	(9)	0.60

† Unresolved doublet. Strength divided by analogy with ^{43}Ti mirror states.
‡ Weak peak in spectrum.
# Sum is over all measured angles.
@ From Adopted Levels.

^{42}Ca(p,γ) E=res 1977Di17,1969Wa19,1965Br31

Gamma decay of resonances in ^{43}Sc.

1977Di17: E=2.00-2.75 MeV proton beams were produced from the 4 and 3 MV Van de Graaff accelerators, at the Centre de Recherches Nucleaires, Strasbourg, France and at McMaster University respectively, for E>2 MeV; from the 3 MeV Van de Graaff accelerator at the Accelerator Laboratory at University of Helsinki, Finland, for E<2 MeV. Targets of enriched $CaCO_3$ on tungsten and gold backings. γ-rays were detected by Ge(Li) detectors. Measured Eγ, Iγ, $\gamma(\theta)$. Deduced levels, J, π, γ-branchings ratios.

1969Wa19, 1970Ma13 (also 1974Ma39,1971Po03): E=1.1-2.1 MeV, E=11, 9.5 MeV in 1971Po03 and E=1.796 MeV and 1.822 MeV in 1974Ma39. proton beams were produced from the Aerospace Research Laboratories (ARL) 2 MeV Van de Graaff accelerator, FWHM=1 keV. Targets of enriched $CaCO_3$ on a 10-mil-thick Ag backing. γ-rays were detected by Ge(Li) detectors. Measured Eγ, Iγ, $\gamma(\theta)$, γ(lin pol), $\gamma\gamma$, $\gamma\gamma(\theta)$. Deduced levels, J, π, γ-branchings, mixing ratios, $T_{1/2}$ by DSAM. 1970Ma13 report γ-ray data from five resonances at E(p)=1235, 1242, 1423, 1808 and 2037 keV. Lifetime data by Doppler-shift method reported by 1971Po03.

1965Br31 (also 1966Br21, 1964Br29, 1963Du11): E=1.013-1.421 MeV resonances. Proton beams were produced from the Van de Graaff generator at the Chalmers University of Technology. Target of enriched ^{42}Ca foil on carbon backing. γ-rays were detected by NaI(Tl) detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin. Deduced levels, γ-branchings.

Others:

1982Mi06: E=0.63-3.01 MeV. Measured yields.

1979Ch29, 1978Vl02: E=0.66-5.39 MeV. Measured cross sections.

1971Ga40: E=1.424 MeV. Measured Eγ, Iγ, $\gamma(\theta)$.

1968So11: measured cross sections for eight resonances.

^{43}Sc Levels

E(level)†	J$^{\pi}$‡	$T_{1/2}$#	Comments
0.0	7/2-		
151.9 *5*	3/2+		
472.3 *4*	3/2-		
845.0 *5*	5/2-	0.146 ps *+7-11*	$T_{1/2}$: or 0.16 ps *+9-5*.
855.3 *4*	1/2+		
880.5 *4*	5/2+		
1158.3 *4*	3/2+		
1179.0 *5*	3/2-	0.23 ps *+9-6*	
1336.3 *5*	7/2+		
1408	7/2-		
1651.2 *6*	5/2+	0.25 ps *+7-6*	
1810.3 *7*	3/2-	16 fs *6*	$T_{1/2}$: or 14 fs *+12-9*.
1884.6 *6*	(5/2,9/2)-		
1931.2 *6*	9/2+		
1962.5 *5*	(3/2,5/2)-	71 fs *11*	$T_{1/2}$: or 67 fs *+24-18*.
2094.3 *3*	3/2-	0.23 ps *+14-7*	
2106.4 *7*	(3/2,5/2)		
2114.3 *9*			
2141.9 *13*	(7/2)	0.17 ps *+6-4*	J$^{\pi}$: from $\gamma\gamma(\theta)$ (1970Ma13). But adopted Jπ=(3/2,5/2+). γ to 1/2+ would exclude 7/2.
2200			E(level): from 1965Br31 only.
2289.3 *8*	5/2-		
2335.8 *9*	5/2-		
2382.9 *5*	3/2(+)		
2552.0 *15*	11/2+		
2580.4 *8*	(5/2)	100 fs *+35-24*	J$^{\pi}$: primary transitions from 7/2 and 3/2 resonances.
2670.3 *6*	3/2-		
2796			
2811.2 *10*			
2840.5 *15*	(5/2,7/2)+		
2846.2 *15*			
2859.7 *16*			
2875	(5/2,9/2)+		
2986.7 *12*	(3/2,5/2)	53 fs *11*	
3160			

Continued on next page (footnotes at end of table)

^{42}Ca(p,γ) E=res 1977Di17,1969Wa19,1965Br31 (continued)

^{43}Sc Levels (continued)

E(level)†	J^{π}‡	$T_{1/2}$#	Comments
3261	(7/2,9/2)-		
3290.2 *16*	7/2-	<3.5 fs	
3327			
3331.4 *17*			
3374	(7/2,9/2)-		
3451.7 *10*	5/2+	7 fs +*7*-*6*	
3463	5/2-		
3503	7/2-		
3645.4 *18*			
3683			
3733.8 *18*			
3757			
3807	7/2-	<3.5 fs	
3843			
3860			
4007	(3/2,5/2)+		
4038	7/2-		
4272			E(level): from 1969Wa19.
4371	5/2-,7/2-		J^{π}: 7/2+ preferred in p$\gamma(\theta)$.
4430			
4454.7	(5/2,9/2)	<3.5 fs	
5919	3/2		E(level): E(p)(lab)=1013.
5950	(3/2,5/2)		E(level): E(p)(lab)=1045.
6060	(5/2)		E(level): E(p)(lab)=1157.
6103	(3/2-,5/2+)		E(level): E(p)(lab)=1201.
6136	3/2		E(level): E(p)(lab)=1234.8. J^{π}: from 1970Ma13.
6143	3/2-		E(level): E(p)(lab)=1241.9. J^{π}: from 1970Ma13.
6182	5/2		E(level): E(p)(lab)=1282.
6198	(3/2,5/2+)		E(level): E(p)(lab)=1298.
6217	(3/2-,5/2+)		E(level): E(p)(lab)=1318.
6247	(3/2,5/2)		E(level): E(p)(lab)=1348.
6320	5/2+		E(level): E(p)(lab)=1422.8.
6685	1/2-		E(level): E(p)(lab)=1797. J^{π}: from 1974Ma39. 14% γ branching proceeds through unidentified transitions.
6696	5/2		E(level): E(p)(lab)=1808.3.
6709	1/2-		E(level): E(p)(lab)=1821. Very weak resonance (1974Ma39). J^{π}: from 1974Ma39.
6777	5/2+		E(level): E(p)(lab)=1891.
6919	7/2		E(level): E(p)(lab)=2036.6. J^{π}: from 1970Ma13.
7344	(3/2-,5/2)		E(level): E(p)(lab)=2471.
7394	(3/2-,5/2+)		E(level): E(p)(lab)=2523.
7512	(5/2+,7/2,9/2)		E(level): E(p)(lab)=2643. J^{π}: 9/2+ only proposed by 1977Di17.
7581	(3/2-,5/2,7/2+)		E(level): E(p)(lab)=2714.

† Average of values from 1977Di17, 1969Wa19 and 1965Br31. Above 4454, excitation energies for proton resonances are obtained from S(p)+E(p)(εM), where S(p)=4929.8 *19* (2011AuZZ). Values of E(p)(lab) are given under comments.
‡ From Adopted Levels up to 5919 keV. For resonances assignments are from 1977Di17, unless otherwise stated.
# From Doppler-shift method (1971Po03).

$\gamma(^{43}Sc)$

Data for different resonances are from the following references: from 1977Di17 for E(p)=1045, 1201, 1299, 1319, 2038, 2471, 2523, 2643 and 2714; from 1969Wa19 (also 1970Ma13 and 1974Ma39) for 1235, 1242, 1423, 1796, 1808, 1822, 1891 and 2037; from 1965Br31 (also 1966Br21,1964Br29) for 1013, 1157 and 1346. Data for 1045, 1235, 1242, 1299, and 1423 resonances are also given by 1965Br31.

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ[‡]	Mult.[§]	δ[§]	Comments
151.9	3/2+	0.0	7/2-	151.9	100			
472.3	3/2-	151.9	3/2+	320.3	4 *1*			
		0.0	7/2-	472.3	100 *2*			
845.0	5/2-	0.0	7/2-	845.0	100	M1+E2	+0.18 *2*	
855.3	1/2+	472.3	3/2-	383.0	25 *2*			
		151.9	3/2+	703.3	100 *4*			
880.5	5/2+	151.9	3/2+	728.5	100 *2*	M1+E2	-0.51 *7*	δ: weighted average of -0.49 *8* and -0.64 *18* (1970Ma13).
		0.0	7/2-	880.5	2 *1*			
1158.3	3/2+	880.5	5/2+	277.8	35 *5*			δ(Q/D)=+0.23 *20*, +23 *+19-∞* or <-5.7.
		855.3	1/2+	303.0	37 *5*			δ(Q/D)=+0.19 *20* or -2.9 *+13-85*.
		472.3	3/2-	686.0	4 *2*			
		151.9	3/2+	1006.3	100 *4*			δ(Q/D)=-1.3 *5* or +1.5 *15*.
1179.0	3/2-	880.5	5/2+	298.5	1			
		845.0	5/2-	334.0	17 *3*			
		472.3	3/2-	706.7	100 *8*			
		151.9	3/2+	1027.0[a]				
		0.0	7/2-	1179.0	23 *3*			
1336.3	7/2+	880.5	5/2+	455.8	26 *2*			
		151.9	3/2+	1184.3	100 *2*			
		0.0	7/2-	1336.3	20 *5*			
1408	7/2-	845.0	5/2-	563	16 *3*			
		472.3	3/2-	936	9 *3*			
		0.0	7/2-	1408	100 *4*			
1651.2	5/2+	1158.3	3/2+	492.9	30 *3*			δ(Q/D)=0.00 *20* or -2.4 *+12-50*.
		880.5	5/2+	770.7	12 *3*			
		855.3	1/2+	795.9	5 *2*			
		151.9	3/2+	1499.2	100 *5*	M1(+E2)	-0.05 *18*	
		0.0	7/2-	1651.2	20 *3*			
1810.3	3/2-	1179.0	3/2-	631.3	100 *13*			
		855.3	1/2+	955.0	41 *10*			
		472.3	3/2-	1338.0	90 *10*			
		151.9	3/2+	1658.3	26 *8*			
1884.6	(5/2,9/2)-	880.5	5/2+	1004.1	21			
		845.0	5/2-	1039.6	16			
		0.0	7/2-	1884.6	100	D+Q		δ(Q/D)=-0.4 *+2-11* for 9/2; +(1.1 *+13-6*) for 5/2.
1931.2	9/2+	1336.3	7/2+	594.9	19 *2*	D+Q	-0.14 *6*	A_2=+0.63 *11*, A_4=+0.01 *12* (1977Di17).
		880.5	5/2+	1050.7	100 *4*	Q		A_2=-0.38 *6*, A_4=+0.30 *6* (1977Di17).
		0.0	7/2-	1931.2	1			
1962.5	(3/2,5/2)-	1179.0	3/2-	783.5	15 *2*			δ(Q/D)=-0.04 *25* or +(1.5 +∞-10).
		1158.3	3/2+	804.2	4 *1*			
		472.3	3/2-	1490.2	100 *2*			

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$^{43}_{21}Sc_{22}$-54

γ(^{43}Sc) (continued)

E_i(level)	J^π_i	E_f(level)	J^π_f	E_γ[†]	I_γ[‡]	Mult.[§]	δ[§]	Comments
		0.0	7/2-	1962.5				
2094.3	3/2-	1179.0	3/2-	915.3	100 *9*			δ(Q/D)=0.00 *10*, +(3.7 *+25-10*) or -10 *+4-48*.
		880.5	5/2+	1213.8	30 *6*			
		855.3	1/2+	1239.0	55 *6*			
		845.0	5/2-	1249.3	33 *6*			
		472.3	3/2-	1622.0	33 *9*			
		151.9	3/2+	1942.3	52 *9*			
2106.4	(3/2,5/2)	1158.3	3/2+	948.1	30 *4*			
		880.5	5/2+	1225.9	100 *6*			
2114.3		1158.3	3/2+	956.0	79 *9*			
		151.9	3/2+	1962.3	100 *13*			
2141.9	(7/2)	1651.2	5/2+	490.7	38			I_γ: from figure 1 of 1977Di17.
		1179.0	3/2-	962.9	6 *3*			
		1158.3	3/2+	983.6	15 *6*			
		880.5	5/2+	1261.4	100 *9*			δ(Q/D)=+0.27 *10* or -23 *+12-∞*.
		855.3	1/2+	1286.6	12 *6*			
		472.3	3/2-	1669.6	50 *6*			
		151.9	3/2+	1989.9	74 *6*			
		0.0	7/2-	2141.8[a]		D(+Q)	0.00 *4*	I_γ: 102 (1969Wa19). γ not reported by 1977Di17.
2200		0.0	7/2-	2200[a]				
2289.3	5/2-	0.0	7/2-	2289.2	100			
2335.8	5/2-	0.0	7/2-	2335.7	100			
2382.9	3/2(+)	1651.2	5/2+	731.7	100			
2552.0	11/2+	1931.2	9/2+	620.8	100 *8*			
		1336.3	7/2+	1215.7	67 *7*			
2580.4	(5/2)	1962.5	(3/2,5/2)-	617.9[a]				I_γ: 1969Wa19 report only the 617 and 1401 gammas from 2580 level, with Iγ(617)/Iγ(1401)=0.33.
		1179.0	3/2-	1401.4[a]				δ(Q/D)=+0.11 *10* or -5.7 *+20-80*.
		1158.3	3/2+	1422.1	52 *10*			
		880.5	5/2+	1699.9	40 *8*			
		151.9	3/2+	2428.3	100 *13*			
2670.3	3/2-	1408	7/2-	1262.3[a]				I_γ: 1969Wa19 report 1260 and 1492 gammas from 2580 level, with Iγ(1260)/Iγ(1492)=0.33.
		1179.0	3/2-	1491.3	16 *4*			I_γ: other: 100 (1969Wa19).
		880.5	5/2+	1789.8	43 *8*			
		855.3	1/2+	1815.0	100 *4*			
		472.3	3/2-	2197.9	45 *6*			
2796		845.0	5/2-	1951	100 *9*			
		151.9	3/2+	2644	33 *5*			
2811.2		1336.3	7/2+	1474.9	100 *10*			
		0.0	7/2-	2811.1	100 *10*			
2840.5	(5/2,7/2)+	880.5	5/2+	1960.0	43 *9*			
		0.0	7/2-	2840.4	100 *7*			
2846.2		0.0	7/2-	2846.1	100			
2859.7		1651.2	5/2+	1208.5	14 *5*			

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$^{43}_{21}Sc_{22}$-55

γ(^{43}Sc) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ†	I_γ‡	Mult.§	δ§	Comments
		1179.0	3/2-	1680.7	16 *5*			
		1158.3	3/2+	1701.4	23 *7*			
		880.5	5/2+	1979.2	100 *5*			
		151.9	3/2+	2707.6	75 *7*			
2875	(5/2,9/2)+	151.9	3/2+	2723				From intensity balance, this γ ray accounts for 80% of the total intensity, other 20% intensity is unaccounted for.
2986.7	(3/2,5/2)	1336.3	7/2+	1650.4	16			
		1179.0	3/2-	1807.7	34 *8*			
		880.5	5/2+	2106.1	71 *5*			δ(Q/D)=-0.95 *50* for 5/2; +0.13 *11* or -11 *+7-∞* for 3/2.
		845.0	5/2-	2141.6	58 *8*			
		151.9	3/2+	2834.6	100 *8*			δ(Q/D)=+(0.66 *+60-30*) for 5/2; 0.00 *9* or +(4.5 *+30-13*) for 3/2.
3160		880.5	5/2+	2279				From intensity balance, this γ ray accounts for 25% of the total intensity, other 75% intensity is unaccounted for.
3261	(7/2,9/2)-	0.0	7/2-	3261				From intensity balance, this γ ray accounts for 60% of the total intensity, other 40% intensity is unaccounted for.
3290.2	7/2-	1810.3	3/2-	1479.9	21 *5*			
		1179.0	3/2-	2111.1	100 *12*			
		880.5	5/2+	2409.6	21 *7*			
		845.0	5/2-	2445.1	91 *9*			
		0.0	7/2-	3290[a]				This is the only γ reported from 3290 level by 1969Wa19.
3327		0.0	7/2-	3327				From intensity balance, this γ ray accounts for 70% of the total intensity, other 30% intensity is unaccounted for.
3331.4		1962.5	(3/2,5/2)-	1368.9	4 *2*			
		1810.3	3/2-	1521.1	13 *4*			
		1179.0	3/2-	2152.3	100 *4*			
		1158.3	3/2+	2173.0	44 *4*			
		845.0	5/2-	2486.3	29 *6*			
		472.3	3/2-	2859.0	19 *4*			
3374	(7/2,9/2)-	0.0	7/2-	3374				From intensity balance, this γ ray accounts for 50% of the total intensity, other 50% intensity is unaccounted for.
3451.7	5/2+	880.5	5/2+	2571.1	100 *7*			
		845.0	5/2-	2606.6	45 *7*			
		151.9	3/2+	3299.6	55 *7*			
		0.0	7/2-	3451.6	27 *9*			I_γ: 1969Wa19 report this as the only γ from 3452 level.
3463	5/2-	880.5	5/2+	2582	37 *4*			
		151.9	3/2+	3311	100 *7*			
3503	7/2-	845.0	5/2-	2658	100 *10*			

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$^{43}_{21}$Sc$_{22}$-56

^{42}Ca(p,γ) E=res 1977Di17,1969Wa19,1965Br31 (continued)

γ(^{43}Sc) (continued)

E_i(level)	J^{π}_i	E_f(level)	J^{π}_f	E_{γ}†	I_{γ}‡	Mult.§	δ§	Comments
		0.0	7/2-	3503	100 *10*			
3645.4		1962.5	(3/2,5/2)-	1682.9	34 *11*			
		1651.2	5/2+	1994.2	66 *13*			
		1179.0	3/2-	2466.3	100 *16*			
		880.5	5/2+	2764.8	63 *13*			
3683		880.5	5/2+	2803	25 *4*			
		845.0	5/2-	2838	56 *5*			
		151.9	3/2+	3531	100 *11*			
3733.8		2289.3	5/2-	1444.5	31			
		1408	7/2-	2325.7	83			
		845.0	5/2-	2888.7	100			
3757		151.9	3/2+	3605	100 *10*			
		0.0	7/2-	3757	43 *7*			
3807	7/2-	1336.3	7/2+	2471	24 *6*			
		880.5	5/2+	2926	100 *5*			A_2=-0.36 *9*, A_4=+0.11 *10* (1977Di17). δ(Q/D)=0.00 *10* for 7/2 to 5/2 transition.
		472.3	3/2-	3335	35 *8*			
		0.0	7/2-	3807				This is the only γ reported by 1969Wa19 from the 3807 level.
3843		845.0	5/2-	2998				From intensity balance, this γ ray accounts for 40% of the total intensity, other 60% intensity is unaccounted for.
3860		151.9	3/2+	3708				From intensity balance, this γ ray accounts for 80% of the total intensity, other 20% intensity is unaccounted for.
4007	(3/2,5/2)+	880.5	5/2+	3126	83 *20*			
		855.3	1/2+	3152	100 *20*			
		472.3	3/2-	3535	50 *13*			
		151.9	3/2+	3855	100 *17*			
4038	7/2-	1931.2	9/2+	2107	100 *13*			
		472.3	3/2-	3566	67 *15*			
4371	5/2-,7/2-	2106.4	(3/2,5/2)	2265	37 *7*			
		1651.2	5/2+	2720	32 *10*			
		1408	7/2-	2963	49 *12*			
		1336.3	7/2+	3035	100 *10*			
		880.5	5/2+	3490	27 *7*			
4430		1179.0	3/2-	3251	100 *15*			
		1158.3	3/2+	3272	75 *13*			
		880.5	5/2+	3549	75 *10*			
4454.7	(5/2,9/2)	0.0	7/2-	4454.5	100			E_{γ}: other: 4464. δ(Q/D)=+0.13 *5* for 9/2; -0.05 *5* or -5.7 *+14-35* for 5/2.
5919	3/2	3290.2	7/2-	2629	33			
		2670.3	3/2-	3249	33			
		2580.4	(5/2)	3338	33			
		2382.9	3/2(+)	3536	67			

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γ(^{43}Sc) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ[‡]	Mult.[§]	δ[§]	Comments
		2200		3719[a]				
		1651.2	5/2+	4268	67			A_2=-0.25 (1966Br21).
		1179.0	3/2-	4740	33			A_2=-0.43 (1966Br21).
		1158.3	3/2+	4760	67			A_2=-0.33 (1966Br21).
		880.5	5/2+	5038	67			A_2=-0.43 (1966Br21).
		845.0	5/2-	5074	100			A_2=-0.77 (1966Br21).
		472.3	3/2-	5446	67			A_2=-0.15 (1966Br21).
		151.9	3/2+	5767	100			A_2=-0.28 (1966Br21).
5950	(3/2,5/2)	3807	7/2-	2143[a]				
		3331.4		2619	62			
		3290.2	7/2-	2660	19			I_γ: 1965Br31 report this as the strongest γ ray from this level.
		2986.7	(3/2,5/2)	2964[a]				
		2580.4	(5/2)	3369	14			
		2335.8	5/2-	3615	5			
		2289.3	5/2-	3661	5			
		2141.9	(7/2)	3808	10			
		2114.3		3836	5			
		2094.3	3/2-	3856	10			
		1962.5	(3/2,5/2)-	3987	33			
		1810.3	3/2-	4139	5			
		1651.2	5/2+	4299	67			
		1179.0	3/2-	4771	100			
		1158.3	3/2+	4791	14			
		855.3	1/2+	5094	43			
		845.0	5/2-	5105				I_γ: other: 25.
		472.3	3/2-	5477	43			
		151.9	3/2+	5798	43			
6060	(5/2)	0.0	7/2-	6060				
6103	(3/2-,5/2+)	3843		2260	1.6			
		3451.7	5/2+	2651	10			
		3160		2943	1.6			
		2986.7	(3/2,5/2)	3116	1.6			
		2846.2		3257	1.6			
		2840.5	(5/2,7/2)+	3262	<1.6			
		2141.9	(7/2)	3961	13			
		2106.4	(3/2,5/2)	3996	5			
		1408	7/2-	4695	5			
		1336.3	7/2+	4766	8			
		1179.0	3/2-	4924	3			
		855.3	1/2+	5247	1.6			
		845.0	5/2-	5258	3			
		472.3	3/2-	5630	1.6			
		151.9	3/2+	5951	100			
		0.0	7/2-	6103	5			

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

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ[‡]	Mult.[§]	δ[§]	Comments
6136	3/2	3807	7/2-	2329[a]				
		3290.2	7/2-	2846[a]				
		2986.7	(3/2,5/2)	3150[a]	30			
		2670.3	3/2-	3466[a]	15			
		2580.4	(5/2)	3555	35			δ(Q/D)=-0.14 *7* or -2.6 *+5-7* for Jπ(res)=3/2 (1970Ma13).
		2141.9	(7/2)	3994	24			
		2094.3	3/2-	4041	71			δ(Q/D)=+0.07 *5* or +2.7 *+6-10* for Jπ(res)=3/2 (1970Ma13).
		1962.5	(3/2,5/2)-	4173	100			δ(Q/D)=+0.14 *10* or -19 *+13-∞* for Jπ(res)=3/2 (1970Ma13).
		1651.2	5/2+	4485	35			δ(Q/D)=+0.36 *2* or +7.6 *+48-∞* for Jπ(res)=3/2 (1970Ma13).
		1179.0	3/2-	4957	65			δ(Q/D)=-0.36 *6* or -9.5 *+30-70* for Jπ(res)=3/2 (1970Ma13).
		1158.3	3/2+	4977	53			δ(Q/D)=-0.05 *3* or +4.7 *+7-20* for Jπ(res)=3/2 (1970Ma13).
		880.5	5/2+	5255	41			δ(Q/D)=-0.05 *3* for Jπ(res)=3/2 (1970Ma13).
		855.3	1/2+	5280	18			
		845.0	5/2-	5291	24			
		472.3	3/2-	5663	24			δ(Q/D)=-0.36 *2* or -7.6 *+20-38* for Jπ(res)=3/2 (1970Ma13).
		151.9	3/2+	5984	100			δ(Q/D)=0.00 *2* or +3.7 *5* for Jπ(res)=3/2 (1970Ma13).
6143	3/2-	3807	7/2-	2336	21			
		3290.2	7/2-	2853	21			δ(Q/D)=0.00 *6* or +3.7 *+8-15* for Jπ(res)=3/2 and Jπ(3290)=3/2; -0.81 *20* for Jπ(3290)=5/2 (1970Ma13).
		2986.7	(3/2,5/2)	3156	37			δ(Q/D)=+0.11 *12* or +2.7 *+5-13* for Jπ(res)=3/2 and Jπ(2987)=3/2; -0.78 *40* for Jπ(2987)=5/2 (1970Ma13).
		2670.3	3/2-	3473	32			
		2094.3	3/2-	4048	32			δ(Q/D)=+0.13 *7* or +2.4 *5* for Jπ(res)=3/2 (1970Ma13).
		1962.5	(3/2,5/2)-	4180	26			δ(Q/D)=+0.06 *5* for Jπ(res)=3/2 (1970Ma13).
		1810.3	3/2-	4332	11			
		1179.0	3/2-	4964	68			δ(Q/D)=-0.17 *4* or +19 *+8-28* for Jπ(res)=3/2 (1970Ma13).
		1158.3	3/2+	4984	16			
		880.5	5/2+	5262	11			
		855.3	1/2+	5287	100			
		845.0	5/2-	5298	53			
		472.3	3/2-	5670	16			δ(Q/D)=0.00 *3* or +3.7 *+5-8* for Jπ(res)=3/2 (1970Ma13).

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$^{43}_{21}Sc_{22}$-59

γ(^{43}Sc) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ[†]	I_γ[‡]	Mult.[§]	δ[§]	Comments
		151.9	3/2+	5991	74			δ(Q/D)=-0.10 *3* or +8.8 *+25-65* for Jπ(res)=3/2 (1970Ma13).
		0.0	7/2-	6143	11			
6182	5/2	151.9	3/2+	6032				
6198	(3/2,5/2+)	3733.8		2464	16			
		2335.8	5/2-	3862	20			
		2141.9	(7/2)	4056	16			
		2094.3	3/2-	4103	52			
		1962.5	(3/2,5/2)-	4235	12			
		1651.2	5/2+	4547	48			
		880.5	5/2+	5317	100			
		855.3	1/2+	5342	60			
		845.0	5/2-	5353	12			
		151.9	3/2+	6046	64			
6217	(3/2-,5/2+)	3860		2357	2			
		3645.4		2572	6			
		3451.7	5/2+	2765	6			
		2986.7	(3/2,5/2)	3230	8			
		2859.7		3357	12			
		2670.3	3/2-	3547	10			
		2141.9	(7/2)	4075	4			
		2106.4	(3/2,5/2)	4110	2			
		2094.3	3/2-	4122	4			
		1810.3	3/2-	4406	6			
		1408	7/2-	4809	2			
		1336.3	7/2+	4880	<2			
		880.5	5/2+	5336	6			
		855.3	1/2+	5361	100			
		472.3	3/2-	5744	16			
		151.9	3/2+	6065	8			
		0.0	7/2-	6217	8			
6247	(3/2,5/2)	3290.2	7/2-	2957[a]				
		2200		4047[a]				
		2141.9	(7/2)	4105	50			
		2094.3	3/2-	4152	17			
		1962.5	(3/2,5/2)-	4284	33			
		1651.2	5/2+	4596[a]				
		1179.0	3/2-	5068	17			
		880.5	5/2+	5366	33			
		845.0	5/2-	5402	83			
		151.9	3/2+	6095	100			
6320	5/2+	3807	7/2-	2513	11			
		3451.7	5/2+	2868	5			
		2986.7	(3/2,5/2)	3333	11			δ(Q/D)=-0.02 *4* for Jπ(2987)=3/2 and -0.81 *12* for Jπ(2987)=5/2 (1970Ma13).
		2580.4	(5/2)	3739	3			

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γ(^{43}Sc) (continued)

E_i(level)	J_i^{π}	E_f(level)	J_f^{π}	E_{γ}†	I_{γ}‡	Mult.§	δ§	Comments
		2382.9	3/2(+)	3937	2			δ(Q/D)=+0.45 *8* or +2.7 *+5-8* for Jπ(2383)=7/2 and -0.18 *8* for Jπ(2383)=3/2 (1970Ma13).
		2141.9	(7/2)	4178	10	D+Q	+0.07 *6*	
		1651.2	5/2+	4669	2			
		1336.3	7/2+	4983	3			
		1179.0	3/2-	5141	6	D+Q	0.00 *3*	
		880.5	5/2+	5439	10	D+Q	+0.14 *5*	
		855.3	1/2+	5464	10			δ(Q/D)=+0.01 *3* or -3.1 *5*.
		845.0	5/2-	5475	8			
		151.9	3/2+	6168	100	D+Q	+0.03 *3*	
6685	1/2-	2580.4	(5/2)	4104	13			
		2094.3	3/2-	4590	79			
		1962.5	(3/2,5/2)-	4722	42			
		1179.0	3/2-	5506	38			
		880.5	5/2+	5804	33			
		855.3	1/2+	5829	25			
		472.3	3/2-	6212	29			
		151.9	3/2+	6533	100			
6696	5/2	3683		3013	5			
		3327		3369[a]	5			
		2382.9	3/2(+)	4313	9			δ(Q/D)=-0.13 *10* or -4.2 *+10-15* for Jπ(2383)=7/2 and +0.20 *10* for Jπ(2383)=3/2.
		1962.5	(3/2,5/2)-	4733	5	D+Q	-0.47 *8*	
		1651.2	5/2+	5044	11	D+Q	-0.07 *7*	
		1336.3	7/2+	5359	11			δ(Q/D)=-0.14 *6* or -23 +∞-12.
		1179.0	3/2-	5517	7			
		1158.3	3/2+	5537	7			
		880.5	5/2+	5815	32	D+Q	+0.03 *3*	
		845.0	5/2-	5851	7	D+Q	-0.27 *10*	
		472.3	3/2-	6223	2	D+Q	+0.22 *5*	
		151.9	3/2+	6544	100	D+Q	-0.14 *4*	
		0.0	7/2-	6695	27	D+Q	+0.02 *4*	
6709	1/2-	2986.7	(3/2,5/2)	3722[a]	25			
		2094.3	3/2-	4614[a]	100			
		1962.5	(3/2,5/2)-	4747[a]	19			
		472.3	3/2-	6236[a]	8			
		151.9	3/2+	6557[a]	17			
6777	5/2+	4454.7	(5/2,9/2)	2322	64			
		2986.7	(3/2,5/2)	3790	45			
		2580.4	(5/2)	4196	55			
		2382.9	3/2(+)	4394	36			
		2141.9	(7/2)	4635	82			
		1651.2	5/2+	5125	91			
		1408	7/2-	5369	18			
		1336.3	7/2+	5440	27			
		1179.0	3/2-	5598	100			

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$^{43}_{21}$Sc$_{22}$-61

γ(^{43}Sc) (continued)

E_i(level)	J^π_i	E_f(level)	J^π_f	E_γ[†]	I_γ[‡]	Mult.[§]	δ[§]	Comments
		880.5	5/2+	5896	91			
		855.3	1/2+	5921	45			
		845.0	5/2-	5932	82			
		472.3	3/2-	6304	91			
		151.9	3/2+	6625	82			
6919	7/2	4454.7	(5/2,9/2)	2464	13			δ(Q/D)=+0.18 *6* for Jπ(res)=7/2 and Jπ(4455)=9/2; -0.04 *6* for Jπ(4455)=5/2 (1970Ma13).
		4272		2647[a]	5			γ from 1969Wa19 only.
		3843		3076	3			
		3327		3592	6			
		3261	(7/2,9/2)-	3658	6			
		2875	(5/2,9/2)+	4044	3			
		2796		4123	3			
		2580.4	(5/2)	4338[a]	3			δ(Q/D)=+0.32 *10* for Jπ(res)=7/2 (1970Ma13).
		1884.6	(5/2,9/2)-	5034	5			δ(Q/D)=-0.18 *16* or -5.7 *+20-60* for Jπ(res)=7/2 and Jπ(1885)=9/2; +0.22 *16* for Jπ(1885)=5/2 (1970Ma13).
		1408	7/2-	5511	5			δ(Q/D)=-0.04 *4* for Jπ(res)=7/2 (1970Ma13).
		880.5	5/2+	6037	3			
		845.0	5/2-	6074	100			δ(Q/D)=0.00 *2* for Jπ(res)=7/2 (1970Ma13).
		472.3	3/2-	6446[a]	3			δ(Q/D)=+0.04 *4* for Jπ(res)=7/2 (1970Ma13).
		0.0	7/2-	6917	11			δ(Q/D)=-0.29 *8* for Jπ(res)=7/2 (1970Ma13).
7344	(3/2-,5/2)	3860		3484	13			
		3807	7/2-	3537	39			
		3683		3661	10			
		3645.4		3698	10			
		3160		4184	19			
		2114.3		5229	6			
		1651.2	5/2+	5692	19			
		1336.3	7/2+	6007	6			
		1179.0	3/2-	6165	6			
		1158.3	3/2+	6185	6			
		880.5	5/2+	6463	100			
		151.9	3/2+	7191	55			
		0.0	7/2-	7343	32			
7394	(3/2-,5/2+)	4430		2964	20			
		4007	(3/2,5/2)+	3387	28			
		3757		3637	8			
		3463	5/2-	3931	12			
		3451.7	5/2+	3942	12			
		2875	(5/2,9/2)+	4519	8			
		2859.7		4534	8			
		2796		4598	4			
		2580.4	(5/2)	4813	4			
		2382.9	3/2(+)	5011	4			

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$^{43}_{21}Sc_{22}$-62

^{42}Ca(p,γ) E=res 1977Di17,1969Wa19,1965Br31 (continued)

γ(^{43}Sc) (continued)

E_i(level)	J_i^π	E_f(level)	J_f^π	E_γ†	I_γ‡	Mult.§	δ§	Comments
		2141.9	(7/2)	5252	4			
		2114.3		5279	28			
		1810.3	3/2-	5583	8			
		1651.2	5/2+	5742	8			
		1408	7/2-	5986	4			
		1336.3	7/2+	6057	4			
		1179.0	3/2-	6215	16			
		1158.3	3/2+	6235	40			
		880.5	5/2+	6513	32			
		855.3	1/2+	6538	20			
		845.0	5/2-	6548	16			
		472.3	3/2-	6921	8			
		151.9	3/2+	7241	100			
		0.0	7/2-	7393	4			
7512	(5/2+,7/2,9/2)	4371	5/2-,7/2-	3141	12			A_2=+0.28 *5*, A_4=-0.02 *5* (1977Di17). δ(Q/D)=+0.31 *6* for 9/2 to 7/2 transition.
		4038	7/2-	3474	3			A_2=-0.22 *12*, A_4=+0.04 *13* (1977Di17). δ(Q/D)=+0.05 *8* for 9/2 to 7/2; -0.70 *22* for 9/2 to 9/2; and +0.02 *11* for 9/2 to 11/2.
		3807	7/2-	3705	10			A_2=-0.31 *10*, A_4=-0.18 *10* (1977Di17). δ(Q/D)=-0.05 *6* for 9/2 to 7/2 transition.
		2840.5	(5/2,7/2)+	4671	3			
		2811.2		4701	3			
		2552.0	11/2+	4960	3			
		1931.2	9/2+	5580	100			A_2=+0.38 *4*, A_4=-0.14 *4* (1977Di17). δ(Q/D)=+0.90 *14* or -0.20 *7* for 9/2 to 9/2 transition.
		1884.6	(5/2,9/2)-	5627	3			
		1158.3	3/2+	6353	5			
		845.0	5/2-	6666	3			
		0.0	7/2-	7511	22			A_2=-0.20 *9*, A_4=+0.01 *9* (1977Di17). δ(Q/D)=+0.05 *7* for 9/2 to 7/2 transition.
7581	(3/2-,5/2,7/2+)	4430		3151	3			
		3683		3898	18			
		3503	7/2-	4078	5			
		3451.7	5/2+	4129	8			
		3374	(7/2,9/2)-	4207	5			
		2859.7		4721	3			
		2141.9	(7/2)	5439	13			
		880.5	5/2+	6700	100			
		151.9	3/2+	7428	93			
		0.0	7/2-	7580	5			

† Level-energy differences.
‡ From average of data from 1977Di17, 1969Wa19 and 1965Br31.
§ From $\gamma(\theta)$, $\gamma\gamma(\theta)$, γ(lin pol) data of 1970Ma13, unless otherwise stated.
[a] Placement of transition in the level scheme is uncertain.

^{42}Ca(p,γ):resonances 1977Di17,1969Wa19

1977Di17: E=1.999-2.758 MeV proton beams were produced from the 4 and 3 MV Van de Graaff accelerators, at the Centre de Recherches Nucleaires, Strasbourg, France and at McMaster University respectively, for E>2 MeV; from the 3 MeV Van de Graaff accelerator at the Accelerator Laboratory at University of Helsinki, Finland, for E<2 MeV. Targets of enriched $CaCO_3$ on tungsten and gold backings. γ-rays were detected by Ge(Li) detectors. Measured γ yields. Deduced energies of resonances.

1969Wa19: E=1.201-2.063 proton beams were produced from the Aerospace Research Laboratories (ARL) 2 MeV Van de Graaff accelerator, FWHM=1 keV. Targets of enriched $CaCO_3$ on a 10-mil-thick Ag backing. γ-rays were detected by an 8-in-diam by 8-in-long NaI(Tl) detector. Measured γ yields. Deduced energies of resonances, relative resonance strengths.

Others:

1968So11: eight resonances in E(p)(lab)=1345-1424 keV region.

1965Br31, 1966Br21, 1964Br29: E=1013-1421.

^{43}Sc Levels

E(level)†	Jπ&	E(p))(LAB)@	Relative intensity#	Comments
5919‡	3/2	1013		E(level): S(p)=4929.8 *19* (1995Au04). L: from 1965Br31.
5950‡	(3/2,5/2)	1044		L: from 1977Di17. Absolute strength=0.67 (1977Di17).
6060‡	(5/2)	1157		L: from 1965Br31.
6103‡	(3/2-,5/2+)	1201	105	Absolute strength=0.68 (1977Di17).
6116		1214	7	
6127		1226	13	
6136‡	3/2	1234.8	109	Absolute strength=0.68 *14* (1969Wa19).
6143‡	3/2-	1241.9	148	Absolute strength=0.92 *18* (1969Wa19).
6146		1245	27	
6151		1250	74	
6174		1274	6	
6182‡	5/2	1282	42	
6185		1285	91	
6190		1290	6	
6198‡	(3/2,5/2+)	1298	121	Absolute strength=0.74 (1977Di17).
6200		1300	14	
6210		1310	13	
6211		1312	91	
6217‡	(3/2-,5/2+)	1318	91	Absolute strength=0.73 (1977Di17).
6228		1329	46	
6242		1343	7	
6247‡	(3/2,5/2)	1348	116	
6253		1354	36	
6262		1364	13	
6280		1382	59	
6286		1388	4	
6291		1393	34	
6297		1400	71	
6312		1415	10	
6315		1418	22	
6320‡	5/2+	1422.8	202	Absolute strength=1.37 *27* (1969Wa19).
6348		1452	70	
6355		1459	13	
6370		1474	20	
6374		1478	85	
6386		1491	3	
6391		1496	13	
6395		1500	85	
6403		1509	53	
6410		1515	15	
6416		1521	50	

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^{42}Ca(p,γ):resonances 1977Di17,1969Wa19 (continued)

^{43}Sc Levels (continued)

E(level)[†]	Jπ[&]	E(p))(LAB)[@]	Relative intensity[#]	Comments
6426		1532	49	
6432		1538	61	
6439		1545	128	
6453		1559	22	
6461		1567	9	
6469		1576	56	
6479		1586	53	
6481		1588	53	
6493		1600	5	
6499		1606	92	
6503		1610	38	
6508		1616	34	
6515		1623	23	
6535		1643	100	
6547		1656	6	
6551		1660	49	
6558		1667	24	
6564		1673	41	
6571		1680	21	
6576		1685	58	
6584		1693	31	
6596		1706	75	
6604		1714	195	
6625		1735	99	
6631		1741	51	
6665		1776	63	
6674		1786	47	
6676		1788	64	
6680		1792	77	
6685[‡]	1/2-	1797	95	
6694		1806	40	
6697[‡]	5/2	1808.3	255	Absolute strength=2.2 *4* (1969Wa19).
6709[‡]	1/2-	1821	41	
6713		1825	16	
6716		1829	48	
6719		1832	127	
6730		1843	57	
6736		1850	142	
6749		1862	33	
6759		1873	111	
6777[‡]	5/2	1891	163	Absolute strength=1.47 *29* (1969Wa19).
6786		1900	63	
6794		1908	148	
6801		1916	135	
6814		1929	177	
6830		1945	185	
6834		1949	47	
6846		1962	183	
6856		1972	113	
6861		1977	107	
6871		1987	34	
6877		1993	183	
6881		1997	52	
6889		2006	4	
6901		2018	37	
6906		2023	37	

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^{42}Ca(p,γ):resonances 1977Di17,1969Wa19 (continued)

^{43}Sc Levels (continued)

E(level)[†]	Jπ[&]	E(p))(LAB)[@]	Relative intensity[#]	Comments
6913		2030	221	
6920[‡]	7/2	2036.6	301	Absolute strength=3.0 *6* (1969Wa19).
6925		2042	30	
6934		2052	110	
6942		2060	190	
6946		2064	87	
6961		2079		
6967		2086		
6971		2090		
6979		2098		
6984		2103		
6991		2110		
6996		2115		
6999		2119		
7004		2123		
7015		2135		
7022		2142		
7025		2145		
7033		2153		
7042		2162		
7051		2171		
7058		2179		
7063		2184		
7072		2193		
7080		2201		
7091		2212		
7095		2217		
7099		2221		
7108		2230		
7118		2240		
7127		2249		
7135		2257		
7141		2264		
7146		2269		
7154		2277		
7159		2282		
7171		2294		
7174		2297		
7177		2300		
7180		2304		
7183		2307		
7198		2322		
7212		2336		
7214		2339		
7223		2348		
7228		2353		
7240		2365		
7250		2375		
7263		2389		
7269		2395		
7275		2401		
7280		2406		
7285		2411		
7288		2414		
7295		2421		
7302		2428		

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^{42}Ca(p,γ):resonances 1977Di17,1969Wa19 (continued)

^{43}Sc Levels (continued)

E(level)†	Jπ&	E(p))(LAB)@	Relative intensity#	Comments
7305		2432		
7313		2440		
7344‡	(3/2-,5/2)	2471		Absolute strength=3.59 (1977Di17).
7349		2477		
7354		2482		
7366		2494		
7373		2501		
7382		2510		
7388		2517		
7394‡	(3/2-,5/2+)	2523		Absolute strength=2.28 (1977Di17).
7402		2531		
7411		2540		
7414		2543		
7418		2547		
7423		2552		
7429		2559		
7433		2563		
7443		2573		
7450		2580		
7466		2596		
7471		2602		
7480		2611		
7483		2614		
7491		2622		
7498		2629		
7501		2632		
7512‡	(5/2+,7/2,9/2-)	2643		Absolute strength=4.20 (1977Di17).
7513		2645		
7518		2650		
7522		2654		
7531		2663		
7536		2668		
7544		2676		
7551		2683		
7559		2692		
7564		2697		
7581‡	(3/2-,5/2,7/2+)	2714		Absolute strength=2.93 (1977Di17).
7592		2725		
7600		2734		
7603		2737		
7607		2741		
7611		2745		
7618		2752		
7624		2758		

† From $E_{c.m.}$+S(p) where S(p)=4929.8 *19* from 2011AuZZ and $E_{c.m.}$ deduced from E_p(lab) from 1969Wa19 and 1977Di17.
‡ Detailed primary and secondary γ-ray data from this resonance is available. See ^{42}Ca(p,γ) E=res dataset.
# From 1969Wa19.
@ Proton energies are from 1969Wa19 from 1201 to ≈2000 and from 1977Di17 above 2 MeV. 2 keV uncertainty for energies from 1969Wa19.
& From Adopted Levels.

^{42}Ca(p,p):resonances 1976Wi16,1974Ma39

S(p)=4929.8 *19* (1995Au04).

1976Wi16: E=1.2-3.0 MeV proton beams were produced from the TUNL 3 MV Van de Graaff accelerator, FWHM=325 eV. Targets of enriched $CaCO_3$ (94.42% ^{42}Ca) on carbon backings. Elastically scattered protons were detected by surface barrier detectors. Measured $\sigma(E,\theta)$. Deduced resonances, levels, J, Γ_p.

1974Ma39: E=1.20-3.23 MeV proton beams were produced from the Aerospace Research Laboratories (ARL) 8-MeV tandem accelerator, FWHM=200 eV. Targets of enriched $CaCO_3$ on carbon backings. Scattered protons were detected by surface barrier detectors. Measured $\sigma(E,\theta)$. Deduced resonances, levels, J, π, Γ.

1968Br27: E=1.24-1.82 MeV. Deduced resonances at 1240, 1792, 1802, 1817.

^{43}Sc Levels

E(level)†	J^{π}†#	Γ_p†	E(p) (lab)†	γ_p^2 keV†	Comments
6149.5	3/2-	125 eV *15*	1248.7	129.90	E(p)=1241.9 *5*, Γ_p=145 eV *5*, γ_p^2=145 keV (1974Ma39).
6222.9	1/2+	50 eV *10*	1323.9	10.99	
6417.6	1/2+	15 eV *5*	1523.2	1.10	
6440.6	1/2+	1.5 eV *5*	1546.8	0.99	
6510.7	1/2+	15 eV *5*	1618.5	0.72	
6561.4	1/2-	180 eV *20*	1670.4	18.52	
6564.1	1/2+	15 eV *5*	1673.2	0.57	
6570.1	1/2+	10 eV *5*	1679.4	0.37	
6630.0	1/2-	5 eV *3*	1740.7	40.3	
6651.0	1/2+	175 eV *20*	1762.2	4.72	
6677.4	(1/2-)	10 eV *5*	1789.2	0.68	
6684.4	1/2+	15 eV *5*	1796.4	0.36	
6685.3	3/2-	65 eV *10*	1797.3	4.01	E(p)=1797 *1*, Jπ=1/2-, Γ_p=120 eV *10*, γ_p^2=145 keV (1974Ma39).
6694.8	1/2-	45 eV *10*	1807.0	2.68	E(p)=1803.3 *5*, Γ_p=75 eV *5*, γ_p^2=7.8 keV (1974Ma39).
6709.2	1/2-	900 eV *90*	1821.8	50.71	
6709.5	1/2-	300 eV *30*	1822.1	16.88	E(p)=1822 *1*, Γ_p=1450 eV *50*, γ_p^2=135 keV (1974Ma39).
6736.6	3/2-	45 eV *10*	1849.8	2.29	
6795.1	1/2-	500 eV *50*	1909.7	20.60	
6795.4	1/2-	500 eV *50*	1910.0	20.58	
6815.3	1/2+	30 eV *7*	1930.4	0.46	
6827.0	3/2-	40 eV *10*	1942.4	1.48	
6849.7	(3/2+)	10 eV *5*	1965.6	1.96	
6850.8	1/2-	25 eV *7*	1966.8	0.85	
6853.9	(3/2+)	10 eV *5*	1969.9	1.93	
6855.0	1/2-	22 eV *7*	1971.0	0.74	
6859.0	(3/2+)	13 eV *5*	1975.1	2.47	
6868.2	1/2+	45 eV *10*	1984.6	0.58	
6880.1	1/2+	120 eV *15*	1996.7	1.50	
6899.7	1/2-	190 eV *20*	2016.8	5.52	E(p)=2021 *1*, Γ_p=310 eV *10*, γ_p^2=13.7 keV (1974Ma39).
6912.4	1/2+	240 eV *25*	2029.8	2.73	E(p)=2033 *1*, Γ_p=280 eV *10*, γ_p^2=5.3 keV (1974Ma39).
6936.4	1/2+	150 eV *15*	2054.4	1.59	E(p)=2059 *1*, Γ_p=205 eV *5*, γ_p^2=4 keV (1974Ma39).
6943.7	1/2-	165 eV *15*	2061.9	4.19	E(p)=2066 *1*, Γ_p=214 eV *5*, γ_p^2=9.6 keV (1974Ma39).
6966.0	(3/2+)	15 eV *5*	2084.7	1.95	
6978.9	(3/2+)	20 eV *5*	2097.9	2.49	
6983.6	1/2-	8 eV *5*	2102.7	0.18	
7013.7	(3/2-)	15 eV *5*	2133.5	0.31	
7024.7	(3/2+)	15 eV *5*	2144.8	1.61	
7027.7	1/2-	150 eV *15*	2147.8	2.97	E(p)=2151 *1*, Γ_p=224 eV *5*, γ_p^2=7.2 keV (1974Ma39).

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^{42}Ca(p,p):resonances 1976Wi16,1974Ma39 (continued)

^{43}Sc Levels (continued)

E(level)†	J^{π}†#	Γ_p†	E(p) (lab)†	γ_p^2 keV†	Comments
7032.1	1/2+	10 eV *5*	2152.4	0.08	
7037.2	3/2-	35 eV *7*	2157.6	0.67	
7046.4	(5/2+)	25 eV *7*	2167.0	2.50	
7067.5	1/2+	800 eV *80*	2188.6	5.99	
7074.9	1/2-	25 eV *7*	2196.2	0.43	
7085.6	1/2-	300 eV *30*	2207.1	5.05	
7094.4	3/2-	75 eV *15*	2216.1	1.23	
7099.1	1/2+	50 eV *10*	2221.0	0.35	
7116.8	1/2-	2.50 keV *25*	2239.1	38.71	
7123.4	(3/2+)	10 eV *5*	2245.8	0.79	
7125.0	1/2+	350 eV *35*	2247.5	2.28	
7132.3	(3/2+)	10 eV *5*	2254.9	0.77	
7138.0	3/2-	600 eV *60*	2260.8	8.80	
7140.2	1/2+	600 eV *60*	2263.0	3.77	
7150.5	(3/2+)	25 eV *7*	2273.6	1.82	
7155.8	3/2-	50 eV *10*	2279.0	0.70	
7170.2	1/2-	600 eV *60*	2293.7	8.10	
7176.5	(5/2-)	5 eV *3*	2300.2	3.37	
7185.2	(3/2+)	10 eV *5*	2309.1	0.66	
7211.0	(1/2-)	10 eV *5*	2335.5	0.12	
7215.3	(1/2+)	5 eV *3*	2339.8	0.03	
7222.9	3/2+	35 eV *7*	2347.7	2.07	
7227.1	(3/2+)	10 eV *5*	2352.0	0.58	
7231.2	1/2-	500 eV *50*	2356.2	5.81	
7240.8	(3/2+)	10 eV *5*	2366.0	0.56	
7247.5	1/2-	150 eV *15*	2372.9	1.68	
7251.0	(3/2+)	15 eV *5*	2376.5	0.82	
7255.4	1/2+	70 eV *10*	2381.0	0.34	
7256.8	3/2-	30 eV *7*	2382.4	0.33	
7266.3	(3/2+)	20 eV *5*	2392.1	1.05	
7281.0	(1/2-)	10 eV *5*	2407.2	0.10	
7289.8	3/2+	35 eV *7*	2416.2	1.73	
7290.9	(3/2+)	25 eV *7*	2417.3	1.23	
7307.6	3/2-	40 eV *10*	2434.4	0.39	
7309.1	1/2-	1.00 keV *10*	2435.9	9.69	
7311.2	(3/2+)	5 eV *3*	2438.1	0.23	
7315.8	1/2+	25 eV *7*	2442.8	0.11	
7326.9	1/2-	3.00 keV *30*	2454.2	27.92	E(p)=2460 *1*, Γ_p=2.92 keV *5*, γ_p^2=42.2 keV (1974Ma39).
7329.5	(3/2+)	20 eV *5*	2456.8	0.89	
7339.4	1/2+	600 eV *60*	2467.0	2.46	E(p)=2473 *1*, Γ_p=540 eV *20*, γ_p^2=4 keV (1974Ma39).
7363.5	1/2+	100 eV *15*	2493.7	0.39	E(p)=2500 *2*, Γ_p=130 eV *10*, γ_p^2=0.9 keV (1974Ma39).
7365.1	1/2-	90 eV *15*	2493.3	0.77	
7369.7	1/2-	700 eV *70*	2498.0	5.93	E(p)=2504 *2*, Γ_p=676 eV *5*, γ_p^2=8.6 keV (1974Ma39).
7370.8	1/2-	40 eV *10*	2499.1	0.34	
7378.5	1/2+	80 eV *15*	2507.0	0.30	E(p)=2514 *2*, Γ_p=85 eV *5*, γ_p^2=0.5 keV (1974Ma39).
7385.5	(5/2-)	5 eV *3*	2514.2	0.77	
7390.3	1/2+	300 eV *30*	2519.1	1.12	
7395.7	3/2+	40 eV *10*	2524.6	1.50	
7412.4	1/2-	225 eV *25*	2541.7	1.74	
7414.5	(3/2+)	5 eV *3*	2543.9	0.18	

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^{42}Ca(p,p):resonances 1976Wi16,1974Ma39 (continued)

^{43}Sc Levels (continued)

E(level)†	Jπ†#	Γ_p†	E(p) (lab)†	γ_p^2 keV†	Comments
7419.4	3/2-	110 eV *15*	2548.9	0.84	
7424.7	5/2+	30 eV *7*	2554.3	1.05	
7439.9	5/2+	50 eV *10*	2569.9	1.69	
7445.0	1/2+	400 eV *40*	2575.1	1.35	
7448.4	1/2-	20 eV *5*	2578.6	0.14	
7461.7	(3/2+)	15 eV *5*	2592.2	0.48	
7463.7	3/2-	20 eV *5*	2594.2	0.14	
7476.6	1/2-	500 eV *50*	2607.4	3.40	
7477.1	(5/2+)	25 eV *7*	2608.0	0.77	
7478.6	3/2-	30 eV *7*	2609.5	0.20	
7483.8	(5/2-)	2 eV *2*	2614.8	0.54	
7492.0	1/2+	175 eV *20*	2623.2	0.54	
7502.0	(5/2-)	5 eV *3*	2633.4	1.28	
7508.5	3/2-	70 eV *10*	2640.1	0.45	
7512.1	1/2-	1.00 keV *10*	2643.8	6.34	
7517.6	(5/2+)	15 eV *5*	2649.4	0.42	
7527.5	(3/2-)	15 eV *5*	2659.6	0.09	
7539.1	3/2-	550 eV *55*	2671.4	3.31	
7540.0	1/2+	15 eV *5*	2672.3	0.04	
7557.1	(5/2+)	20 eV *5*	2689.9	0.51	
7560.2	3/2-	150 eV *15*	2693.0	0.87	
7564.1	(3/2+)	15 eV *5*	2697.0	0.38	
7570.1	1/2+	400 eV *40*	2703.2	1.08	E(p)=2715 *2*, Γ_p=380 eV *30*, γ_p^2=1.1 keV (1974Ma39).
7586.6	1/2-	125 eV *15*	2720.1	0.69	E(p)=2727 *2*, Γ_p=150 eV *10*, γ_p^2=1.2 keV (1974Ma39).
7595.5	(3/2+)	15 eV *5*	2729.2	0.35	
7596.9	1/2-	400 eV *40*	2730.6	2.16	E(p)=2737 *2*, Γ_p=550 eV *20*, γ_p^2=4.5 keV (1974Ma39).
7599.6	1/2+	80 eV *15*	2733.4	0.21	E(p)=2740 *2*, Γ_p=90 eV *10*, γ_p^2=0.4 keV (1974Ma39).
7604.5	(3/2+)	15 eV *5*	2738.4	0.35	
7614.2	3/2-	20 eV *5*	2748.3	0.10	
7615.6	(1/2-)	10 eV *5*	2749.7	0.05	
7619.5	1/2-	3.50 keV *35*	2753.7	18.16	E(p)=2761 *2*, Γ_p=770 eV *40*, γ_p^2=5.6 keV (1974Ma39).
7620.8	(3/2+)	10 eV *5*	2755.1	0.22	
7625.8	(3/2+)	15 eV *5*	2760.2	0.33	E(p)=2768 *2*, Γ_p=30 eV *10*, γ_p^2=1 keV (1974Ma39).
7627.1	(5/2+)	20 eV *5*	2761.6	0.44	
7630.7	3/2-	185 eV *20*	2765.2	0.94	E(p)=2772 *2*, Jπ=1/2-, Γ_p=320 eV *10*, γ_p^2=2.3 keV (1974Ma39).
7639.4	3/2-	20 eV *5*	2774.1	0.10	
7644.1	(3/2+)	15 eV *5*	2778.9	0.32	
7646.1	(3/2+)	15 eV *5*	2781.0	0.32	
7659.6	3/2-	50 eV *10*	2794.5	0.24	
7666.6	1/2+	500 eV *50*	2802.0	1.17	
7668.0	1/2+	600 eV *60*	2803.4	1.40	
7675.7	3/2-	50 eV *10*	2811.3	0.24	
7683.6	(5/2-)	18 eV *5*	2819.4	2.90	
7693.2	1/2-	60 eV *10*	2829.2	0.27	
7703.3	(5/2+)	8 eV *5*	2839.5	0.15	
7708.3	1/2+	100 eV *10*	2844.7	0.22	
7711.1	1/2-	700 eV *70*	2847.5	3.10	
7714.8	(5/2-)	15 eV *5*	2851.3	2.24	

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^{42}Ca(p,p):resonances 1976Wi16,1974Ma39 (continued)

^{43}Sc Levels (continued)

E(level)†	Jπ†#	Γ_p†	E(p) (lab)†	γ_p^2 keV†	Comments
7721.7	1/2-	25 eV *7*	2858.4	0.11	
7733.7	(5/2+)	20 eV *5*	2870.7	0.35	
7738.3	1/2-	75 eV *15*	2875.4	0.32	
7738.5	1/2+	25 eV *7*	2875.6	0.05	
7744.3	3/2-	700 eV *70*	2881.5	2.93	
7747.3	1/2-	40 eV *10*	2884.6	0.17	
7751.4	1/2-	25 eV *7*	2888.8	0.10	
7754.0	(5/2+)	25 eV *7*	2891.4	0.42	
7760.9	(5/2+)	25 eV *7*	2898.5	0.42	
7761.3	1/2-	35 eV *7*	2898.9	0.14	
7769.4	1/2+	650 eV *65*	2907.2	1.32	
7784.7	(3/2+)	15 eV *5*	2922.9	0.24	
7785.3	(5/2-)	5 eV *3*	2923.5	0.63	
7797.5	(5/2+)	30 eV *7*	2936.0	0.47	
7803.6	1/2+	125 eV *15*	2942.2	0.24	
7807.2	3/2-	115 eV *15*	2945.9	0.44	
7807.7	1/2-	35 eV *7*	2946.4	0.13	
7810.8	(3/2+)	5 eV *3*	2949.6	0.08	
7815.6	(5/2+)	10 eV *5*	2954.5	0.15	
7818.6	1/2+	200 eV *20*	2957.6	0.38	
7819.0	1/2+	80 eV *15*	2958.0	0.15	
7820.5	(5/2+)	20 eV *5*	2959.5	0.30	
7829.6	1/2-	25 eV *7*	2968.8	0.09	
7830.3	3/2-	240 eV *25*	2969.6	0.88	
7832.0	(5/2-)	3 eV *3*	2971.3	0.34	
7832.8	(3/2+)	30 eV *7*	2972.1	0.44	
7836.2	(5/2-)	8 eV *5*	2975.6	0.90	
7838.0	(3/2+)	25 eV *7*	2977.4	0.36	
7841.4	1/2+	200 eV *20*	2980.9	0.37	
7844.2	3/2-	120 eV *15*	2983.3	0.43	
7850.5	3/2-	75 eV *15*	2990.2	0.27	
7859.2	1/2-	225 eV *25*	2999.1	0.79	
7859.8	1/2-	30 eV *7*	2999.8	0.11	
7861.6	3/2+	20 eV *5*	3001.6	0.28	
7868.5	3/2-	50 eV *10*	3008.7	0.17	
7919‡	3/2+,(5/2+)‡	150 eV *20*‡	3060‡	7‡	
7926‡	1/2-,(3/2-)‡	420 eV *50*‡	3067‡	2‡	
7933‡	1/2+‡	270 eV *20*‡	3074‡	0.6‡	
7941‡	1/2+‡	1.36 keV *6*‡	3083‡	3.1‡	
7954‡	1/2-,(3/2-)‡	160 eV *10*‡	3096‡	0.7‡	
7961‡	1/2-,(3/2-)‡	150 eV *10*‡	3103‡	0.6‡	
8014‡	1/2-‡	260 eV *10*‡	3157‡	1‡	
8019‡	3/2+,(5/2+)‡	30 eV *10*‡	3163‡	0.4‡	
8034‡	3/2+,(5/2+)‡	80 eV *10*‡	3178‡	1‡	
8045‡	3/2+,(5/2+)‡	40 eV *10*‡	3189‡	0.5‡	
8048‡	1/2+‡	140 eV *10*‡	3192‡	0.3‡	
8061‡	1/2-‡	300 eV *10*‡	3206‡	1‡	
8065‡	3/2-,(1/2-)‡	90 eV *10*‡	3210‡	0.3‡	
8071‡	3/2-‡	80 eV *10*‡	3216‡	2.6‡	
8075‡	9/2+,(7/2+)‡	>55 eV‡	3220‡	53‡	

† From 1976Wi16, unless otherwise indicated.
‡ From 1974Ma39.
# From theoretical fits to the experimental data.

^{42}Ca(p,p′γ):resonances 1984Ka27

S(p)=4929.8 *19* (1995Au04).
1984Ka27: E=3.00-3.35 MeV. Measured (inelastically) scattered protons and γ rays, σ(θ). For proton spectrum, FWHM=6 keV.

^{43}Sc Levels

E(level)†	Jπ&	E(p)(lab)@	Cross section (MB)@	Comments
8021‡		3165	11	
8027#		3171	0.3	
8054#		3198	0.4	
8063‡		3208	37	
8068‡	3/2-	3212	27	
8074‡#	3/2-	3220	51	σ=2.9 mb for scattering from 1837, 0+.
8093‡#		3237	20	σ=1.1 mb for scattering from 1837, 0+.
8112#		3258	0.9	
8122#		3268	1.7	
8132#		3278	2.9	
8139#		3285	1.3	
8149#		3296	1.4	
8193#		3341	0.7	

† From $E_{c.m.}$+S(p) where S(p)=4929.8 *19* from 2011AuZZ and $E_{c.m.}$ deduced from E_p(lab) unless otherwise noted.
‡ (p,p′) from 1525, 2+ (1525γ) in ^{42}Ca.
# (p,p′) from 1837, 0+ (312γ to 1525 level) in ^{42}Ca.
@ Values read off the plots shown by 1984Ka27.
& From σ(θ).

^{42}Ca(d,n) 1971Bo04,1968Gr06

Target ^{42}Ca Jπ=0+.

1971Bo04: E=5.0-6.05 MeV deuteron beam was produced from the CN Van de Graaff at the Hahn-Meitner-Institute, Berlin. Target of a 100 μg/cm^2 $CaCO_3$ enriched to 92%. Neutron energy was measured by time-of-flight, FWHM≈100 keV. Measured σ(E_n,θ). Deduced levels, J, π, L and spectroscopic factors from DWBA analysis.

1968Gr06: E=5.15 MeV deuteron beam was produced from the University of Alberta 5.5 MeV Van de Graaff accelerator. Target of a 86.4% enriched ^{42}Ca metal evaporated onto a 125 μm gold backing. Measured σ(E_n,θ). Deduced levels, spectroscopic factors from DWBA analysis.

1992NaZN: E=25 MeV. Measured σ(θ), deduced spectroscopic factors. FWHM≈150 keV. A total of 48 groups reported, out of which 22 groups are above 6.2 MeV.

1971De17: E<5.5 MeV. Measured σ(E).

1965Ok01: measured σ(θ).

^{43}Sc Levels

E(level)†	Jπ	L#	(2J+1)C^{2}S‡	Comments
0		3	4.0	S: other: 4.1 (1992NaZN).
152		2	1.1	S: other: 0.91 (1992NaZN).
475		1	0.31	S: other: 0.30 (1992NaZN).
860		0	0.14	S: other: 0.64 (1992NaZN).
1177		1	0.72	S: other: 0.69 (1992NaZN).
1395				
1817		1	0.40	S: other: 0.35 (1992NaZN).
1947		1	0.04	L: L=0, S=0.03 (1968Gr06).
2117		(1)	0.08	S: other: 0.085 (1992NaZN).
2310		3	1.3	S: other: 1.1 (1992NaZN).
2657		(0)	0.05	E(level): from 1971Bo04 and 1992NaZN. S: other: 0.18 (1992NaZN).
2830@		1+3@	0.020,0.11@	S: for p3/2 and f5/2.
2930@		2@	0.070,.054@	
2977				
3330@		3@	0.34,0.28@	
3460		2	0.25,0.20	E(level): from 1971Bo04 and 1992NaZN. L: from 1992NaZN.
3630				
3683		3	0.90	S: other: 0.84,0.61 (1992NaZN).
3940		3	0.80,0.60	E(level): from 1971Bo04 and 1992NaZN. L: from 1992NaZN.
4011				
4243		3	2.2	S: 1978En02 give (2J+1)S=6.5 with C^2=2 for T=3/2. Other: 1.5 (1992NaZN).
4379		3	0.8	S: other: 0.50,0.37 (1992NaZN).
4580				
4670		1	0.13	
4725		1	0.13	S: 1978En02 give (2J+1)S=0.38 with C^2=2 for T=3/2. Other: 0.33,0.34 (1992NaZN).
4898		(1)	0.21	E(level): 1992NaZN give L=2, S=0.33,0.27 for a 4910 group.
5026		1	0.47	S: other: 0.56,0.56 (1992NaZN).
5260@		1@	0.13,0.13@	
5511		1	0.37,0.38	L: from 1992NaZN for a 5540 group.
5647		1	0.11	
5715		1	0.16	S: other: 0.37,0.38 (1992NaZN).
5826				
5988				
6041		1	0.08	S: other: 0.26,0.27 (1992NaZN).
6155		1	1.15	S: 1978En02 give (2J+1)S=3.4 with C^2=2 for T=3/2. Other: S=1.7 (1992NaZN).

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^{42}Ca(d,n) 1971Bo04,1968Gr06 (continued)

^{43}Sc Levels (continued)

E(level)†	Jπ	L#	(2J+1)C²S‡	Comments
6777@		1@	0.53,0.48@	
7030@		1@	0.51,0.55@	
7160@		2@	0.19,0.18@	
7380@		1@	0.35,0.37@	
7530@		1@	0.32,0.34@	
7700@		3@	0.41,0.30@	
7900@		3@	0.20,0.15@	
8111@		3@	0.30,0.23@	
8380@		3@	0.77,0.57@	
8690@		3@	0.35,0.26@	
8910@		3@	0.42,0.31@	
9170@		3@	0.45,0.33@	
9450@		3@	0.55,0.40@	
9750@		3@	0.62,0.45@	
10040@		3@	0.46,0.34@	
10230@		2@	0.18,0.17@	
10750@		3@	0.44,0.32@	
10910@		3@	0.57,0.42@	
11260@		3@	0.58,0.43@	
11560@		3@	0.31,0.23@	
11840@		1@	0.25,0.27@	
12090@		1@	0.30,0.32@	

† From 1968Gr06, unless otherwise stated. Above 6155, levels reported by 1992NaZN only are not given in the Adopted Levels due to poor resolution in this region and weak peaks, as judged from spectrum shown by 1992NaZN.
‡ From 1971Bo04. When unknown, J=3/2 for L=1 and J=7/2 for L=3 is assumed. Relative values for first few levels are also available from 1968Gr06. Values quoted by 1978En02 are (2J+1)S and have been adjusted upwards by ≈50% based on revised normalization factor N. When values are quoted from 1992NaZN, the first value corresponds to L-1/2 and the second value to L+1/2.
# From 1971Bo04, unless otherwise stated. L values from 1968Gr06 measured for g.s., 475, 860, 1177, 1817, 1947 and 6155 are in agreement with those from 1971Bo04, except for the 1947 level.
@ From 1992NaZN only.

^{42}Ca(^{3}He,d) 1971Bo04,1968Br08,1966Sc17

1971Bo04 (also 1967LyZY): E=18 MeV ^{3}He beam was produced from the EN Tandem Van de Graaff of the Max-Planck-Institut, Heidelberg. Target enriched ^{42}Ca metal foil. Deuterons were momentum analyzed with a broad-range magnetic spectrograph and detected by a ΔE-E counter telescope, overall FWHM=20 keV. Measured $\sigma(E_d,\theta)$. Deduced levels, J, π, L, spectroscopic factors from DWBA analysis. The uncertainty in cross sections is expected to be about 25%.

1968Br08: E=16.5 MeV. A total of 50 groups reported, but about 15 groups not confirmed by 1971Bo04.

1966Sc17: E=11 MeV ^{3}He beam was produced from the tandem Van de Graaff accelerator at Argonne National Laboratory. Target of enriched $CaCO_3$ on tantalum backing. Deuterons were momentum analyzed with a broad-range magnetic spectrograph and detected in nuclear emulsions. Measured $\sigma(E_d,\theta)$. A total of 30 groups reported with L transfers for ten of these.

Others:

1974La14: E=15, 18 MeV.

1973GuZR (also 1972BrZX): no details are available.

1968To17: measured $\sigma(\theta)$.

1968Ly02: E=18 MeV, measured $\sigma(E_d,\theta)$.

^{43}Sc Levels

E(level)†	J$^{\pi}$	L‡	(2J+1)C^{2}S#	Comments
0.0		3	4.4	S: 6.4 (1966Sc17).
154		2	0.95	S: 1.05 (1966Sc17).
470		1	0.30	S: 0.57 (1966Sc17).
846@				
851		0	0.11	E(level): 856 (1966Sc17), 857 (1968Br08). S: 0.38 (1966Sc17).
876@				
1179		1	0.81	S: 1.4 (1966Sc17).
1647				E(level): from 1966Sc17. Not reported by 1971Bo04.
1809		1	0.45	S: 0.57 (1966Sc17).
1958		1	0.04	
2097		1	0.07	S: 0.10 (1966Sc17).
2120@				
2291		3	1.6	S: 1.3 (1966Sc17).
2339@				
2395@				
2606@				
2657		0	0.06	
2681				
2875@				
2978				
3191@				
3258@				
3330		3	0.25	
3452@				
3474		3	0.13	
3500@				
3613				
3673		3	0.85	S: 0.67 (1966Sc17).
3786				
3939		3	0.11	
3956				
3985				
4234		3	2.2	S: 2.1 (1966Sc17) 1978En02 quote (2J+1)S=5.5 for T=3/2.
4363		3	0.17	
4388		3	0.24	
4555				
4584				
4662		1	0.15	
4712		1	0.13	S: 1978En02 quote (2J+1)S=0.32 for T=3/2.

Continued on next page (footnotes at end of table)

^{42}Ca(^{3}He,d) 1971Bo04,1968Br08,1966Sc17 (continued)

^{43}Sc Levels (continued)

E(level)†	Jπ	L‡	(2J+1)C²S#	Comments
4765		1	0.02	
4810		1	0.07	
4876@				
4887		1	0.21	
4927@				
5007		1	0.35	
5187				
5258		1	0.14	
5317				
5446@				
5490		1	0.07	
5530		1	0.05	
5633		1	0.16	
5724		1	0.31	
5819				
5871				
5921				
5964				
6024		1	0.16	
6079				
6105@				
6145		1	1.4	S: 1978En02 quote (2J+1)S=3.5 for T=3/2.
6282				E(level): from 1966Sc17, not reported by 1971Bo04.
6384				
6444				
6704		(1)		
6811				
6917				

† From 1971Bo04, unless otherwise stated.
‡ From 1971Bo04.
# From 1971Bo04. Values quoted by 1978En02 are (2J+1)S and adjusted upwards by ≈25% based on standardized normalization factors as in 1977En02.
@ From 1968Br08 only. Above 2610, values quoted by 1968Br08 are lowered by 15 keV, based on comparison of energies in 1971Bo04 and 1966Sc17. Below 2610, the values may be 7 keV too high.

^{42}Ca(^{16}O,^{15}N) 1973Ko01

1973Ko01: E=48 MeV ^{16}O beam was produced from the Argonne FN tandem accelerator with intensity of 200-500 nA. Target of isotopically enriched 100 μg/cm^2 thick ^{42}Ca foil on 20 μg/cm^2 carbon backings. The ejectiles were identified and detected by up to six ΔE-E counter telescopes of ≈15-μm and ≈100-μm silicon surface barrier detectors, FWHM≈250 keV. Measured $\sigma(\theta)$. Deduced levels, J, π, L from DWBA analysis. Absolute cross sections are accurate to 15%.
1975EiZT: E=56 MeV. Measured $\sigma(\theta)$.

^{43}Sc Levels

E(level)	J$^{\pi}$†	L	dσ/dΩ (max) (mb/sr)
0	7/2-	4	0.98
470	3/2-	2	0.08
1180	3/2-	2	0.12
1810	3/2-	2	0.10

† From Adopted Lpvels.

^{43}Ca(p,n) 1967Mc07

1967Mc07: E=4.0-5.5 MeV proton beam was produced from the SUNI 5.5 MV Van de Graaff accelerator. Target of CaO evaporated onto 0.025 cm tantalum discs 2.5 cm in diam. Neutrons were detected by a NE 213 liquid scintillator. Measured $\sigma(E_n)$. Deduced levels.
1960Mc12: E<4.9 MeV. Measured σ(E). Deduced levels.
1971De17: E<5.6 MeV. Measured σ(E).
From 1967Mc07.

^{43}Sc Levels

E(level)	J$^{\pi}$	Comments
0		
152		E(level): 138 *8* (1960Mc12).
476		E(level): 456 *10* (1960Mc12).
855		E(level): 874 *10* (1960Mc12).
881		
1175		
1347		
1424		
1677		

^{43}Ca(^{3}He,t) 1971Al19

Jπ(^{43}Ca g.s.)=7/2-.

1971Al19 (also 1971ScYM): E=26 MeV ^{3}He beam was produced from the MP tandem Van de Graaff at the University of Rochester's Nuclear Structure Laboratory. Target of 81.12% enriched 50 μg/cm^2 $CaCO_3$ on a 20 μg/cm^2 carbon backing. Tritons were momentum analyzed with an ENge split-pole spectrograph (FWHM=15-20 keV) and detected in 50 μg NTB emulsion in the focal plane. Measured $\sigma(E_t,\theta)$. Deduced levels. Uncertainty in cross sections is ≈25%.

1971Be29: E=24.6 MeV. Measured $\sigma(\theta)$. Deduced Coulomb-displacement energy=7238 *4*.

All data is from 1971Al19 unless otherwise noted.

^{43}Sc Levels

E(level)	Jπ	L	dσ/dΩ (30°) (μb/sr)	Comments
0@			28.9	
152†			1.7	
473†			0.8	
846†			<1.1#	
856†			<1.1#	
880†			<1.1#	
1178			3.9	
1402			1.5	
1810†			0.8	
1826			9.2	
1881			6.5	
2244†			0.6	
2284@			11.6	
2333†			0.7	
2455‡			16.7	
2620†			<0.5	
2630			6.3	
2670†			1.2	
2756@			4.7	
2983			16.3	
3120			15.4	
3254			9.9	
3324			9.6	
3464‡			7.7	
3667				
3843			7.4	
3894			13.9	
3931			7.1	
4128			3.2	E(level): possible contaminant.
4230		0	46.8	E(level): average of 4234 *8* (1971Be29) and 4226 *8* (1971Al19). Strongest transition. Interpreted as Δ(T)=0 transition to the IAS of ^{43}Ca g.s. Coulomb-displacement energy=7238 *4* (1971Be29).
4276			3.5	
4343			3.0	
4371‡			18.9	
4511			8.8	
4658‡				
4766			8.8	
4821		2	4.4	E(level): probable IAS of 593, 3/2- in ^{43}Ca.
4871			21.2	

† Rounded off energy from Adopted Levels. Poor statistics in (^{3}He,t) (1971Al19).
‡ Doublet.
# 1.1 for 846+856+880.
@ $\sigma(\theta)$ is similar to 1+ to 0+ spin-flip transitions.

^{45}Sc(p,t) 1977SaZF,1973Se01

Jπ(^{45}Sc g.s.)=7/2-.
1977SaZF: E=40 MeV. Measured σ(θ), DWBA analysis.
1973Se01: E=52 MeV proton beam was produced from the synchrocyclotron at the Institute for Nuclear Studies. Target of scandium oxide on Mylar backings. Tritons were momentum analyzed with a broad-range spectrograph and detected with a proportional counter, FWHM≈70 keV. Measured σ(E_t,θ).Deduced levels, L from DWBA analysis.
1972KrZD: E=27 MeV. Measured σ(θ).

^{43}Sc Levels

E(level)†	L‡	Comments
0	0&	
470#	2	
850#	2	
1180#	2	
1410#	0&	
1811@	2	
1830#	2&	
1880#	2&	
1933@	5	
2110	(3+5)	E(level): doublet.
2246	2	
2291	4	
2337	2&	
2460	2&	
2549	(5,6)	
2633	2	
2670	2	
2760	4	E(level): L=3 for a 2780 group (1973Se01).
2793	2	
2838	5	
2859	3	
2984	4	
3123	6	
3205	(4)	
3257	4	
3290	2	
3328	2	
3373	2	
3448	5	
3480	3	
3509	0	
3676	3	
3700	6	
3771	5	
3807	5	
3848	5	
3949	3	
4015	5	
4049	4	
4138	5	
4169	4	
4211	3	
4239	0&	
4650#		
5236		E(level): 5250 (1973Se01).

† From 1977SaZF (as quoted by 1978En02), unless otherwise stated. There are four additional levels between 5700 and 6100 in 1977SaZF.
‡ From 1977SaZF (as quoted by 1978En02), unless otherwise stated.
# From 1973Se01.
@ Rounded off energy from Adopted Levels.
& From 1973Se01.

^{46}Ti(p,α), (pol p,α) 1982Ab03,1981Bo37,1965Pl01

1982Ab03: (p,α) E=40.35 MeV proton beam was produced from the University of Manitoba sector-focused cyclotron. Target of 81.2% enriched Ti metal. α particles were detected by 6 counter telescopes of ΔE-E silicon surface barrier detectors, FWHM=70-80 keV. . Measured $\sigma(E_\alpha,\theta)$. Deduced levels, J, π from DWBA analysis.

1981Bo37: (pol p,α) E=79.2 MeV polarized proton beam was produced from the Indiana University Cyclotron Facility (IUCF). Target of self-supporting enriched Ti foils. α particles were momentum analyzed with the IUCF QDDM magnetic spectrograph and detected in the 1 m long focal plane detector, FWHM=80-100 keV. Measured $\sigma(E\alpha,\theta)$ and Ay(θ). Deduced levels, J, π from DWBA calculations.

1965Pl01: (p,α) E=10 MeV proton beam was produced from the Florida State University Tandem Van de Graaff accelerator. Target of TiO_2 on a carbon backing. α particles were momentum analyzed with a broad range magnetic spectrograph and detected on 50 μm thick Kodak-NTA emulsions. Measured $\sigma(E_\alpha,\theta)$. Deduced levels.

1971NoZX: (p,α) E=30 MeV. Measured $\sigma(\theta)$.

^{43}Sc Levels

σ(theory)=N$\times\sigma$(DWBA), where N=47.2$\times10^6$ to give 1.0 for g.s.

E(level)[†]	J$^\pi$	Relative cluster factors[b]	Comments
0	7/2-[&a]	1.2	σ(exp)/σ(theory)=1.0.
151	3/2+[a]		σ(exp)/σ(theory)=0.75.
479			
840[‡]	5/2-[&]		
856	1/2+[a]		σ(exp)/σ(theory)=2.5.
884			
1188			
1400	7/2-[a]		σ(exp)/σ(theory)=0.1.
1640[‡]	5/2+[&]		
1830	11/2-[&a]	0.27	σ(exp)/σ(theory)=1.8.
2130[@]			
2250[@]			
2650[@]			
2870	(5/2+,9/2+)[#]		J$^\pi$: $\sigma(\theta)$ (1982Ab03) fits 7/2+. σ(exp)/σ(theory)=5.5.
2990	15/2-[&]	0.67	σ(exp)/σ(theory)=1.2.
3120	19/2-[&]	1.0	σ(exp)/σ(theory)=0.5.
3470[@]			
3810[@]			
4180[‡]	(9/2+,13/2+)[#]		
4230	7/2-[a]		σ(exp)/σ(theory)=1.1.
4360[‡]	17/2-	$\leq$0.11	J$^\pi$: poor fit of $\sigma(\theta)$ and Ay(θ) data in (pol p,α) to 17/2- due probably to contribution from other levels in the vicinity or to complex reaction mechanism.
4550[‡]	(11/2+,13/2-)[#]	0.34	
4700[‡]	(15/2+)[#]		
5200[‡]	17/2+[#]		
5230	3/2+[a]		
6220	1/2+[a]		

† From 1965Pl01 for levels below 1200. Above this energy, values are from 1982Ab03, unless otherwise indicated.
‡ From 1981Bo37.
# From Ay(θ) in (pol p,α).
@ From spectrum figure of 1982Ab03.
& $\sigma(\theta)$ and Ay(θ) data in (pol p,α) are consistent with the assigned Jπ.
a From comparison of $\sigma(\theta)$ with DWBA calculations (1982Ab03).
b From 1981Bo37, normalized to 1.0 for 19/2-, 3120 state.

^{45}Sc(p,p2n):moments 2011Av01

2011Av01:E=25-48 MeV. Isotopes produced at IGISOL facility at Jyvaskyla. Measured hyperfine structure, moments, isotope shifts, charge radii by collinear laser spectroscopy. Comparison with shell- model calculations.
Known moments for ^{45}Sc g.s. used as reference.

^{43}Sc Levels

E(level)	J$^\pi$	$T_{1/2}$	Comments
0	7/2-	3.89 h	μ=+4.528 *10* (2011Av01). Q=-0.27 *5* (2011Av01). $\delta\langle r^2\rangle$(^{45}Sc,^{43}Sc)=+0.082 fm^2 *14*(stat) *88*(syst) (2011Av01).

Adopted Levels, Gammas

Q(β^-)=-11296 *SY*; S(n)=12288 *9*; S(p)=4488 *7*; Q(α)=-4489 *7* 2011AuZZ
Δ(Q(β^-))=233 (syst,2011AuZZ).
Q(εp)=1937 *7* (2011AuZZ).
1988Kr11: ^{40}Ca(^{12}C,^{9}Be), E=480 MeV ^{12}C beam at GANIL populated only the 19/2- 3066 keV level.
1987Th02: ^{42}Ca(pol p, π^-), measured cross section and analyzing power.
1983Wa05: ^{40}Ca(^{3}He,γ), E=3.19 MeV, measured σ(E,θ), deduced a broad resonance at level of 18.7 MeV *2* with Γ=3.1 MeV *3*.
1982Vi05: ^{42}Ca(p,π^-), measured cross section.
1974An36, 1972Sc21: ^{40}Ca(^{12}C,^{9}Be), E=114 MeV, measured σ.
Mass measurement: 2000HaZY, 1977Mu03, 1972Pr10.
Production cross section measurements: 1994Bl10.
Structure calculations: 2010Qi01, 2008Bo23, 2008Pe13, 2006Za08, 2003Ra45, 2001Ro13, 2000De10, 1999Ca12, 1997Bo47, 1992Po04.

^{43}Ti Levels

Cross Reference (XREF) Flags

A	^{44}Cr εp decay:42.8 ms	D	^{40}Ca(^{6}Li,t)
B	Be(^{58}Ni,Xγ):isomers	E	^{46}Ti(^{3}He,^{6}He)
C	^{40}Ca(α,nγ)		

E(level)†	J$^\pi$	$T_{1/2}$	XREF	Comments
0	7/2-	509 ms *5*	ABCDE	μ=0.85 *2* (2005St24,1993Ma67). %ε+%β^+=100 . μ: β-NMR in Pt. See also 1993Ma72 and 1992Ma63. J$^\pi$: log *ft*=3.56 to 7/2- g.s. of ^{43}Sc (superallowed transition). Mirror state of 7/2-, g.s. in ^{43}Sc. $T_{1/2}$: from β activity in 1987Ho14. Others: 0.58 s *4*(1948Sc20), 0.58 s (1954Ty33), 0.56 s *2* (1961Ja22), 0.528 s *3* (1960Ja12), 0.50 s *2* (1962Pl02), 0.40 s *5* (1963Va37), 0.49 s *1* (1967Al08).
313.0 *10*	(3/2+)	11.9 μs *3*	BC E	J$^\pi$: (3/2+) proposed in (^{3}He,^{6}He) from similarity of $\sigma(\theta)$ pattern of 3/2+ states, all believed to be from d3/2 orbit, in ^{39}Ca, ^{47}Cr, ^{51}Fe and ^{55}Ni. Possible mirror state of 150, 3/2+ level in ^{43}Sc. $T_{1/2}$: weighted average of 11.7 μs *3* (2011Ho02) and 12.6 μs *6* (1978Me15), both from γ(t).
475			DE	J$^\pi$: possible mirror state of 3/2-, 472 level in ^{43}Sc.

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Adopted Levels, Gammas (continued)

^{43}Ti Levels (continued)

E(level)†	J^π	$T_{1/2}$	XREF	Comments
				Ref: D: 520.
998			C E	E(level): population of this level in (α,nγ) is uncertain. From energy matching, the strong group in (^{3}He,^{6}He) may correspond to 1022.4 from (α,nγ) (as proposed in 1990En08) but proposed Jπ assignments (1/2+ for 998 in (^{3}He,^{6}He) and 5/2+ for 1022 in (α,nγ)) disfavor this correspondence. J^π: (1/2+) proposed in (^{3}He,^{6}He) from similarity of $\sigma(\theta)$ pattern of 1/2+ states, all believed to be from d3/2 orbit, in ^{39}Ca, ^{47}Cr, ^{51}Fe and ^{55}Ni.
1022.4 *10*			A	J^π: possible mirror state of 5/2+, 880 level in ^{43}Sc.
1160			DE	J^π: L(^{6}Li,t)=1 suggests 1/2-,3/2-,5/2-.
1483.5 *10*			C E	J^π: possible mirror state of 7/2+, 1337 level in ^{43}Sc.
1760			De	J^π: L(^{6}Li,t)=1 suggests 1/2-,3/2-,5/2-.
1857.7 *10*	(11/2-)		BCDe	J^π: L(^{6}Li,t)=(5) suggests 7/2- to 13/2-. 11/2- is supported by yrast sequence (19/2-) - (15/2-) - (11/2-) - 7/2 and probable mirror state of 11/2-, 1830 level in ^{43}Sc.
2062.4 *10*			C	J^π: possible mirror state of 9/2+, 1931 level in ^{43}Sc.
2250			DE	J^π: L(^{6}Li,t)=3 suggests 3/2- to 9/2-.
2438			E	
2640			D	J^π: L(^{6}Li,t)=5 suggests 7/2- to 13/2-.
2951.7 *10*	(15/2-)		BCDE	J^π: L(^{6}Li,t)=7 suggests 11/2- to 17/2-. 15/2- is supported by γ from (19/2-) in an yrast sequence and probable mirror state of 15/2-, 2987 level in ^{43}Sc. Ref: E: 2990.
3066.4 *10*	(19/2-)	556 ns *6*	BC	μ=+7.22 *1* (2005St24,1989Ra17,1978Ha07). Q=0.30 *7* (2005St24,1989Ra17,1981Da06). μ: dPAD. J^π: from agreement of experimental μ with that calculated from shell model with configuration=$\nu(f^3_{7/2}+f_{7/2}{}^2f_{5/2})$. Probable mirror state of (19/2-), 3123 level in ^{43}Sc with $T_{1/2}$=468 ns *4*. $T_{1/2}$: weighted average of 551 ns *7* (2011Ho02), 560 ns *6* (1978Ha07), 553 ns *21* (1981Da06), 560 ns *35* (1978Me09); from γ(t).
3220			D	J^π: L(^{6}Li,t)=(9) suggests 15/2- to 21/2-.

† From (α,nγ). From (^{3}He,^{6}He) when a level is not populated in γ-ray study.

γ(^{43}Ti)

E_i(level)	J^π_i	E_f(level)	J^π_f	E_γ†	I_γ	Mult.	Comments
313.0	(3/2+)	0	7/2-	312.7 *2*	100	[M2]	B(M2)(W.u.)=0.0710 *18*. E_γ: from Be(^{58}Ni,xγ).
1022.4		313.0	(3/2+)	709.4			
1483.5		313.0	(3/2+)	1170.5			
1857.7	(11/2-)	0	7/2-	1857.7		[E2]	
2062.4		1022.4		1040.0			
2951.7	(15/2-)	1857.7	(11/2-)	1094.0		[E2]	
3066.4	(19/2-)	2951.7	(15/2-)	114.7	100	[E2]	B(E2)(W.u.)=5.7 *3*.

† From (α,nγ) unless otherwise noted.

^{44}Cr εp decay:42.8 ms 2007Do17

Parent: ^{44}Cr: E=0; Jπ=0+; $T_{1/2}$=42.8 ms *6*; Q(g.s.)=8570 *SY*; %εp=14.0 *9*

^{44}Cr-Q(g.s.): 8570 *50* (syst,2003Au03 and 2009AuZZ). Other: 8889 *196* (sys,2011AuZZ).

^{44}Cr-$T_{1/2}$: Measured by 2007Do17.

2007Do17: Fragmentation reaction used to produce ^{44}Cr isotope at SISSE/LISE3 facility in GANIL. Primary beam: $^{58}Ni^{26+}$ at 74.5 MeV/nucleon; target=natural Ni. Fragment separator=ALPHA-LISE3. Fragment identification by energy loss, residual energy and time-of- flight measurements using two micro-channel plate (MCP) detectors and Si detectors. Double-sided silicon-strip detectors (DSSSD) and a thick Si(Li) detector were used to detect implanted events, charged particles and β particles. The γ rays were detected by four Ge detectors. Coincidences measured between charged particles and γ rays.

$T_{1/2}$ measured by time correlation of implantation events due to ^{44}Cr and subsequent emission of protons and γ rays.

Total proton branching ratio is from time spectrum of events with energy >900 keV in the charged-particle spectrum. Possible small contributions from delayed-α and delayed-2p decays are ignored.

^{43}Ti Levels

E(level)
0

Delayed Particles (^{43}Ti)

E(^{43}Ti)	E(p)‡	I(p)†
0	908 *11*	1.7 *3*
Unplaced	1384 *12*	1.1 *3*
Unplaced	1741 *15*	0.6 *3*

† For absolute intensity per 100 decays, multiply by 0.140 *9*.
‡ The proton energies are in the center-of-mass system.

Be(^{58}Ni,Xγ):isomers 2011Ho02

2011Ho02: E(^{58}Ni)=550 MeV/nucleon beam was produced from the UNILAC-SIS accelerator complex at the GSI Helmholtzzentrum fur Schwerionenforschung mbH, Darmstadt, Germany. Target of 4 g/cm^2 Be. Reaction products were separated by a 70 m long fragment separator (FRS) and identified by time-of-flight and energy loss in the MUSIC detectors. γ-rays were detected by 15 high-resoluation and high-efficiency CLUSTER germanium detectors. Measured Eγ, Iγ. Deduced levels, $T_{1/2}$.

^{43}Ti Levels

E(level)	J$^{\pi\dagger}$	$T_{1/2}$	Comments
0	7/2-		
312.7 *2*	(3/2+)	11.7 μs *3*	$T_{1/2}$: measured by 2011Ho02, γ(t). Adopted value of 11.9 μs *3* is given in 2011Ho02 based on averaging current value with literature value taken from ENSDF database.
1858	(11/2-)		
2952	(15/2-)		
3067	(19/2-)	551 ns *7*	$T_{1/2}$: measured by 2011Ho02, γ(t). Adopted value of 556 ns *5* is given in 2011Ho02 based on averaging current value with literature value taken from ENSDF database.

† From Adopted Levels.

γ(^{43}Ti)

E_i(level)	J^π_i	E_f(level)	J^π_f	E_γ	Mult.	$\alpha^\dagger$	Comments
312.7	(3/2+)	0	7/2-	312.7 *2*	[M2]	0.0048	B(M2)(W.u.)=0.072 *2*.
1858	(11/2-)	0	7/2-	1858	[E2]		
2952	(15/2-)	1858	(11/2-)	1094	[E2]		
3067	(19/2-)	2952	(15/2-)	114.7 *2*	[E2]	0.200	B(E2)(W.u.)=4.82 *8*.

† Calculated values from 2008Ki07.

^{40}Ca(α,nγ) 1978Me15

1978Me15, 1978Me09: E=20 MeV α beam was produced at the Argonne National Laboratory. Target of an enriched (>99.9%) ^{40}Ca with thickness of about 1 mg/cm^2, evaporated onto a 0.127 mm thick Pb foil. Neutrons and γ-rays were separated by pulse-shape discrimination using a 5-cm diam by 2.5-cm thick stilbene crystal. γ-rays were detected with a 70-cm^3 Ge(Li) detector. Measured Eγ, Iγ, γ(t), nγ(t), $\gamma\gamma$(t). Deduced levels, $T_{1/2}$.

1978Ha07: E=21 MeV α beam was produced from the Chalk River MP tandem accelerator. Targets of ≈10mg/cm^2 ^{40}Ca. Delayed γ-rays were detected with Ge(Li) detectors. Measured $\gamma(\theta$,H,t). Deduced g factors, $T_{1/2}$.

1981Da06: E=21 MeV α beam was produced from the Stony Brook FN tandem. Target of a 400 μg/cm^2 Ca. γ-rays were detected with both NaI and Ge(Li) detectors. Measured $\gamma\gamma(\theta$,H,t). Deduced levels, $T_{1/2}$, quadrupole moments.

Others: 1976Fi08.

All data is from 1978Me15 and 1978Me09 unless otherwise noted.

^{43}Ti Levels

E(level)	J$^{\pi}$†	$T_{1/2}$	Comments
0.0	7/2-		J$^{\pi}$: from Adopted Levels.
313.0 *10*	(3/2+)	12.6 μs *6*	$T_{1/2}$: from γ(t) in 1978Me15.
999	(1/2+)		
1022.4 *10*	(5/2+)		
1483.5 *10*	(7/2+)		
1857.7 *10*	(11/2-)		
2062.4 *10*	(9/2+)		
2951.7 *10*	(15/2-)		
3066.4 *10*	(19/2-)	560 ns *6*	Q=0.30 *7* (1981Da06). μ=+7.22 *1* (1978Ha07). μ: dPAD method. $T_{1/2}$: from γ(t) (1978Ha07). 553 ns *21* from 1981Da06.

† From analogy with mirror nucleus ^{43}Sc.

γ(^{43}Ti)

E_i(level)	J^{π}_i	E_f(level)	J^{π}_f	Eγ	Mult.
313.0	(3/2+)	0.0	7/2-	313.0	
999	(1/2+)	313.0	(3/2+)	686[a]	
1022.4	(5/2+)	313.0	(3/2+)	709.4	
1483.5	(7/2+)	313.0	(3/2+)	1170.5	
1857.7	(11/2-)	0.0	7/2-	1857.7	
2062.4	(9/2+)	1022.4	(5/2+)	1040.0	
2951.7	(15/2-)	1857.7	(11/2-)	1094.0	
3066.4	(19/2-)	2951.7	(15/2-)	114.7	[E2]

[a] Placement of transition in the level scheme is uncertain.

^{40}Ca(^{6}Li,t) 1974Li01

1974Li01: E=34.0 and 36.0 MeV ^{6}Li beams were produced from the University of Rochester MP Tandem accelerator, with intensity of 300-400 nA. Targets of ≈75 μg/cm^{2} natural ^{40}Ca on carbon and gold backings. Tritons were detected in a spark counter mounted in the focal plane of a magnetic spectrograph, FWHM≈50 keV. Measured $\sigma(\theta)$. Deduced levels, L, J, π from DWBA analysis.
1986Pl01: E=156 MeV Measured (fragment)γ-coin, s(θ).
1982Ne02: E=156 MeV, measured $\sigma(\theta)$.
All data is from 1974Li01 unless otherwise noted.

^{43}Ti Levels

E(level)	J$^{\pi}$	L†	S
0		3	1.0
520			
1150		1	2.5
1760		1	1.5
1860		(5)	0.63
2230		3	1.8
2640		5	0.35
2950		7	0.24
3220		(9)	0.55

† From $\sigma(\theta)$. Jπ values implied are: 1/2- to 5/2- for L=1; 3/2- to 9/2- for L=3; 7/2- to 13/2- for L=5; 11/2- to 17/2- for L=7 and 15/2- to 21/2- for L=9.

^{46}Ti(^{3}He,^{6}He) 1977Mu03

1977Mu03 (also 1977MuZS): E=70 MeV ^{3}He beam was produced the Michigan State University cyclotron and incident on thin isotopically enriched carbon-backed metal foils. ^{6}He particles were detected by a resistive-wire gas-proportional counter. Measured $\sigma(\theta)$. Deduced levels, mass access, Q.
1972Pr10: E=65-75 MeV beams were produced from the Michigan State University sector-focused cyclotron. ^{6}He particles were analyzed and detected in the focal plane of an Enge split-pole magnetic spectrograph. Measured σ(E(^{6}He)). Deduced mass.
Others: 1975Mu09.

^{43}Ti Levels

E(level)†	J$^{\pi}$‡
0	(7/2-)
319	(3/2+)
475	
998	(1/2+)
1160	
1470	
1800	
2250	
2438	
2990	

† From 1977Mu03.
‡ From similarity of $\sigma(\theta)$ pattern with states of similar configuration in ^{39}Ca, ^{47}Cr, ^{51}Fe and ^{55}Ni (1977Mu03).

Adopted Levels

Q(β^-)=-16090 *SY*; S(n)=18510 *SY*; S(p)=209 *SY*; Q(α)=-6280 *SY* 2011AuZZ
Δ(Q(β^-))=300, Δ(S(n))=550, Δ(S(p))=233, Δ(Q(α))=230 Q(εp)=6808 *233* (syst,2011AuZZ).
First identification of ^{43}V nuclide by 1987Po04.
^{43}V produced by Ni(^{58}Ni,X) E=55 MeV/nucleon (1987Po04) and E=69 MeV/nucleon (1992Bo37), followed by measurement of fragment spectra.
Mass measurement: 2000HaZY by Schottky-mass spectrometry.
Structure and reaction calculations: 2009Pa18, 1999Ca12, 1997Co19, 1995He18, 1993Ma72, 1987Sa19, 1976Ha07, 1975Be56.

^{43}V Levels

Cross Reference (XREF) Flags

A ^{43}Cr ε decay (21.2 ms)
B Ni(^{58}Ni,X)

E(level)	J$^\pi$	$T_{1/2}$	XREF	Comments
0		79.3 ms *24*	*AB*	%ε+%β+=100 . μ: +5.106 nm *49* from calculations in 2010Pe15. $T_{1/2}$: from 2007Do17. J$^\pi$: 7/2- proposed from syst (1997Au04).
8.25$\times10^3$ *23*	(3/2+)		*A*	E(level): probable IAS of ^{43}Cr g.s. (2001Gi01).

^{43}Cr ε decay (21.2 ms) 2001Gi01

Parent: ^{43}Cr: E=0.0; Jπ=(3/2+); $T_{1/2}$=21.2 ms *7*; Q(g.s.)=16090 *SY*; %ε=100
^{43}Cr-Q(g.s.): Δ(Q(β^+))=300 (2011AuZZ).
^{43}Cr decays also by β^+p to ^{42}Ti and by β^+2p to ^{41}Sc.
2001Gi01: E=74.5 MeV/nucleon ^{43}Cr beam was produced in projectile fragmentation experiment using Ni(^{58}Ni,X) at the GANIL facility. Target of a 230.6 mg/cm^2 thick natural nickel and 2.7 mg/cm^2 thick carbon stripper. Isotopes were selected with the Alpha spectrometer and the LISE3 separator. The selected isotopes were implanted in a silicon telescope of two silicon detectors. Measured $T_{1/2}$(^{43}Cr) and delayed-proton spectra.

^{43}V Levels

E(level)	J$^\pi$	Comments
8.25$\times10^3$ *23*	(3/2+)	Main β^+ decay may be to IAS state of ^{43}Cr g.s. at 8255 *230* (2001Gi01).

ε,β^+ radiatons

Eε	E(level)	
(7.8E+3)	8.25E3	

Ni(^{58}Ni,X) 2007Do17

2007Do17: E=74.5 MeV/nucleon $^{58}Ni^{26+}$ beam was produced at SISSE/LISE3 facility in GANIL. Target of natural Ni. Fragments were selected by the separator ALPHA-LISE3 and identified by energy loss, residual energy and time-of-flight measurements using two micro-channel plate (MCP) detectors and Si detectors. Double-sided silicon-strip detectors (DSSSD) and a thick Si(Li) detector were used to detect implanted events, charged particles and β particles. The γ rays were detected by four Ge detectors. Coincidences measured between charged particles and γ rays.

Total proton branching ratio is from time spectrum of events with energy >900 keV in the charged-particle spectrum. Possible small contributions from delayed-α and delayed-2p decays are ignored (2007Do17).

^{43}V Levels

E(level)	J$^\pi$	$T_{1/2}$†	Comments
0		79.3 ms *24*	$T_{1/2}$: earlier measured value was >800 ms by 1992Bo37. No delayed protons were detected. Thus ^{43}V decays almost 100% by β^++ε decay to ^{43}Ti (2007Do17).

† From time correlation of implantation events due to ^{43}V and subsequent emission of protons and γ rays (2007Do17).

$^{43}_{24}Cr_{19}$

Adopted Levels

S(n)=16500 *SY*; S(p)=1640 *SY*; Q(α)=-6510 *SY* 2011AuZZ

Δ(S(n))=360, Δ(S(p))=540, Δ(Q(α))=360 (syst,2011AuZZ).

Q(εp)=15880 *200* (syst,2011AuZZ).

First identification of ^{43}Cr nuclide by 1992Bo37.

1992Bo37: ^{43}Cr produced by Ni(^{58}Ni,X) E=69 MeV/nucleon, followed by measurement of fragment spectra. Measured β^+p, E(p), I(p), $T_{1/2}$.

1994Bl10: ^{43}Cr produced by ^{9}Be(^{58}Ni,X) E=600 MeV/nucleon. Measured production cross sections.

2001Gi01,2001Gi02: ^{43}Cr produced by Ni(^{58}Ni,X) E=74.5 MeV/nucleon. Selected isotopes implanted in a ΔE-E silicon detector telescope. Measured $T_{1/2}$, E(p), I(p).

2007Do17: E=74.5 MeV/nucleon ^{58}Ni was produced at the SISSI-LISE3 facility of GANIL, incident on a natural nickel target of 250 mg/cm^2. Fragments were selected by the ALPHA-LISE3 separator, identified by two micro-channel plate (MCP) detectors and detected in a detection setup consisting of silicon and germanium detectors. Measured β-delayed proton and γ spectra, branching ratios, half-life.

2011Po01: E=161 MeV/nucleon ^{58}Ni beam was produced at the National Superconduction Cyclotron Laboratory at Michigan State University, incident on a target of 800 mg/cm^2 natural nickel foil. Reaction products were separated by the A1900 fragment separator and identified by time-of-flight (TOF) and energy-loss. Decays were detected using the Optical Time Projection Chamber (OTPC). Measured Ep, Ip, branching ratios for difference decay modes. Deduced half-life.

Structure and reaction calculations: 2004Bb14, 2003Br07, 2003Gr04, 2003Gr24, 1997Co19, 1994Bl10, 1991De26, 1975Be56.

^{43}Cr Levels

E(level)	J$^\pi$	$T_{1/2}$	Comments
0	(3/2+)	21.2 ms *7*	%ε+%β+=12 *4* 2011Po01. %εp=81 *4* 2011Po01. %ε2p=7.1 *4* 2011Po01. %$\beta^+\alpha$=? %β^+p=23 *6* and %β^+2p=6 *5* from 1992Bo37. %β^+p+%β^+ 2p=12 *4* to the IAS (1992Bo37). Search for β delayed α decay proved inconclusive (1992Bo37). Theory: 1991De26. Total delayed-proton emission of 88% *4* from 2011Po01 compares well with another recent measurement of 92.5% *28* by 2007Do17.

Continued on next page (footnotes at end of table)

Adopted Levels (continued)

^{43}Cr Levels (continued)

E(level)	J^{π}	$T_{1/2}$	Comments
			Relative branching ratios of delayed protons: 91.8% *3* for one-proton, 8.1% *3* for two-proton and 0.096% *30* for three-proton emissions. (2011Po01). J^{π}: from 2001Gi01. $T_{1/2}$: weighted average of 20.6 ms *9* (2011Po01, decay time distribution of β-delayed one-proton events), 21.1 ms *4* (2007Do17, decay time distribution), 21.6 ms *7* (2001Gi01, decay time distribution), 21 ms *+4-3* (1992Bo37, decay time distribution).

^{45}Fe 2P DECAY:2.4 MS 2009Mi29,2007Gi10,2005Do20

Complete data for this dataset can be found in the online version

Parent: ^{45}Fe: E=0; Jπ=(3/2+); $T_{1/2}$=2.4 ms *3*; Q(g.s.)=1152 *15*; %2P=70 *4*

^{45}Fe-Q(g.s.): From 2011AuZZ. 1130 *40* from 2009AuZZ, 2003Au03; 1154 *16* from 2005Do20.

^{45}Fe-$T_{1/2}$: Weighted average of 2.6 ms *2* (2007Mi36, 2007Mi40, from decay time), 3.5 ms *+16-8* (2007Gi10, determined by the time difference between implantation events and subsequent decay event), 1.6 ms *+5-3* (2005Do20, from decay of the daughter activity), 3.2 ms *+26-10* (2002Pf02, decay time distribution), 4.7 ms *+34-14* (2002Gi09, decay time).

2007Mi36,2007Mi40,2009Mi29: E=161 MeV/nucleon provided by the K500-K1200 coupled cyclotrons at the National Superconducting Cyclotron Laboratory at Michigan State University. ^{45}Fe ions were separated from other reaction products by the A1900 fragment separator. Decays of ^{45}Fe were detected using the Optical Time Projection Chamber (OTPC), consisting of parallel wire mesh electrodes and filled with a gas mixture of 66% He, 32% Ar, 1% N_2, 1% CH_4. Incoming ^{45}Fe ions and their decay products induce ionizing electrons along their trajectories which result in a camera signal, and a photomultiplier signal which are used to reconstruct the particle′s momentum. Two DGF-4C modules record ΔE and time of flight information. Measured decay particle spectra, half-lives, branching ratios and angular and energy correlations between the two protons emitted from the ^{45}Fe ground state.

2007Gi10: ^{45}Fe nuclei produced in the reaction Ni(^{58}Ni,X) at the SISSI-ALPHA-LISE3 facility at GANIL. Two individual protons observed for the first time in a 2-proton decay mode using a time-projection chamber. Measured half-life and total decay energy. A total of ten ^{45}Fe implantations were recorded.

2005Do20: ^{45}Fe produced by fragmentation of a primary beam of ^{58}Ni at 74.5 MeV/nucleon with a natural Ni target. Fragments selected by α-LISE3 separator, the detection system for fragments and β particles consisted of four silicon detectors, time-of-flight technique. A total of 30 implantation events were assigned to ^{45}Fe. Also see 2005Bl31, 2005Gi15.

Study of 2-proton decay mode of ^{45}Fe.

REFERENCES FOR A=43

1935FR04
1937WA07
1940WA01
1945HI04
1945HI05
1948SC20
1949OV01
1952HA44
1953DU22
1953NU08
1954AN25
1954CO70
1954LI42
1954NU22
1954TY33
1955NE01
1957BA07
1957BO99
1957BR19
1957LI39
1959BE72
1959PE26
1960MC12
1961JA22
1961MA03
1962RA11
1963DU11
1963HO17
1963LA04
1963VA37
1964BA46
1964BJ01
1964BR29
1964HO14
1964LA14
1964LE02
1964SA26
1965BE11
1965BE23
1965BR31
1965DE15
1965OK01
1965PL01
1966BR21
1966CO06
1966CO13
1966CU01
1966DO02
1966FA02
1966GO38
1966SC17
1967AL08
1967CL05
1967CR08
1967FO01
1967HA41
1967LYZY
1967MC07
1967PH01
1967SC08
1968AN10
1968BE36

REFERENCES FOR A=43(CONTINUED)

1968BR08
1968BR27
1968CH12
1968DE04
1968DE09
1968DO02
1968GR06
1968LY02
1968ME14
1968SA09
1968SM05
1968SO11
1968TO17
1969GR08
1969HA03
1969KA18
1969LA16
1969RA16
1969TA07
1969VA41
1969WA19
1969YN01
1970AJ01
1970BA51
1970BR27
1970FO06
1970GI10
1970HO26
1970HU11
1970LA11
1970MA13
1970PE07
1970SA24
1971AL19
1971AR32
1971BA10
1971BA92
1971BE29
1971BIZH
1971BLZH
1971BO04
1971CH56
1971CR02
1971DE17
1971GA40
1971HOYN
1971NA10
1971NOZX
1971PO03
1971RA35
1972AL12
1972BA04
1972BI13
1972EM01
1972FI20
1972GR04
1972KA41
1972KRZD
1972MA23
1972PR10
1972SC21
1972WA20

REFERENCES FOR A=43(CONTINUED)

1973GUZR
1973KO01
1973SA10
1973SE01
1974AN36
1974BR04
1974BR19
1974DE36
1974DE42
1974GL04
1974HO39
1974JE01
1974LA14
1974LI01
1974LI06
1974MA39
1974PO10
1974SC09
1975BE56
1975BO30
1975BRYQ
1975EIZT
1975MU09
1975YO03
1976DE41
1976DO05
1976FI08
1976HA07
1976KA24
1976PO03
1976TA04
1976WE23
1976WI16
1976ZE01
1977DI17
1977EN02
1977MI10
1977MU02
1977MU03
1977NA30
1977PO07
1977SAZF
1977SC05
1978BR33
1978DEZD
1978EN02
1978HA07
1978HU10
1978ME09
1978ME15
1978MEZX
1978VE06
1978VL02
1979BE27
1979BE28
1979CH29
1979TH03
1979WE10
1980FA07
1980OLZX
1980SH09
1980SHZN

REFERENCES FOR A=43(CONTINUED)

1981BO37
1981DA06
1981GR05
1981HUZT
1981SM03
1981VO04
1982AB03
1982DU06
1982EN06
1982HO17
1982KUZU
1982MI06
1982NE02
1982TO02
1982VI05
1983HAZJ
1983RA37
1983WA05
1984KA27
1984MO17
1984PI07
1984RA23
1985BA77
1985HA08
1985KI07
1986PL01
1987AR18
1987FR09
1987HO14
1987PO04
1987SA19
1987TH02
1987WA29
1988KR11
1988WA28
1989GU03
1989LE16
1989OTZZ
1989RA06
1989RA17
1990EN08
1990TU01
1991DE26
1991NAZZ
1991WA19
1991ZH24
1992BO37
1992KO15
1992MA63
1992NAZN
1992PO04
1993KO16
1993KO36
1993MA72
1994BL10
1994ZH43
1995HE18
1995PE19
1995SO03
1995ZV02
1996BE39
1997BO47

REFERENCES FOR A=43(CONTINUED)

1997CO19
1997LI15
1997MO25
1997TA08
1997VO03
1998BE29
1998MO16
1998WIZX
1999AI02
1999CA12
1999DU05
1999IB01
1999MA89
1999YOZW
2000DE10
2000DI15
2000HAZY
2000MA75
2000MU17
2000SA21
2001CA24
2001GI01
2001GI02
2001HE29
2001RO13
2002NO11
2003AU03
2003BR07
2003GR04
2003GR24
2003RA45
2003YA20
2004AN14
2004BB14
2004DE41
2004GR20
2004MO21
2004MO47
2004SO30
2005BL31
2005BL33
2005DO20
2005GI15
2005ST24
2006FR13
2006GA31
2006GA47
2006JA11
2006KH08
2006ME08
2006MUZX
2006WI10
2006ZA08
2006ZA11
2007BA47
2007BA71
2007CH40
2007DO17
2007GI10
2007JU03
2007MI36
2007MI40

REFERENCES FOR A=43(CONTINUED)

2007NA31
2007SH10
2007TA15
2007YA08
2008AD08
2008BL01
2008BO23
2008FE02
2008KI07
2008PE13
2008RI04
2008TI05
2009AUZZ
2009DA05
2009GA05
2009HA02
2009KH03
2009MI29
2009MO09
2009NO01
2009PA18
2009RI11
2009RI12
2010GA15
2010PE15
2010QI01
2011AUZZ
2011AV01
2011HO02
2011KA03
2011PO01
2011SZAA
2011TI03
2011TI04