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Nuclear Data Sheets for A=43*

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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 1978En04, and 1998En04 update).

No excited states are known in ^{43}Al, ^{43}Si and ^{43}Cr. Only one excited state is known in ^{43}V which is the probable the 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 either no decay data available or the decay schemes are incomplete in view of large Q values and known excitations much lower than allowed by Q values. The ^{43}K, ^{43}Ca and ^{43}Sc nuclides remain the most extensively studied from many different reactions and decays.

Cutoff Date: Literature available up to March 31, 2015 has been included. Main bibliographic source was the NSR database (2011Pr03) at Brookhaven laboratory webpage: www.nndc.bnl.gov/nsr/.

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 log *ft* code. The Q values and particle-separation energies have been adopted from 2012Wa38 (AME-12). In cases where weighted averaging procedures have been used, the assigned uncertainty is generally not lower than the lowest uncertainty given in a measurement. Nuclear charge radii have been adopted from 2013An02 evaluation. Moments are from 2014StZZ and 2013StZZ whenever possible. Theoretical total conversion coefficients are from BrIcc code (2008Ki07) for frozen-orbit option with an implicit uncertainty of 1.4% when not stated.

Acknowledgements: We thank Dr. E. McCutchan (NNDC, BNL) for a review of this work, and McMaster undergraduate students S. Geraedts, J. Roediger, A. MacDonald and M. Birch for XUNDL compilations of several datasets used in this work.

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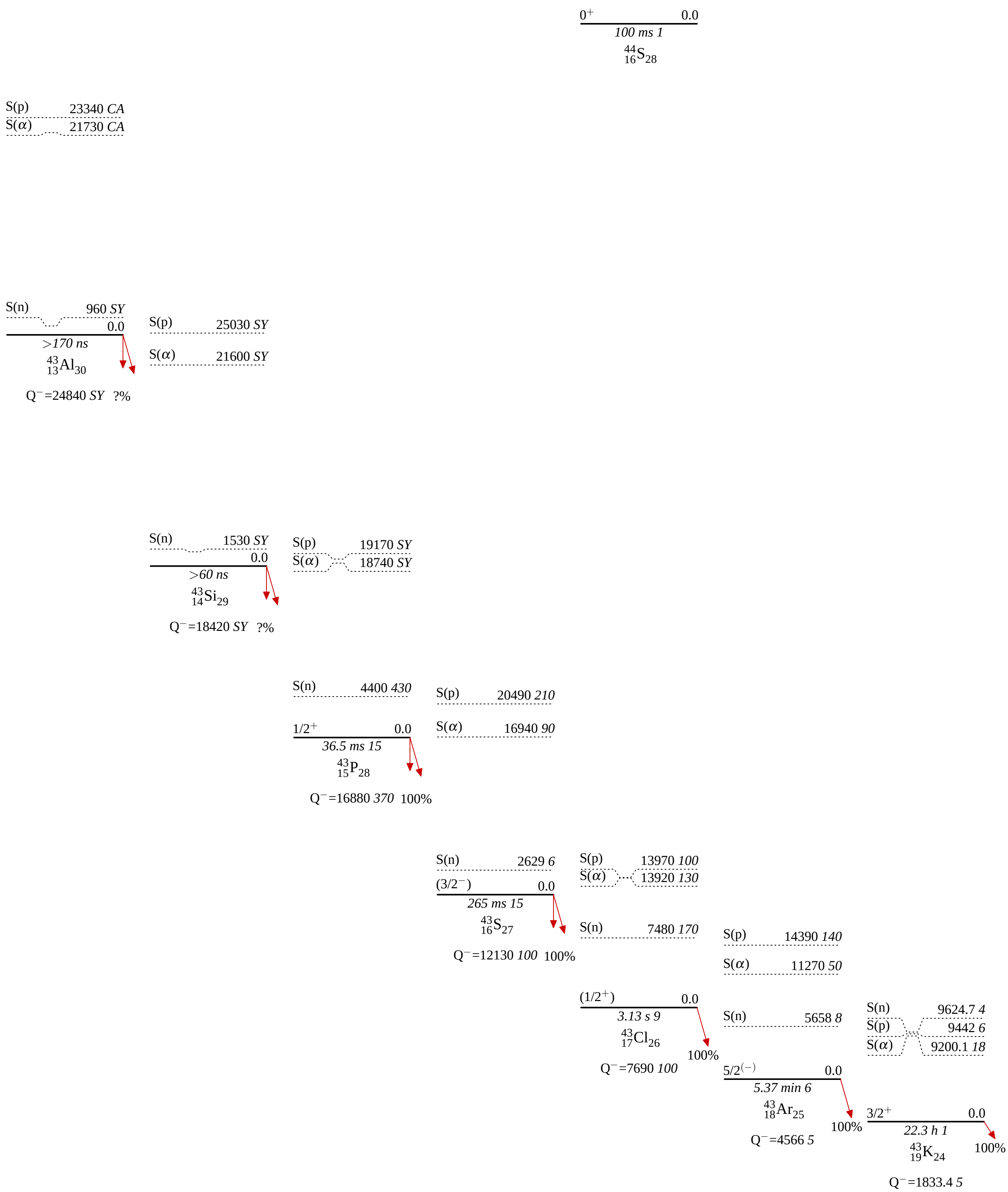
Index for A=43

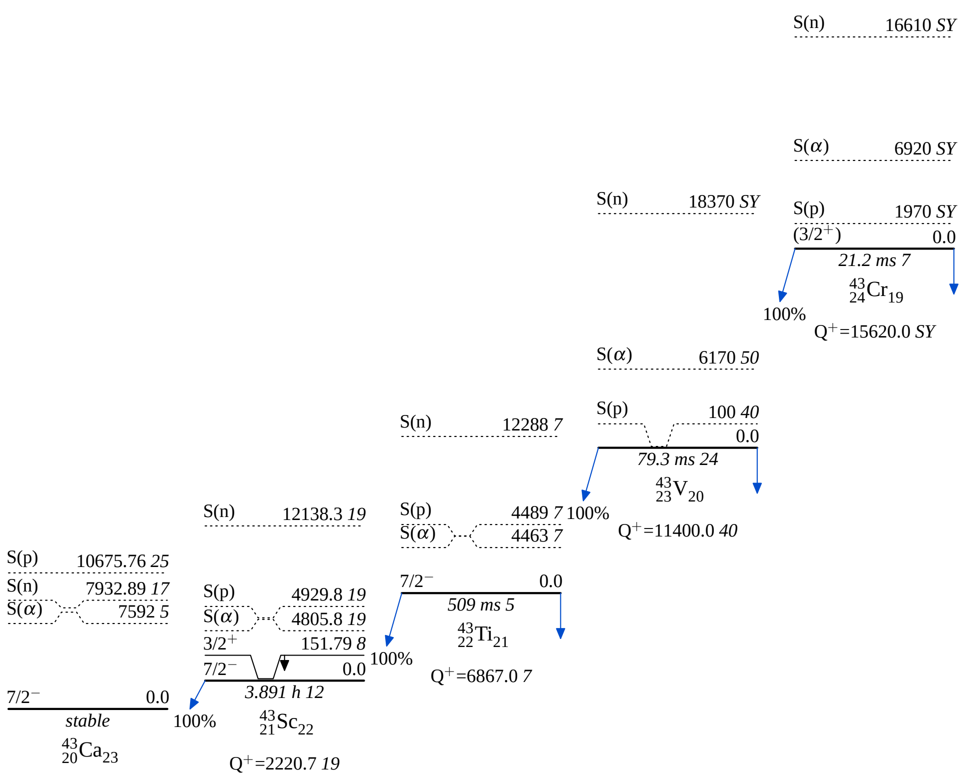
Skeleton Scheme for A=43



Skeleton Scheme for A=43 (continued)

Ground-State and Isomeric-Level Properties

Nuclide	Level	Jπ	$T_{1/2}$	Decay Mode
^{43}Al	0.0		>170 ns	$\%\beta^-$=?; $\%\beta^-$n=?; $\%\beta^-$2n=?
^{43}Si	0.0		>60 ns	$\%\beta^-$=?; $\%\beta^-$n=?; $\%\beta^-$2n=?
^{43}P	0.0	$1/2^+$	36.5 ms *15*	$\%\beta^-$=100; $\%\beta^-$n=100; $\%\beta^-$2n=?
^{43}S	0.0	$(3/2^-)$	265 ms *15*	$\%\beta^-$=100; $\%\beta^-$n=40 *10*
^{43}Cl	0.0	$(1/2^+)$	3.13 s *9*	$\%\beta^-$=100
^{43}Ar	0.0	$5/2^{(-)}$	5.37 min *6*	$\%\beta^-$=100
^{43}K	0.0	$3/2^+$	22.3 h *1*	$\%\beta^-$=100
^{43}Ca	0.0	$7/2^-$	stable	
^{43}Sc	0.0	$7/2^-$	3.891 h *12*	$\%\varepsilon+\%\beta^+$=100
^{43}Sc	151.79	$3/2^+$	438 μs *7*	%IT=100
^{43}Ti	0.0	$7/2^-$	509 ms *5*	$\%\varepsilon+\%\beta^+$=100; $\%\varepsilon$p=?
^{43}V	0.0		79.3 ms *24*	$\%\varepsilon+\%\beta^+$=100; $\%\varepsilon$p=?
^{43}Cr	0.0	$(3/2^+)$	21.2 ms *7*	$\%\varepsilon+\%\beta^+$=100; $\%\varepsilon$p=79.3 *30*; $\%\varepsilon$2p=11.6 *10*...
^{44}S	0.0	0^+	100 ms *1*	$\%\beta^-$n=18 *3*
^{44}Cr	0.0	0^+	42.8 ms *6*	$\%\varepsilon$p=12.0 *20*
^{45}Fe	0.0	$(3/2^+)$	2.4 ms *3*	%2p=70 *4*



Adopted Levels:tentative

$Q(\beta^-)=25330$ *SY*; $S(n)=1090$ *SY*; $S(p)=25640$ *SY*; $Q(\alpha)=-21730$ *CA* 2011AuZZ,1997Mo25
$\Delta(Q(\beta^-))=1210$, $\Delta(S(n))=1280$, $\Delta(S(p))=1210$ (syst,2011AuZZ).
$S(2n)=1602$ *1208*, $Q(\beta^-n)=23800$ *030* (syst,2011AuZZ). $S(2p)=53620$ (calculated,1997Mo25).
$Q(\beta^-)$, S(n), and S(p) from 2011AuZZ; $Q(\alpha)$ 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)	$T_{1/2}$	Comments
0?	>170 ns	$\%\beta^-=?$; $\%\beta^-n=?$ 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^π: $5/2^+$ (syst,1997Mo25).

Adopted Levels

$Q(\beta^-)$=24840 *SY*; S(n)=960 *SY*; S(p)=23340 *CA*; $Q(\alpha)$=−21730 *CA* 2012Wa38,1997Mo25
Estimated uncertainties: $\Delta Q(\beta^-)=\Delta S(n)$=920 (2012Wa38).
S(2n)=2090 *920*, $Q(\beta^-n)$=23310 *860* (syst,2012Wa38). S(2p)=53620 (calculated,1997Mo25).
$Q(\beta^-)$ and S(n) from 2012Wa38; S(p) and $Q(\alpha)$ 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.

^{43}Al Levels

E(level)	$T_{1/2}$	Comments
0?	>170 ns	$\%\beta^-$=?; $\%\beta^-n$=?; $\%\beta^-2n$=? One event was assigned to ^{43}Al with a probability of 0.0024 that this event was due to possible contribution from the neighboring ^{42}Al. 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 (Fig. 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^π: 5/2$^+$ (syst,1997Mo25).

Adopted Levels

Q(β^-)=18420 *SY*; S(n)=1530 *SY*; S(p)=25030 *SY*; Q(α)=−21600 *SY* 2012Wa38
Estimated uncertainties: ΔQ(β^-)=700, ΔS(n)=780, ΔS(p)=840, ΔQ(α)=790 (2012Wa38).
S(2n)=5160 *700*, Q(β^-n)=14020 *630* (syst,2012Wa38).
S(2p)=50140 (calculated,1997Mo25).
First identification of ^{43}Si nuclide by 2002No11.
2007Ta15: E=142 MeV/nucleon ^{48}Ca beam from the coupled cyclotron facility at the NSCL. Targets of 724 mg/cm^2 ^{9}Be or 1111 mg/cm^2 ^{nat}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)	$T_{1/2}$	Comments
0	>60 ns	%β^-=?; %β^-n=?; %β^-2n=? Four events were assigned to ^{43}Si by 2002No11. Production σ=5 pb *2* (2007Ta15). 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 (2012Au07) and calculated value of 13.5 ms (1997Mo25). J$^\pi$: systematics: 3/2$^-$ (2012Au07,1997Mo25).

Adopted Levels, Gammas

Q(β^-)=16.88×10^3 *37*; S(n)=4.40×10^3 *43*; S(p)=19170 *SY*; Q(α)=−18740 *SY* 2012Wa38
Estimated uncertainties: ΔS(p)=ΔQ(α)=620 (2012Wa38).
S(2n)=6480 *380*, S(2p)=43790 *700* (syst), Q(β^-n)=14250 *370*, (2012Wa38).
First identification of ^{43}P 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,^{43}Pγ) dataset.
Mean-square radius from energy-integrated cross sections: 2006Kh08.

^{43}P Levels

Cross Reference (XREF) Flags

A ^{9}Be(^{44}S,^{43}Pγ)

E(level)†	J$^\pi$‡	T$_{1/2}$	XREF	Comments
0	1/2$^+$	36.5 ms *15*	A	%β^-=100; %β^-n=100; %β^-2n=? Measured mean-square radius (r_0^2)=1.77 fm^2 *28* (2006Kh08). π2s$_{1/2}$ orbital (2006Fr13,2008Ri04). 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 *1*	3/2$^+$		A	π1d$_{3/2}$ orbital (2006Fr13,2008Ri04).
845 *3*	(5/2$^+$)		A	
1009 *5*	(5/2$^+$)		A	
1095 *6*	(5/2$^+$)		A	
1774 *8*	(5/2$^+$)		A	
2035 *11*	(5/2$^+$)		A	

† From least-squares fit to Eγ data.
‡ From comparisons of experimental data with shell-model calculations (2008Ri04). For g.s., 184, 1009 and 1095 levels, parallel-momentum distributions give L=0 for g.s., and L=2 for all others in a proton-removal reaction.

γ(^{43}P)

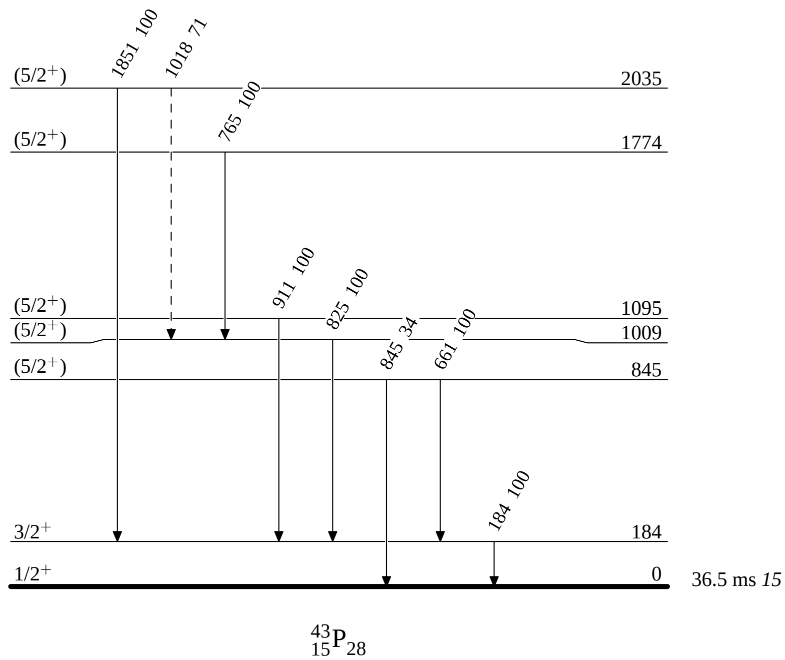
E$_i$(level)	J$^\pi_i$	E$_\gamma$†	I$_\gamma$†	E$_f$	J$^\pi_f$
184	3/2$^+$	184 *1*	100	0	1/2$^+$
845	(5/2$^+$)	661 *4*	100 *13*	184	3/2$^+$
		845 *4*	34 *9*	0	1/2$^+$
1009	(5/2$^+$)	825 *5*	100	184	3/2$^+$
1095	(5/2$^+$)	911 *6*	100	184	3/2$^+$
1774	(5/2$^+$)	765 *6*	100	1009	(5/2$^+$)
2035	(5/2$^+$)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

† From 2008Ri04.
‡ Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



^{9}Be(^{44}S,^{43}PXγ) 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 α 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 *1*	3/2$^+$ @	3.1 *3*
845 *3*	(5/2$^+$) &	0.37 *7*
1009 *5*	(5/2$^+$) &	0.8 *2*
1095 *6*	(5/2$^+$) &	1.9 *2*
1774 *8*	(5/2$^+$)	0.4 *1*
2035 *11*	(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)

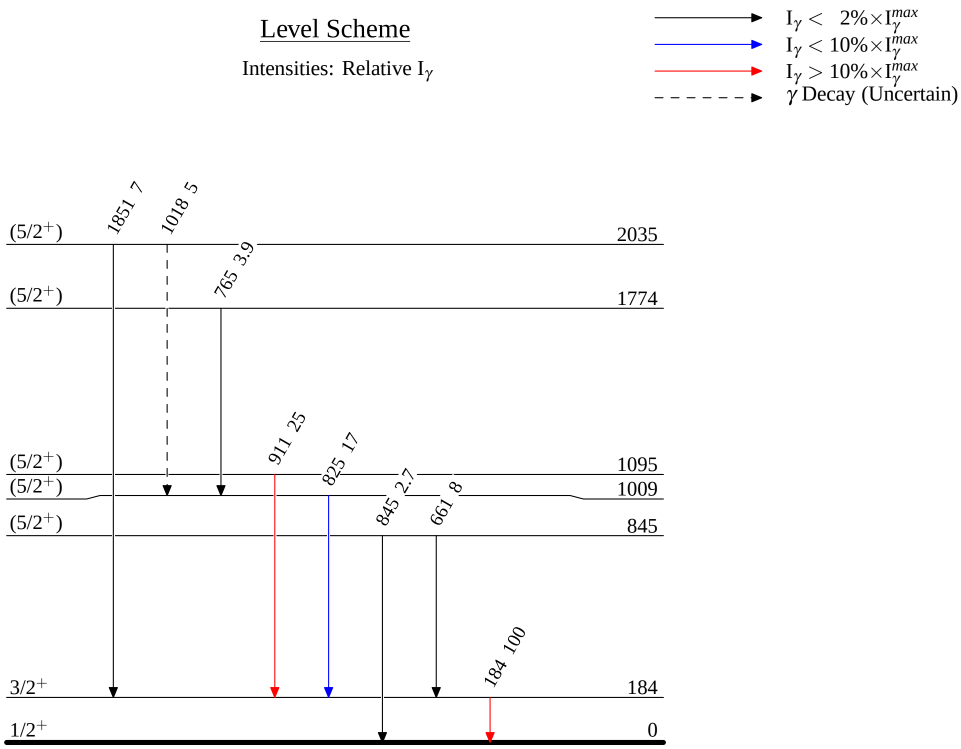
E$_\gamma$	I$_\gamma$	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$
184 *1*	100	184	3/2$^+$	0	1/2$^+$
661 *4*	8 *1*	845	(5/2$^+$)	184	3/2$^+$
765 *6*	3.9 *6*	1774	(5/2$^+$)	1009	(5/2$^+$)
825 *5*	17 *1*	1009	(5/2$^+$)	184	3/2$^+$
845 *4*	2.7 *7*	845	(5/2$^+$)	0	1/2$^+$
911 *6*	25 *1*	1095	(5/2$^+$)	184	3/2$^+$
1018† *6*	5 *1*	2035	(5/2$^+$)	1009	(5/2$^+$)
1851 *11*	7 *1*	2035	(5/2$^+$)	184	3/2$^+$

† Placement of transition in the level scheme is uncertain.

$^{9}Be(^{44}S,^{43}PX\gamma)$ 2008Ri04,2006Fr13

Level Scheme

Intensities: Relative I_γ



$^{43}_{15}P_{28}$

$^{9}Be(^{44}S,^{43}P\gamma)$ 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 α 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 State University (MSU) facility. The ^{44}S beam impinged another ^{9}Be target and the residues were analyzed by S800 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.

All data from 2008Ri04 unless otherwise noted.

^{43}P Levels

E(level)[†]	J$^\pi$[#]	L[‡]	σ (mb)[b]
0	1/2$^+$[@]	0	2.3 *4*
184 *1*	3/2$^+$[&]	2	3.1 *3*
845 *3*	(5/2$^+$)[a]		0.37 *7*
1009 *5*	(5/2$^+$)[a]	2	0.8 *2*
1095 *6*	(5/2$^+$)[a]	2	1.9 *2*
1774 *8*	(5/2$^+$)		0.4 *1*
2035 *11*	(5/2$^+$)[a]		0.7 *2*

† From least-squares fit to Eγ data (by evaluators).
‡ From parallel momentum distributions and comparison with eikonal-model calculations.
# From comparisons of experimental data with shell-model calculations.
@ Configuration=2$s_{1/2}$.
& Configuration=1$d_{3/2}$.
a Configuration=1$d_{5/2}$.
b Partial cross section.

$\gamma(^{43}P)$

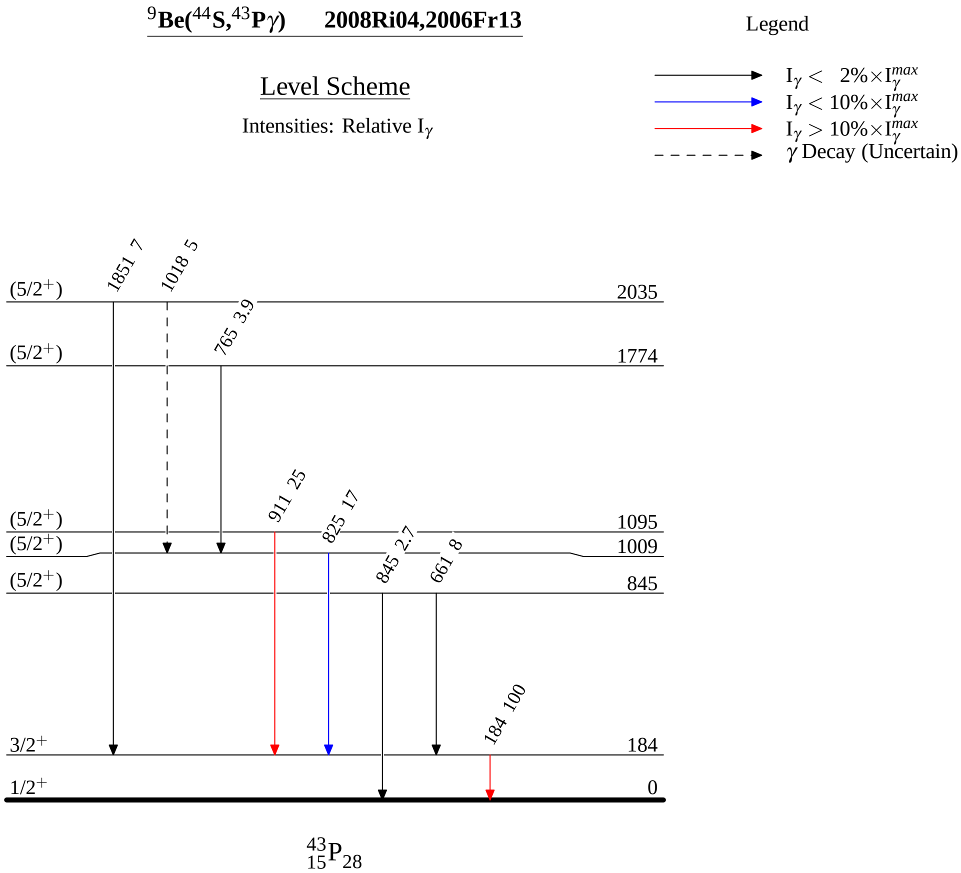
E$_\gamma$	I$_\gamma$	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$
184 *1*	100	184	3/2$^+$	0	1/2$^+$
661 *4*	8 *1*	845	(5/2$^+$)	184	3/2$^+$
765 *6*	3.9 *6*	1774	(5/2$^+$)	1009	(5/2$^+$)
825 *5*	17 *1*	1009	(5/2$^+$)	184	3/2$^+$
845 *4*	2.7 *7*	845	(5/2$^+$)	0	1/2$^+$
911 *6*	25 *1*	1095	(5/2$^+$)	184	3/2$^+$
1018[†] *6*	5 *1*	2035	(5/2$^+$)	1009	(5/2$^+$)
1851 *11*	7 *1*	2035	(5/2$^+$)	184	3/2$^+$

† Placement of transition in the level scheme is uncertain.

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

Level Scheme

Intensities: Relative I_γ



Adopted Levels, Gammas

Q(β^-)=12.13×10^3 *10*; S(n)=2629 *6*; S(p)=20.49×10^3 *21*; Q(α)=−16940 *90* 2012Wa38
S(2n)=9330 *6*, S(2p)=38890 *370*, Q(β^-n)=4650 *140* (2012Wa38).
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, $T_{1/2}$.
2012Ch16: TDPAD method used to measure spectroscopic quadrupole moment of 7/2$^-$ isomeric state of ^{43}S at 320.5 keV. E=345 MeV/nucleon beam produced at RIKEN-RBF facility using BigRIPS spectrometer for fragment separation. ^{43m}S fragments were selected and implanted in Cu host. The g factor was first measured to validate the method. The 320.5-keV γ-ray was measured using four HPGe detectors. Time spectrum of each detector was used to generate R(t) function.
Mass measurement: 2012Ga45, 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)
B	^{9}Be(^{44}S,Xγ)
C	^{9}Be(^{45}Cl,Xγ)
D	Coulomb excitation

E(level)†	J$^\pi$	$T_{1/2}$	XREF	Comments
0#	(3/2$^-$)	265 ms *15*	ABCD	%β^-=100; %β^-n=40 *10* (1989Le16) Configuration=$\nu p_{3/2}$. This state is found to be part of well deformed K=1/2 decoupled rotational band from shell-model calculations. J$^\pi$: 3/2$^-$ proposed from shell-model (2000Sa21,2009Ri11,2009Ga05); 7/2$^-$ proposed (1999Ib01) 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).
320.7 *5*	(7/2$^-$)	415 ns *5*	A	μ=−1.110 *14* (2009Ga05,2014StZZ) Q=0.23 *3* (2012Ch16,2014StZZ) $T_{1/2}$: from 2009Ga05. Other: 0.48 μs *5* (2000Sa21). J$^\pi$: 7/2$^-$ proposed from shell-model calculations (2000Sa21); also from agreement of g(Schmidt)=−0.546 for $\nu f_{7/2}$ with the experimental value (2009Ga05). μ: from g factor=−0.317 *4* (2009Ga05) by TDPAD method, the uncertainty includes the statistical and that in the magnetic field. Q: TDPAD method (2012Ch16). This value is significantly larger than predicted by single-particle state which suggests that the isomer is not a spherical state (2012Ch16), only the magnitude is known, not the sign.
970# *5*	(5/2$^-$,7/2$^-$)‡		BCD	
1153# *5*	(5/2$^-$,7/2$^-$)‡		BC	
2616 *9*	(7/2$^-$)‡		B	

† From least-squares fit to Eγ data.
‡ Proposed from shell-model calculations (2009Ri11).
# Band(A): Ground-state band.

Adopted Levels, Gammas (continued)

$\gamma(^{43}S)$

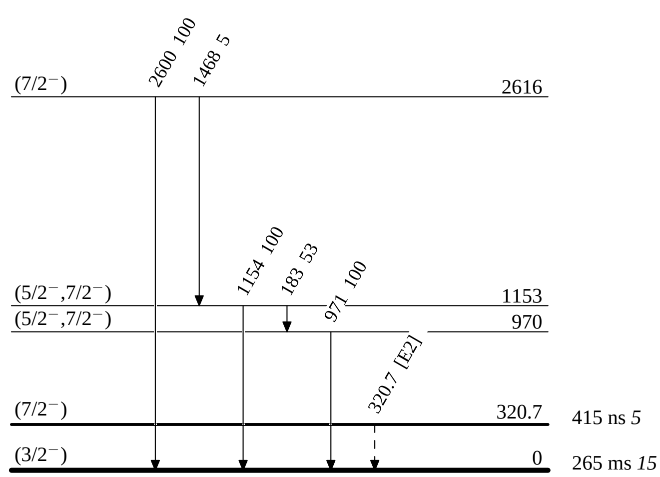
E_i(level)	J_i^π	E_γ†	I_γ†	E_f	J_f^π	Mult.	Comments
320.7	(7/2−)	320.7‡ *5*		0	(3/2−)	[E2]	B(E2)(W.u.)=0.040 *4* B(E2)↓=0.357×10^{-4} *36* (2001Sa72) B(E2)=0.517×10^{-4} *52* in 2000Sa21 (same group as 2001Sa72) seems a misprint. E_γ: from ^{43}S IT decay. This γ either feeds the g.s. or a very close-lying 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−)	971 *6*	100	0	(3/2−)		
1153	(5/2−,7/2−)	183 *1*	53 *3*	970	(5/2−,7/2−)		
		1154 *7*	100	0	(3/2−)		
2616	(7/2−)	1468 *9*	5 *3*	1153	(5/2−,7/2−)		
		2600 *16*	100 *7*	0	(3/2−)		

† From ^{9}Be(^{44}S,Xγ) unless otherwise noted.
‡ Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

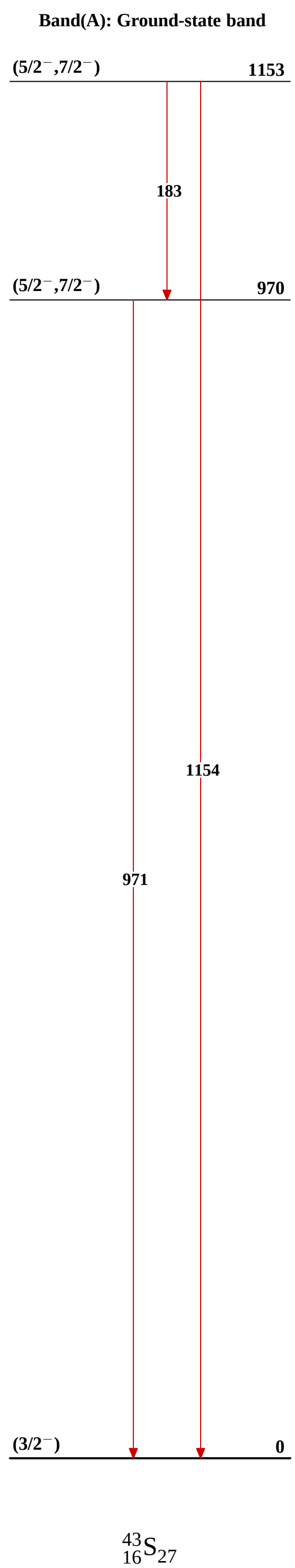
Level Scheme

Intensities: Relative photon branching from each level



$^{43}_{16}S_{27}$

Adopted Levels, Gammas



^{43}S IT decay (415 ns) 2000Sa21,2009Ga05

Parent: ^{43}S: E=320.7 *5*; J$^{\pi}$=(7/2^{-}); $T_{1/2}$=415 ns *5*; %IT decay=100.0

^{43}S-J$^{\pi}$,$T_{1/2}$: From Adopted Levels.

2000Sa21, 2001Sa72: ^{43}S was 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.

2009Ga05: E=60 MeV/nucleon ^{48}Ca beam was produced at GANIL. Fragments were separated by the LISE-2000 spectrometer. A 50 μm thick 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, particle+rotor model, generator coordinate method (GCM), and Gaussian overlap approximation (GOA).

2012Ka36: ^{43}S was produced by Be(^{238}U,Fγ) with E=345 MeV/nucleon ^{238}U beam from the RIBF accelerator at RIKEN on a Be target. Fission fragments were separated and analyzed by BigRIPS separator, transported to focal plane of ZeroDegree spectrometer and finally implanted in an aluminum stopper. Particle identification was achieved by ΔE-tof-Bρ method. Delayed γ-rays from microsecond isomers were detected by three clover-type HPGe detectors (FWHM=2.1 keV at 1 MeV). Measured Eγ, Iγ, $\gamma\gamma$-coin, isomer half-life. Deduced level. Comparison with previous studies.

^{43}S Levels

E(level)	J$^{\pi}$	$T_{1/2}$	Comments
0	(3/2^{-})		J$^{\pi}$: 3/2^{-} proposed from shell-model calculations (2000Sa21,2009Ga05). Configuration=$\nu p_{3/2}$. This state is found to be part of well deformed K=1/2 decoupled rotational band from shell-model calculations (2009Ga05).
320.7 *5*	(7/2^{-})	0.48 μs *5*	μ=1.095 *14* (2009Ga05) J$^{\pi}$: from agreement of g(Schmidt)=−0.546 for $\nu f_{7/2}$ with the experimental value (2009Ga05). $T_{1/2}$: from 2009Ga05, from time interval between an event in plastic scintillator and a signal in one of the Ge detectors. Others: 0.45 μs *5* (2000Sa21), 0.20 μs *+14−7* (2012Ka36). 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, J=7/2^{-} level is built on $\nu f_{7/2}$ orbital.

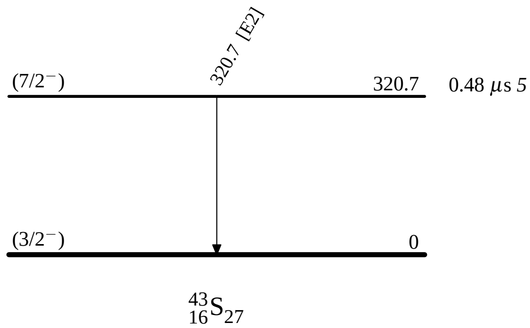
γ(^{43}S)

Eγ	E_i(level)	J^{π}_i	E_f	J^{π}_f	Mult.	Comments
320.7 *5*	320.7	(7/2^{-})	0	(3/2^{-})	[E2]	B(E2)↓=0.357×10^{-4} *36* (2001Sa72) B(E2)=0.517×10^{-4} *52* in 2000Sa21 (same group as 2001Sa72) seems a misprint. Eγ: weighted average of 320.5 *5* (2009Ga05) and 320.9 *5* (2012Ka36). Mult.: E1 and M1 give very large hindrance factors. E2 would be compatible with the measured lifetime.

^{43}S IT decay (415 ns) 2000Sa21,2009Ga05

Decay Scheme

%IT=100.0



^{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; γ-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(^{45}Cl,Xγ).

^{43}S Levels

E(level)†	J$^{\pi\ddagger}$
0$^{\#}$	3/2$^-$
970$^{\#}$ *5*	(5/2$^-$,7/2$^-$)
1153$^{\#}$ *5*	(5/2$^-$,7/2$^-$)
2616 *9*	(7/2$^-$)

† From least-squares fit to Eγ data.

‡ From comparisons with shell-model calculations.

$^{\#}$ Band(A): Ground state rotational band.

γ(^{43}S)

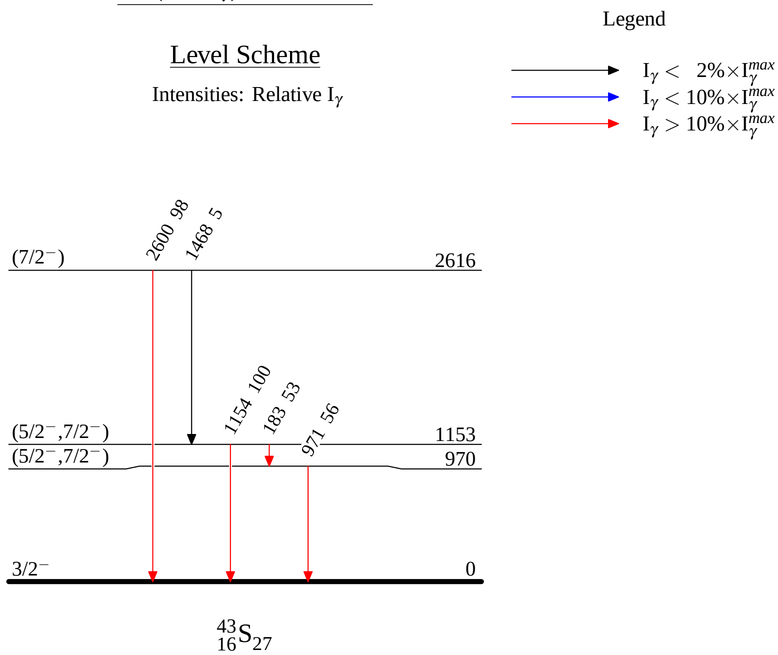
E$_\gamma$	I$_\gamma$	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$
183 *1*	53 *3*	1153	(5/2$^-$,7/2$^-$)	970	(5/2$^-$,7/2$^-$)
^{x}231 *1*	6 *1*				
^{x}459 *3*	7 *2*				
^{x}621 *4*	31 *3*				
^{x}719 *4*	21 *3*				
^{x}770 *5*	12 *3*				
^{x}849 *5*	24 *3*				
971 *6*	56 *4*	970	(5/2$^-$,7/2$^-$)	0	3/2$^-$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

^{x} γ ray not placed in level scheme.

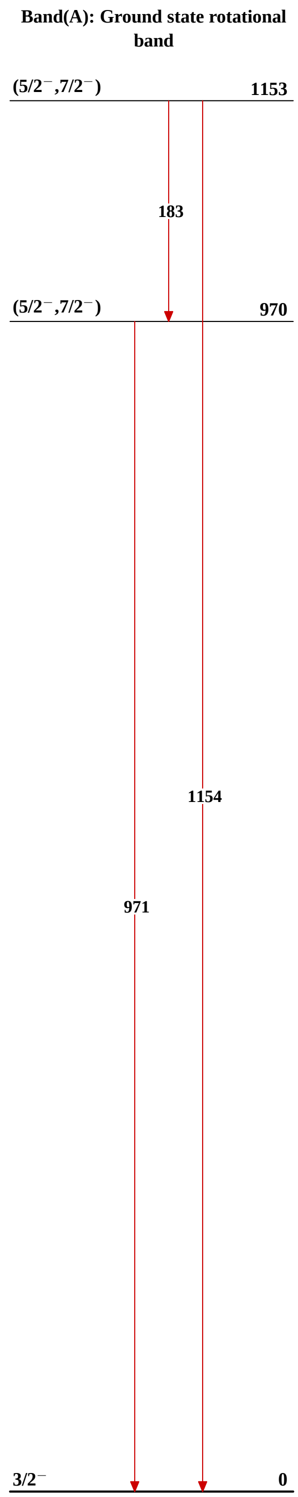
^{9}Be(^{44}S,Xγ) 2009Ri11

Level Scheme

Intensities: Relative I_γ



^{9}Be(^{44}S,Xγ) 2009Ri11



$^{43}_{16}S_{27}$

^{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; γ-rays were detected by the Segmented Germanium Array (SeGA). Measured Eγ, Iγ, γγ-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(^{44}S,Xγ).

^{43}S Levels

E(level)†	J^{π}‡
0#	$3/2^-$
971# *5*	$(5/2^-,7/2^-)$
1154# *5*	$(5/2^-,7/2^-)$

† From least-squares fit to Eγ data.
‡ From comparisons with shell-model calculations.
\# Band(A): ground state rotational band.

γ(^{43}S)

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

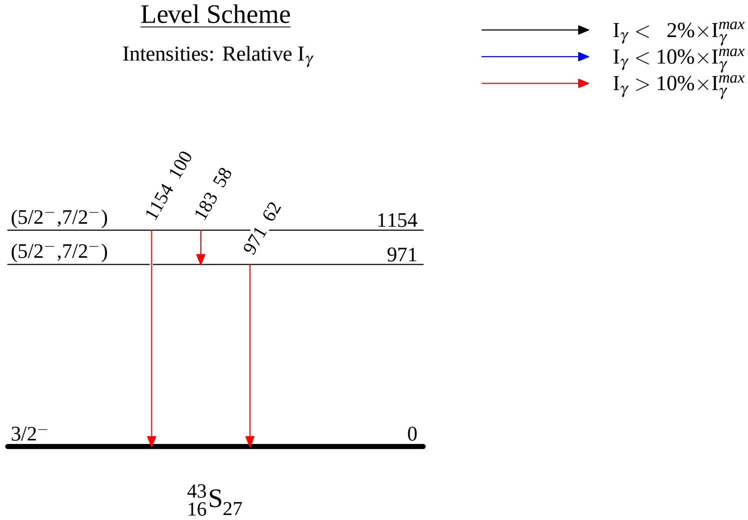
^{x} γ ray not placed in level scheme.

$^{9}Be(^{45}Cl,X\gamma)$ 2009Ri11

Legend

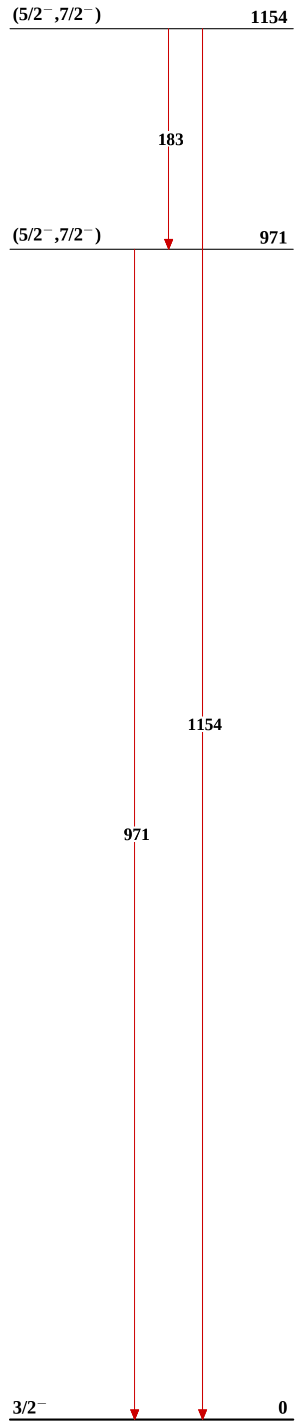
Level Scheme

Intensities: Relative I_γ



^{9}Be(^{45}Cl,Xγ) 2009Ri11

Band(A): Ground state rotational band



$^{43}_{16}S_{27}$

^{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

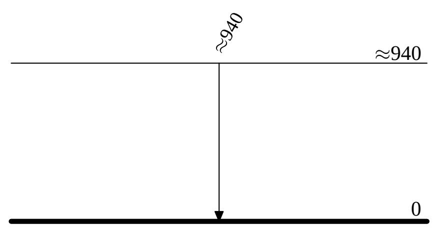
E(level)	Comments
0	
≈940	B(E2)↑=0.0175 *69* E(level): probably a multiplet. B(E2) applies to the sum of unresolved levels. Experimental B(E2) is consistent with calculated B(E2) for a multiplet of states generated near 1 MeV in either the particle-rotation (prolate and oblate) or the particle-vibration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

$\gamma(^{43}S)$

E_γ	E_i(level)	E_f	Comments
≈940	≈940	0	E_γ: probably a multiplet.

Coulomb excitation 1999Ib01

Level Scheme



$^{43}_{16}S_{27}$

Adopted Levels, Gammas

$Q(\beta^-)=7.69\times10^3$ *10*; $S(n)=7.48\times10^3$ *17*; $S(p)=13.97\times10^3$ *10*; $Q(\alpha)=-13.92\times10^3$ *13* 2012Wa38
S(2n)=13160 *120*, S(2p)=33920 *120*, $Q(\beta^-n)$=2030 *100* (2012Wa38).
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, MSU 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 particles.
Mass measurements: 1976Ka24, 1990Tu01, 1991Zh24, 2000Sa21, 2007Ju03.
Mean-square radius from energy-integrated cross sections: 2006Kh08.
Structure calculations: 2011Ka03, 2009No01, 1987Sa19.
Level scheme is essentially that proposed in ^{9}Be(^{48}K,Xγ) (2012St12).

^{43}Cl Levels

Cross Reference (XREF) Flags

A	^{43}S β^- decay (265 ms)	D	^{9}Be(^{48}K,Xγ)
B	^{44}S β^-n decay (100 ms)	E	^{9}Be(^{48}Ca,Xγ)
C	^{1}H(^{46}Ar,Xγ)	F	^{208}Pb(^{40}Ar,Xγ)

E(level)	J$^\pi$ †	T$_{1/2}$	XREF	Comments
0	(1/2$^+$)	3.13 s *9*	ABCDEF	%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 (2012Au07) from syst.
328 *2*	(3/2$^+$)		CDEF	
884? *4*	(1/2,3/2)		CDE	E(level): tentative level proposed in (^{48}K,Xγ) from 882 *14* γ not in coin with any other γ-ray (2012St12). Eγ=888 *6* in ^{1}H(^{46}Ar,Xγ) (2006Ga31) and 881 *5* placed from an 1830 level. J$^\pi$: possible γ to (1/2$^+$) is dipole.
943 *5*	(5/2$^+$)		CDE	
1668 *6*	(7/2$^+$)		CDE	E(level): level proposed in (^{48}K,Xγ) from 1338 *15* γ in coin with 327γ (2012St12). Eγ=1342 *7* in ^{1}H(^{46}Ar,Xγ) (2006Ga31) and 1338 *6* placed from a 1338 level.
1924 *7*			D	

† From transition multipolarities determined from $\gamma(\theta)$ data in ^{9}Be(^{48}Ca,Xγ) and shell-model predictions (2004So30,2012St12).

γ(^{43}Cl)

E$_i$(level)	J$^\pi_i$	E$_\gamma$ †	I$_\gamma$	E$_f$	J$^\pi_f$	Mult. ‡
328	(3/2$^+$)	328 *2*	100	0	(1/2$^+$)	D
884?	(1/2,3/2)	884§ *4*	100	0	(1/2$^+$)	D
943	(5/2$^+$)	615 *5*	100	328	(3/2$^+$)	D
1668	(7/2$^+$)	1340 *6*	100	328	(3/2$^+$)	(Q)
1924		256 *4*	100	1668	(7/2$^+$)	

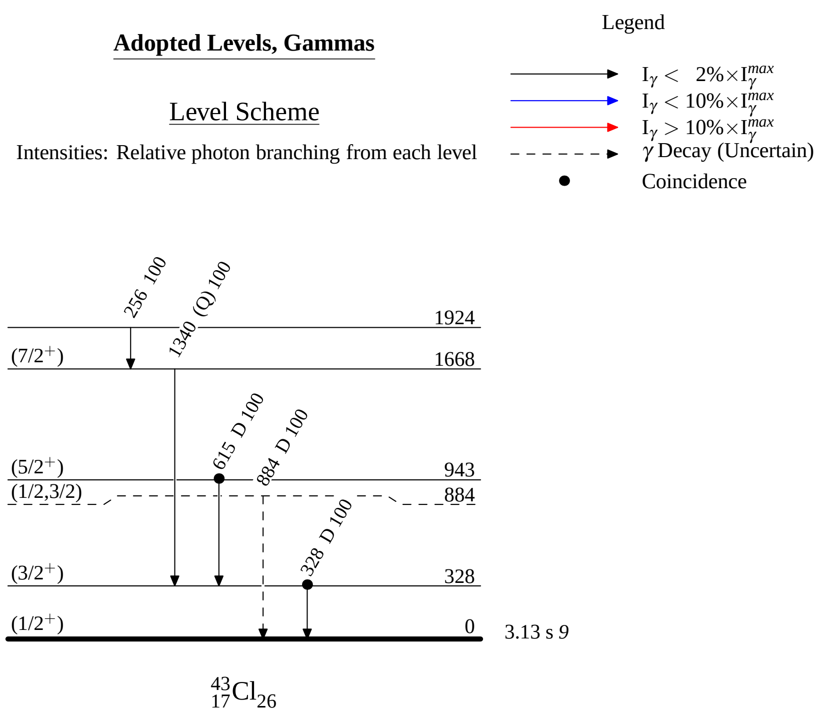
† Weighted average of all available values.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

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

‡ From $\gamma(\theta)$ in $^{9}Be(^{48}Ca,X\gamma)$; mult=D indicates ΔJ=1 transition and mult=(Q) a ΔJ=2 transition.
§ Placement of transition in the level scheme is uncertain.



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

Parent: ^{43}S: E=0; J^π=(3/2$^-$); $T_{1/2}$=265 ms *15*; Q(β^-)=12.13×10^3 *10*; %β^- decay=100.0
^{43}S-J^π,$T_{1/2}$: From Adopted Levels.
^{43}S-Q(β^-): From 2012Wa38.
%β^-n=40 *10* (1989Le16).
No information is available for population of levels in ^{43}Cl from ^{43}S decay.

^{43}Cl Levels

E(level)
0

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

Parent: ^{44}S: E=0; $J^\pi=0^+$; $T_{1/2}$=100 ms *1*; Q(β^-n)=7.05×10^3 *10*; %β^-n decay=18 *3*
^{44}S-$T_{1/2}$: From ^{44}S Adopted Levels in ENSDF database.
^{44}S-Q(β^-n): From 2012Wa38.
^{44}S-%β^-n decay: %β^-n=18 *3* (1995So03). Other: 30 *10* (1989Le16).
No information is available for population of levels in ^{43}Cl from ^{44}S β^-n decay.

^{43}Cl Levels

E(level)
0

^{1}H(^{46}Ar,Xγ) 2006Ga31

2006Ga31: E=76.4 MeV/nucleon ^{46}Ar was produced at the Coupled Cyclotron facility of the NSCL at MSU via projectile fragmentation of a 110 MeV/nucleon ^{48}Ca primary beam on a 376 mg/cm^2 ^{9}Be target located at the mid target 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 ^{9}Be(^{48}Ca,Xγ) in 2004So30.

^{43}Cl Levels

E(level)†	J$^\pi$†	Comments
0	(1/2$^+$)	
329 *4*	(3/2$^+$)	
945 *7*	(5/2$^+$)	
1342 *7*	(5/2$^+$)	E(level): level not included in Adopted Levels due to revised placement of 1342γ.
1833‡ *9*	(7/2$^+$)	E(level): level not included in Adopted Levels.

† From level scheme proposed by 2004So30.
‡ A tentative 1509 *10* γ from this level reported by 2004So30 is not seen by 2006Ga31.

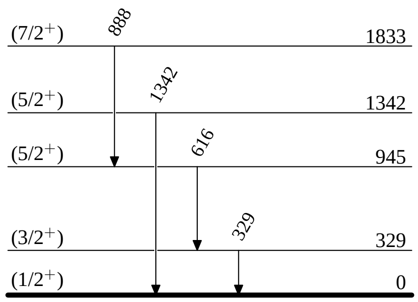
γ(^{43}Cl)

E$_\gamma$	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Comments
^{x}256† *5*					
329 *4*	329	(3/2$^+$)	0	(1/2$^+$)	
616 *5*	945	(5/2$^+$)	329	(3/2$^+$)	
888 *6*	1833	(7/2$^+$)	945	(5/2$^+$)	Note that this γ was not observed in coin with 330γ or 614γ in 2012St12, thus its placement from 1833 level is suspect.
1342 *7*	1342	(5/2$^+$)	0	(1/2$^+$)	

† This γ not reported by 2004So30.
^{x} γ ray not placed in level scheme.

$^{1}H(^{46}Ar,X\gamma)$ 2006Ga31

Level Scheme



$^{43}_{17}Cl_{26}$

^{9}Be(^{48}K,Xγ) 2012St12

2012St12: E=85 MeV/nucleon ^{48}K beam was produced from fragmentation of 140 MeV/nucleon ^{48}Ca beam with ^{9}Be target at the Coupled cyclotron facility of NSCL at MSU. Target=376 mg/cm^2 ^{9}Be. The beam was purified in A1900 fragment separator. The S800 spectrograph together with plastic scintillators was used for event-by-event identification of projectile-like reaction products and time-of-flight and energy loss information. Measured Eγ, Iγ, $\gamma\gamma$ coin, (fragment)γ coin using SeGA array of 32-fold segmented HPGe detectors. Shell-model calculations.

^{43}Cl Levels

E(level)†	J$^\pi$‡	Comments
0	(1/2$^+$)	
327 *5*	(3/2$^+$)	
882? *14*		
940 *9*	(5/2$^+$)	
1665 *16*		E(level): ordering of the 256-1338 γ cascade is not established in this work, but in 2006Ga31, intensity of the 256γ is much weaker than that of the 1338γ.
1921 *16*		

† From Eγ data.
‡ From shell-model calculations (2012St12).

γ(^{43}Cl)

E$_\gamma$	I$_\gamma$	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Comments
256† *4*	18 *1*	1921		1665		
327 *5*	100 *3*	327	(3/2$^+$)	0	(1/2$^+$)	
613 *7*	45 *3*	940	(5/2$^+$)	327	(3/2$^+$)	
882 *14*	30 *3*	882?		0	(1/2$^+$)	882γ was not observed in coin with either the 327γ or the 613γ as proposed in 2004So30.
^{x}1024 *10*	7 *2*					
1338† *15*	22 *3*	1665		327	(3/2$^+$)	
^{x}1494‡ *16*						
^{x}1529‡ *16*						

† Ordering of the 256-1328 γ cascade is not established in this work, but it is based on much weaker intensity of 256γ in 2006Ga31.
‡ Weak unresolved doublet.
^{x} γ ray not placed in level scheme.

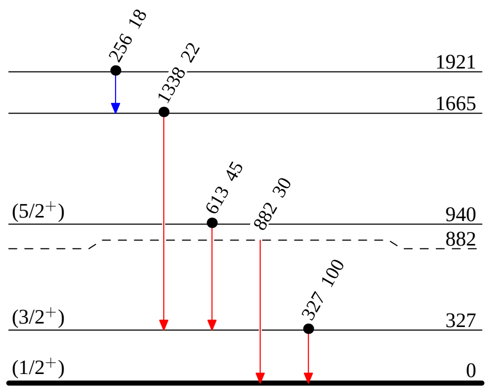
^{9}Be(^{48}K,Xγ) 2012St12

Level Scheme

Intensities: Relative I_γ

Legend

$I_\gamma <$ 2%$\times I_\gamma^{max}$
$I_\gamma <$ 10%$\times I_\gamma^{max}$
$I_\gamma >$ 10%$\times I_\gamma^{max}$
Coincidence



$^{43}_{17}Cl_{26}$

^{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$^\pi$	Comments
0.0	(1/2$^+$)	
330 *5*	(3/2$^+$)	
946 *7*	(5/2$^+$)	
1338 *6*	(5/2$^+$)	E(level): level not included in Adopted Levels due to revised placement of 1338γ.
1830 *8*	(7/2$^+$)	E(level): level not included in Adopted Levels due to revised placement of 882γ.

γ(^{43}Cl)

E$_\gamma$	I$_\gamma$	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.	Comments
330 *5*	100	330	(3/2$^+$)	0.0	(1/2$^+$)	D	Mult.: ΔJ=1 transition from Iγ(122°)/Iγ(136°)=1.4 *4*; Iγ(85°)/Iγ(136°)=2.0 *4*.
614 *5*	60	946	(5/2$^+$)	330	(3/2$^+$)	D	Mult.: ΔJ=1 transition from Iγ(122°)/Iγ(136°)=1.3 *4*; Iγ(85°)/Iγ(136°)=1.7 *4*.
881† *5*	50	1830	(7/2$^+$)	946	(5/2$^+$)	D	Note that this γ was not observed in coin with 330γ or 614γ in 2012St12, thus its placement from 1830 level is suspect. Mult.: ΔJ=1 transition from Iγ(122°)/Iγ(136°)=1.3 *3*; Iγ(85°)/Iγ(136°)=2.0 *5*.
1338 *6*	30	1338	(5/2$^+$)	0.0	(1/2$^+$)	(Q)	Placement as ground-state transition is incorrect in view of 1338γ observed in coin with 327γ in 2012St12. Mult.: ΔJ=2 or 0 transition from Iγ(122°)/Iγ(136°)=1.0 *4*; Iγ(85°)/Iγ(136°)=1.0 *3*.
1509† *10*	20	1830	(7/2$^+$)	330	(3/2$^+$)		E$_\gamma$: this γ-ray is specified at a 2.5σ confidence level (2004So30).

† Placement of transition in the level scheme is uncertain.

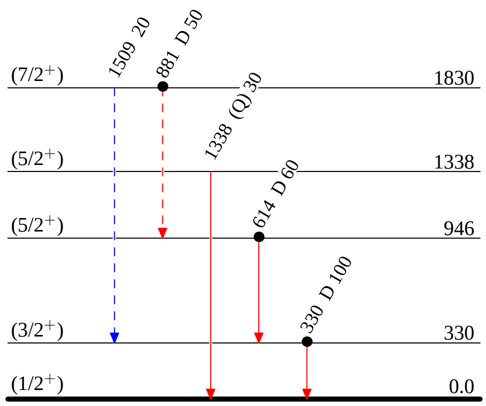
^{9}Be(^{48}Ca,Xγ) 2004So30

Level Scheme

Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)
Coincidence



$^{43}_{17}Cl_{26}$

$^{208}Pb(^{40}Ar,X\gamma)$ 2013Sz02

Transfer channel: one-proton removal and four-neutron addition 2013Sz02: E(^{40}Ar)=255 MeV provided by the ECR ion source and accelerated by the superconducting ALPI-Linac accelerator of LNL, Legnaro facility. Target=300 μg/cm^2 ^{208}Pb. Measured fragments, Eγ, Iγ, time-of-flight, energy loss, $\gamma\gamma$, (fragment)γ-coin using the Clara array and magnetic spectrometer Prisma. Deduced level, J, π.

^{43}Cl Levels

E(level)	J$^{\pi}$ †
0	(1/2$^+$)
328 *2*	(3/2$^+$)

† From Adopted Levels.

γ(^{43}Cl)

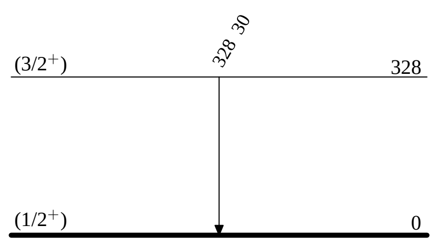
E$_\gamma$	I$_\gamma$ †	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$
328 *2*	30 *10*	328	(3/2$^+$)	0	(1/2$^+$)

† Effective number of counts with correction for detector efficiency.

$^{208}Pb(^{40}Ar,X\gamma)$ 2013Sz02

Level Scheme

Intensities: Relative I$_\gamma$



$^{43}_{17}Cl_{26}$

Adopted Levels, Gammas

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

^{43}Ar Levels

Cross Reference (XREF) Flags

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

E(level)	J$^\pi$	T$_{1/2}$	XREF	Comments
0	5/2$^{(-)}$	5.37 min *6*	ABCDE	%β^-=100 μ=−1.021 *6* (2008Bl01,2014StZZ) Q=+0.142 *14* (2008Bl01,2014StZZ) Evaluated rms charge radius=3.4414 fm *41* (2013An02). μ,Q: fast beam collinear laser spectroscopy using highly sensitive ion detection of optical resonance. Statistical uncertainty=0.002 and systematic uncertainty of 10% in Q due to electric field gradient and Sternheimer shielding correction are combined in quadrature. Isotope shift (^{38}Ar,^{43}Ar)=556.7 MHz *23* (2008Bl01); statistical uncertainty=1.4, systematic uncertainty=1.8. Measured mean-square radius (r_0^2)=1.23 fm^2 *8* (beam energy=50 MeV/nucleon, 1999Ai02), 1.31 fm^2 *7* (beam energy=90 MeV/nucleon, 1999Ai02), 1.23 fm^2 *3* (beam energy=70 MeV/nucleon, 1997Li15). The rms charge radius $(<r^2>)^{1/2}$=3.4415 fm *23* from $\delta<r^2>$(^{38}Ar,^{43}Ar)=+0.221 fm^2 *14*(stat) *66*(syst) (2008Bl01, laser spectroscopy). J$^\pi$: from laser spectroscopy in 2008Bl01. Hyperfine structure intervals and relative amplitudes of the resonances firmly establish 5/2. log *ft*=6.6 (log $f^{1u}t$<8.5) to 3/2$^-$ and log *ft*=6.2 to 5/2$^+$ give 3/2 or 5/2. log *ft*=7.8 to 7/2$^-$ and log *ft*=7.9 to 7/2$^+$ make 3/2 less likely. Model arguments as discussed by 1999Ma89 propose 5/2$^-$ or 7/2$^-$ from systematics of N=23 and 25 nuclides. Possible configuration= $\pi d_{3/2}^{-2}\nu f_{7/2}^{-3}$ (1999Ma89). T$_{1/2}$: from 1970Hu11 (β and γ activity measurements). Other: 5.35 min *15* (β decay, 1969Ha03), 6.5 min *18* (1969La16).
0+x	(7/2$^-$)		E	E(level): predicted value of x≈100 keV (2011Sz02), 200 keV (2009Mo09).
201.27? *16*	(7/2$^-$)		C	E(level): this level was proposed only in 2009Mo09 but not confirmed in other measurements. It is probably the same level as the 0+x level. J$^\pi$: from theoretical predictions in ^{9}Be(^{36}S,2pγ).
762.05 *8*	(3/2$^-$)		A E	J$^\pi$: from theoretical predictions in ^{208}Pb(^{40}Ar,Xγ).
1381.74 *7*			A	
1441.48 *10*			A	
1527.4+x *5*	(11/2$^-$)		E	J$^\pi$: assignment based on conclusion from 1999Ma89 that this is a negative parity

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Adopted Levels, Gammas (continued)

^{43}Ar Levels (continued)

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

γ(^{43}Ar)

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f
201.27?	(7/2$^-$)	201.27 *16*		0	5/2$^{(-)}$
762.05	(3/2$^-$)	761.81 *11*	100	0	5/2$^{(-)}$
1381.74		619.56 *10*	36 *3*	762.05	(3/2$^-$)
		1381.79 *7*	100 *6*	0	5/2$^{(-)}$
1441.48		679.24 *10*	100 *7*	762.05	(3/2$^-$)
		1441.69 *23*	16 *3*	0	5/2$^{(-)}$
1527.4+x	(11/2$^-$)	1527.4 *5*	100	0+x	(7/2$^-$)
1793.80	(3/2$^+$)	352.13 *14*	2.3 *3*	1441.48	
		411.8 *3*	1.37 *21*	1381.74	
		1031.84 *9*	100.0 *27*	762.05	(3/2$^-$)
		1793.5 *6*	3.03 *19*	0	5/2$^{(-)}$
1816.8		1816.5† *3*	100	0	5/2$^{(-)}$
1859+x	(9/2$^-$)	1859 *2*	100	0+x	(7/2$^-$)
1944.96?		1944.96† *21*	100	0	5/2$^{(-)}$
2344.4		903†		1441.48	
		2344†		0	5/2$^{(-)}$
2390.50		948.96 *17*	33 *3*	1441.48	
		1008.82 *24*	13.3 *25*	1381.74	
		1628.1† *6*	13.5 *27*	762.05	(3/2$^-$)
		2390.5 *4*	100 *8*	0	5/2$^{(-)}$
2520.38		726.58 *8*	100 *5*	1793.80	(3/2$^+$)
		1758.2 *5*	6.3 *26*	762.05	(3/2$^-$)
2798.8?		2036.4† *4*	100	762.05	(3/2$^-$)
3374.8?		1933.3† *5*	100	1441.48	

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Adopted Levels, Gammas (continued)

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

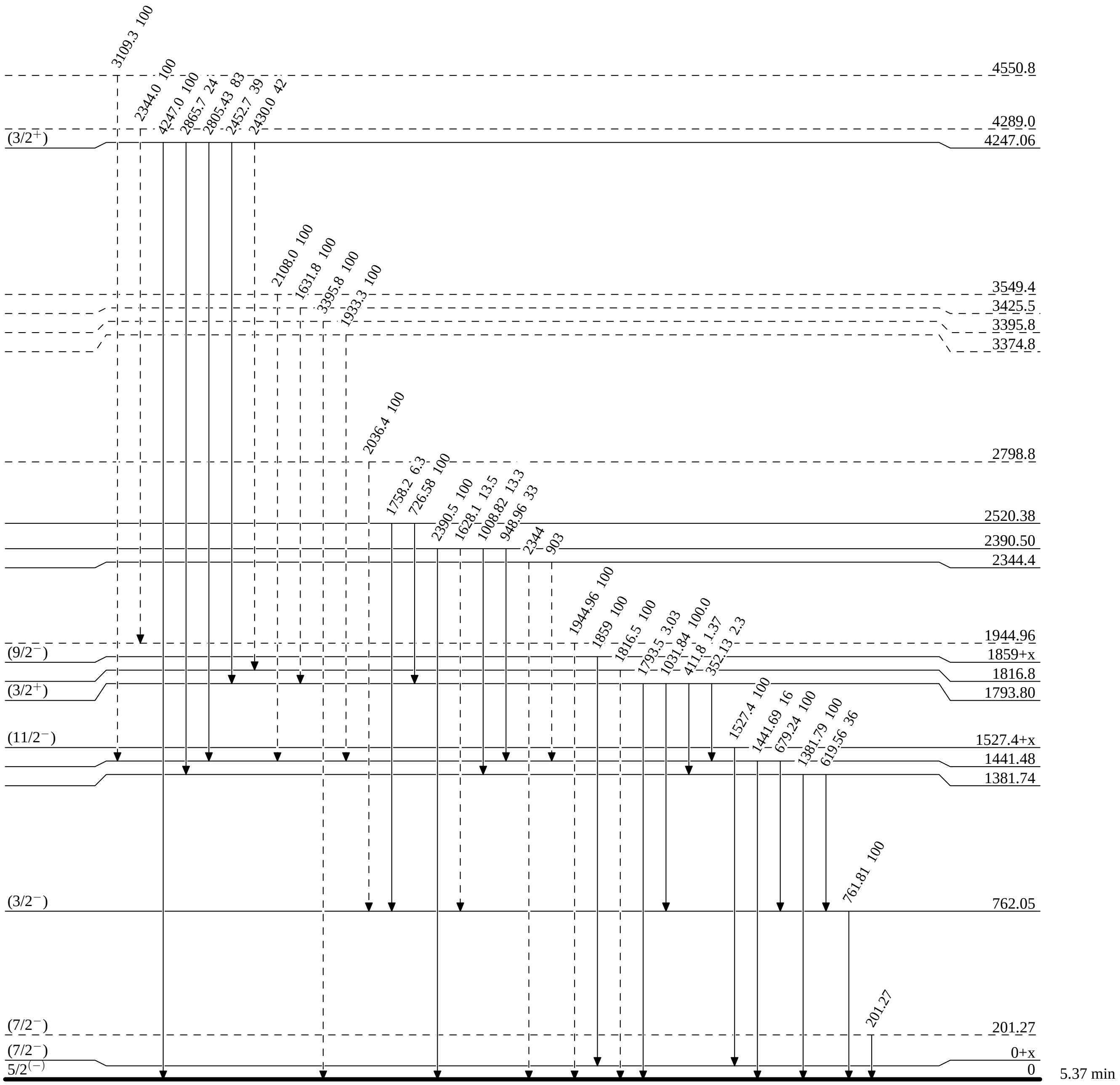
E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π
3395.8?		3395.8† *3*	100	0	$5/2^{(-)}$
3425.5?		1631.8† *5*	100	1793.80	$(3/2^+)$
3549.4?		2108.0† *7*	100	1441.48	
4247.06	$(3/2^+)$	2430.0† *5*	42 *5*	1816.8	
		2452.7 *6*	39 *5*	1793.80	$(3/2^+)$
4247.06		2805.43 *17*	83 *9*	1441.48	
		2865.7 *4*	24 *4*	1381.74	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

† Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



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

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

Parent: ^{43}Cl: E=0; J$^\pi$=(1/2$^+$); T$_{1/2}$=3.13 s *9*; Q(β^-)=7.69×10^3 *10*; %β^- decay=100.0

^{43}Cl-J$^\pi$,T$_{1/2}$: From Adopted Levels.

^{43}Cl-Q(β^-): From 2012Wa38.

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, MSU 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.

Evaluators consider the decay scheme to be incomplete in view of several uncertain placements of γ transitions and unaccounted 28% *10* β feeding.

^{43}Ar Levels

E(level)†	J$^\pi$	E(level)†	E(level)†	E(level)†	J$^\pi$
0.0	5/2$^{(-)}$‡	1816.65? *23*	2798.4? *5*	4009.2? *3*	
762.02 *8*		1944.96? *21*	3374.8? *5*	4247.02 *18*	(3/2$^+$)@
1381.73 *7*		2344.4 *8*	3395.8? *3*	4289.0? *5*	
1441.43 *11*		2390.47 *15*	3425.5? *5*	4550.8? *4*	
1793.77 *11*	(3/2$^+$)#	2520.35 *13*	3549.4? *7*		

† From least-squares fit to Eγ data.
‡ From Adopted Levels. 1998WiZX suggested 5/2$^-$ or 7/2$^-$.
# From shell-model prediction.
@ Allowed β-decay from (1/2$^+$) parent.

β^- radiations

There is a total of 28% *10* unidentified β feeding (2006Wi10). Up to 8% can be associated with feeding to the ground state. It is possible that some of the unidentified feeding is associated with β-delayed neutron decay of ^{43}Cl.

E(decay)	E(level)	Iβ^-†	Log *ft*	E(decay)	E(level)	Iβ^-†	Log *ft*
(3.14×10^3‡ *10*)	4550.8?	0.53 *12*	5.7 *1*	(5.17×10^3 *10*)	2520.35	3.0 *5*	6.0 *1*
(3.40×10^3‡ *10*)	4289.0?	1.6 *5*	5.4 *2*	(5.30×10^3 *10*)	2390.47	4.6 *7*	5.8 *1*
(3.44×10^3 *10*)	4247.02	5.8 *9*	4.9 *1*	(5.35×10^3 *10*)	2344.4	3	6.0
(3.68×10^3‡ *10*)	4009.2?	0.66 *22*	5.9 *2*	(5.87×10^3 *10*)	1816.65?	0.98 *23*	6.7 *1*
(4.14×10^3‡ *10*)	3549.4?	0.33 *9*	6.5 *1*	(5.90×10^3 *10*)	1793.77	50 *7*	5.0 *1*
(4.26×10^3‡ *10*)	3425.5?	0.74 *17*	6.2 *1*	(6.25×10^3 *10*)	1441.43	1.7 *6*	6.6 *2*
(4.29×10^3‡ *10*)	3395.8?	1.28 *22*	6.0 *1*	(6.31×10^3 *10*)	1381.73	3.3 *6*	6.3 *1*
(4.32×10^3‡ *10*)	3374.8?	0.19 *12*	6.8 *3*	(7.69×10^3‡ *10*)	0.0	<8	>8.5^{1u}
(4.89×10^3 *10*)	2798.4?	0.33 *8*	6.8 *1*				

† Absolute intensity per 100 decays.
‡ Existence of this branch is questionable.

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

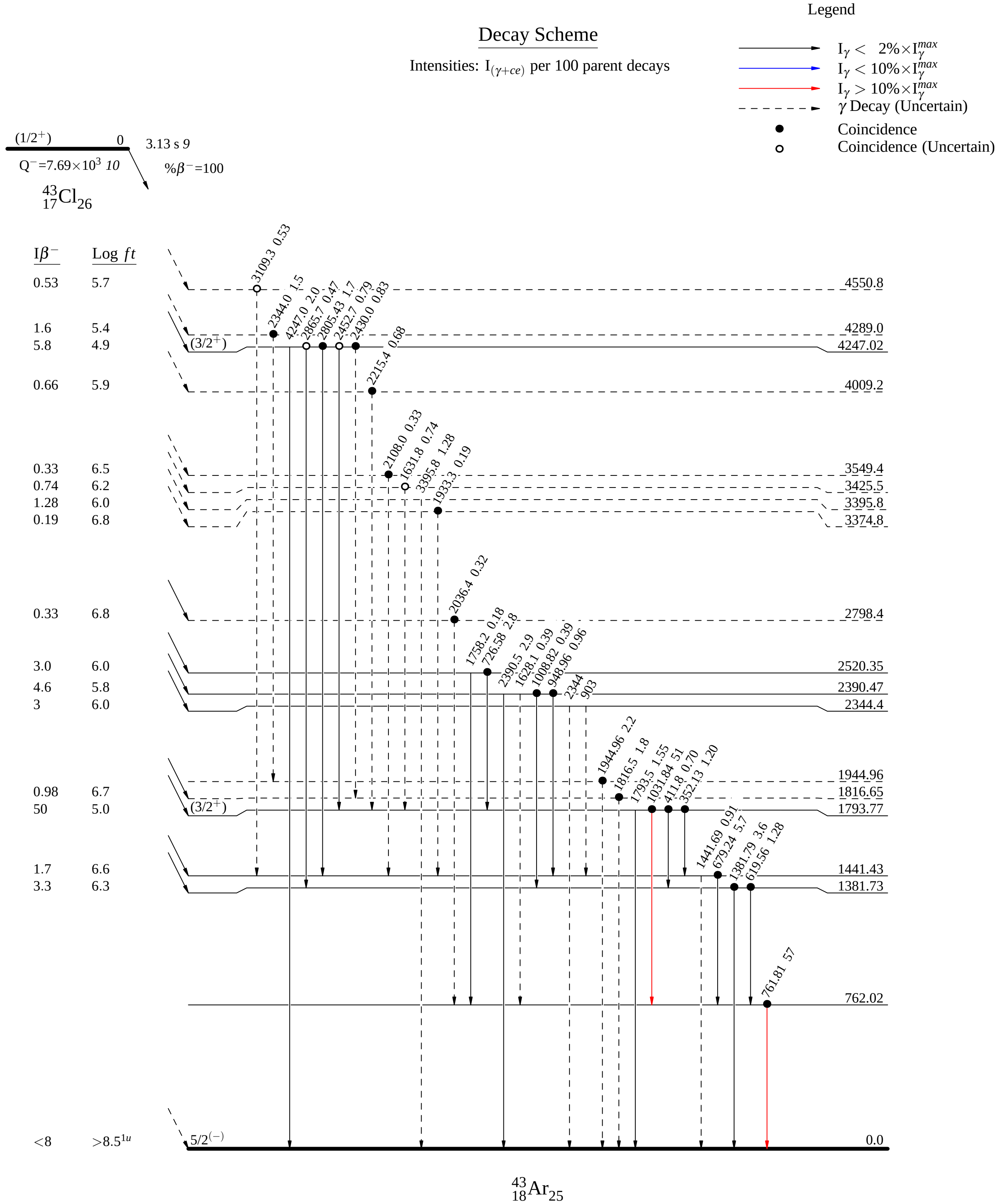
$\gamma(^{43}Ar)$

Iγ normalization: Deduced by 2006Wi10 from intensity of γ-rays from ^{43}Ar decay.

E_γ [†]	I_γ [†&]	E_i(level)	J^π_i	E_f	J^π_f
352.13 *14*	2.1 *3*	1793.77	(3/2$^+$)	1441.43	
411.8 *3*	1.23 *19*	1793.77	(3/2$^+$)	1381.73	
619.56 *10*	2.25 *22*	1381.73		762.02	
679.24 *10*	10.0 *7*	1441.43		762.02	
726.58 *8*	4.94 *24*	2520.35		1793.77	(3/2$^+$)
761.81 *11*	100.0 *21*	762.02		0.0	5/2$^{(-)}$
903 [‡@]		2344.4		1441.43	
948.96 *17*	1.69 *17*	2390.47		1441.43	
1008.82 *24*	0.68 *13*	2390.47		1381.73	
1031.84 *9*	89.7 *24*	1793.77	(3/2$^+$)	762.02	
1381.79 *7*	6.3 *4*	1381.73		0.0	5/2$^{(-)}$
1441.69 [@] *23*	1.6 *3*	1441.43		0.0	5/2$^{(-)}$
1628.1 [@] *6*	0.69 *14*	2390.47		762.02	
1631.8 [@] *5*	1.29 *23*	3425.5?		1793.77	(3/2$^+$)
1758.2 *5*	0.31 *13*	2520.35		762.02	
1793.5 [§] *6*	2.72 *17*	1793.77	(3/2$^+$)	0.0	5/2$^{(-)}$
1816.5 [@] *3*	3.18 *24*	1816.65?		0.0	5/2$^{(-)}$
1933.3 [@] *5*	0.34 *20*	3374.8?		1441.43	
1944.96 [@] *21*	3.9 *3*	1944.96?		0.0	5/2$^{(-)}$
2036.4 [@] *4*	0.57 *11*	2798.4?		762.02	
2108.0 [@] *7*	0.58 *13*	3549.4?		1441.43	
2215.4 [@] *3*	1.2 *3*	4009.2?		1793.77	(3/2$^+$)
2344 [‡@]		2344.4		0.0	5/2$^{(-)}$
2344.0 [@] *4*	2.7 *7*	4289.0?		1944.96?	
2390.5 *4*	5.1 *4*	2390.47		0.0	5/2$^{(-)}$
2430.0 [@] *5*	1.46 *19*	4247.02	(3/2$^+$)	1816.65?	
2452.7 *6*	1.38 *17*	4247.02	(3/2$^+$)	1793.77	(3/2$^+$)
2805.43 *17*	2.9 *3*	4247.02	(3/2$^+$)	1441.43	
2865.7 *4*	0.83 *14*	4247.02	(3/2$^+$)	1381.73	
3109.3 [@] *4*	0.93 *15*	4550.8?		1441.43	
3395.8 [@] *3*	2.24 *20*	3395.8?		0.0	5/2$^{(-)}$
4247.0 *7*	3.5 *7*	4247.02	(3/2$^+$)	0.0	5/2$^{(-)}$

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

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



$^{1}H(^{43}Ar,p')$ **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 NSCL, on a 285 mg/cm^2 Be production 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 *40*	$(3/2^-)$	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,2pγ) 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

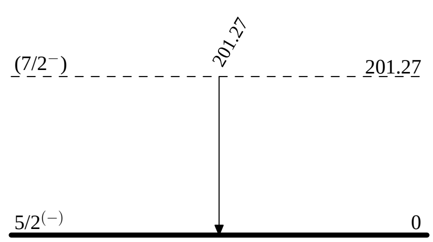
E(level)	J$^\pi$	Comments
0	5/2$^{(-)}$	J$^\pi$: from Adopted Levels.
201.27? *16*	(7/2$^-$)	E(level): this level is uncertain since it has not been observed and confirmed in other experiments. J$^\pi$: from theoretical predictions.

γ(^{43}Ar)

E$_\gamma$	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$
201.27 *16*	201.27?	(7/2$^-$)	0	5/2$^{(-)}$

^{9}Be(^{36}S,2pγ) 2009Mo09

Level Scheme



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

^{48}Ca(α,^{9}Be) 1974Je01

1974Je01: E=77.7 MeV α beam with intensity of ≈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-E) detector, 59 and 35 μm thick, a 260 μm E detector, and a 500 μm reject detector. Measured σ(E). Deduced levels.

^{43}Ar Levels

E(level)
0
1740 *50*
2550 *50*
3560 *70*
4.74×10^{3} *10*

^{208}Pb(^{40}Ar,Xγ) 2011Sz02

2011Sz02: 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. γ-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. Also 2013Sz01.

^{43}Ar Levels

E(level)	J^{π} †	Comments
0.0	(5/2$^-$)	
0+x	(7/2$^-$)	E(level): x ≈ 100 keV predicted. Previous assignment of a 200-keV γ-ray from this level (2009Mo09) was not confirmed in the present work.
762.3 *4*	(3/2$^-$)	
1527.4+x *5*	(11/2$^-$)	J^{π}: assignment based on conclusion from 1999Ma89 that this is a negative parity state which is dominated by a configuration with the valence neutrons in the *fp* shell and new results from 2006Wi10.
1859+x *2*	(9/2$^-$)	J^{π}: assignment based on strong $2^+(^{42}Ar)\otimes\nu f_{7/2}$ component of the wave function for the state, similar to that in ^{41}Ar.

† From theoretical predications by shell-model calculations (2011Sz02).

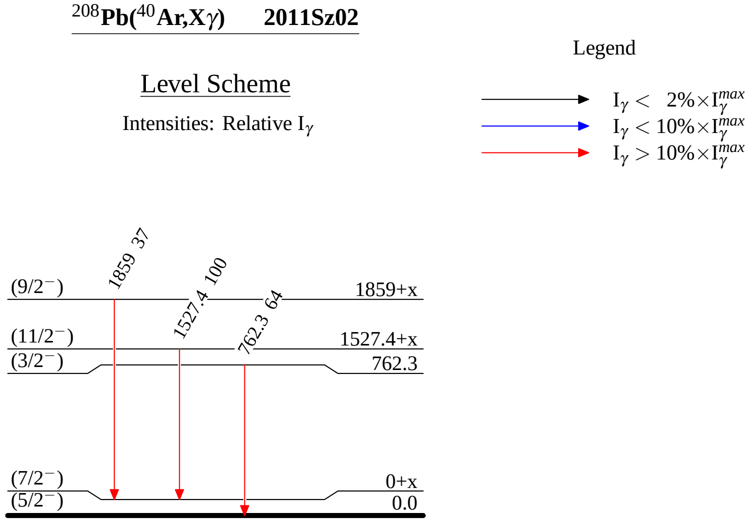
γ(^{43}Ar)

E_γ	I_γ	E_i(level)	J^{π}_i	E_f	J^{π}_f
762.3 *4*	64 *21*	762.3	(3/2$^-$)	0.0	(5/2$^-$)
1527.4 *5*	100 *16*	1527.4+x	(11/2$^-$)	0+x	(7/2$^-$)
1859 *2*	37 *15*	1859+x	(9/2$^-$)	0+x	(7/2$^-$)

^{208}Pb(^{40}Ar,Xγ) 2011Sz02

Level Scheme

Intensities: Relative I_γ



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

Adopted Levels, Gammas

Q(β^-)=1833.4 *5*; S(n)=9624.7 *4*; S(p)=9442 *6*; Q(α)=−9200.1 *18* 2012Wa38
S(2n)=17158.5 *4*, S(2p)=23850 *40* (2012Wa38).
Hyperfine studies, isotope shifts, moments, radius: 2014Pa45, 2014Kr04, 1982To02, 1982Du06.
Mass Measurements: 2007Ya08.

^{43}K Levels

Cross Reference (XREF) Flags

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

E(level)[†]	J$^\pi$[#]	T$_{1/2}$[‡]	XREF	Comments
0	3/2$^+$	22.3 h *1*	ABCDEFGH	%β^-=100 μ=+0.1633 *8* (1982To02,2014StZZ) μ: ABLDS method (1982To02,1982Du06). Other: 1959Pe26. Evaluated rms charge radius=3.4556 fm *86* (2013An02). Adopted (by 1977En02) spectroscopic factor S=4.0 *15* (proton pickup). δ<r^2>(^{47}K,^{43}K)=+0.049 fm^2 *19*(stat) *69*(syst) (2014Kr04) for $\delta\nu$(^{39}K,^{43}K)=+459.0 MHz *12* from literature. 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$^\pi$: spin from atomic-beam method; also from fitting of hyperfine structure (2014Pa45,2014Kr04); parity from L(t,p)=0; L(d,^{3}He)=L(t,α)=2. Configuration=$\pi 1d^{-1}_{3/2}$ (92%) (2014Pa45) from shell-model calculations.
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[a] *6*	7/2$^-$	200 ns *5*	ABC EFGH	μ=+4.43 *5* (1983Ra37,2014StZZ) XREF: F(748). μ: TDPAD 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).
975.32 *6*	3/2$^-$	1.6 ps *+14−6*	ABCDEFGH	XREF: D(1007)H(984). J$^\pi$: L(d,^{3}He)=1; L(t,p)=3.
1109.93 *6*	3/2$^+$	1.0 ps *8*	ABCDEFGH	XREF: F(1119)H(1121). J$^\pi$: L(d,^{3}He)=L(t,α)=L(t,p)=2; 5/2 not allowed by RUL for γ to 1/2$^+$.
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 *10*	(5/2 to 11/2)$^+$		D	J$^\pi$: L(t,p)=4 from 3/2$^+$.
1849.57[a] *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*	(3/2,5/2$^+$)		A C F	J$^\pi$: γ to 1/2$^+$, log *ft*=7.7 from 5/2$^{(-)}$ parent.
1956 *10*	(5/2 to 11/2)$^+$		D	J$^\pi$: L(t,p)=4 from 3/2$^+$.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{43}K Levels (continued)

E(level)[†]	J^{π}[#]	$T_{1/2}$[‡]	XREF	Comments
1986.57 *8*	(9/2)		BC	XREF: C(?). J^{π}: ΔJ=1 stretched dipole to $7/2^+$.
2035 *10*	$3/2^+$		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 $7/2^+$.
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). But the parity is inconsistent with log *ft*=5.8 from $5/2^{(-)}$ parent.
2189.32 *14*	(3/2,5/2,7/2)		A fg	J^{π}: γ to $3/2^+$; log *ft*=7.4 from $5/2^{(-)}$ parent. L(t,α)=(2) for a 2180 group gives $(3/2^+,5/2^+)$ for one of the levels near this energy.
2218 *10*	(3/2 to $9/2)^-$		D	J^{π}: L(t,p)=3 from $3/2^+$.
2344.96 *9*	$(3/2^-)$	0.7 ps *+14−4*	A C	J^{π}: γ decays to $1/2^+$ and $(5/2,7/2)^+$; log *ft*=5.6 from $5/2^{(-)}$ parent.
2451 *10*	$1/2^+$		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 $3/2^+$; ΔJ=2, Q γ to $7/2^+$; possible positive-parity yrast band member.
2548 *10*	$(1/2,3/2,5/2)^-$		D	J^{π}: L(t,p)=1 from $3/2^+$.
2668 *15*	$3/2^+,5/2^+$[@]		FG	
2784 *10*	(1/2 to $7/2)^+$		D	J^{π}: L(t,p)=2 from $3/2^+$.
2879 *10*	(1/2 to $7/2)^+$		D	J^{π}: L(t,p)=2 from $3/2^+$.
2981 *15*			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.
3057.26 *21*	$(5/2)^+$		A fG	J^{π}: L(d,^{3}He)=2; γ to $7/2^-$.
3084 *15*	$3/2^+,5/2^+$		fG	J^{π}: L(d,^{3}He)=2.
3114.69[a] *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).
3150 *18*			G	
3190 *10*	(1/2 to $7/2)^+$		D	J^{π}: L(t,p)=2 from $3/2^+$.
3229 *15*	$3/2^+,5/2^+$[@]		FG	
3264.34 *11*	$(3/2,5/2)^+$		A D	XREF: D(3254). J^{π}: γ to $1/2^+$; L(t,p)=2 from $3/2^+$; log *ft*=5.9 from $5/2^{(-)}$ parent.
3309.86 *13*	$(3/2,5/2)^+$		A D	J^{π}: γ decays to $3/2^-$, $3/2^+$ and $(5/2,7/2)^+$; L(t,p)=2 from $3/2^+$; log *ft*=5.1 from $5/2^{(-)}$ parent is inconsistent with positive parity.
3342 *15*	$3/2^+,5/2^+$[@]		FG	
3393.14 *20*	(3/2 to $7/2)^+$		A D	J^{π}: L(t,p)=2 from $3/2^+$; log *ft*=6.2 from $5/2^{(-)}$ parent.
3455.60 *12*	$(3/2^-)$		A G	J^{π}: γ to $1/2^+$; log *ft*=5.1 from $5/2^{(-)}$ parent.
3580 *30*			G	
3591.28[&] *10*	$(15/2^+)$		B	J^{π}: ΔJ=2 stretched quadrupole to $(11/2^+)$ from DCO ratios possible positive-parity yrast band member in.
3608.46 *15*	$(5/2^-,7/2^-)$		A	J^{π}: log *ft*=5.1 from $5/2^{(-)}$ parent; γ transitions to $7/2^-$ and $7/2^+$.
3646.1 *4*	$(3/2,5/2,7/2^+)$		A G	J^{π}: γ transitions to $3/2^+$ and $(5/2,7/2)^+$; log *ft*=5.9 from $5/2^{(-)}$.
3714.16 *22*	$(3/2^+,5/2^+)$		A FG	XREF: F(3730). J^{π}: γ transitions to $3/2^+$, $3/2^-$ and $(5/2,7/2)^+$; L(d,^{3}He)=(2); log *ft*=5.6 from $5/2^{(-)}$ is inconsistent with positive parity.
3837 *15*			G	
3880 *15*	$(3/2^+,5/2^+)$		FG	J^{π}: L(d,^{3}He)=(2).
3970? *30*			G	
3985.28 *25*			B	
4018 *15*	$3/2^+,5/2^+$[@]		FG	
4070 *30*			G	
4124 *15*	$3/2^+,5/2^+$[@]		FG	J^{π}: L(d,^{3}He)=2; but L(t,α)=(0) is inconsistent.
4177 *15*			G	
4234 *15*			G	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{43}K Levels (continued)

E(level)†	Jπ#	XREF	Comments
4290 *30*		G	
4410 *40*		G	
4472 *15*	3/2+,5/2+@	FG	
4540 *40*		G	
4540.4 *3*		B	
4680? *40*		G	
4794 *15*	3/2+,5/2+@	FG	
4860? *40*		G	
4920? *40*		G	
4930.3 *3*	(19/2−)	B	Jπ: 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 *40*		G	
5150? *40*		G	
5194 *30*	3/2+,5/2+@	FG	
5260 *40*		G	
5380 *40*		G	
5610 *30*	3/2+,5/2+@	F	
5900 *30*	3/2+,5/2+@	F	
7450 *30*	(3/2+,5/2+)	F	Jπ: 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+. Arguments based on log *ft* values are considered as tentative since the decay scheme of ^{43}Ar decay is not considered as well established.
@ L(d,^{3}He) and/or L(t,α)=2.
& Band(A): Possible positive-parity yrast band. Band from 1992Ko15.
a Band(B): Possible negative-parity yrast band. Band from 1992Ko15.

γ(^{43}K)

Ei(level)	Jπi	Eγ†	Iγ‡	Ef	Jπf	Mult.§	δ§	Comments
561.20	1/2+	561.10 *5*	100	0	3/2+			
738.30	7/2−	738.23 *6*	100	0	3/2+	M2+E3	−0.13 *2*	B(M2)(W.u.)=0.0567 *15*; B(E3)(W.u.)=7.7 *24*
975.32	3/2−	414.0 *1*	4.3 *3*	561.20	1/2+	[E1]		B(E1)(W.u.)=0.00020 *+8−18*
		975.3 *1*	100.0 *3*	0	3/2+	[E1]		B(E1)(W.u.)=0.00036 *+14−32*
1109.93	3/2+	548.62 *6*	43 *5*	561.20	1/2+			
		1110.1 *1*	100 *5*	0	3/2+			
1206.91	(5/2,7/2)+	1206.95 *9*	100	0	3/2+			
1509.99	7/2+	303.09 *5*	9 *2*	1206.91	(5/2,7/2)+			
		1510.05 *7*	100 *2*	0	3/2+	E2		B(E2)(W.u.)=1.3 *4*
1549.96	3/2+,5/2+	439.3 *3*	12 *2*	1109.93	3/2+			
		1550.0 *1*	100 *2*	0	3/2+			
1849.57	11/2−	1111.14 *6*	100	738.30	7/2−	E2		B(E2)(W.u.)=8.1 *22*
1865.65	(3/2,5/2+)	755.0 *3*	1.5 *5*	1109.93	3/2+			
		890.4 *1*	100 *3*	975.32	3/2−			
		1304.3 *7*	2.6 *5*	561.20	1/2+			
		1866.1 *2*	59 *3*	0	3/2+			
1986.57	(9/2)	476.58 *6*	100	1509.99	7/2+	D		
2048.88	(9/2)	1310.58 *7*	100	738.30	7/2−	D		

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Adopted Levels, Gammas (continued)

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

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

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Adopted Levels, Gammas (continued)

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

E_i(level)	J^π_i	E_γ †	I_γ ‡	E_f	J^π_f
3714.16	$(3/2^+,5/2^+)$	2506.7 *15*	10 *3*	1206.91	$(5/2,7/2)^+$
		2603.4 *4*	10 *4*	1109.93	$3/2^+$
		2739.5 *7*	22 *4*	975.32	$3/2^-$
		3714.3 *3*	100 *6*	0	$3/2^+$
3985.28		1477.0 *3*	100 *20*	2508.34	$(11/2^+)$
		1936.4 *5*	64 *17*	2048.88	(9/2)
4540.4		555.2 *3*	100 *22*	3985.28	
		1401.0 *5*	86 *22*	3139.39	(13/2)
		1553.1 *6*	93 *22*	2986.76	$(13/2^-)$
4930.3	$(19/2^-)$	1815.61 *26*	100 *15*	3114.69	$15/2^-$

† From β^- decay, (α,pγ), (t,pγ) and (^{36}S,npγ).

‡ Primarily from β^- decay. Weighted averages are taken when values with uncertainties are also available from ^{9}Be(^{36}S,npγ), (α,pγ), (t,pγ).

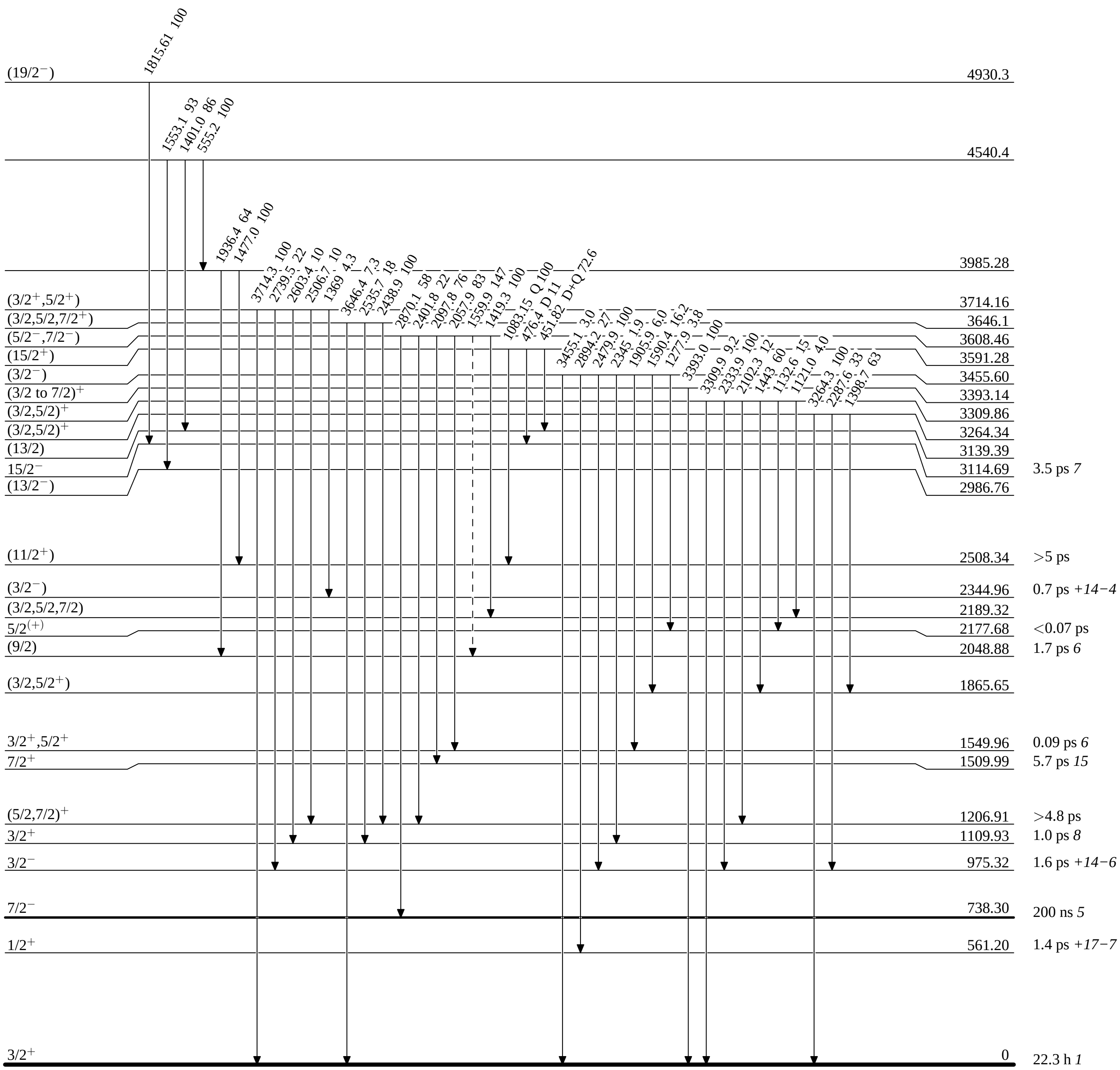
§ From (α,pγ),(t,pγ) and (^{36}S,npγ).

& Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

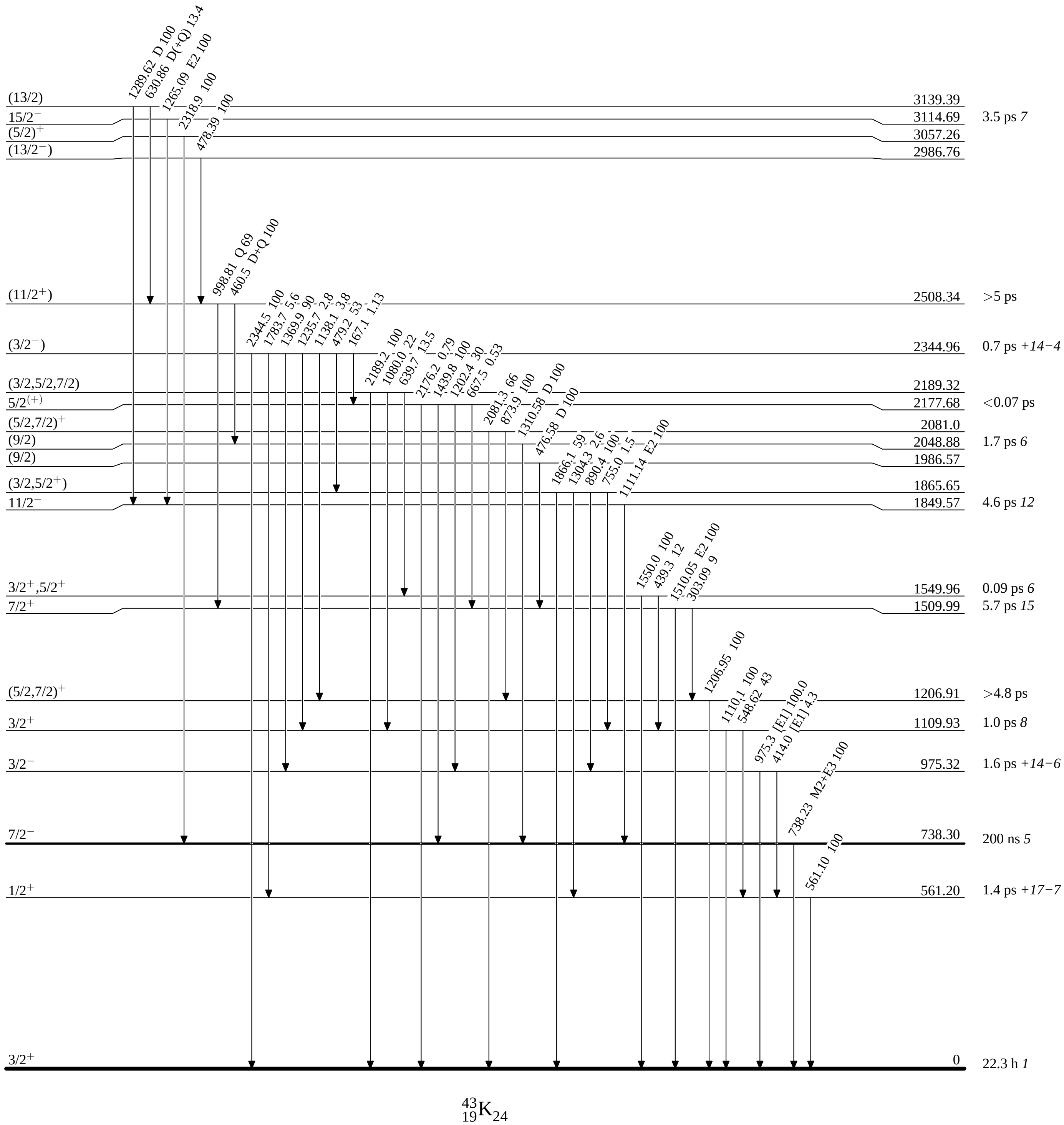


$^{43}_{19}K_{24}$

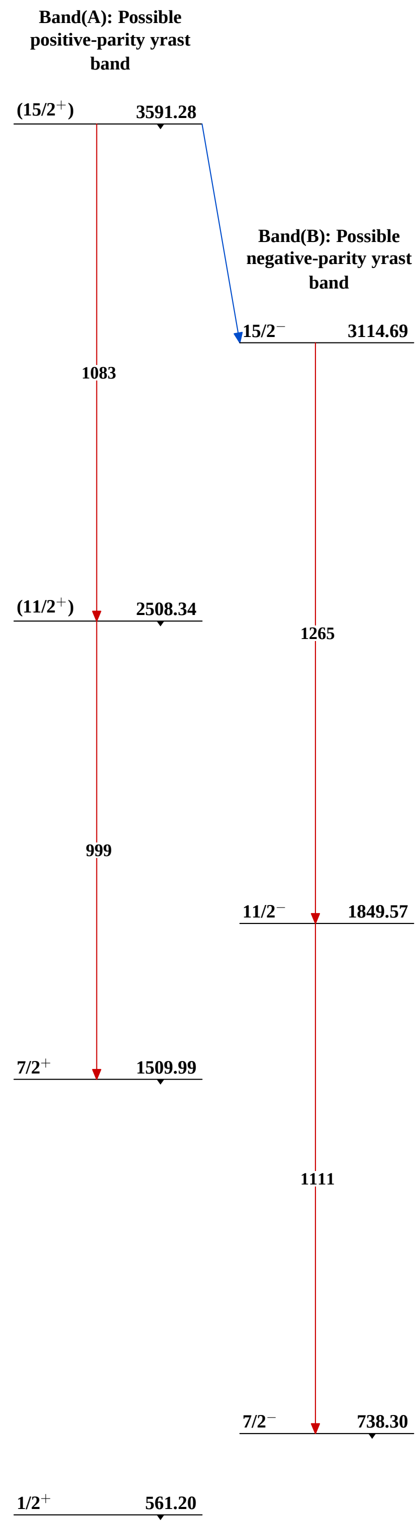
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



Adopted Levels, Gammas



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

^{43}Ar β^- decay (5.37 min) 1978Hu10

Parent: ^{43}Ar: E=0; J$^\pi$=5/2$^{(-)}$; $T_{1/2}$=5.37 min *6*; Q(β^-)=4566 *5*; %β^- decay=100.0
^{43}Ar-J$^\pi$,$T_{1/2}$: From Adopted Levels of ^{43}Ar.
^{43}Ar-Q(β^-): From 2012Wa38.
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.
The decay scheme is considered incomplete in view of no uncertainties available on γ-ray intensities. Thus all β feedings and log *ft* values are considered as approximate. In Adopted dataset, log *ft* have been used but the Jπ based on these are considered as tentative.

^{43}K Levels

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

E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]
0	3/2$^+$	1549.90 *9*	3/2$^+$,5/2$^+$	3264.18 *10*	(3/2,5/2)$^+$
561.32 *7*	1/2$^+$	1865.73 *7*	(3/2,5/2$^+$)	3310.11 *9*	(3/2,5/2)$^+$[@]
738.03 *8*	7/2$^-$	2048.5?[#] *1*	(9/2)	3393.14 *20*	(3/2,5/2,7/2)$^+$
975.31 *6*	3/2$^-$	2177.72 *8*	5/2$^{(+)}$	3455.49 *9*	(3/2$^-$)
1109.96 *7*	3/2$^+$	2189.32 *11*	(3/2,5/2,7/2)	3608.50 *12*	(5/2$^-$,7/2$^-$)
1206.94 *10*	(5/2,7/2)$^+$	2345.02 *7*	(3/2$^-$)	3646.1 *4*	(3/2,5/2,7/2$^+$)
1509.85 *9*	7/2$^+$	3057.00 *22*	(5/2)$^+$	3714.29 *17*	(3/2$^+$,5/2$^+$)

[†] From least-squares fit to Eγ data. Since the quoted Δ(Eγ) result in a poor fit, these were increased to 0.2 keV for strong γ-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. But the adopted Jπ=(9/2) is inconsistent with the log *ft*=7.8 from 5/2$^{(-)}$ parent.
[@] log *ft*=5.1 allowed decay from 5/2$^{(-)}$ parent is inconsistent with parity=+.

β^- radiations

E(decay)	E(level)	Iβ^-[‡]	Log *ft*	E(decay)	E(level)	Iβ^-[‡]	Log *ft*	E(decay)	E(level)	Iβ^-[‡]	Log *ft*
(852 *5*)	3714.29	0.47	5.5	(1509 *5*)	3057.00	1.1	6.1	(3359 *5*)	1206.94	1.5	7.4
(920 *5*)	3646.1	0.28	5.8	(2221 *5*)	2345.02	19	5.6	(3456 *5*)	1109.96	0.9	7.7
(958 *5*)	3608.50	1.5	5.2	(2377 *5*)	2189.32	0.39	7.4	(3591 *5*)	975.31	16	6.5
(1111 *5*)	3455.49	3.5	5.1	(2388 *5*)	2177.72	16	5.8	(3828 *5*)	738.03	1.4	7.7
(1173 *5*)	3393.14	0.38	6.1	(2700 *5*)	1865.73	0.32	7.7	(4005[#] *5*)	561.32	0.1	9.0
(1256 *5*)	3310.11	5.5	5.1	(3016 *5*)	1549.90	0.29	7.9	(4566 *5*)	0	30[†]	6.7
(1302 *5*)	3264.18	1.0	5.9	(3056 *5*)	1509.85	0.37	7.9				

[†] Estimated (by 1978Hu10) from a comparison of the observed ^{43}Ar-^{43}K (parent-daughter) activities with those expected from series decay.
[‡] Absolute intensity per 100 decays.
[#] Existence of this branch is questionable.

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

$\gamma(^{43}K)$

Iγ normalization: Σ(Iγ to g.s.)=70 *7*, based on Iβ(g.s.)=30 *7* (1978Hu10).

E_γ	I_γ[d]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	δ
167.1 *1*	2.5	2345.02	(3/2$^-$)	2177.72	5/2$^{(+)}$		
^{x}231.4 *1*	2.8						
^{x}236.2 *1*	3.4						
302.9 *2*	1.9	1509.85	7/2$^+$	1206.94	(5/2,7/2)$^+$		
413.9 *1*	42.9	975.31	3/2$^-$	561.32	1/2$^+$		
439.3 *2*	2.8	1549.90	3/2$^+$,5/2$^+$	1109.96	3/2$^+$		
479.2 *1*	116.0	2345.02	(3/2$^-$)	1865.73	(3/2,5/2$^+$)		
548.5 *1*	13.4	1109.96	3/2$^+$	561.32	1/2$^+$		
561.1 *1*	94.0	561.32	1/2$^+$	0	3/2$^+$		
^{x}587.0[†] *1*	9.0						
639.7 *3*	2.7	2189.32	(3/2,5/2,7/2)	1549.90	3/2$^+$,5/2$^+$		
667.5 *2*	1.9	2177.72	5/2$^{(+)}$	1509.85	7/2$^+$		
738.1 *1*	454.8	738.03	7/2$^-$	0	3/2$^+$	M2+E3[§]	−0.13[§] *2*
755.0 *3*	1.8	1865.73	(3/2,5/2$^+$)	1109.96	3/2$^+$		
^{x}812.4 *4*	1.3						
^{x}878.2 *8*	0.9						
890.4 *1*	118.3	1865.73	(3/2,5/2$^+$)	975.31	3/2$^-$		
^{x}910.5 *9*	1.0						
^{x}922.5 *5*	1.7						
974.9[&] *1*	1000	975.31	3/2$^-$	0	3/2$^+$		
1080.0[#] *2*	4.6	2189.32	(3/2,5/2,7/2)	1109.96	3/2$^+$		
1110.1 *1*	31.2	1109.96	3/2$^+$	0	3/2$^+$		
1121.0 *2*	3.2	3310.11	(3/2,5/2)$^+$	2189.32	(3/2,5/2,7/2)		
1132.6 *1*	12.2	3310.11	(3/2,5/2)$^+$	2177.72	5/2$^{(+)}$		
1138.1 *1*	8.7	2345.02	(3/2$^-$)	1206.94	(5/2,7/2)$^+$		
^{x}1146.4 *2*	9.1						
^{x}1184.3 *3*	5.1						
1202.4 *3*	98.3	2177.72	5/2$^{(+)}$	975.31	3/2$^-$		
1207.1 *3*	75.8	1206.94	(5/2,7/2)$^+$	0	3/2$^+$		
1235.7[a] *2*	6.3	2345.02	(3/2$^-$)	1109.96	3/2$^+$		
^{x}1255.6 *3*	3.2						
1277.9 *5*	2.5	3455.49	(3/2$^-$)	2177.72	5/2$^{(+)}$		
1304.3 *7*	3.1	1865.73	(3/2,5/2$^+$)	561.32	1/2$^+$		
1311.4[e] *1*	22.7	2048.5?	(9/2)	738.03	7/2$^-$		
1369	0.4	3714.29	(3/2$^+$,5/2$^+$)	2345.02	(3/2$^-$)		
1369.9 *1*	200.0	2345.02	(3/2$^-$)	975.31	3/2$^-$		
1398.7 *1*	9.5	3264.18	(3/2,5/2)$^+$	1865.73	(3/2,5/2$^+$)		
1419.3 *1*	12.9	3608.50	(5/2$^-$,7/2$^-$)	2189.32	(3/2,5/2,7/2)		
1439.8 *1*	369.0	2177.72	5/2$^{(+)}$	738.03	7/2$^-$		
1443	48.0	3310.11	(3/2,5/2)$^+$	1865.73	(3/2,5/2$^+$)		
^{x}1487.8 *5*	2.7						
1509.7 *1*	20.7	1509.85	7/2$^+$	0	3/2$^+$		
1550.0 *1*	22.9	1549.90	3/2$^+$,5/2$^+$	0	3/2$^+$		
1559.9[ce] *1*	15.9	3608.50	(5/2$^-$,7/2$^-$)	2048.5?	(9/2)		
1590.4 *2*	10.6	3455.49	(3/2$^-$)	1865.73	(3/2,5/2$^+$)		
^{x}1605.7 *8*	2.6						
^{x}1621.7 *5*	5.5						
^{x}1713.3 *6*	3.2						
^{x}1724.6 *2*	9.3						
^{x}1750.0 *5*	2.0						

Continued on next page (footnotes at end of table)

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

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

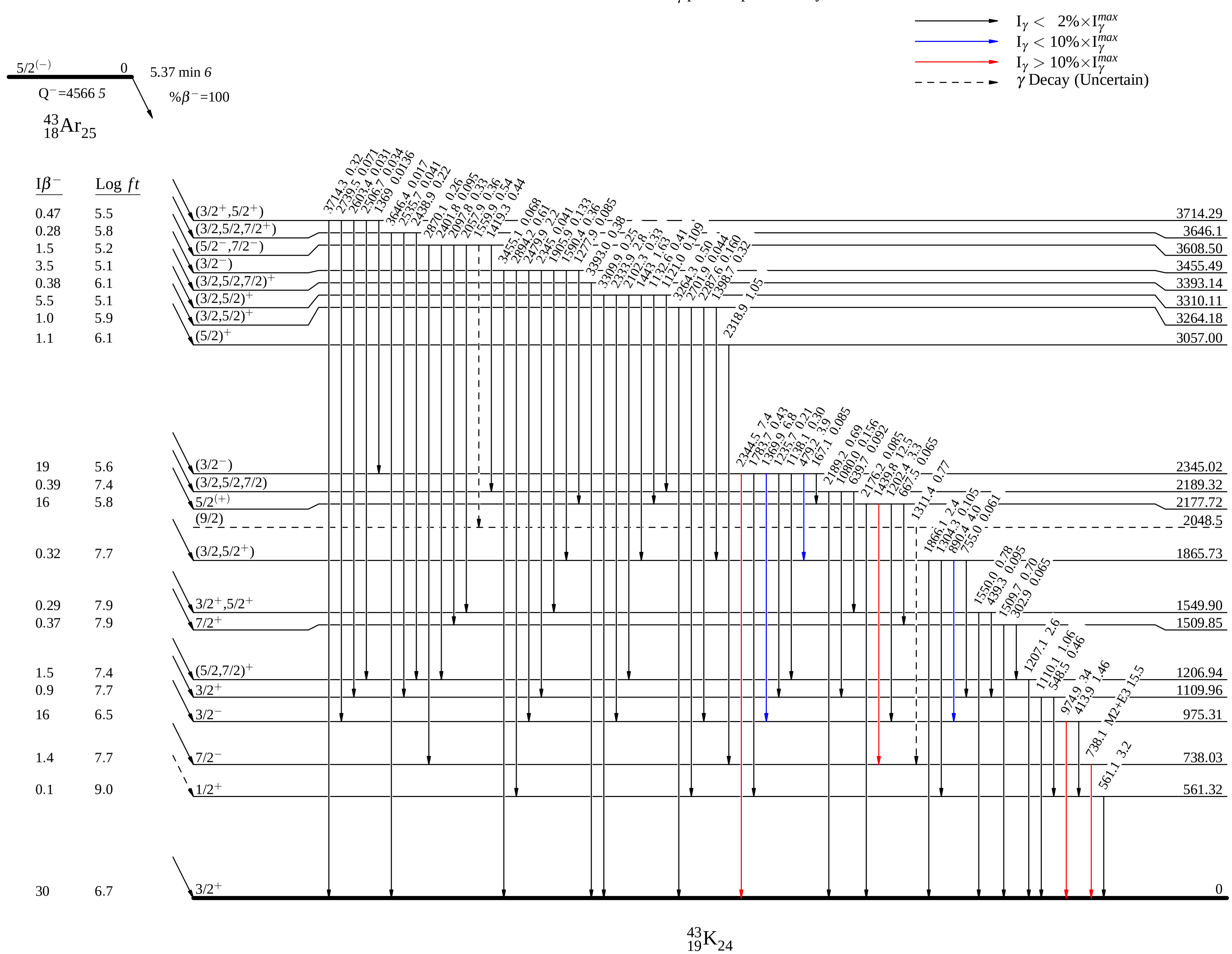
E_γ	I_γ[d]	E_i(level)	J_i^π	E_f	J_f^π
[x]1758.2[‡] *2*	10.2				
1783.7 *2*	12.6	2345.02	$(3/2^-)$	561.32	$1/2^+$
[x]1849.6 *8*	2.5				
1866.1[@] *1*	70.4	1865.73	$(3/2,5/2^+)$	0	$3/2^+$
[x]1889.2 *7*	3.0				
1905.9 *6*	3.9	3455.49	$(3/2^-)$	1549.90	$3/2^+,5/2^+$
[x]1950.8 *3*	10.0				
2057.9 *3*	10.7	3608.50	$(5/2^-,7/2^-)$	1549.90	$3/2^+,5/2^+$
2097.8 *5*	9.8	3608.50	$(5/2^-,7/2^-)$	1509.85	$7/2^+$
2102.3 *5*	9.8	3310.11	$(3/2,5/2)^+$	1206.94	$(5/2,7/2)^+$
2176.2 *7*	2.5	2177.72	$5/2^{(+)}$	0	$3/2^+$
2189.2 *3*	20.4	2189.32	(3/2,5/2,7/2)	0	$3/2^+$
2287.6[b] *2*	4.7	3264.18	$(3/2,5/2)^+$	975.31	$3/2^-$
2318.9 *2*	31.0	3057.00	$(5/2)^+$	738.03	$7/2^-$
2333.9 *2*	81.9	3310.11	$(3/2,5/2)^+$	975.31	$3/2^-$
2344.5 *2*	217.3	2345.02	$(3/2^-)$	0	$3/2^+$
2345	1.2	3455.49	$(3/2^-)$	1109.96	$3/2^+$
2401.8 *3*	2.8	3608.50	$(5/2^-,7/2^-)$	1206.94	$(5/2,7/2)^+$
2438.9 *5*	6.4	3646.1	$(3/2,5/2,7/2^+)$	1206.94	$(5/2,7/2)^+$
2479.9 *1*	65.5	3455.49	$(3/2^-)$	975.31	$3/2^-$
2506.7 *15*	1.0	3714.29	$(3/2^+,5/2^+)$	1206.94	$(5/2,7/2)^+$
2535.7 *7*	1.2	3646.1	$(3/2,5/2,7/2^+)$	1109.96	$3/2^+$
2603.4 *4*	0.9	3714.29	$(3/2^+,5/2^+)$	1109.96	$3/2^+$
2701.9 *5*	1.3	3264.18	$(3/2,5/2)^+$	561.32	$1/2^+$
2739.5 *7*	2.1	3714.29	$(3/2^+,5/2^+)$	975.31	$3/2^-$
2870.1 *2*	7.5	3608.50	$(5/2^-,7/2^-)$	738.03	$7/2^-$
2894.2 *2*	17.9	3455.49	$(3/2^-)$	561.32	$1/2^+$
[x]2976.2 *3*	2.8				
3264.3 *2*	14.7	3264.18	$(3/2,5/2)^+$	0	$3/2^+$
3309.9 *2*	7.4	3310.11	$(3/2,5/2)^+$	0	$3/2^+$
[x]3380.6 *7*	0.8				
3393.0 *2*	11.2	3393.14	$(3/2,5/2,7/2)^+$	0	$3/2^+$
3455.1 *4*	2.0	3455.49	$(3/2^-)$	0	$3/2^+$
3646.4 *5*	0.5	3646.1	$(3/2,5/2,7/2^+)$	0	$3/2^+$
3714.3 *2*	9.5	3714.29	$(3/2^+,5/2^+)$	0	$3/2^+$

[†] In coin with 1758γ.
[‡] In coin with 587γ.
[§] From Adopted Gammas.
[&] Level-energy difference=975.4 *1*.
[@] Level-energy difference=1865.6 *1*.
[#] Level-energy difference=1079.3 *2*.
[a] Level-energy difference=1235.0 *2*.
[b] Poor fit. Level-energy difference=2288.6 *2*.
[c] Placement (evaluator) based on 1560-1310 $\gamma\gamma$ coin.
[d] For absolute intensity per 100 decays, multiply by 0.034 *4*.
[e] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

^{43}Ar β^- decay (5.37 min) 1978Hu10

Decay Scheme

Intensities: I_γ per 100 parent decays



$^{9}Be(^{36}S,np\gamma)$ 1992Ko15,1998Mo16

1992Ko15: E=100 MeV ^{36}S beam was produced from 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

E(level)	J^π[†]	E(level)	J^π[†]	E(level)	J^π[†]	E(level)	J^π[†]
0	$3/2^+$	1206.97 *7*	$(5/2,7/2)^+$	2081.0 *4*	$(5/2,7/2)^+$	3591.90[a] *8*	$(15/2^+)$[#]
561.13[a] *4*	$1/2^+$	1510.07[a] *7*	$7/2^+$	2508.84[a] *7*	$(11/2^+)$[#]	3985.69 *24*	
738.28[b] *5*	$7/2^-$	1850.43[b] *7*	$11/2^-$[‡]	2987.26 *17*	$(13/2^-)$[@]	4540.9 *3*	
975.09 *4*	$3/2^-$	1986.66 *10*	$(9/2)$[#]	3115.53[b] *10*	$15/2^-$[‡]	4931.2 *3*	$(19/2^-)$[&]
1109.83 *6*	$3/2^+$	2048.89 *7*	$(9/2)$[#]	3140.04 *8*	$(13/2)$[#]		

† From Adopted Levels unless otherwise noted.
‡ From ΔJ=2 transitions indicated by R_{DCO} (1992Ko15).
\# From ΔJ=1 transitions indicated by R_{DCO} (1992Ko15).
@ Probably high spin formed in coupling an $f_{7/2}$ proton with four $f_{7/2}$ neutrons in a 4^+ configuration (1992Ko15).
& 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).
a Band(A): Possible positive-parity yrast band (1992Ko15).
b Band(B): Possible negative-parity yrast band (1992Ko15).

$\gamma(^{43}K)$

Unplaced γ-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_γ[†]	I_γ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[@]	δ[@]	Comments
303.10 *5*	4.42 *14*	1510.07	$7/2^+$	1206.97	$(5/2,7/2)^+$			
413.97[§] *5*	0.58[§] *7*	975.09	$3/2^-$	561.13	$1/2^+$			
451.82 *4*	7.7 *2*	3591.90	$(15/2^+)$	3140.04	$(13/2)$	D+Q	−0.2	R_{DCO}=0.89 *5* gated on 3140 to 1850 transition; 1.06 *12* gated on 3140 to 2509 transition.
459.93 *4*	21.2 *6*	2508.84	$(11/2^+)$	2048.89	$(9/2)$	D+Q	−0.2	R_{DCO}=0.92 *3* gated on 2049 to 738 transition.
476.4[§] *3*	1.2[§] *5*	3591.90	$(15/2^+)$	3115.53	$15/2^-$	D		R_{DCO}=0.77 *10* gated on 3116 to 1850 transition.
476.58 *6*	5.2 *3*	1986.66	$(9/2)$	1510.07	$7/2^+$	D		R_{DCO}=1.31 *9* gated on 1510 g.s. transition.
478.39 *16*	2.36 *10*	2987.26	$(13/2^-)$	2508.84	$(11/2^+)$			R_{DCO}=1.04 *11* gated on 2509 to 1510 transition; 0.90 *3* gated on 2509 to 2049 transition.
[x]540.7 *4*	4.6 *13*							
[x]543.1 *5*	4.0 *13*							
548.65[§] *5*	6.8[§] *3*	1109.83	$3/2^+$	561.13	$1/2^+$			

Continued on next page (footnotes at end of table)

$^{9}Be(^{36}S,np\gamma)$ 1992Ko15,1998Mo16 (continued)

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

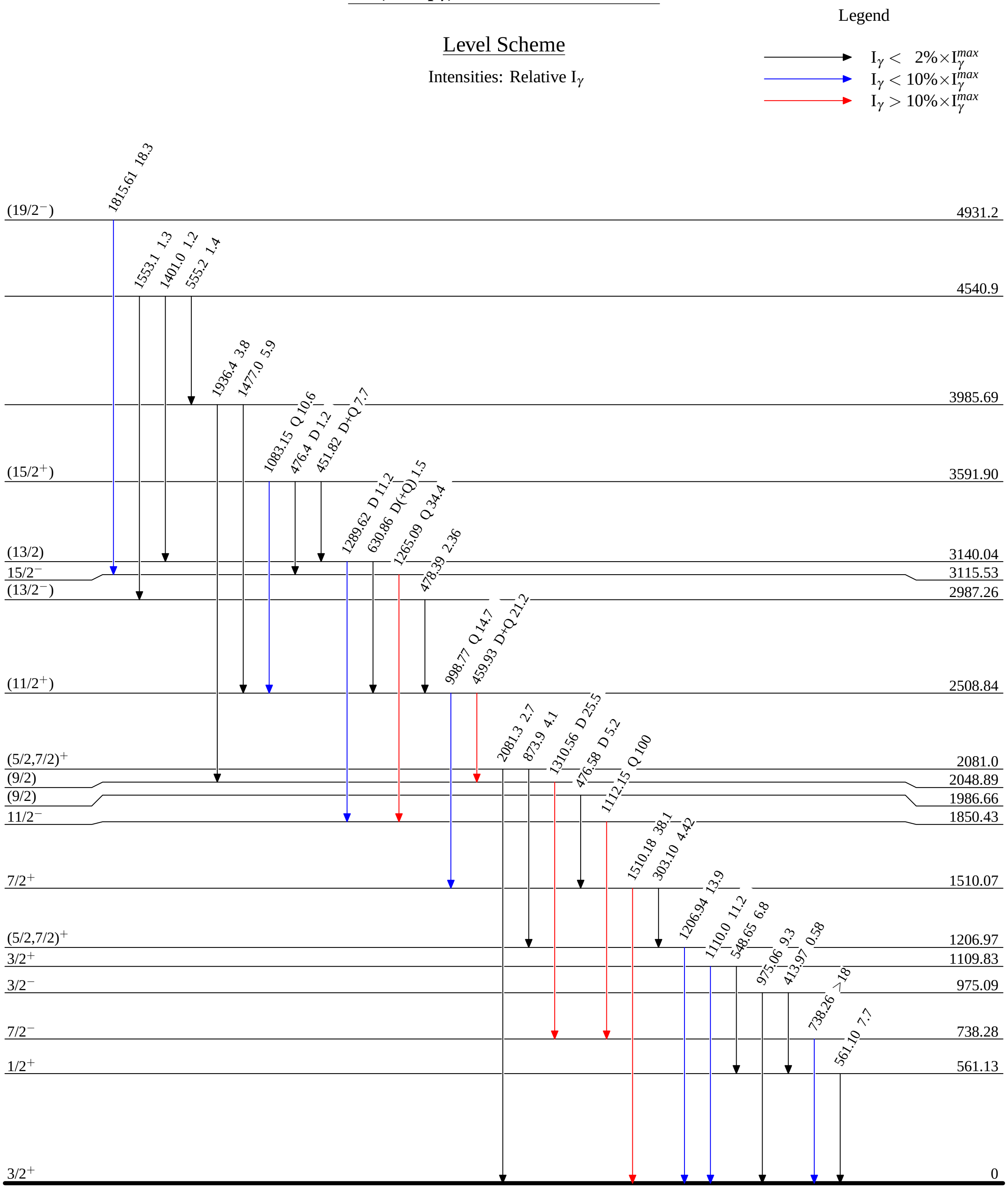
E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	Comments
555.2[&] *3*	1.4[&] *3*	4540.9		3985.69			
561.10 *5*	7.7 *6*	561.13	1/2$^+$	0	3/2$^+$		
630.86[§] *12*	1.5[§] *2*	3140.04	(13/2)	2508.84	(11/2$^+$)	D(+Q)	R_{DCO}=1.42 *22* gated on 2509 to 1510 transition; 1.32 *3* gated on 2509 to 2049 transition.
738.26 *5*	>18	738.28	7/2$^-$	0	3/2$^+$		I_γ: the decaying state is a long-lived state and most γ transitions from this state were outside the coincidence window (1992Ko15). It is greater than 100 from intensity balance.
873.9[&] *4*	4.1[&] *10*	2081.0	(5/2,7/2)$^+$	1206.97	(5/2,7/2)$^+$		
975.06 *5*	9.3 *3*	975.09	3/2$^-$	0	3/2$^+$		
998.77 *8*	14.7 *8*	2508.84	(11/2$^+$)	1510.07	7/2$^+$	Q	R_{DCO}=0.72 *5* gated on 1510 g.s. transition.
1083.15 *7*	10.6 *12*	3591.90	(15/2$^+$)	2508.84	(11/2$^+$)	Q	R_{DCO}=0.64 *7* gated on 2509 to 1510 transition.
1110.0 *1*	11.2 *22*	1109.83	3/2$^+$	0	3/2$^+$		
1112.15 *6*	100 *3*	1850.43	11/2$^-$	738.28	7/2$^-$	Q	R_{DCO}=0.77 *3* gated on 738 g.s. transition.
1206.94 *9*	13.9 *4*	1206.97	(5/2,7/2)$^+$	0	3/2$^+$		
1265.09 *7*	34.4 *11*	3115.53	15/2$^-$	1850.43	11/2$^-$	Q	R_{DCO}=0.93 *4* gated on 1850 to 738 transition.
1289.62 *8*	11.2 *13*	3140.04	(13/2)	1850.43	11/2$^-$	D	R_{DCO}=1.5 *1* gated on 1850 to 738 transition.
1310.56 *7*	25.5 *7*	2048.89	(9/2)	738.28	7/2$^-$	D	R_{DCO}=1.22 *10* gated on 738 g.s. transition.
1401.0[&] *5*	1.2[&] *3*	4540.9		3140.04	(13/2)		
1477.0[&] *3*	5.9[&] *12*	3985.69		2508.84	(11/2$^+$)		
1510.18 *18*	38.1 *12*	1510.07	7/2$^+$	0	3/2$^+$		
1553.1[&] *6*	1.3[&] *3*	4540.9		2987.26	(13/2$^-$)		
[x]1798.5 *4*	4.5 *12*						
[x]1810.0 *6*	4.5 *13*						
1815.61[&] *26*	18.3[&] *27*	4931.2	(19/2$^-$)	3115.53	15/2$^-$		
1936.4[&] *5*	3.8[&] *10*	3985.69		2048.89	(9/2)		
2081.3[&] *7*	2.7[&] *9*	2081.0	(5/2,7/2)$^+$	0	3/2$^+$		
[x]2124.9 *4*	7.0 *14*						
[x]2219.8 *6*	4.0 *10*						
[x]2442.3 *6*	2.9 *10*						
[x]2521.6 *5*	4.3 *11*						

† Weighted average from 1992Ko15 and 1998Mo16 unless otherwise noted.
‡ Weighted or unweighted average from 1992Ko15 and 1998Mo16 unless otherwise noted.
§ From 1992Ko15 only.
& From 1998Mo16 only.
@ From 1992Ko15.
x γ ray not placed in level scheme.

^{9}Be(^{36}S,npγ) 1992Ko15,1998Mo16

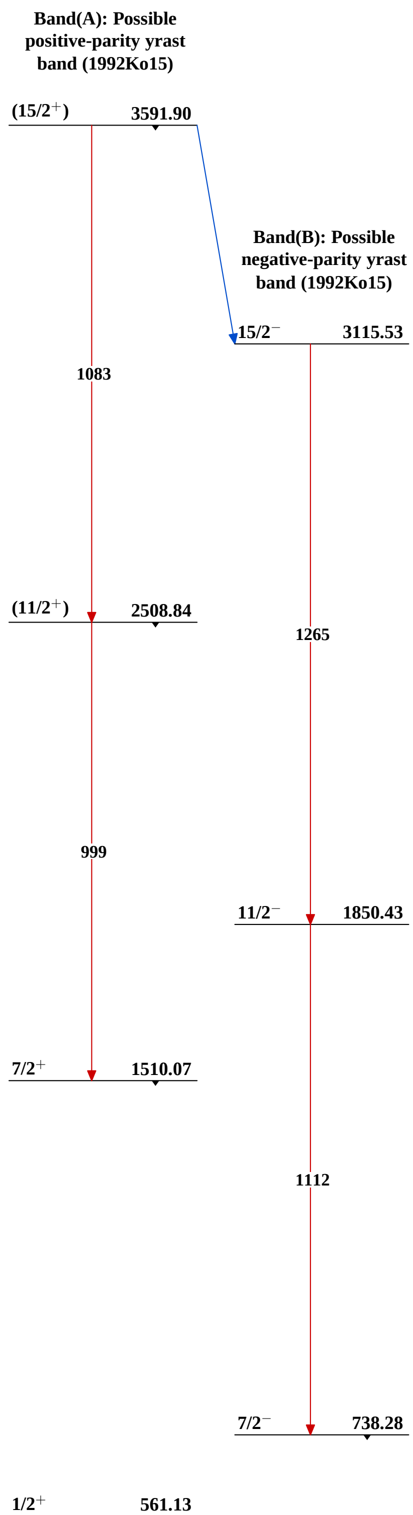
Level Scheme

Intensities: Relative I_γ



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

^{9}Be(^{36}S,npγ) 1992Ko15,1998Mo16



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

^{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, $\gamma\gamma$, $\gamma(\theta)$, 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 DSAM.

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 $\gamma(\theta$,H,t). Deduced g factor and $T_{1/2}$, hyperfine interactions.

1980OlZX: E=116-11.9 MeV α beam. Measured $\gamma(\theta)$, $\gamma\gamma$, $T_{1/2}$ 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 (TUNL) FN tandem accelerator facility. Argon gas target. Two 7.6 by 7.6 cm NaI detectors for detecting γ-rays. Measured $\gamma\gamma(\theta$,H,t). Deduced g factor, $T_{1/2}$.

1976De41: E=12.7 MeV. Measured p$\gamma(\theta$,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 $\gamma(\theta)$, 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 $\sigma(E_p)$, pγ.

^{43}K Levels

E(level)†	J$^{\pi}$#	$T_{1/2}$	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?‡ *1*	(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‡ *1*	(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).

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

γ(^{43}K)

A_2, A_4 and polarization coefficients are from 1979Be28.

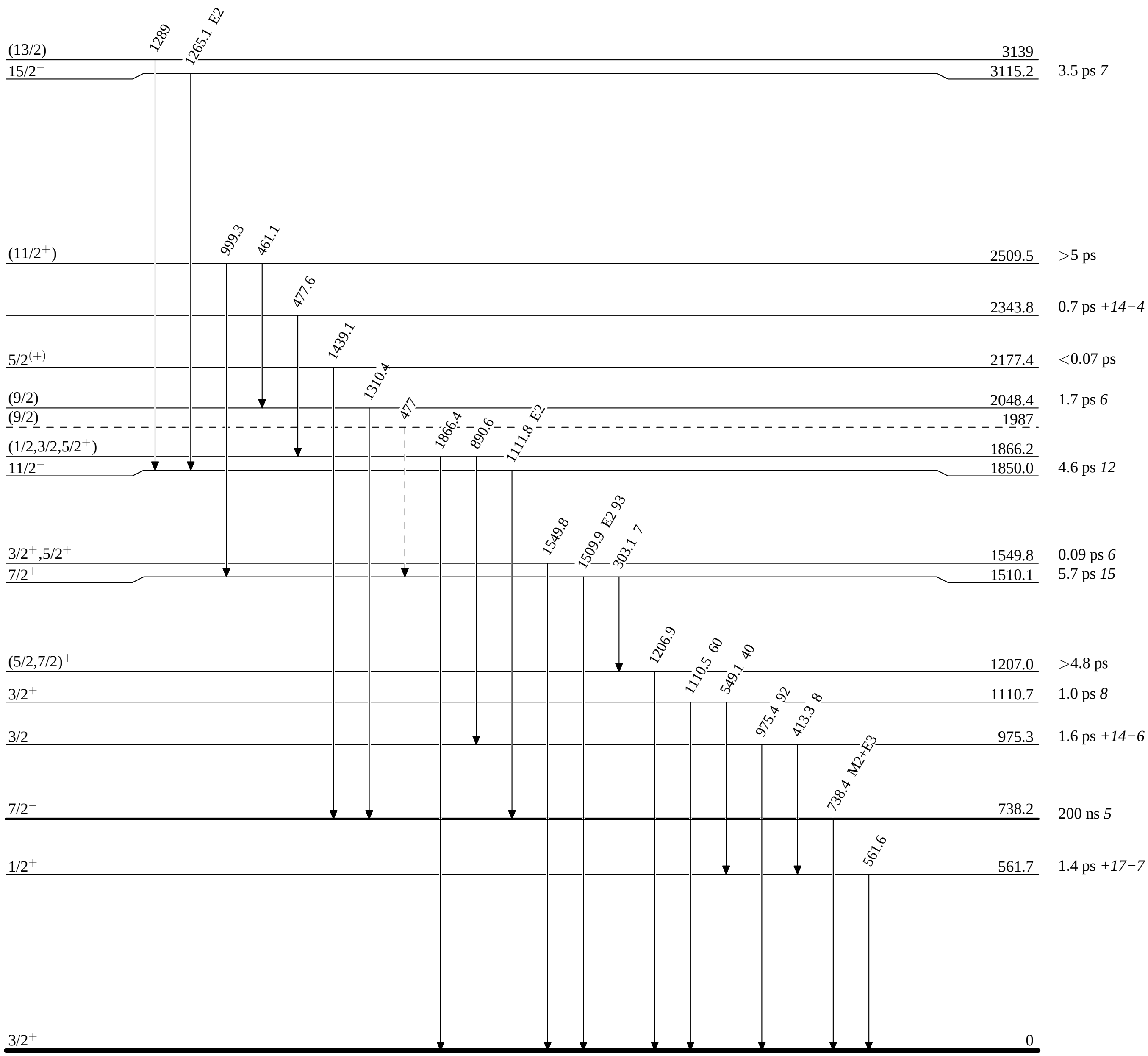
E$_i$(level)	J$^\pi_i$	E$_\gamma$[†]	I$_\gamma$[‡]	E$_f$	J$^\pi_f$	Mult.[§]	δ[§]	Comments
561.7	1/2$^+$	561.6[&]		0	3/2$^+$			
738.2	7/2$^-$	738.4[&]		0	3/2$^+$	M2+E3	−0.13 *2*	A_2=+0.17 *2*, A_4=−0.04 *2*. Pol=−0.23 *4*.
975.3	3/2$^-$	413.3[&]	8 *5*	561.7	1/2$^+$			
		975.4[&]	92 *5*	0	3/2$^+$			
1110.7	3/2$^+$	549.1[&]	40 *10*	561.7	1/2$^+$			
		1110.5[&]	60 *10*	0	3/2$^+$			
1207.0	(5/2,7/2)$^+$	1206.9 *5*		0	3/2$^+$			
1510.1	7/2$^+$	303.1 *2*	7 *4*	1207.0	(5/2,7/2)$^+$			
		1509.9 *6*	93 *4*	0	3/2$^+$	E2		A_2=+0.29 *2*, A_4=−0.07 *2*. Pol=+0.53 *16*.
1549.8	3/2$^+$,5/2$^+$	1549.8[&]		0	3/2$^+$			
1850.0	11/2$^-$	1111.8 *4*		738.2	7/2$^-$	E2		A_2=+0.35 *2*, A_4=−0.21 *3*. Pol=+0.47 *6*.
1866.2	(1/2,3/2,5/2$^+$)	890.6[&]		975.3	3/2$^-$			
		1866.4[&]		0	3/2$^+$			
1987?	(9/2)	477[@]		1510.1	7/2$^+$			
2048.4	(9/2)	1310.4 *6*		738.2	7/2$^-$			
2177.4	5/2$^{(+)}$	1439.1[&]		738.2	7/2$^-$			
2343.8		477.6[&]		1866.2	(1/2,3/2,5/2$^+$)			
2509.5	(11/2$^+$)	461.1 *2*		2048.4	(9/2)			
		999.3 *3*		1510.1	7/2$^+$			
3115.2	15/2$^-$	1265.1 *4*		1850.0	11/2$^-$	E2		A_2=+0.46 *2*, A_4=−0.19 *2*. Pol=+0.88 *20*.
3139	(13/2)	1289		1850.0	11/2$^-$			

† From 1979Be28, unless otherwise stated.
‡ From 1978MeZX.
§ From $\gamma(\theta)$ and γ(lin pol) (1979Be28).
& From 1978MeZX.
@ Placement of transition in the level scheme is uncertain.

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

Level Scheme

Intensities: % photon branching from each level



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

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

Target ^{41}K $J\pi=3/2^+$.

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 $\sigma(E_p,\theta)$. 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‡	E(level)†	L‡
0	0	1517 *10*	2	2218 *10*	3	3190 *10*	2
560 *10*	2	1815 *10*	4	2512 *10*	(4)	3254 *10*	2
1007 *10*	3	1956 *10*	4	2548 *10*	1	3312 *10*	2
1113 *10*	2	2035 *10*	0	2784 *10*	2	3399 *10*	2
1214 *10*	2	2086 *10*	4	2879 *10*	2		

† Uncertainty of 10 keV assigned by 1990En08.

‡ From comparison of $\sigma(\theta)$ 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 beam line 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 used to define 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.

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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
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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
----------------------------------------------------
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^{43}K Levels

E(level)†	J$^\pi$†
0	3/2$^+$
561.2	1/2$^+$
738.3	7/2$^-$
975.3	3/2$^-$
1109.9	3/2$^+$

† From Adopted Levels,Gammas.

γ(^{43}K)

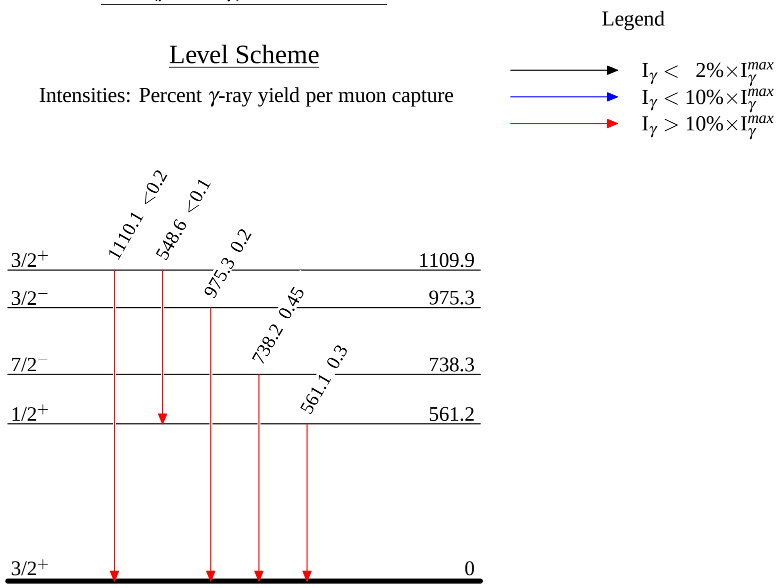
E$_\gamma$†	Percent γ-ray yield	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$
548.6	<0.1	1109.9	3/2$^+$	561.2	1/2$^+$
561.1	0.3 *1*	561.2	1/2$^+$	0	3/2$^+$
738.2	0.45 *12*	738.3	7/2$^-$	0	3/2$^+$
975.3	0.2 *1*	975.3	3/2$^-$	0	3/2$^+$
1110.1	<0.2	1109.9	3/2$^+$	0	3/2$^+$

† From Adopted Levels,Gammas.

$^{44}Ca(\mu^-,\nu n\gamma)$ 2006Me08

Level Scheme

Intensities: Percent γ-ray yield per muon capture



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

^{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)	L	C^{2}S‡	Comments
0	2	3.15	C^{2}S: 2.90 (1974De36), 4.5 (1969Yn01).
566† *8*	0	1.15	C^{2}S: 1.55 (1974De36), 2 (1969Yn01).
748† *8*	3	0.85	C^{2}S: 0.98 (1974De36).
982† *8*	1	0.16	C^{2}S: 0.27 (1974De36).
1119† *8*	2	0.36	C^{2}S: for d5/2. C^{2}S=0.50 for d3/2. Other: 0.30 (1974De36).
1540 *15*	2	0.24	
1870 *15*			
2180 *15*			
2450 *15*	0	0.32	
2670 *15*	2	0.41	
3070 *15*	2	0.16	
3230 *15*	2	0.20	
3340 *15*	2	0.56	
3730 *15*	(2)	0.13	
3880 *15*	(2)	0.1	
4020 *15*	2	0.15	
4120 *15*	2	0.31	
4470 *15*	2	0.17	
4790 *15*	2	0.14	
5190 *30*	2	0.23	
5610 *30*	2	0.23	
5900 *30*	2	0.30	
7450 *30*	(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‡#
0	2	2.2
560 *15*	(0)	1.3
740 *15*	3	0.48
967 *15*	(1)	0.10
1107 *15*	2	0.20
1202 *15*	(2)	0.06
1544 *15*		
1847 *15*		
2177 *15*	(2)	0.05
2446 *17*	0	0.24
2666 *16*	2	0.45
2981 *15*		
3056 *17*		
3084@ *15*		
3150 *18*		
3228 *21*	2	0.19
3344 *19*	2	0.45
3460& *30*		
3580& *30*		
3670& *30*		
3717 *15*		
3837 *15*		
3890& *30*		
3970?& *30*		
4015@ *15*		0.24
4070& *30*		
4127@ *15*	(0)	0.06
4177 *15*		
4234 *15*		
4290& *30*		
4410& *40*		
4490?& *40*		
4540& *40*		
4680?& *40*		
4820& *40*		
4860?& *40*		
4920?& *40*		
5030& *40*		
5150?& *40*		
5200& *40*		
5260& *40*		
5380& *40*		

† 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^{π}†	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 Fig. 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^-)=−2220.7 *19*; S(n)=7932.89 *17*; S(p)=10675.76 *25*; Q(α)=−7592 *5* 2012Wa38
S(2n)=19413.56 *18*, S(2p)=19919.3 *4* (2012Wa38).
Hyperfine structure measurements: 2011Av01, 2004Mo21, 2000Mu17.

^{43}Ca Levels

Cross Reference (XREF) Flags

A	^{43}K β^- decay (22.3 h)	I	^{42}Ca(n,γ),(n,n):resonances	Q	^{44}Ca(d,t)
B	^{43}Sc ε decay (3.891 h)	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)		

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[@]	XREF	Comments
0	7/2$^-$	stable	ABCDEFGH JKLMNOPQRSTUV	μ=−1.31726 *60* (1972Ol01,2014StZZ) Q=−0.0408 *8* (1991Si14,2008Py02,2014StZZ) Evaluated rms charge radius=3.4954 fm *19* (2013An02). μ: optical method (1972Ol01). Other: −1.317643 *7* (NMR,1973Lu08). Q: from CFBLS method (revised value by 1993Su36 from -0.043 *9* (1991Si14). Other measurements: −0.062 *12* (ABMR-LIRF, 1982Ay02), −0.065 *20* (ABMR, laser spectroscopy, 1979Gr05), −0.040 *8* (optical isotope shift method, 1980Be13,1981Ar15). Recalculations and analyses: -0.0552 *11* (2002Mi37), −0.0408 *8* (1993Su36,2008Py02), -0.049 *5* (1984Sa10,1983Ar25,1982Ol05). Measured Δ<r^2>(^{43}Ca−^{40}Ca)=0.117 fm^2 *25* (1981Wo02), 0.1254 fm^2 *32* (1984Pa12), 0.1215 fm^2 *4* (1991Si14). Adopted (by 1977En02) spectroscopic factor S=0.58 *6* (neutron stripping); 3.1 *3* (neutron pickup). J$^\pi$: 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). J$^\pi$: 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). J$^\pi$: 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). T$_{1/2}$: other: 160 ps *10* from p′γ(t) in (p,p′γ).
990.257[a] *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). J$^\pi$: 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$^-$ from $\gamma(\theta)$ 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).
1394.473[b] *8*	5/2$^+$	1.84[&] ps *35*	A CDEF H JKLM PQRS U	J$^\pi$: 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	J$^\pi$: L(α,α′)=2+4; ΔJ=2 to 7/2$^-$ from $\gamma(\theta)$ and γ(lin pol) in (α,nγ).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{43}Ca Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$[@]	XREF	Comments
1901.99[a] *14*	$7/2^+$	0.53[&] ps *10*	CDE J LM	J^{π}: 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	J^{π}: 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). J^{π}: 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). J^{π}: 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	J^{π}: 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).
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 $5/2^-$ from $\gamma(\theta)$ and γ(lin pol) in (α,nγ); positive sign gives unacceptable M2 strength from (α,nγ).
2248 *8*			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	XREF: P(2250). J^{π}: L(d,t)=L(p,d)=2.
2409.68[b] *15*	$9/2^+$	1.2[&] ps *4*	CDE J LM	J^{π}: γ decays to $5/2^+$, $7/2^+$ and $7/2^-$; ΔJ=2 to $5/2^+$ from $\gamma(\theta)$ and γ(lin pol) in (α,nγ).
2523 *10*	($1/2^-$,$3/2^-$)		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.
2696.5 *5*	$3/2^+$,$5/2^+$	<38 fs	E J LM OPQ S	XREF: P(2660)Q(2680). 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*.
2748 *8*	$1/2^+$		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 $3/2^-$.
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 $1/2^-$.
2951.33[a] *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).

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Adopted Levels, Gammas (continued)

^{43}Ca Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$[@]	XREF	Comments
3028.7 *8*	(3/2 to 7/2)	<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^{π}: γ 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 $7/2^-$ from $\gamma(\theta)$ 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*	($1/2^-$ to $7/2^-$)	<17 fs	Ef jkl o	J^{π}: γ to $3/2^-$ and $5/2^-$.
3097.0 *6*	($5/2^+$ to $11/2^+$)	0.76 ps *21*	Ef j l o	J^{π}: γ to $7/2^+$ and $9/2^+$.
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.
3270	(5/2)		kl opq S	J^{π}: D+Q γ transitions to $5/2^-$ and $7/2^-$; γ to $5/2^+$; $\alpha\gamma$(2288) favors 5/2.
3278 *10*	(11/2 to 17/2)$^+$		G kl opq	J^{π}: L(α,d)=6 from $3/2^+$; L(α,α')=3+5. L(α,^{3}He)=(4) implying ($7/2^+$,$9/2^+$) is inconsistent with either of the Jπ values for 3278 or 3270 levels.
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.
3371.19[b] *19*	$13/2^+$	<14 ps	CDE G O	XREF: G(3372)O(3377). 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).
3376.6 *10*			E JK	
3415 *8*	$5/2^-$,$7/2^-$		JKL	J^{π}: L(d,p)=L(α,^{3}He)=3.
3469 *5*			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 *10*	$(1/2)^+$		J PQ	J^{π},E(level): L(d,p)=0. However, L(p,d)=2 giving $3/2^+$,$5/2^+$ may suggest a doublet near this energy.
3649 *8*	($3/2^+$,$5/2^+$)		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 *10*			J	
3737 *10*			J	
3772 *10*	$1/2^-$,$3/2^-$		J	J^{π}: L(d,p)=1.
3783 *10*			J	
3816.1 *8*	($7/2^-$)	69 fs *38*	E JK	XREF: K(3803). J^{π}: from L(d,p)=L(α,^{3}He)=(3) and γ to $9/2^+$.
3837 *10*	(3/2 to 13/2)$^+$		G O	J^{π}: L(α,d)=4 from $3/2^+$.
3864 *10*	($1/2^-$,$3/2^-$)		J	J^{π}: L(d,p)=(1).

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Adopted Levels, Gammas (continued)

^{43}Ca Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$[@]	XREF	Comments
3898 *10*			J	
3918 *8*	(7/2,9/2)$^+$		F JK O	E(level): possible doublet as suggested in (α,^{3}He) and in 1990En08 evaluation. See also Jπ comment. J^{π}: L(^{3}He,p)=2 from 3/2$^+$; L(α,α')=3+5; L(α,^{3}He)=(4). L(d,p)=(1) from 1974Br19 is in disagreement but L(d,p)=4 is also suggested by 1966Do02. Similarity to 4984, 9/2$^+$ state in ^{41}Ca indicates 4p-1h component in this level (1968Do02).
3943.81[a] *24*	15/2$^+$	0.76 ps *21*	CDE G O	J^{π}: ΔJ=1 to 13/2$^+$ from $\gamma(\theta)$ and γ(lin pol) in (α,nγ); L(α,d)=6 from 3/2$^+$.
3958 *10*			J	
3978 *10*	3/2$^+$,5/2$^+$		J PQ	XREF: P(3950). J^{π}: L(d,p)=L(p,d)=L(d,t)=2.
4017 *10*			J	
4044 *8*	3/2$^+$,5/2$^+$		JK	J^{π}: L(d,p)=2.
4078 *10*			J	
4089 *10*	(5/2$^-$,7/2$^-$)		J	J^{π}: L(d,p)=(3).
4135.9 *7*	7/2$^+$,9/2$^+$	<260 fs	E G JK O	XREF: J(4124)K(4123). J^{π}: L(d,p)=4; inconsistent with L(α,d)=6 from 3/2$^+$.
4148 *10*	1/2$^+$		J	J^{π}: L(d,p)=0.
4174.8 *11*			E	
4186.5 *4*	15/2$^+$	125 fs *50*	DE G	J^{π}: ΔJ=1 to 13/2$^+$ from $\gamma(\theta)$ and γ(lin pol) in (α,nγ); L(α,d)=6 from 3/2$^+$.
4207.2 *5*	1/2$^-$		H JK	XREF: J(4196)K(4193). J^{π}: 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).
4210? *20*	3/2$^+$,5/2$^+$		PQ	J^{π}: 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 *10*	1/2$^-$,3/2$^-$		J	J^{π}: L(d,p)=1.
4268 *10*	(3/2$^+$,5/2$^+$)		J Q	J^{π}: L(d,t)=2. L(d,p)=1 in 1974Br19 suggests 1/2$^-$,3/2$^-$. In another experiment L(d,p)=2 is also suggested by 1966Do02.
4291 *10*	(7/2 to 13/2)$^+$		G	J^{π}: L(α,d)=4+6 from 3/2$^+$.
4298 *10*	1/2$^+$		J	J^{π}: L(d,p)=0.
4364 *10*	(7/2 to 13/2)$^+$		G J	J^{π}: L(α,d)=4+6 from 3/2$^+$.
4394.8 *5*	15/2$^-$	42 fs *17*	E	J^{π}: ΔJ=2 to 11/2$^-$ from $\gamma(\theta)$ and γ(lin pol) in (α,nγ).
4401 *10*			J	
4461 *7*	5/2$^-$,7/2$^-$		G JK P	J^{π}: L(d,p)=3. Incompatible with (7/2 to 13/2)$^+$ from L(α,d)=4+6 from 3/2$^+$.
4498 *10*			J	
4533 *10*	1/2$^+$		J	J^{π}: L(d,p)=0.
4569 *8*			K	
4585 *10*			J	
4591.0[b] *4*	17/2$^+$	0.21 ps *5*	CDE G	J^{π}: ΔJ=1 to 15/2$^-$ from $\gamma(\theta)$ 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	J^{π}: γ from 1/2$^+$ capture state.
4621.2 *4*	15/2$^+$	76 fs *28*	E	J^{π}: ΔJ=1, M1 γ to 13/2$^+$ from $\gamma(\theta)$ and γ(lin pol) in (α,nγ).

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Adopted Levels, Gammas (continued)

^{43}Ca Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$[@]	XREF	Comments
4641.6 *10*	$3/2^+,5/2^+$		H J	J^{π}: L(d,p)=2.
4654 *10*	$1/2^+$		J	J^{π}: L(d,p)=0.
4703 *10*			G J pq	
4736 *10*	$3/2^+,5/2^+$		J pq	J^{π}: L(d,t)=2.
4758 *10*			J	
4783 *10*			J	
4796 *10*			J	
4826 *8*	$(5/2^-,7/2^-)$		JK	J^{π}: L(α,^{3}He)=(3).
4854 *10*			J	
4878 *8*	$(7/2\ \text{to}\ 17/2)^+$		G JK	J^{π}: L(α,d)=6 from $3/2^+$.
4901.2 *6*	$1/2^-,3/2^-$		H J	J^{π}: L(d,p)=1. $J\pi=1/2^-$ is preferred by γ(circ pol) in (pol n,γ).
4922 *10*			J	
4944 *10*			J	
4982 *10*	$(3/2^+,5/2^+)$		J	J^{π}: L(d,p)=2 from 1974Br19; but L(d,p)=1 implying $1/2^-,3/2^-$ is suggested in 1966Do02.
5004 *8*	$(5/2^-,7/2^-)$		JK	J^{π}: L(α,^{3}He)=(3).
5037.5 *11*	$1/2^-,3/2^-$		H Jk	J^{π}: L(d,p)=1. $J\pi=1/2^-$ is preferred by γ(circ pol) in (pol n,γ).
5047 *10*	$1/2^-,3/2^-$		Jk	J^{π}: L(d,p)=1.
5072 *10*	$1/2^-,3/2^-$		J	J^{π}: L(d,p)=1.
5100 *10*	$1/2^+$		J	J^{π}: L(d,p)=0.
5155.4 *6*	$(13/2,17/2)^-$	76 fs *28*	E	J^{π}: ΔJ=1, M1+E2 γ to $15/2^-$; γ to $13/2^-$.
5170 *10*	$3/2^+,5/2^+$		J	J^{π}: L(d,p)=2.
5189 *10*	$(7/2\ \text{to}\ 13/2)^+$		G	J^{π}: L(α,d)=4+6 from $3/2^+$.
5193 *10*	$1/2^+$		JK p	J^{π}: L(d,p)=0. L(α,^{3}He)=(3) and L(p,d)=(2,3) is inconsistent.
5215 *10*	$1/2^+$		J pQ	J^{π}: L(d,p)=0. L(p,d)=(2,3) is inconsistent.
5249 *8*	$(7/2\ \text{to}\ 13/2)^+$		G K	J^{π}: L(α,d)=4+6 from $3/2^+$.
5351 *10*	$(7/2\ \text{to}\ 13/2)^+$		G Q	J^{π}: L(α,d)=4+6 from $3/2^+$.
5394.7 *11*	$(11/2^-\ \text{to}\ 19/2^-)$	0.104 ps *31*	E K	E(level): 5410 group in (α,^{3}He) may define a different level. J^{π}: γ to $15/2^-$.
5430 *20*			P	
5548 *8*			K	
5555.4[a] *6*	$(15/2,19/2)^+$	1.4 ps *4*	DE	J^{π}: $\gamma(\theta$,pol) in (α,nγ) and RUL.
5647 *8*			K	
5696 *10*	$(7/2\ \text{to}\ 13/2)^+$		G	J^{π}: L(α,d)=4+6 from $3/2^+$.
5728 *8*	$3/2^+,5/2^+$		K PQ	J^{π}: L(d,t)=2.
5805 *8*			K	
5889 *8*			K	
5931.5 *8*	$(11/2\ \text{to}\ 19/2)^-$	55 fs *17*	E	J^{π}: M1(+E2) stretched dipole transition to $(13/2,17/2)^-$ from $\gamma(\theta$,lin pol) in (α,nγ).
5991 *8*	$(5/2^-,7/2^-)$		K	J^{π}: L(α,^{3}He)=(3).
6015 *20*	$1/2^+$		PQ	J^{π}: L(p,d)=0. L(d,t)=(2) is inconsistent.
6087 *10*			G	
6177 *10*	$(3/2^+,5/2^+)$		G PQ	J^{π}: L(d,t)=(2).
6223.6[b] *8*	$(17/2,21/2)^+$	0.58 ps *15*	DE	J^{π}: 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	

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Adopted Levels, Gammas (continued)

^{43}Ca Levels (continued)

E(level)†	Jπ‡	XREF	Comments
6680		F	
6790		F	
6950		F	
7040		F	
7090		F	
7190		F	
7500		F	
7590 *20*		F Q	
7730		F	
7920		F	
(7932.7 *3*)	$1/2^+$	H	
7941.88 *17*	$1/2^-,3/2^-$#	I	
7942.08 *17*	$1/2^+$#	I	
7951.56 *17*	$1/2^-,3/2^-$#	I	
7955.13 *17*	$1/2^+$#	I	
7956.17 *17*	$1/2^-,3/2^-$#	I	
7958.62 *17*	$1/2^+$#	I	
7968.91 *17*	$1/2^-,3/2^-$#	I	
7969.51 *17*	$1/2^+$#	I	
7972.10 *17*	$1/2^-,3/2^-$#	I	
7977.9	$1/2^+$#	I	
7980.06 *17*	$1/2^+$#	I	
7981.48 *17*	$1/2^-,3/2^-$#	I	
7981.65 *17*	$1/2^-,3/2^-$#	I	
7989.92 *17*	$1/2^+$#	I	
7990 *20*	$(3/2)^+$	F PQR	T=5/2 XREF: F(8033). Jπ: 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=$3/2^+$.
7991.80 *17*	$1/2^+$#	I	
7996.59 *17*	$1/2^+$#	I	
8002.12 *17*	$1/2^-,3/2^-$#	I	
8006.45 *17*	$1/2^-,3/2^-$#	I	
8007.62 *17*	$1/2^+$#	I	
8013.64 *17*	$1/2^+$#	I	
8014.25 *17*	$1/2^-,3/2^-$#	I	
8020.16 *17*		I	
8020.52 *17*		I	
8023.49 *19*		I	
8023.77 *19*		I	
8025.59 *19*		I	
8028.55 *19*	$1/2^+$#	I	
8033.83 *20*	$1/2^-,3/2^-$#	I	
8047.20 *20*	$1/2^+$#	I	
8049.25 *20*	$1/2^-,3/2^-$#	I	
8052.1 *10*	$1/2^+$#	I	
8055.99 *20*	$1/2^-,3/2^-$#	I	
8057.0 *10*	$1/2^+$#	I	

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Adopted Levels, Gammas (continued)

^{43}Ca Levels (continued)

E(level)[†]	J^π[‡]	XREF
8057.07 *20*	1/2⁻,3/2⁻[#]	I
8057.46 *20*		I
8058.34 *20*		I
8061.1 *3*	1/2⁻,3/2⁻[#]	I
8062.2 *3*	1/2⁺[#]	I
8066.1 *3*	1/2⁻,3/2⁻[#]	I
8073.9 *3*	1/2⁺[#]	I
8074.6 *3*	1/2⁻,3/2⁻[#]	I
8075.5 *3*		I
8078.4 *3*	1/2⁺[#]	I
8081.0 *3*		I
8086.1 *3*	1/2⁺[#]	I
8089.4 *3*		I
8090.3 *4*		I
8099.3 *4*		I
8103.3 *10*	1/2⁺[#]	I
8106.1 *4*	1/2⁺[#]	I
8113.7 *4*		I
8115.4 *4*	1/2⁺[#]	I
8128.3 *5*		I
8132.9 *5*		I
8134.1 *5*		I
8138.2 *5*		I
8139.9 *5*	1/2⁺[#]	I
8141.6 *5*	1/2⁻,3/2⁻[#]	I
8144.3 *5*		I
8149.0 *5*	1/2⁻,3/2⁻[#]	I
8152.3 *5*	1/2⁻,3/2⁻[#]	I
8157.2 *5*	1/2⁺[#]	I
8160		F
8165.9		I
8176.1		I
8181.0	1/2⁻,3/2⁻[#]	I
8186.4	1/2⁺[#]	I
8201.0	1/2⁺[#]	I
8201.5		I
8204.9	1/2⁺[#]	I
8206.9	1/2⁻,3/2⁻[#]	I
8223.0		I
8259.1		I
8263.0		I
8270		F
8281.1	1/2⁺[#]	I
8302.6		I
8308.9		I
8323.1	1/2⁺[#]	I
8341.1	1/2⁺[#]	I
8348.0	1/2⁺[#]	I
8367.5		I

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Adopted Levels, Gammas (continued)

^{43}Ca Levels (continued)

E(level)[†]	J^{π}[‡]	XREF	Comments
8369.5		I	
8372.9	$1/2^{+}$[#]	I	
8399.7	$1/2^{+}$[#]	I	
8412.9	$1/2^{+}$[#]	I	
8418.8		I	
8430.0		I	
8434.4	$1/2^{+}$[#]	I	
8452.5	$1/2^{+}$[#]	I	
8465.6	$1/2^{+}$[#]	I	
8470		F	
8474.9	$1/2^{+}$[#]	I	
8479.8	$1/2^{+}$[#]	I	
8484.2		I	
8490.1	$1/2^{+}$[#]	I	
8492.0		I	
8590 *20*	$1/2^{+}$	PQ	T=5/2 J^{π}: L(p,d)=L(d,t)=0. Possible IAS of $1/2^{+}$, 561 in ^{43}K.
8767 *20*	$5/2^{-},7/2^{-}$	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 *20*	$1/2^{-},3/2^{-}$	PQ	T=5/2 J^{π}: L(p,d)=L(d,t)=1. Possible IAS of $3/2^{-}$, 975 in ^{43}K.
9145 *30*	$3/2^{+},5/2^{+}$	PQ	T=5/2 J^{π}: L(p,d)=L(d,t)=2. Possible IAS of $3/2^{+}$, 1110 in ^{43}K.
10485 *30*	$1/2^{+}$	PQ	T=5/2 J^{π}: L(p,d)=L(d,t)=0. Possible IAS of $1/2^{+}$, 2451 in ^{43}K.
10720 *30*	$3/2^{+},5/2^{+}$	PQ	J^{π}: L(d,t)=2.
11380 *30*		PQ	
12060 *30*		P	
12265 *30*	$3/2^{+},5/2^{+}$	PQ	J^{π}: L(d,t)=2.
13230 *30*	$(3/2^{+},5/2^{+})$	PQ	J^{π}: L(d,t)=(2).
13700 *30*		P	
13950 *30*		P	
14190 *30*		Q	

† 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 s-wave or p-wave assignment in the analysis of neutron-resonance data (2006MuZX).
@ From DSAM in (α,nγ), unless otherwise indicated. For levels from 7992 to 8590, see the (n,γ),(n,n):resonances for Γ widths.
& From DSAM. Weighted average of values in (α,nγ) and (p,p$'\gamma$).
a Band(A): Band based on $3/2^{+}$.
b Band(B): Band based on $5/2^{+}$.

$\gamma(^{43}Ca)$

E_i(level)	J_i^π	E_γ†	I_γ‡	E_f	J_f^π	Mult.§	δ§	Comments
372.762	5/2⁻	372.760 7	100	0	7/2⁻	M1+E2	−0.161 14	B(M1)(W.u.)=0.0122 11; B(E2)(W.u.)=6.5 13 δ: 0.192 11 was deduced by 1978En02 from B(E2)=8.7×10^{-3} 7 (1971HoYN) and $T_{1/2}$=48 ps 4. Using the same B(E2) and $T_{1/2}$=34 ps 3, evaluators get δ=0.161 14. Sign from $\gamma(\theta$, lin) in (α,nγ). δ=−0.15 3 from (^{3}He,$\alpha\gamma$).
593.394	3/2⁻	220.632 5	42.3 8	372.762	5/2⁻	M1+E2	−0.09 4	B(M1)(W.u.)=0.0075 4; B(E2)(W.u.)=4 +4−3 δ: weighted average From $\gamma(\theta)$ in (α,nγ) and (^{3}He,$\alpha\gamma$).
		593.390 6	100.0 4	0	7/2⁻	E2		B(E2)(W.u.)=7.5 4
990.257	3/2⁺	396.861 6	14.93 13	593.394	3/2⁻	E1(+M2)	−0.1 1	B(E1)(W.u.)=2.31×10^{-5} 20
		617.490 6	100.00 14	372.762	5/2⁻	E1(+M2)	−0.015 17	B(E1)(W.u.)=4.1×10^{-5} 4; B(M2)(W.u.)<0.4 δ: weighted average from $\gamma(\theta)$ in (α,nγ) and (^{3}He,$\alpha\gamma$).
		990.245 8	0.36 5	0	7/2⁻	[M2]		B(M2)(W.u.)=0.17 3
1394.473	5/2⁺	404.214 13	18.7 7	990.257	3/2⁺	M1+E2	+0.32 5	B(M1)(W.u.)=0.023 5; B(E2)(W.u.)=41 14
		801.070 13	7.5 7	593.394	3/2⁻	E1(+M2)	−0.03 4	B(E1)(W.u.)=3.2×10^{-5} 7; B(M2)(W.u.)<0.8
		1021.698 13	100.0 9	372.762	5/2⁻	E1(+M2)	+0.11 12	B(E1)(W.u.)=0.00021 4
		1394.448 14	9 3	0	7/2⁻	E1		B(E1)(W.u.)=7.E−6 3 I_γ: unweighted average of 6.7 4 from β^- decay, 15.1 5 from (α,nγ) and 4.8 8 from (p,p′γ).
1677.84	11/2⁻	1677.8 2	100	0	7/2⁻	E2(+M3)	−0.02 2	B(E2)(W.u.)=5.6 10
1901.99	7/2⁺	507.8 3	24 3	1394.473	5/2⁺	[M1]		B(M1)(W.u.)=0.053 13
		911.6 3	19 6	990.257	3/2⁺	E2(+M3)	−0.02 3	B(E2)(W.u.)=25 10
		1901.8 2	100 6	0	7/2⁻	E1(+M2)	+0.03 4	B(E1)(W.u.)=0.000106 22; B(M2)(W.u.)<0.5
1931.53	5/2⁻	1338.3 5	11.7 11	593.394	3/2⁻	M1+E2	+2.2 25	B(M1)(W.u.)=0.0009 +18−9; B(E2)(W.u.)=7 4
		1558.8 2	59 2	372.762	5/2⁻	M1+E2	+0.28 14	B(M1)(W.u.)=0.016 5; B(E2)(W.u.)=1.5 +15−11
		1931.4 2	100 2	0	7/2⁻	M1+E2	−0.8 3	B(M1)(W.u.)=0.009 4; B(E2)(W.u.)=4.6 25
1957.4	1/2⁺	967.1 4	28 1	990.257	3/2⁺	[M1]		B(M1)(W.u.)=0.0048 14
		1364.0 5	100 1	593.394	3/2⁻	[E1]		B(E1)(W.u.)=0.00015 5
2046.21	3/2⁻	651.2 4	2 1	1394.473	5/2⁺	[E1]		B(E1)(W.u.)=3.2×10^{-5} 18
		1056.0 5	11 1	990.257	3/2⁺	E1(+M2)	0.00 3	B(E1)(W.u.)=4.1×10^{-5} 11
		1453.0 3	13 2	593.394	3/2⁻			
		1673.5 4	32 3	372.762	5/2⁻	[M1]		B(M1)(W.u.)=0.0012 4
		2046.2 3	100 6	0	7/2⁻	E2(+M3)	0.00 2	B(E2)(W.u.)=1.4 4
2067.21	7/2⁻	1694.3 3	28.0 12	372.762	5/2⁻	M1+E2	−0.90 24	B(M1)(W.u.)=0.026 11; B(E2)(W.u.)=21 10
		2067.2 2	100.0 12	0	7/2⁻	M1+E2	−0.10 6	B(M1)(W.u.)=0.09 3; B(E2)(W.u.)=0.6 +8−5
2093.81	9/2⁻	2093.8 2	100	0	7/2⁻	M1+E2	−5.9 11	B(M1)(W.u.)=4.8×10^{-5} 22; B(E2)(W.u.)=1.1 4
2102.7	3/2⁻	1509.2 5	50	593.394	3/2⁻	M1+E2	+2.0 17	B(M1)(W.u.)=0.0010 +14−10; B(E2)(W.u.)=4.9 25
		1730.0 6	100 40	372.762	5/2⁻	[M1]		B(M1)(W.u.)=0.006 4
		2102.8 5	50 30	0	7/2⁻	[E2]		B(E2)(W.u.)=1.2 9
2223.9	3/2⁻,5/2⁻	1630.4 5	100.0 23	593.394	3/2⁻	M1+E2		δ: −0.50 25 for J=5/2; +0.8 +4−10 for J=3/2.
		1851.2 4	74.5 23	372.762	5/2⁻	M1+E2		δ: −0.20 5 for J=5/2; >+11, or <−5.6 for J=3/2.
2249.01	9/2⁻	570.7 5	2.3 6	1677.84	11/2⁻			

γ(^{43}Ca) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[§]	δ[§]	Comments
2249.01	9/2⁻	1876.3 *2*	12.6 *11*	372.762	5/2⁻	E2(+M3)	−0.01 *3*	B(E2)(W.u.)=8.1 *19*
		2248.9 *2*	100.0 *11*	0	7/2⁻	M1+E2	−0.75 *12*	B(M1)(W.u.)=0.029 *8*; B(E2)(W.u.)=9 *3*
2272.8	3/2⁺,5/2⁺	877.8 *4*	19 *4*	1394.473	5/2⁺	M1+E2		δ: −10 *+4−13* for J=5/2; +0.1 *4* for J=3/2.
		1283.3 *5*	100 *4*	990.257	3/2⁺	M1+E2		δ: −11 *+2−4* for J=5/2; −0.26 *5* for J=3/2.
2409.68	9/2⁺	508.0 *7*	24 *4*	1901.99	7/2⁺			I_γ: from (p,p′γ).
		732[&]	<15	1677.84	11/2⁻			
		1015.2 *2*	98 *9*	1394.473	5/2⁺	[E2]		B(E2)(W.u.)=22 *8*
		2409.6 *3*	100 *9*	0	7/2⁻	E1(+M2)	−0.03 *4*	B(E1)(W.u.)=1.5×10^{-5} *6*; B(M2)(W.u.)<0.04
2611.1	1/2⁻	564.9 *3*	54 *16*	2046.21	3/2⁻	[M1]		B(M1)(W.u.)=0.33 *17*
		2017.6 *5*	100 *16*	593.394	3/2⁻	[M1]		B(M1)(W.u.)=0.013 *6*
2674.3	5/2⁻,7/2⁻	1276.0[&] *10*		1394.473	5/2⁺			
		2301.5 *8*	100	372.762	5/2⁻			
		2674.6[&] *8*		0	7/2⁻			
2696.5	3/2⁺,5/2⁺	1706.2 *6*	57.7 *14*	990.257	3/2⁺			
		2103.1	27 *14*	593.394	3/2⁻			
		2324.4 *9*	100.0 *14*	372.762	5/2⁻	[E1]		B(E1)(W.u.)>0.00062
2754.00	15/2⁻	1076.14 *15*	100	1677.84	11/2⁻	E2(+M3)	−0.02 *2*	B(E2)(W.u.)=1.86 *8*
2769.6	(1/2,3/2,5/2)	1779.1 *6*		990.257	3/2⁺			
		2176.6 *8*		593.394	3/2⁻			
2844.7	(5/2)⁺	942.1 *6*		1901.99	7/2⁺			
		1450.2		1394.473	5/2⁺			
		2845.7 *11*		0	7/2⁻			
2878.7	1/2⁻	831.4[&] *10*		2046.21	3/2⁻			γ seen in (n,γ) only.
		922.1[&] *6*		1957.4	1/2⁺			E_γ: γ seen in (α,nγ) only.
		2285.2 *10*		593.394	3/2⁻			γ reported in (n,γ) and (α,nγ).
		2505.9[&]		372.762	5/2⁻			γ seen in (^{3}He,$\alpha\gamma$) only.
2943.5	3/2⁻	840.9 *10*	12 *8*	2102.7	3/2⁻			
		1953.2	35 *13*	990.257	3/2⁺			
		2350.3 *4*	100 *12*	593.394	3/2⁻			
		2570.1 *8*	100 *40*	372.762	5/2⁻			
		2943.4	12 *7*	0	7/2⁻			
2951.33	11/2⁺	541.5 *3*	21.5 *15*	2409.68	9/2⁺	M1+E2	−0.04 *2*	B(M1)(W.u.)=0.0041 *11*; B(E2)(W.u.)=0.06 *+7−5*
		857.6 *3*	100.0 *15*	2093.81	9/2⁻	E1(+M2)	0.00 *2*	B(E1)(W.u.)=0.00012 *3*
		1049.0 *4*	32.3 *15*	1901.99	7/2⁺	[E2]		B(E2)(W.u.)=2.2 *6*
3028.7	(3/2 to 7/2)	2655.9 *8*	100	372.762	5/2⁻			
3030.4	(1/2,3/2,5/2)	2040.1	45 *13*	990.257	3/2⁺			
		2436.9	100	593.394	3/2⁻			
3049.6		3049.5[&] *15*	100	0	7/2⁻			
3050.6	11/2⁻	801.7 *7*	23 *2*	2249.01	9/2⁻	[M1]		B(M1)(W.u.)>0.30
		1373.0 *6*	100 *4*	1677.84	11/2⁻	M1+E2	+0.30 *5*	B(M1)(W.u.)>0.23; B(E2)(W.u.)>23

$^{43}_{20}$Ca$_{23}$-10

γ(^{43}Ca) (continued)

E_i(level)	J^{π}_i	E_γ†	I_γ‡	E_f	J^{π}_f	Mult.§	δ§	Comments
3050.6	11/2⁻	3049.7 11	69 4	0	7/2⁻	E2(+M3)	−0.02 2	B(E2)(W.u.)>5.1
3076.0	(5/2)⁺	3075.9 15	100	0	7/2⁻			
3096.0	(1/2⁻ to 7/2⁻)	2502.4 8		593.394	3/2⁻			
		2723.4 11		372.762	5/2⁻			
3097.0	(5/2⁺ to 11/2⁺)	687.3 7		2409.68	9/2⁺			
		1195.0 10		1901.99	7/2⁺			
3195.6	7/2⁺,9/2⁺	350.7 4		2844.7	(5/2)⁺			
		1294.1 7		1901.99	7/2⁺			
3270	(5/2)	1876&	35	1394.473	5/2⁺			
		2280&	100	990.257	3/2⁺	D+Q	+0.07 5	
		3270&	69	0	7/2⁻	D(+Q)	−0.13 13	
3285.7	3/2⁻	1239.6 9	100 30	2046.21	3/2⁻	[M1]		B(M1)(W.u.)>0.096
		2692.2	50 20	593.394	3/2⁻			I_γ: quoted by 1978En02.
		2912.8	50 20	372.762	5/2⁻			I_γ: quoted by 1978En02.
3315.2	1/2⁻,3/2⁻	1269.0 6	100	2046.21	3/2⁻	[M1]		B(M1)(W.u.)=0.08 4
3371.19	13/2⁺	419.6 3	51 3	2951.33	11/2⁺			
		617.1 7	63 3	2754.00	15/2⁻			
		961.6 2	100 3	2409.68	9/2⁺	E2(+M3)	0.00 2	B(E2)(W.u.)>2.3
		1693.7 9	29 3	1677.84	11/2⁻			
3376.6		1282.8 9		2093.81	9/2⁻			
3505.3	13/2⁺	554.1 5	16 3	2951.33	11/2⁺	M1+E2	−0.06 2	B(M1)(W.u.)=0.21 8; B(E2)(W.u.)=7 6
		751.1 6	17 3	2754.00	15/2⁻	[E1]		B(E1)(W.u.)=0.0023 9
		1827.4 9	100 3	1677.84	11/2⁻	E1(+M2)	−0.03 3	B(M2)↓=1.1 11 B(E1)(W.u.)=0.0009 3; B(M2)(W.u.)<3.5
3572.2	3/2⁻	1525.4 10	58 17	2046.21	3/2⁻			
		2978.9 7	100 25	593.394	3/2⁻			
		3199.3	25 17	372.762	5/2⁻			
3662.5	13/2⁻	612.0 7	20 3	3050.6	11/2⁻	[M1]		B(M1)(W.u.)=0.24 11
		908.0 9	21 3	2754.00	15/2⁻	[M1]		B(M1)(W.u.)=0.08 4
		1412.9 7	23 3	2249.01	9/2⁻	[E2]		B(E2)(W.u.)=32 15
		1984.8 9	100 3	1677.84	11/2⁻	M1+E2	−0.60 14	B(M1)(W.u.)=0.026 12; B(E2)(W.u.)=7 3
3816.1	(7/2⁻)	1406.4 7	100	2409.68	9/2⁺			
3943.81	15/2⁺	438.5 4	100 14	3505.3	13/2⁺	M1(+E2)	0.00 2	B(M1)(W.u.)=0.18 6
		572.6 2	67 14	3371.19	13/2⁺	[M1]		B(M1)(W.u.)=0.053 20
		993		2951.33	11/2⁺			E_γ: from (^{18}O,αnγ).
		1189.8 7	29 14	2754.00	15/2⁻	[E1]		B(E1)(W.u.)=6.E−5 4
4135.9	7/2⁺,9/2⁺	1184.6 6	100	2951.33	11/2⁺			
4174.8		1902.0 10	100	2272.8	3/2⁺,5/2⁺			
4186.5	15/2⁺	681.1 4	16 4	3505.3	13/2⁺	[M1]		B(M1)(W.u.)=0.08 4
		815.4 6	100 4	3371.19	13/2⁺	M1+E2	−0.15 2	B(M1)(W.u.)=0.27 11; B(E2)(W.u.)=27 13
4207.2	1/2⁻	2161.1 6	45 13	2046.21	3/2⁻			

$^{43}_{20}$Ca$_{23}$-11

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

E_i(level)	J^π_i	E_γ†	I_γ‡	E_f	J^π_f	Mult.§	δ§	Comments
4207.2	1/2⁻	3613.4 8	100 23	593.394	3/2⁻			
4394.8	15/2⁻	731.9 5	54 7	3662.5	13/2⁻	[M1]		B(M1)(W.u.)=0.30 13
		1641.1 7	90 7	2754.00	15/2⁻	M1+E2	−0.50 14	B(M1)(W.u.)=0.035 15; B(E2)(W.u.)=9 6
		2717.4 12	100 7	1677.84	11/2⁻	E2(+M3)	0.00 2	B(E2)(W.u.)=4.2 18
4591.0	17/2⁺	404.4 4	49 10	4186.5	15/2⁺	[M1]		B(M1)(W.u.)=0.38 13
		647.2 3	100 10	3943.81	15/2⁺	M1(+E2)	0.00 2	B(M1)(W.u.)=0.19 6
		1837.4 9	55 10	2754.00	15/2⁻	E1(+M2)	0.00 2	B(E1)(W.u.)=0.00011 4
4603.4	(1/2,3/2,5/2⁺)	4009.8&		593.394	3/2⁻			
4621.2	15/2⁺	677.4 4	39 6	3943.81	15/2⁺	[M1]		B(M1)(W.u.)=0.26 11
		1249.9 7	100 6	3371.19	13/2⁺	M1(+E2)	−0.02 3	B(M1)(W.u.)=0.11 4; B(E2)(W.u.)<0.3
4641.6	3/2⁺,5/2⁺	2595.3&		2046.21	3/2⁻			
4901.2	1/2⁻,3/2⁻	2628.3	67 33	2272.8	3/2⁺,5/2⁺			
		2798.4	100 67	2102.7	3/2⁻			
		2854.9	100 50	2046.21	3/2⁻			
		4307.6	67 50	593.394	3/2⁻			
5037.5	1/2⁻,3/2⁻	2992.4 10		2046.21	3/2⁻			
5155.4	(13/2,17/2)⁻	760.4 5	100 5	4394.8	15/2⁻	M1+E2	−0.11 4	B(M1)(W.u.)=0.42 16; B(E2)(W.u.)=25 21 δ: from −0.15 2 (for Jπ=13/2⁻) and −0.08 2 (for Jπ=17/2⁻).
		1493.1 5	54 5	3662.5	13/2⁻			
5394.7	(11/2⁻ to 19/2⁻)	2640.6 10	100	2754.00	15/2⁻			
5555.4	(15/2,19/2)⁺	964.5 6	66	4591.0	17/2⁺			
		1611.4 7	100	3943.81	15/2⁺	M1,E2		
5931.5	(11/2 to 19/2)⁻	776.1 5	100	5155.4	(13/2,17/2)⁻	M1(+E2)		B(M1)(W.u.)<0.9
6223.6	(17/2,21/2)⁺	668.2 5	100	5555.4	(15/2,19/2)⁺	M1(+E2)		
(7932.7)	1/2⁺	2895.1 5	3.8 6	5037.5	1/2⁻,3/2⁻			
		3031.3 10	2.1 6	4901.2	1/2⁻,3/2⁻			
		3291.1		4641.6	3/2⁺,5/2⁺			
		3330.0		4603.4	(1/2,3/2,5/2⁺)			
		3725.3 3	15.7 32	4207.2	1/2⁻			
		4359.5 5	5.5 8	3572.2	3/2⁻			
		4616.6 9	1.1 6	3315.2	1/2⁻,3/2⁻			
		4646.2 6	4.5 9	3285.7	3/2⁻			
		4989.2 5	6.8 9	2943.5	3/2⁻			
		5054.2 5	4.5 8	2878.7	1/2⁻			
		5321.4 5	7.7 11	2611.1	1/2⁻			
		5828.6 15	1.7 6	2102.7	3/2⁻			
		5886.0 4	100 15	2046.21	3/2⁻			
		5975.2 15	1.1 6	1957.4	1/2⁺			
		7339.0 7	10.8 17	593.394	3/2⁻			

† From weighted average of measured Eγ values in different reactions and decays, when such data are available. Otherwise, the values represent level-energy

Adopted Levels, Gammas (continued)

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

differences.

‡ Weighted average of available data from different reactions.

§ From $\gamma(\theta$,pol) in (α,nγ) and (^{3}He,$\alpha\gamma$), unless otherwise noted.

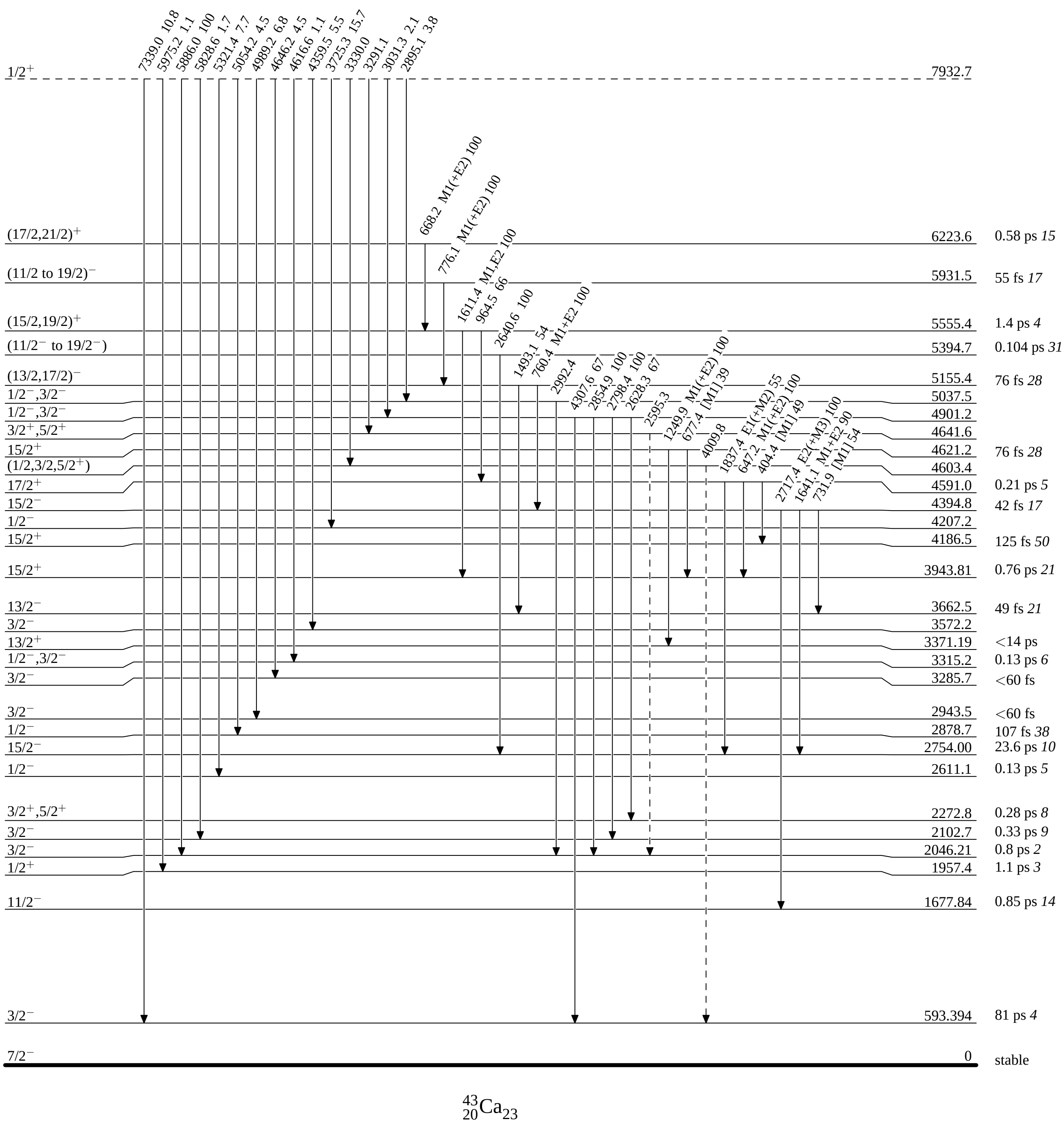
& Placement of transition in the level scheme is uncertain.

${}^{43}_{20}Ca_{23}$-13

Adopted Levels, Gammas

Level Scheme

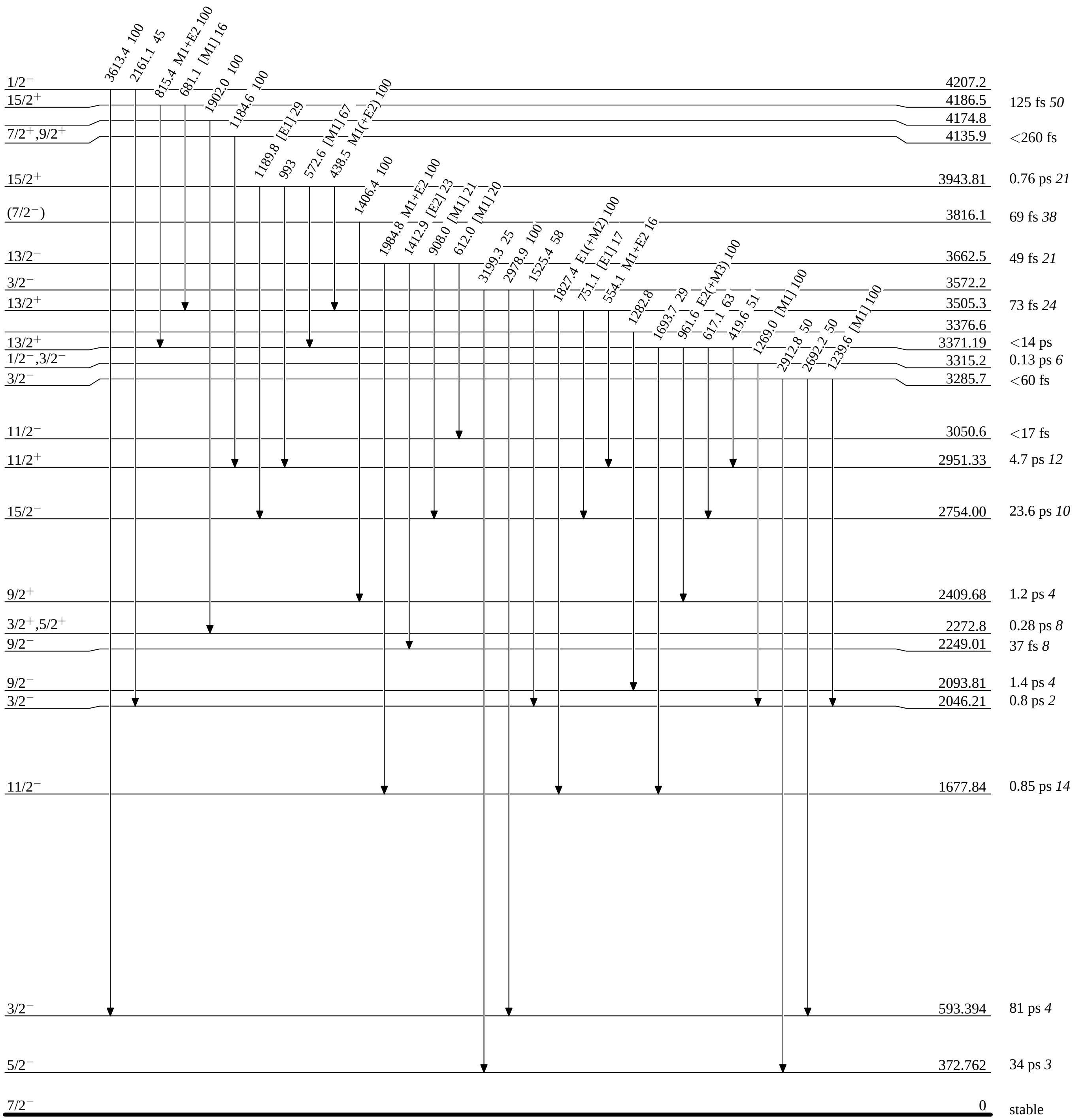
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

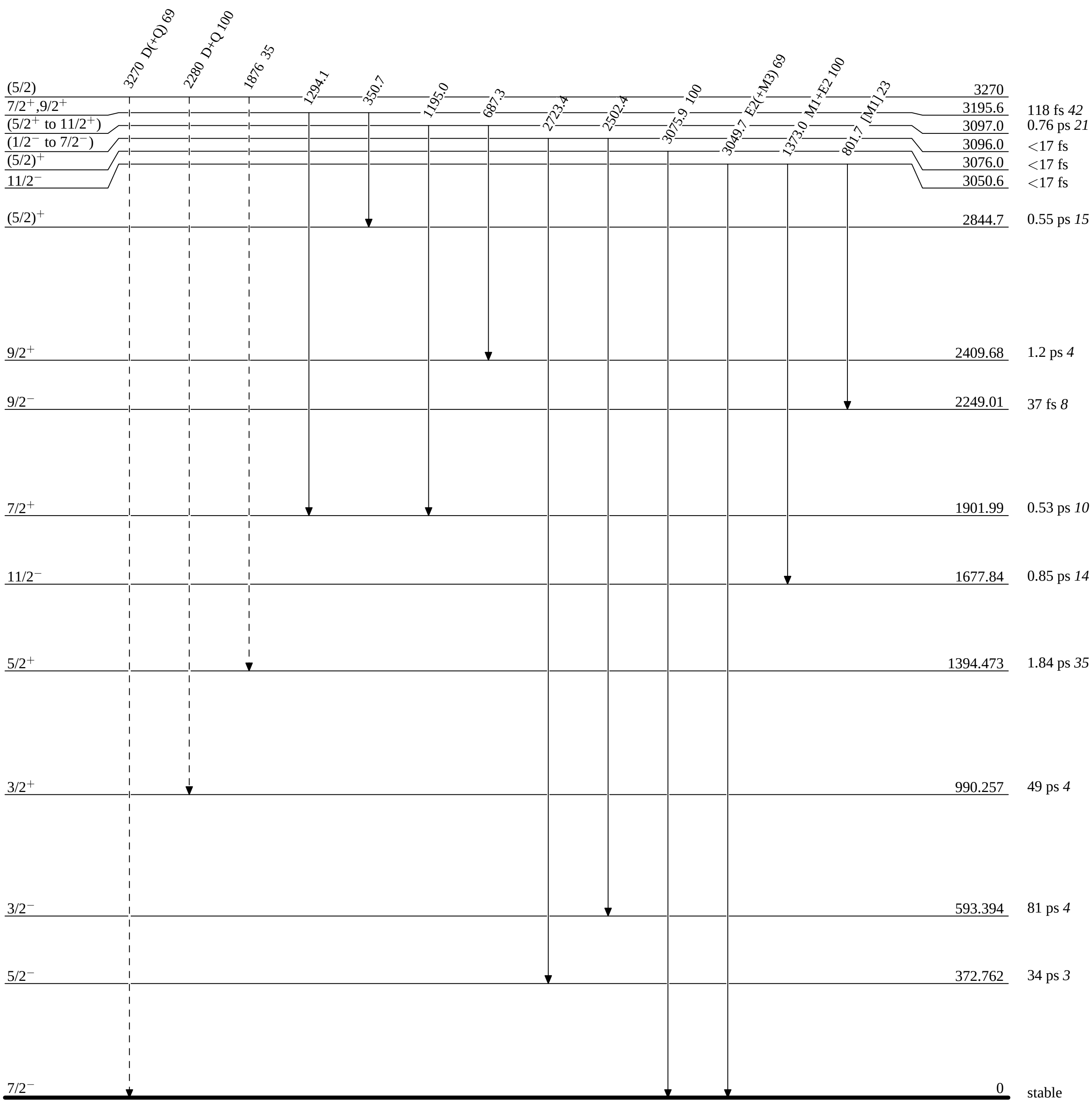


$^{43}_{20}Ca_{23}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

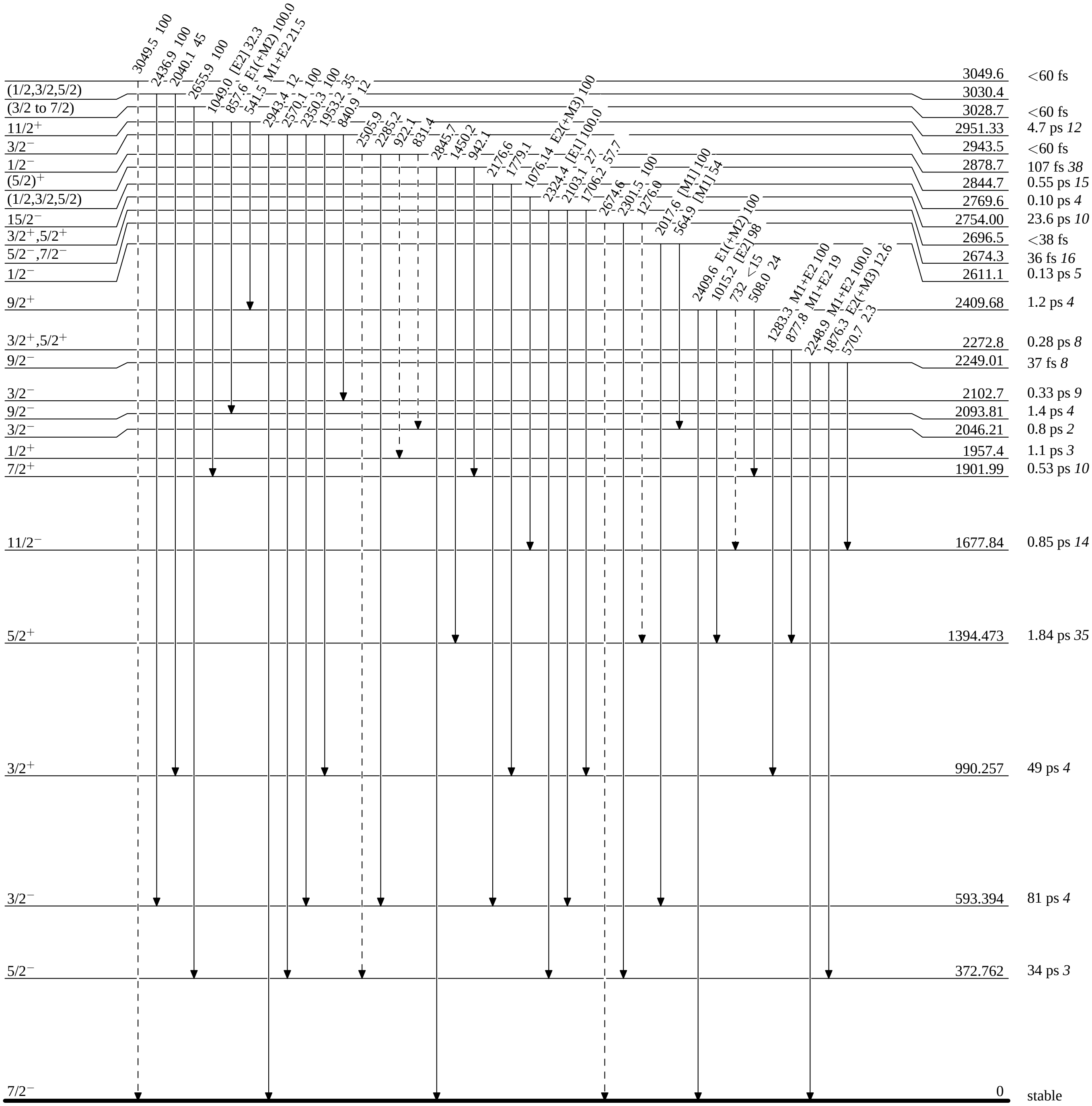


$^{43}_{20}Ca_{23}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

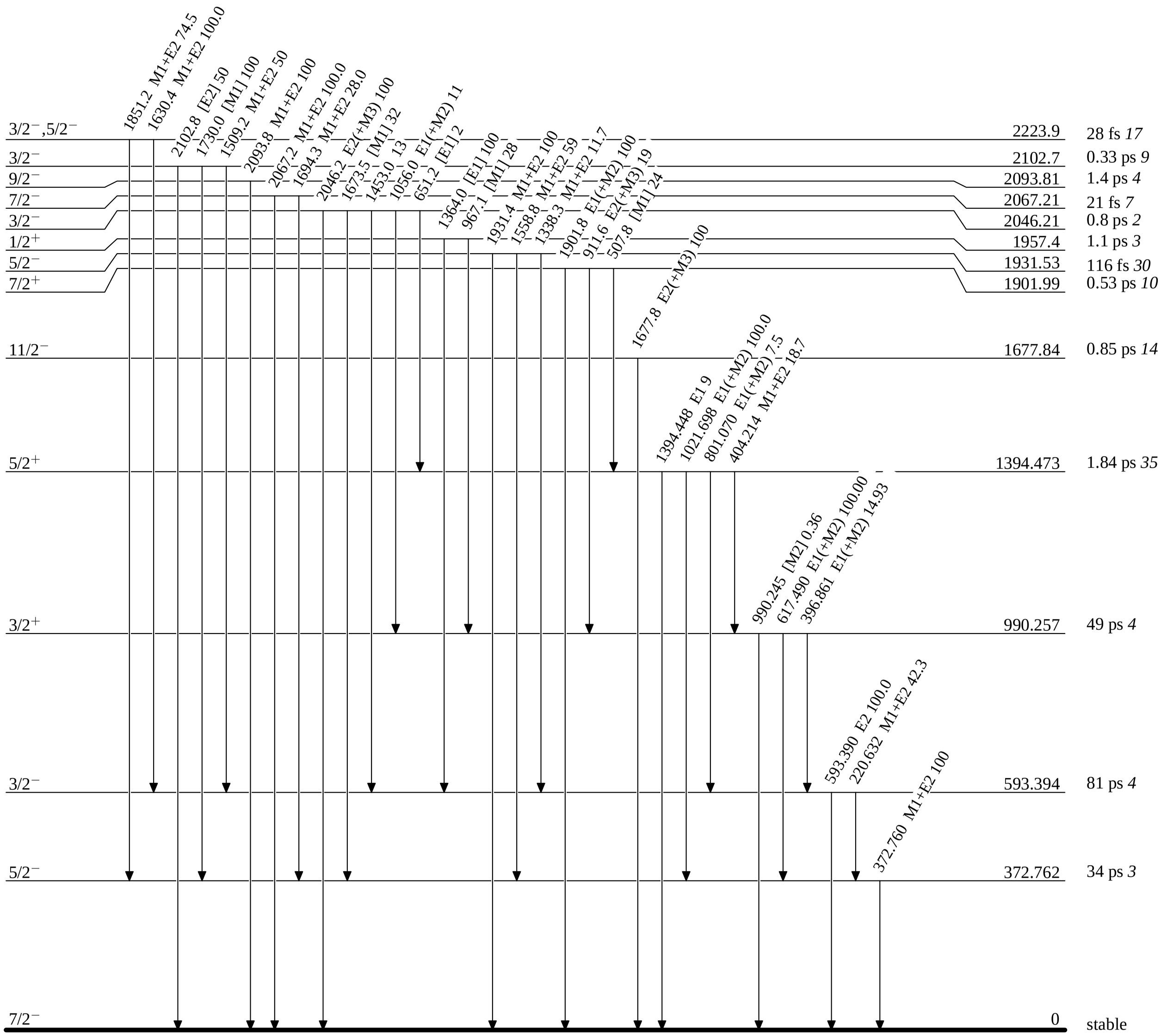


$^{43}_{20}Ca_{23}$

Adopted Levels, Gammas

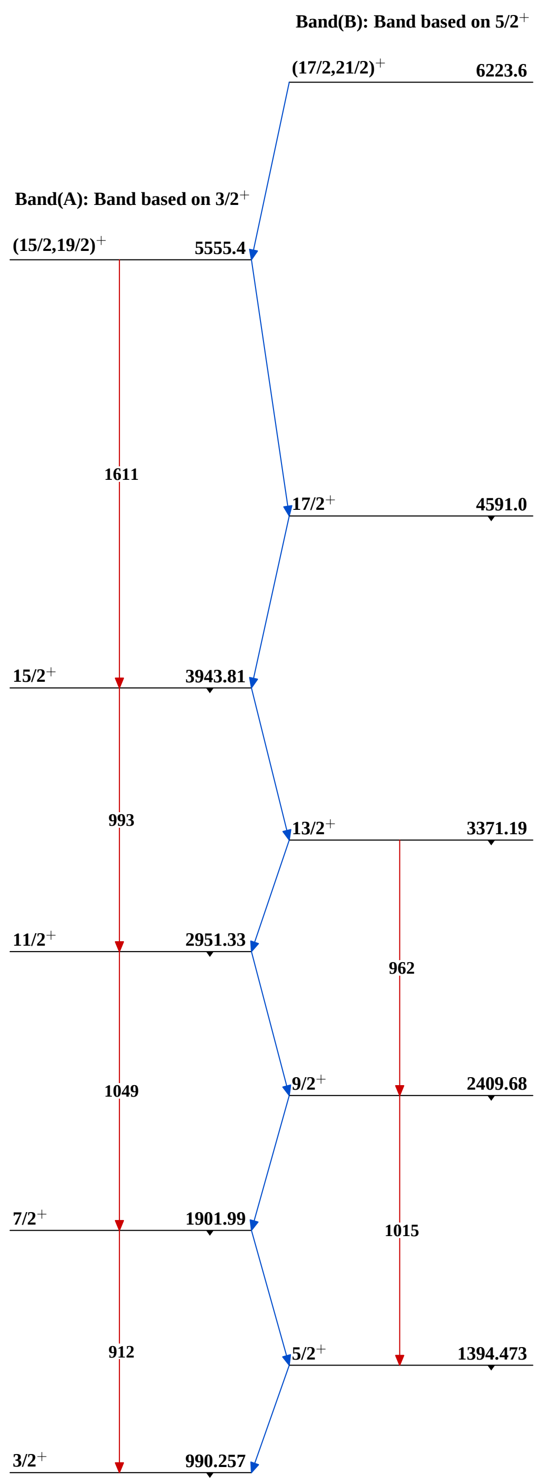
Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{43}_{20}Ca_{23}$

Adopted Levels, Gammas



$^{43}_{20}Ca_{23}$

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

Parent: ^{43}K: E=0; J^π=3/2$^+$; $T_{1/2}$=22.3 h *1*; Q(β^-)=1833.4 *5*; %β^- decay=100.0
^{43}K-J^π,$T_{1/2}$: From Adopted Levels of ^{43}K.
^{43}K-Q(β^-): From 2012Wa38.
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)[†]	J^π[‡]
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.

β^- radiations

E(decay)	E(level)	Iβ^-[†]	Log *ft*	Comments
(438.9 *5*)	1394.473	2.60 *4*	6.10 *1*	
(843.1 *5*)	990.257	90.9 *6*	5.60 *1*	
(1240.0 *5*)	593.394	4.06 *13*	7.60 *2*	
(1460.6 *5*)	372.762	0.9 *6*	8.5 *3*	Iβ^-: from 1988Wa28.
(1833.4 *5*)	0	1.54 *18*	9.73[1u] *5*	From magnetic spectrometer measurements (1988Wa28), the Kurie plot has the expected unique first-forbidden shape. Iβ^-: from Iβ(g.s.)/Iβ(990)=0.017 *2* (adopted by 1988Wa28 as the average of 0.019 (1954Li42) and 0.015 (1959Be72)).

[†] Absolute intensity per 100 decays.

γ(^{43}Ca)

Iγ normalization: I(γ+ce)(γs to g.s.)=98.46 *18*. Iβ(g.s.)=1.54 *18*.

E_γ[†]	I_γ[†&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[§]	δ[§]
220.632 *5*	5.53 *7*	593.394	3/2$^-$	372.762	5/2$^-$	M1+E2	−0.09 *4*
372.760[‡] *7*	100.0	372.762	5/2$^-$	0	7/2$^-$	M1+E2	−0.161 *14*
396.861 *6*	13.65 *9*	990.257	3/2$^+$	593.394	3/2$^-$	E1(+M2)	−0.1 *1*

Continued on next page (footnotes at end of table)

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

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

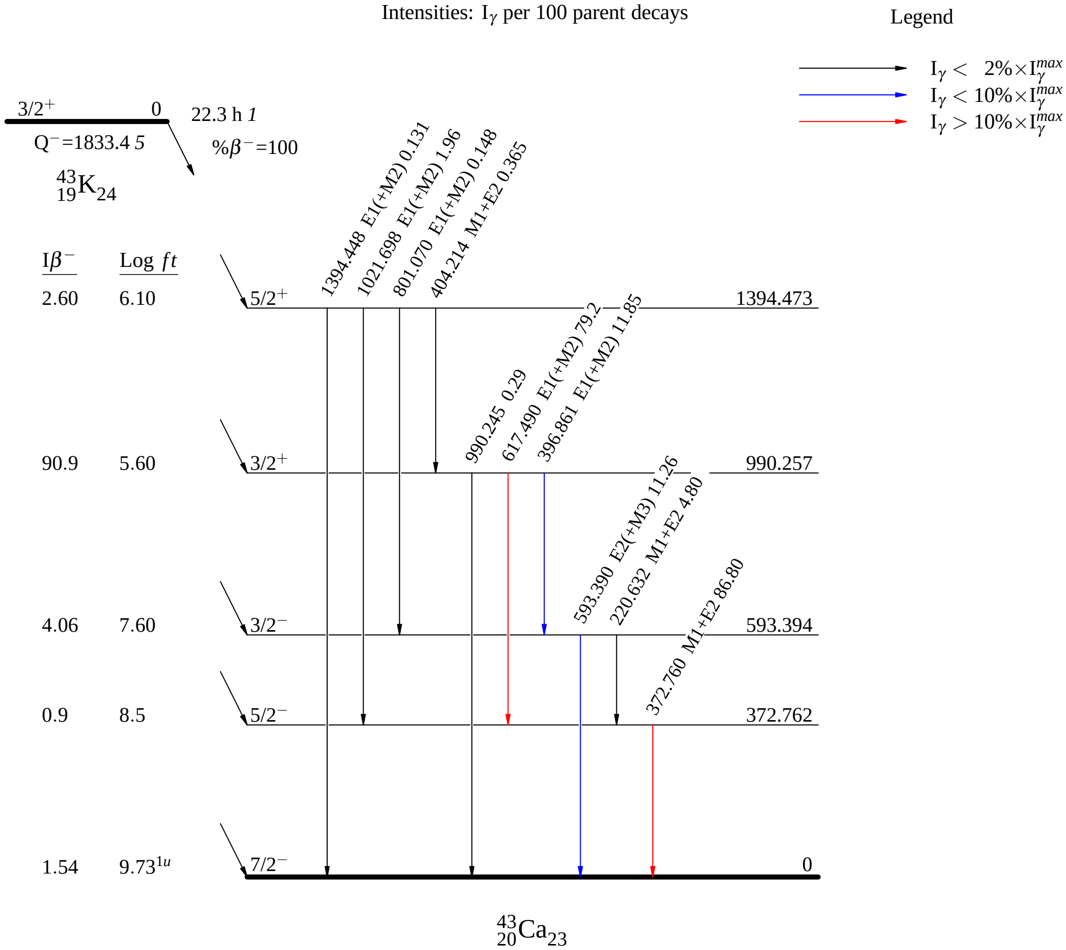
E_γ [†]	I_γ [†&]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [§]	δ [§]
404.214 *13*	0.420 *15*	1394.473	5/2+	990.257	3/2+	M1+E2	+0.32 *5*
593.390 *6*	12.97 *9*	593.394	3/2−	0	7/2−	E2(+M3)	≈0
617.490 *6*	91.2 *7*	990.257	3/2+	372.762	5/2−	E1(+M2)	−0.015 *17*
801.070 *13*	0.170 *15*	1394.473	5/2+	593.394	3/2−	E1(+M2)	−0.03 *4*
990.245 *8*	0.33 *4*	990.257	3/2+	0	7/2−		
1021.698 *13*	2.26 *3*	1394.473	5/2+	372.762	5/2−	E1(+M2)	+0.11 *12*
1394.448 *14*	0.151 *9*	1394.473	5/2+	0	7/2−	E1(+M2)	≈0

[†] From 1988Wa28.
[‡] Recoil correction removed from $E\gamma$=372.762 (1988Wa28).
[§] From Adopted Gammas.
[&] For absolute intensity per 100 decays, multiply by 0.868 *2*.

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

Decay Scheme

Intensities: I_γ per 100 parent decays



^{43}Sc ε decay (3.891 h) 1975Yo03

Parent: ^{43}Sc: E=0; J$^\pi$=7/2$^-$; $T_{1/2}$=3.891 h *12*; Q(ε)=2220.7 *19*; %ε+%β^+ decay=100.0
^{43}Sc-J$^\pi$,$T_{1/2}$: From Adopted Levels of ^{43}Sc.
^{43}Sc-Q(ε): From 2012Wa38.
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 are 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.

ε,β^+ radiations

E(decay)	E(level)	Iβ^+[†]	Iε[†]	Log *ft*	I($\varepsilon+\beta^+$)[†]	Comments
(289.7 *20*)	1931.0		0.0253 *10*	5.68 *2*	0.0253 *10*	
(1847.8 *19*)	372.9	17.2 *5*	5.33 *17*	4.98 *2*	22.5 *7*	
(2220.7 *19*)	0	70.9 *6*	6.64 *9*	5.04 *1*	77.5 *7*	I($\varepsilon+\beta^+$): from I($\gamma^\pm$)=783 *24* relative to I(373γ)=100 (1975Yo03).

[†] Absolute intensity per 100 decays.

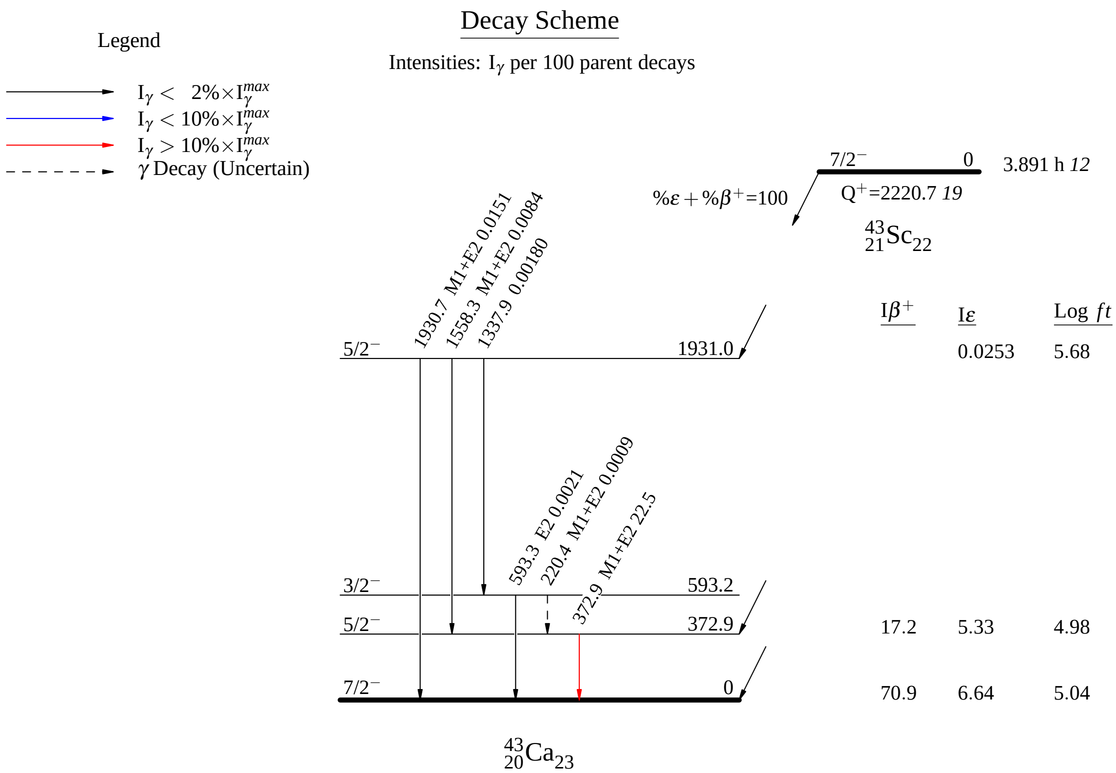
γ(^{43}Ca)

Iγ normalization: I(γ+ce)(γs to g.s.)=22.5 *7*. Total $\varepsilon+\beta^+$ feeding to g.s.=77.5 *7* deduced by 1975Yo03 from I($\gamma^\pm$)=783 *24* relative to I(373γ)=100. Other %$\varepsilon+\beta^+$= 78 (quoted by 1975Yo03 from 1963Du11).

E$_\gamma$	I$_\gamma$[§]	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.[†]	δ[†]	Comments
(220.4)	0.0040[‡] *14*	593.2	3/2$^-$	372.9	5/2$^-$	M1+E2	−0.09 *4*	
372.9 *3*	100	372.9	5/2$^-$	0	7/2$^-$	M1+E2	−0.161 *14*	
593.3 *7*	0.0095 *32*	593.2	3/2$^-$	0	7/2$^-$	E2		δ(M3/E2)≈0.
1337.9 *7*	0.0080 *10*	1931.0	5/2$^-$	593.2	3/2$^-$			
1558.3 *6*	0.0375 *22*	1931.0	5/2$^-$	372.9	5/2$^-$	M1+E2	+0.28 *14*	
1930.7 *6*	0.0672 *34*	1931.0	5/2$^-$	0	7/2$^-$	M1+E2	−0.8 *3*	

[†] From Adopted Gammas.
[‡] Normalized from Adopted branching.
[§] For absolute intensity per 100 decays, multiply by 0.225 *7*.

^{43}Sc ε decay (3.891 h) 1975Yo03



^{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

E(level)	J$^\pi$ †	$T_{1/2}$ ‡	E(level)	J$^\pi$ †	$T_{1/2}$ ‡	E(level)	J$^\pi$ †	$T_{1/2}$ ‡
0	7/2$^-$		1677.80 *20*	11/2$^-$		2951.5@ *3*	11/2$^+$	<14 ps
372.81 *5*	5/2$^-$		1901.80@ *20*	7/2$^+$		3371.2@ *4*	13/2$^+$	<14 ps
593.39 *8*	3/2$^-$		2093.90 *20*	9/2$^-$		3943.8@ *5*	15/2$^+$	<3.5 ps
990.32@ *7*	3/2$^+$	51 ps *8*	2409.80@ *20*	9/2$^+$		4591.0@ *6*	17/2$^+$	
1394.60@ *9*	5/2$^+$		2753.96 *25*	15/2$^-$	23.6# ps *10*			

† From Adopted Levels.
‡ Recoil-distance method in 1976Po03, unless otherwise noted.
# 27 ps *4* from 1974Li06.
@ Band(A): 3/2$^+$ band.

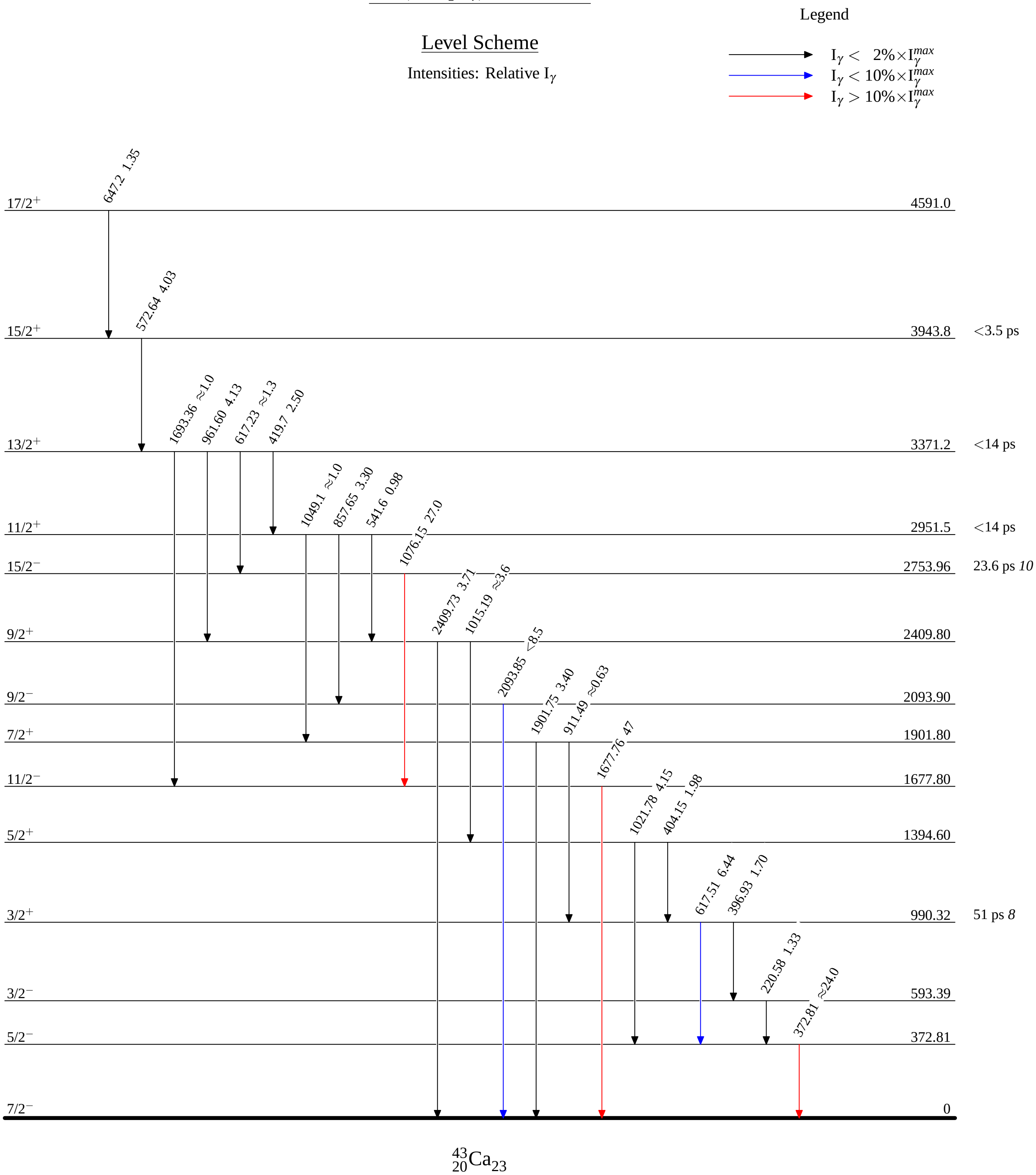
γ(^{43}Ca)

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

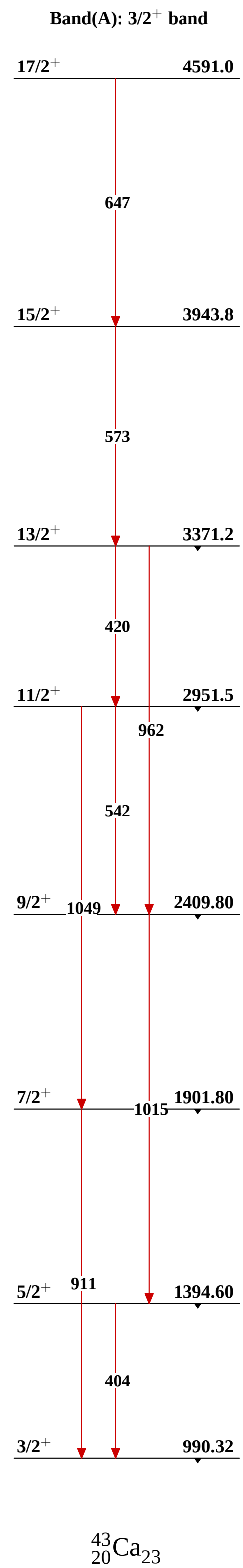
E$_\gamma$ †	I$_\gamma$	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Comments
220.58	1.33	593.39	3/2$^-$	372.81	5/2$^-$	A_2=−0.11 *5*, A_4=0.
372.81	≈24.0	372.81	5/2$^-$	0	7/2$^-$	
396.93	1.70	990.32	3/2$^+$	593.39	3/2$^-$	
404.15	1.98	1394.60	5/2$^+$	990.32	3/2$^+$	A_2=−0.25 *5*, A_4=0.
419.7 *3*	2.50	3371.2	13/2$^+$	2951.5	11/2$^+$	A_2=−0.16 *12*, A_4=0. Pol=−0.41 *13*.
541.6 *3*	0.98	2951.5	11/2$^+$	2409.80	9/2$^+$	A_2=−0.46 *19*, A_4=0.
572.64 *20*	4.03	3943.8	15/2$^+$	3371.2	13/2$^+$	A_2=−0.25 *5*, A_4=0. Pol=−0.08 *5*.
617.23	≈1.3	3371.2	13/2$^+$	2753.96	15/2$^-$	
617.51	6.44	990.32	3/2$^+$	372.81	5/2$^-$	A_2=−0.21 *4*, A_4=0. Pol=+0.11 *9*.
647.2 *3*	1.35	4591.0	17/2$^+$	3943.8	15/2$^+$	A_2=−0.17 *7*, A_4=0.
857.65 *25*	3.30	2951.5	11/2$^+$	2093.90	9/2$^-$	A_2=−0.09 *10*, A_4=0.
911.49	≈0.63	1901.80	7/2$^+$	990.32	3/2$^+$	A_2=+0.28 *2*, A_4=−0.16 *2*. Pol=+0.53 *14*.
961.60 *20*	4.13	3371.2	13/2$^+$	2409.80	9/2$^+$	A_2=+0.23 *5*, A_4=−0.10 *5*.
1015.19	≈3.6	2409.80	9/2$^+$	1394.60	5/2$^+$	A_2=+0.35 *2*, A_4=−0.12 *2*. Pol=+0.19 *15*.
1021.78	4.15	1394.60	5/2$^+$	372.81	5/2$^-$	A_2=+0.08 *4*, A_4=0.
1049.1 *4*	≈1.0	2951.5	11/2$^+$	1901.80	7/2$^+$	
1076.15 *15*	27.0	2753.96	15/2$^-$	1677.80	11/2$^-$	A_2=+0.25 *2*, A_4=−0.11 *2*. Pol=+0.43 *7*.
1677.76	47 *16*	1677.80	11/2$^-$	0	7/2$^-$	A_2=+0.23 *2*, A_4=−0.08 *2* for unresolved γ. Pol=+0.30 *8*.
1693.36	≈1.0	3371.2	13/2$^+$	1677.80	11/2$^-$	
1901.75	3.40	1901.80	7/2$^+$	0	7/2$^-$	A_2=+0.17 *6*, A_4=−0.13 *6*.
2093.85	<8.5	2093.90	9/2$^-$	0	7/2$^-$	A_2=−0.11 *3*, A_4=+0.11 *3*. Pol=−0.05 *22*.
2409.73	3.71	2409.80	9/2$^+$	0	7/2$^-$	A_2=−0.23 *5*, A_4=0.

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

^{27}Al(^{19}F,2pnγ) 1976Po03



$^{27}Al(^{19}F,2pn\gamma)$ 1976Po03



^{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 multi-detector 4π GASP array 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

E(level)	J$^{\pi}$†	E(level)	J$^{\pi}$†	E(level)	J$^{\pi}$†	E(level)	J$^{\pi}$†
0	7/2$^-$	1678 *1*	11/2$^-$	2951‡ *1*	11/2$^+$	4591# *1*	17/2$^+$
373 *1*	5/2$^-$	1902‡ *1*	7/2$^+$	3371# *1*	13/2$^+$	5555‡ *1*	(19/2$^+$)
593 *1*	3/2$^-$	2094 *1*	9/2$^-$	3505 *1*	13/2$^+$	6223# *2*	(21/2$^+$)
990‡ *1*	3/2$^+$	2410# *1*	9/2$^+$	3944‡ *1*	15/2$^+$		
1394# *1*	5/2$^+$	2754 *1*	15/2$^-$	4187 *1*	15/2$^+$		

† As proposed by 1998Be29 and 1996Be39 based on DCO ratio analysis.
‡ Band(A): 3/2$^+$ band.
# Band(B): 5/2$^+$ band.

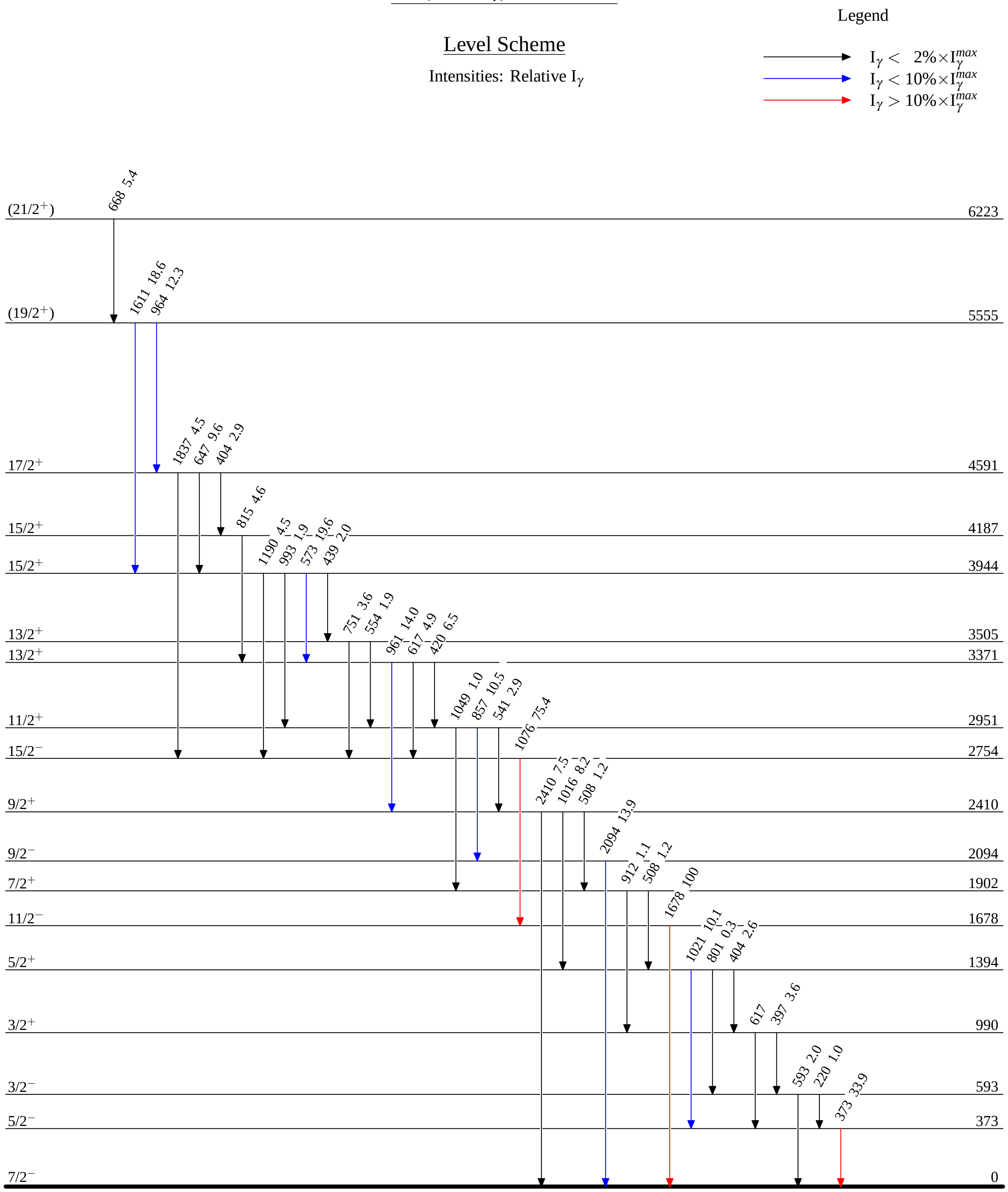
γ(^{43}Ca)

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

$^{30}Si(^{18}O,\alpha n\gamma)$ 1998Be29

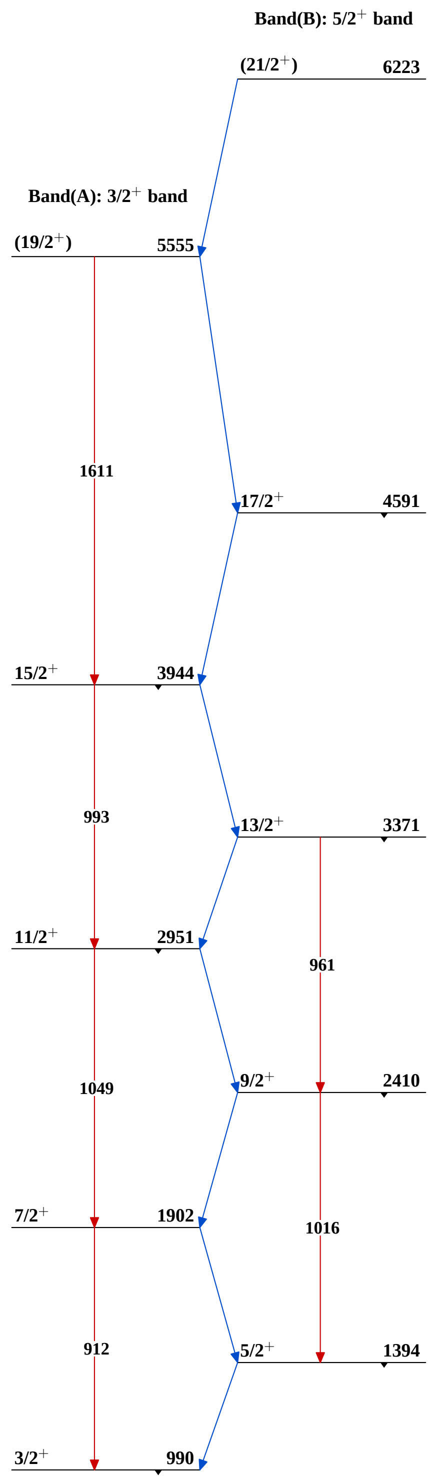
Level Scheme

Intensities: Relative I_γ



$^{43}_{20}Ca_{23}$

^{30}Si(^{18}O,αnγ) 1998Be29



$^{43}_{20}Ca_{23}$

^{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 the 3663 level.

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[a]	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*	$T_{1/2}$: other: 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	$T_{1/2}$: other: <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	

Continued on next page (footnotes at end of table)

^{40}Ar(α,nγ) 1979Be27 (continued)

^{43}Ca Levels (continued)

E(level)[†]	J^π[‡]	$T_{1/2}$[a]	E(level)[†]	J^π[‡]	$T_{1/2}$[a]
3376.8 *10*			4394.8 *6*	15/2$^-$	42 fs *17*
3505.2 *5*	13/2$^+$	73 fs *24*	4590.8 *5*	17/2$^+$	0.21 ps *5*
3662.5 *5*	13/2$^-$	49 fs *21*	4621.0 *6*	15/2$^+$	76 fs *28*
3816.2 *8*		69 fs *38*	5155.4 *6*	13/2$^-$,17/2$^-$[#]	76 fs *28*
3943.6 *5*	15/2$^+$	0.76 ps *21*	5394.6 *11*		0.104 ps *31*
4135.9 *7*		<0.26 ps	5555.2 *7*	(15/2,19/2)$^+$	1.4 ps *4*
4175.0 *11*			5931.5 *8*	(11/2,15/2,19/2)$^-$[@]	55 fs *17*
4186.4 *5*	15/2$^+$	0.13 ps *5*	6223.4 *9*	(17/2,21/2)$^+$[&]	0.58 ps *15*

[†] From least-squares fit to Eγ data.
[‡] From $\gamma(\theta)$ and γ(lin pol) (1979Be27).
[#] No observed transitions to J≤11/2 and excitation function favors 17/2.
[@] No observed transitions to J<11/2 and excitation function favors 19/2.
[&] No observed transitions to J<13/2 and excitation function favors 21/2.
[a] From DSAM method (1979Be27) unless otherwise noted.

γ(^{43}Ca)

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.[†]	δ[†]	Comments
372.76	5/2−	372.7 2	100	0.0	7/2−	M1+E2	−0.161 14	Mult.,δ: from Adopted Gammas; sign(δ) from $\gamma(\theta$,pol). A_2=+0.01 1, A_4=−0.02 1. Pol=−0.06 1.
593.48	3/2−	220.7 2	29.1 5	372.76	5/2−	M1(+E2)	−0.07 7	A_2=+0.01 1, A_4=−0.03 1. Pol=−0.08 3.
		593.5 2	70.9 5	0.0	7/2−	E2		A_2=+0.08 1, A_4=−0.02 1. Pol=+0.08 1. δ(O/Q)≈0.
990.31	3/2+	396.9 2	12.6 3	593.48	3/2−	E1		δ(M2/E1)=−0.1 1. A_2=+0.07 1, A_4=−0.02 1. Pol=−0.16 5.
		617.1 4	87.4 3	372.76	5/2−	E1		δ(M2/E1)=−0.02 2. A_2=−0.05 1, A_4=+0.01 1. Pol=+0.09 1.
1394.78	5/2+	404.3 3	11.7 4	990.31	3/2+	M1+E2	+0.32 5	A_2=+0.14 1, A_4=+0.02 1. Pol=−0.47 6.
		801.2 4	5.7 4	593.48	3/2−	E1		δ(M2/E1)=−0.03 4. A_2=−0.21 2, A_4=+0.02 2. Pol=+0.35 12.
		1021.6 4	77.6 4	372.76	5/2−	E1		δ(M2/E1)=+0.11 12. A_2=+0.25 1, A_4=−0.02 1. Pol=−0.31 3.
		1394.8 4	11.7 4	0.0	7/2−	E1		δ(M2/E1)=0. A_2=−0.25 3, A_4=+0.09 3. Pol=+0.12 19.
1677.7	11/2−	1677.7 6	100	0.0	7/2−	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+	507	17 4	1394.78	5/2+			
		911.6 3	13 4	990.31	3/2+	E2		δ(O/Q)=−0.02 3. A_2=+0.54 4, A_4=−0.25 4.
		1902.1 5	70[‡] 4	0.0	7/2−	E1		δ(M2/E1)=+0.03 4. A_2=+0.33 1, A_4=−0.01 1. Pol=−0.45 12.
1931.85	5/2−	1338.4 5	6.6 10	593.48	3/2−	M1+E2	+2.2 25	A_2=+0.52 8, A_4=+0.12 7.
		1559.6 5	35.1 10	372.76	5/2−	M1+E2	+0.28 14	A_2=+0.43 2, A_4=−0.03 1. Pol=+0.48 17.
		1931.6 3	58.3 10	0.0	7/2−	M1+E2	−0.8 3	A_2=+0.31 1, A_4=+0.02 1. Pol=−0.36 12.
1957.4	1/2+	967.1 4	28 1	990.31	3/2+			
		1364.0 5	100 1	593.48	3/2−			
2046.1	3/2−	651.0 4	2	1394.78	5/2+			
		1056.0 5	7	990.31	3/2+	E1		δ(M2/E1)=0.00 3. A_2=+0.40 5, A_4=−0.11 4.
		1451	8	593.48	3/2−			
		1675	20	372.76	5/2−			
		2046.6 9	63[‡]	0.0	7/2−	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−	1694.7 6	21.9 9	372.76	5/2−	M1+E2	−0.90 24	A_2=−0.94 3, A_4=+0.12 3. Pol=+0.25 11.
		2067.5 6	78.1 9	0.0	7/2−	M1+E2	−0.10 6	A_2=+0.32 1, A_4=+0.01 1. Pol=+0.96 12.
2094.0	9/2−	2094.2 8	100	0.0	7/2−	M1+E2	−5.9 11	A_2=−0.19 2, A_4=+0.16 2. Pol=+0.09 5.
2102.8	3/2−	1509.2 5	25	593.48	3/2−	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.
		1730.1 6	50	372.76	5/2−			A_2=+0.09 2, A_4=−0.07 2. Pol=−0.20 8.

$^{43}_{20}$Ca$_{23}$-33

γ(^{43}Ca) (continued)

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.[†]	δ[†]	Comments
2102.8	$3/2^-$	2102.9 *5*	25	0.0	$7/2^-$			
2223.8	$(3/2,5/2)^-$	1630.3 *5*	57.3 *13*	593.48	$3/2^-$	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*.
		1851.0 *6*	42.7 *13*	372.76	$5/2^-$	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*.
2249.4	$9/2^-$	1876.8 *6*	11 *1*	372.76	$5/2^-$	E2		δ(O/Q)=−0.01 *3*. A_2=+0.40 *6*, A_4=−0.34 *8*. Pol=+1.0 *5*.
		2249.5 *7*	89 *1*	0.0	$7/2^-$	M1+E2	−0.75 *12*	A_2=−0.85 *2*, A_4=+0.05 *3*. Pol=+0.15 *7*.
2273.0	$(3/2,5/2)^+$	877.8 *4*	16 *3*	1394.78	$5/2^+$	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*.
		1283.3 *5*	84 *3*	990.31	$3/2^+$	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	$9/2^+$	508.0 *7*	11[§] *2*	1902.06	$7/2^+$			
		1015	44[§] *4*	1394.78	$5/2^+$			
		2409.8 *6*	45[‡] *4*	0.0	$7/2^-$	E1		δ(M2/E1)=−0.03 *4*. A_2=−0.26 *1*, A_4=+0.01 *1*. Pol=+0.15 *10*.
2611.1		565.0 *3*		2046.1	$3/2^-$			
		2017.5 *6*		593.48	$3/2^-$			
2675.0		2302.2 *7*		372.76	$5/2^-$			
		2674.6[&] *8*		0.0	$7/2^-$			γ not seen in (p,p′γ).
2696.9		1706.2 *6*	36.6 *9*	990.31	$3/2^+$			
		2324.9 *9*	63.4 *9*	372.76	$5/2^-$			A_2=+0.26 *2*, A_4=+0.02 *2*. Pol=−0.61 *12*.
2753.9	$15/2^-$	1076.0 *5*	100	1677.7	$11/2^-$	E2		δ(O/Q)=−0.02 *2*. A_2=+0.36 *1*, A_4=−0.14 *1*. Pol=+0.60 *3*.
2769.7		1779.1 *6*		990.31	$3/2^+$			
		2176.6 *8*		593.48	$3/2^-$			
2844.8		750.9[&]		2094.0	$9/2^-$			γ treated as uncertain (by evaluators) in view of adopted Jπ(2844)=$(5/2)^+$ and Jπ(2094)=$9/2^-$.
		942.1 *6*		1902.06	$7/2^+$			
		1450.0		1394.78	$5/2^+$			
		2845.7 *11*		0.0	$7/2^-$			
2879.2		922.1 *6*		1957.4	$1/2^+$			
		2285.0 *10*		593.48	$3/2^-$			
2943.6		2350.4 *6*		593.48	$3/2^-$			
		2570.1 *8*		372.76	$5/2^-$			
2951.3	$11/2^+$	541.5 *3*	14 *1*	2409.8	$9/2^+$	M1+E2	−0.04 *2*	A_2=−0.16 *1*, A_4=+0.03 *1*. Pol=−0.20 *13*.
		857.4 *4*	65 *1*	2094.0	$9/2^-$	E1		δ(M2/E1)=0.00 *2*. A_2=−0.15 *1*, A_4=+0.01 *1*. Pol=+0.39 *3*.
		1048.9 *5*	21 *1*	1902.06	$7/2^+$			
3028.7		2655.9 *8*	100	372.76	$5/2^-$			A_2=+0.32 *2*, A_4=−0.05 *2*. Pol=+0.48 *10*.
3049.6		3049.5 *15*	100	0.0	$7/2^-$			

$^{43}_{20}$Ca$_{23}$-34

γ(^{43}Ca) (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.†	δ†	Comments
3050.7	11/2⁻	801.7 7	12 2	2249.4	9/2⁻			
		1373.0 6	53 2	1677.7	11/2⁻	M1+E2	+0.30 5	A_2=+0.42 2, A_4=−0.02 1. Pol=+0.50 10.
		3049.7 11	36 2	0.0	7/2⁻	E2		δ(O/Q)=−0.02 2.
3076.0		3075.9 15	100	0.0	7/2⁻			A_2=+0.37 2, A_4=−0.04 2. Pol=−0.50 16.
3096.1		2502.4 8		593.48	3/2⁻			
		2723.4 11		372.76	5/2⁻			
3097.1		687.3 7		2409.8	9/2⁺			
		1195.0 10		1902.06	7/2⁺			Pol=+0.45 10.
3195.7		350.7 4		2844.8				
		1294.1 7		1902.06	7/2⁺			
3286.0		1239.9 9		2046.1	3/2⁻			
3315.6		1269.5 10		2046.1	3/2⁻			
3371.1	13/2⁺	419.5 5	21.0 12	2951.3	11/2⁺			
		617.1 7	26.0 12	2753.9	15/2⁻			
		961.6 8	41.0 12	2409.8	9/2⁺	E2		δ(O/Q)=0.00 2. A_2=+0.27 2, A_4=−0.13 2. Pol=+0.55 7.
		1693.7 9	12.0 12	1677.7	11/2⁻			
3376.8		1282.8 9		2094.0	9/2⁻			
3505.2	13/2⁺	554.1 5	12 2	2951.3	11/2⁺	M1+E2	−0.06 2	A_2=−0.30 3, A_4=−0.07 4. Pol=0.00 3.
		751.1 6	13 2	2753.9	15/2⁻			
		1827.4 9	75 2	1677.7	11/2⁻	E1		δ(M2/E1)=−0.03 3. A_2=−0.15 1, A_4=0.00 1. Pol=+0.41 6.
3662.5	13/2⁻	612.0 7	12 2	3050.7	11/2⁻			
		908.0 9	13 2	2753.9	15/2⁻			
		1412.9 7	14 2	2249.4	9/2⁻			
		1984.8 9	61 2	1677.7	11/2⁻	M1+E2	−0.60 14	A_2=−0.92 3, A_4=+0.11 4. Pol=−0.03 10.
3816.2		1406.4 7		2409.8	9/2⁺			
3943.6	15/2⁺	438.5 4	51 7	3505.2	13/2⁺	M1(+E2)	0.00 2	A_2=−0.24 2, A_4=−0.01 2. Pol=−0.34 5.
		572.2 6	34 7	3371.1	13/2⁺			
		1189.8 7	15 7	2753.9	15/2⁻			
4135.9		1184.6 6		2951.3	11/2⁺			
4175.0		1902.0 10		2273.0	(3/2,5/2)⁺			
4186.4	15/2⁺	681.1 4	14 3	3505.2	13/2⁺			
		815.4 6	86 3	3371.1	13/2⁺	M1+E2	−0.15 2	A_2=−0.50 2, A_4=−0.01 2. Pol=−0.28 5.
4394.8	15/2⁻	731.9 5	22 3	3662.5	13/2⁻			
		1641.1 7	37 3	2753.9	15/2⁻	M1+E2	−0.50 14	A_2=+0.43 7, A_4=−0.17 7. Pol=+0.56 25.
		2717.4 12	41 3	1677.7	11/2⁻	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⁺	404.4 4	24 5	4186.4	15/2⁺			
		647.2 5	49 5	3943.6	15/2⁺	M1(+E2)	0.00 2	A_2=−0.30 1, A_4=−0.03 2. Pol=−0.47 7.
		1837.4 9	27 5	2753.9	15/2⁻	E1		δ(M2/E1)=0.00 2.
4621.0	15/2⁺	677.4 4	28 4	3943.6	15/2⁺			

γ(^{43}Ca) (continued)

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.†	δ†	Comments
4621.0	15/2$^+$	1249.9 *7*	72 *4*	3371.1	13/2$^+$	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$^-$	760.4 *5*	65 *3*	4394.8	15/2$^-$	M1+E2		δ: −0.08 *2* or −0.15 *2*. A_2=−0.36 *2*, A_4=−0.05 *2*. Pol=−0.20 *10*.
		1493.1 *6*	35 *3*	3662.5	13/2$^-$			δ: 0.00 *2* for 17/2 to 13/2, but no γ(θ) data quoted.
5394.6		2640.6 *10*		2753.9	15/2$^-$			
5555.2	(15/2,19/2)$^+$	964.5 *6*	<60	4590.8	17/2$^+$			
		1611.4 *7*	>40	3943.6	15/2$^+$	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*.
5931.5	(11/2,15/2,19/2)$^-$	776.1 *5*	100	5155.4	13/2$^-$,17/2$^-$	M1(+E2)		δ: −0.03 *2*; +0.07 *3*; −0.11 *2* for different Jπ values. A_2=−0.28 *3*, A_4=−0.01 *4*. Pol=−0.33 *18*.
6223.4	(17/2,21/2)$^+$	668.2 *5*	100	5555.2	(15/2,19/2)$^+$	M1(+E2)		δ: −0.02 *3*; +0.06 *3*; +0.09 *3* for different Jπ values. A_2=−0.27 *4*, A_4=−0.05 *5*. Pol=−0.40 *17*.

† From γ(θ) and γ(lin pol) (1979Be27).

‡ Quoted by 1979Be27 from 1978En02.

§ I(508γ)=44 *4* and I(1015γ)=11 *2* in 1979Be27 could be mistakenly assigned to each other. Values seem to be from (p,p′γ) (1972Gr04).

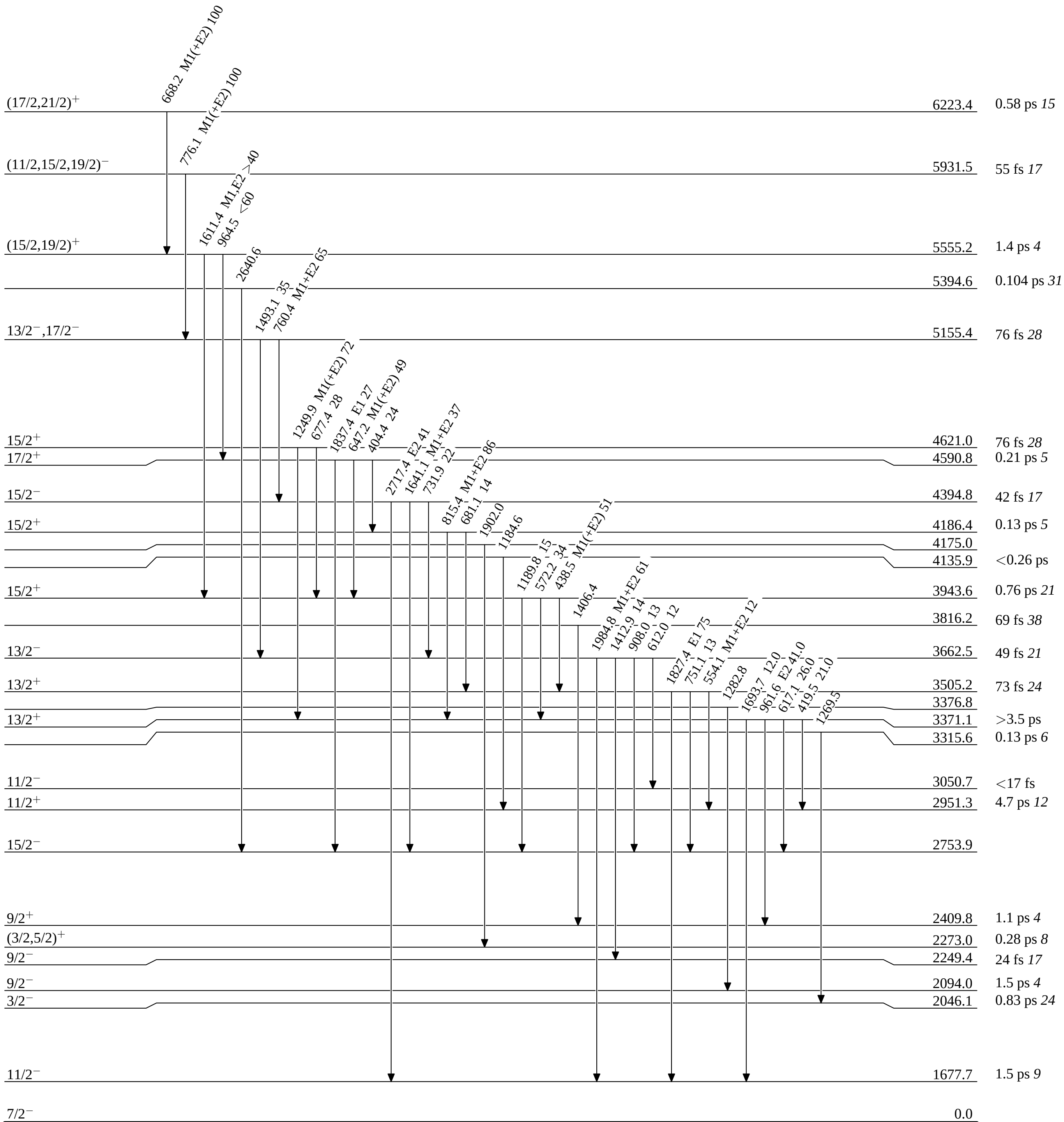
& Placement of transition in the level scheme is uncertain.

$^{43}_{20}$Ca$_{23}$-36

$^{40}Ar(\alpha,n\gamma)$ 1979Be27

Level Scheme

Intensities: % photon branching from each level

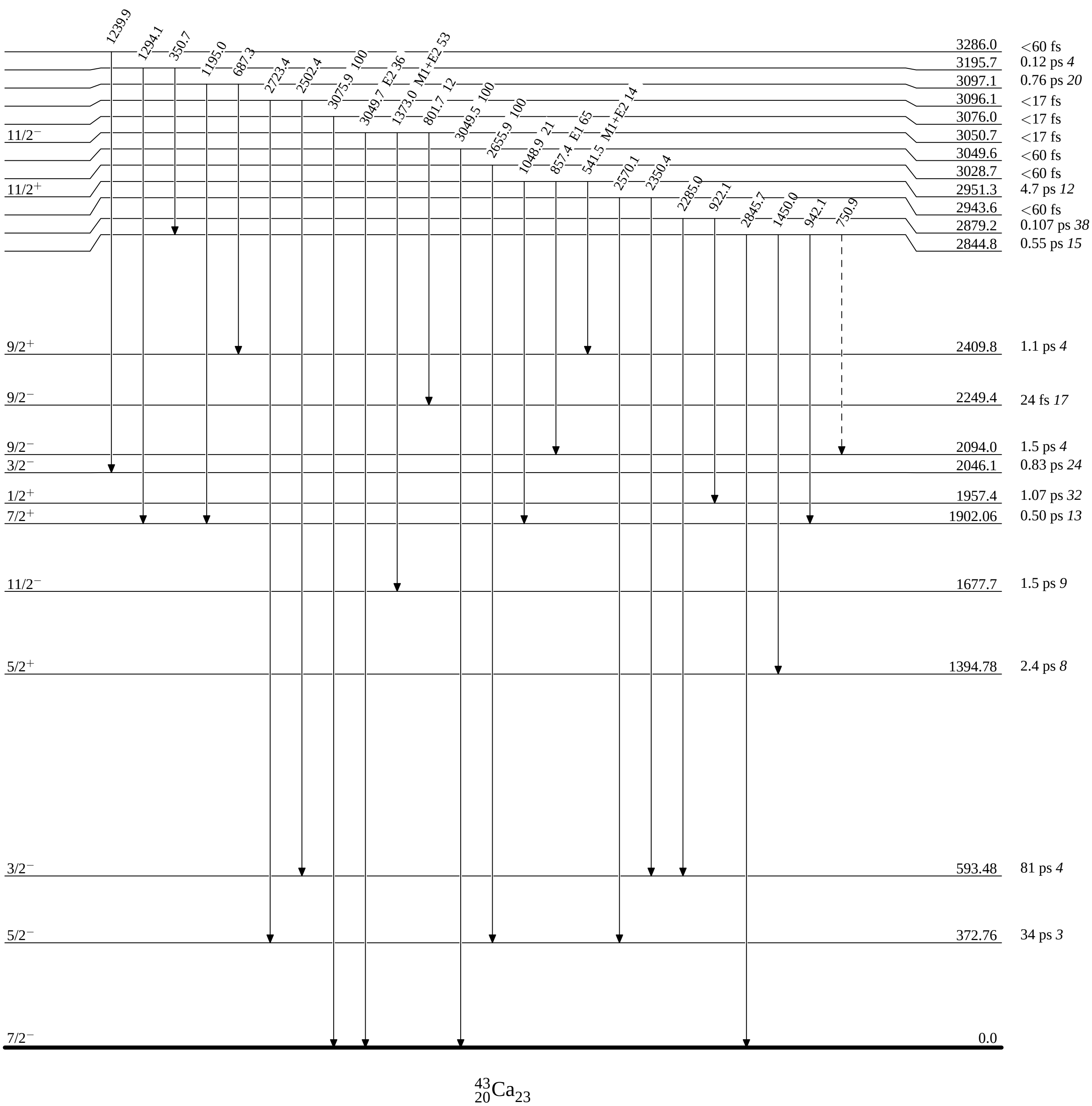


$^{43}_{20}Ca_{23}$

$^{40}Ar(\alpha,n\gamma)$ 1979Be27

Level Scheme (continued)

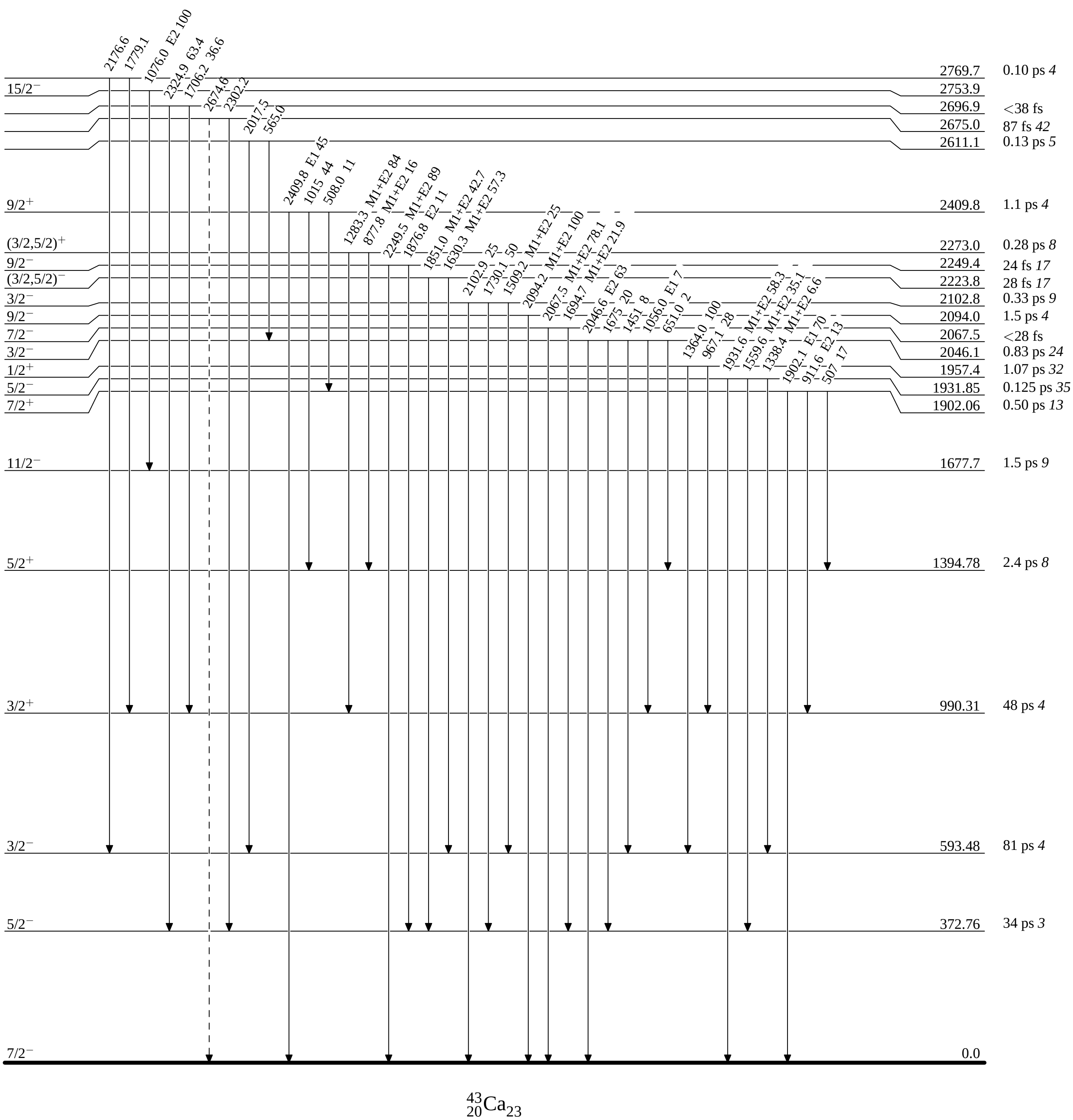
Intensities: % photon branching from each level



^{40}Ar(α,nγ) 1979Be27

Level Scheme (continued)

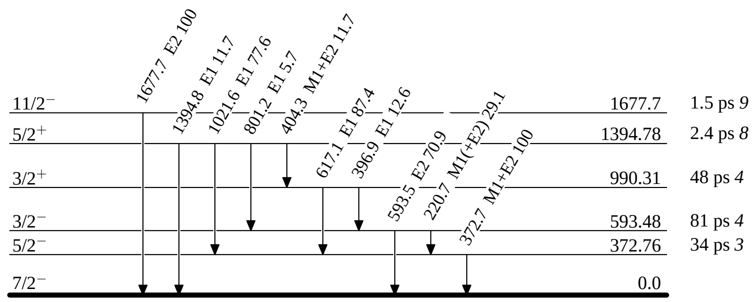
Intensities: % photon branching from each level



^{40}Ar(α,nγ) 1979Be27

Level Scheme (continued)

Intensities: % photon branching from each level



$^{43}_{20}Ca_{23}$

^{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)	L	dσ/dΩ (μb/sr)†	Comments
0‡		10‡	
990	0	18	Weak population is consistent with configuration=$1f^{4}_{7/2}1d^{-1}_{3/2}$, J=3/2, T=3/2 as proposed by 1966Do02 in (d,p).
1393?		<4	Very weak population suggests a configuration more complicated than $1f^{4}_{7/2}1d^{-1}_{3/2}$; 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=$1f^{4}_{7/2}1d^{-1}_{3/2}$; J$\pi$=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 *30*	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 MSU Cyclotron. Enriched ^{41}K target (98%) on a thin carbon foil, thickness of ≈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 σ(E_d,θ) 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)	Jπ[#]	L	dσ/dΩ (μb/sr)[‡]
0	7/2$^-$[@]	5	150
2045 *10*	3/2$^-$[@]	3	65
2850 *10*	(11/2$^+$,13/2$^+$)	4+6	23, 20
2951 *10*		6	76
3072 *10*	(11/2$^+$,13/2$^+$)	4+6	10, 18
3196[†] *10*			
3278 *10*	(11/2$^+$ to 17/2$^+$)	6	24
3372 *10*		6	79
3500 *10*	(11/2$^+$,13/2$^+$)	4+6	130, 110
3838 *10*	(7/2$^+$ to 13/2$^+$)	4	60
3944 *10*		6	135
4134 *10*	(11/2$^+$,13/2$^+$)	6	78
4191 *10*	(11/2$^+$ to 17/2$^+$)	6	220
4291 *10*	(11/2$^+$,13/2$^+$)	4+6	32, 21
4357 *10*	(11/2$^+$,13/2$^+$)	4+6	58, 25
4462 *10*	(11/2$^+$,13/2$^+$)	4+(6)	33, 6
4591 *10*		6	510
4701 *10*			
4888 *10*	(11/2$^+$ to 17/2$^+$)	6	105
5189 *10*	(11/2$^+$,13/2$^+$)	4+6	20,35
5246 *10*	(11/2$^+$,13/2$^+$)	4+6	110, 28
5351 *10*	(11/2$^+$,13/2$^+$)	4+6	78, 34
5696 *10*	(11/2$^+$,13/2$^+$)	4+6	42, 37
6087 *10*			
6173 *10*			

[†] Very weakly populated.

[‡] 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, γγ. 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 with Ge(Li) detectors. Measured γ(circ pol). Deduced levels, J.

Others:

1971BiZH: E=thermal. Measured Eγ, Iγ, γγ.

1971Cr02: E=thermal. Measured Eγ, Iγ. Data for three secondary γ-rays.

1989Ra06: E=thermal.

^{43}Ca Levels

E(level)‡	Jπ†	$T_{1/2}$	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+@	1.1 eV *2*	Γ from 2006MuZX.

† From Adopted Levels, unless otherwise stated.

‡ Least-squares fit to Eγ data.

Observed de-excitation intensity is 88% *8* of g.s. feeding.

@ s-wave capture in ^{42}Ca g.s.

& From (pol n,γ) measurements (1978Ve06).

γ(^{43}Ca)

Iγ normalization: normalized assuming Iγ(g.s.)=100. Capture σ_0=0.68 b *7* (2006MuZX).
Asymmetry ratios from (pol n,γ) are given under comments as R values.

Eγ†‡	Iγ†&	E_i(level)	J^π_i	E_f	J^π_f
220.6 *3*	11 *1*	593.31	3/2−	372.72	5/2−
372.70 *20*	38 *4*	372.72	5/2−	0.0	7/2−
396.9 *4*	0.9 *2*	990.4	3/2+	593.31	3/2−

Continued on next page (footnotes at end of table)

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

γ(^{43}Ca) (continued)

E_γ [†‡]	I_γ [†&]	E_i(level)	J_i^π	E_f	J_f^π	Comments
404.0 *8*	0.5 *2*	1394.5	5/2$^+$	990.4	3/2$^+$	
564.4 *6*	1.5 *5*	2610.9	1/2$^-$	2046.33	3/2$^-$	
593.4 *6*	23 *2*	593.31	3/2$^-$	0.0	7/2$^-$	
617.7 *3*	6.6 *7*	990.4	3/2$^+$	372.72	5/2$^-$	
651.6 *6*	0.9 *5*	2046.33	3/2$^-$	1394.5	5/2$^+$	
831.4 *10*	0.4 *2*	2878.2	1/2$^-$	2046.33	3/2$^-$	
840.9 *10*	0.3 *2*	2943.5	3/2$^-$	2102.8	3/2$^-$	
^{x}878.2 *6*	0.9 *2*					
967.5 *15*	≈0.2	1957.3	1/2$^+$	990.4	3/2$^+$	
1021.5 *10*	1.4 *4*	1394.5	5/2$^+$	372.72	5/2$^-$	
1055.9 *6*	4.2 *6*	2046.33	3/2$^-$	990.4	3/2$^+$	
1239.1 *12*	1.0 *2*	3286.1	3/2$^-$	2046.33	3/2$^-$	
1268.9 *6*	0.7 *2*	3315.4	1/2$^-$,3/2$^-$	2046.33	3/2$^-$	
1363.9 *10*	1.5 *10*	1957.3	1/2$^+$	593.31	3/2$^-$	
^{x}1370.5 *10*	1.1 *2*					
1453.0 *3*	4.9 *5*	2046.33	3/2$^-$	593.31	3/2$^-$	
1525.4 *10*	0.7 *2*	3572.6	3/2$^-$	2046.33	3/2$^-$	
1673.5 *4*	11.9 *12*	2046.33	3/2$^-$	372.72	5/2$^-$	
1729.9 *10*	1.2 *4*	2102.8	3/2$^-$	372.72	5/2$^-$	
2017.8 *8*	2.8 *3*	2610.9	1/2$^-$	593.31	3/2$^-$	
2046.3 *3*	38 *4*	2046.33	3/2$^-$	0.0	7/2$^-$	
2102.7 *6*	1.2 *5*	2102.8	3/2$^-$	0.0	7/2$^-$	
2161.1 *6*	2.1 *3*	4207.3	1/2$^-$	2046.33	3/2$^-$	
2285.4 *10*	1.4 *3*	2878.2	1/2$^-$	593.31	3/2$^-$	
2350.3 *4*	2.5 *3*	2943.5	3/2$^-$	593.31	3/2$^-$	
2595.3[@]		4641.5	3/2$^+$,5/2$^+$	2046.33	3/2$^-$	
2628.4		4901.2	1/2$^-$,3/2$^-$	2272.8		Iγ(2628)/Iγ(2855)=0.67 *47* (quoted by 1990En08).
2798.4		4901.2	1/2$^-$,3/2$^-$	2102.8	3/2$^-$	Iγ(2798)/Iγ(2855)=1.00 *85* (quoted by 1990En08).
2854.8		4901.2	1/2$^-$,3/2$^-$	2046.33	3/2$^-$	
2895.1 *5*	2.0 *3*	(7932.7)	1/2$^+$	5037.8	1/2$^-$,3/2$^-$	R=+2.1 *9* (1978Ve06).
2978.9 *7*	1.2 *3*	3572.6	3/2$^-$	593.31	3/2$^-$	
2992.4 *10*	0.6 *3*	5037.8	1/2$^-$,3/2$^-$	2046.33	3/2$^-$	
3031.3 *10*	1.1 *3*	(7932.7)	1/2$^+$	4901.2	1/2$^-$,3/2$^-$	R=+0.9 *5* (1978Ve06).
3199.4	0.3 *2*	3572.6	3/2$^-$	372.72	5/2$^-$	
3291.1		(7932.7)	1/2$^+$	4641.5	3/2$^+$,5/2$^+$	
3330.0		(7932.7)	1/2$^+$	4602.6	(1/2,3/2,5/2$^+$)	
3613.4 *8*	4.7 *12*	4207.3	1/2$^-$	593.31	3/2$^-$	
^{x}3654.7 *6*	0.9 *3*					
3725.3 *3*	8.3 *12*	(7932.7)	1/2$^+$	4207.3	1/2$^-$	R=+0.98 *15* (1978Ve06).
4009.8[@]		4602.6	(1/2,3/2,5/2$^+$)	593.31	3/2$^-$	
4307.6		4901.2	1/2$^-$,3/2$^-$	593.31	3/2$^-$	Iγ(4308)/Iγ(2855)=0.67 *60* (quoted by 1990En08).
4359.5 *5*	2.9 *4*	(7932.7)	1/2$^+$	3572.6	3/2$^-$	R=−0.4 *2* (1978Ve06).
4616.6 *9*	0.6 *3*	(7932.7)	1/2$^+$	3315.4	1/2$^-$,3/2$^-$	
4646.2 *6*	2.4 *5*	(7932.7)	1/2$^+$	3286.1	3/2$^-$	R=−0.3 *2* (1978Ve06).
^{x}4836.8 *9*	≈0.1					
4989.2 *5*	3.6 *5*	(7932.7)	1/2$^+$	2943.5	3/2$^-$	R=−0.55 *18* (1978Ve06).
5054.2 *5*	2.4 *4*	(7932.7)	1/2$^+$	2878.2	1/2$^-$	R=+0.6 *3* (1978Ve06).
5321.4 *5*	4.1 *6*	(7932.7)	1/2$^+$	2610.9	1/2$^-$	R=+0.79 *19* (1978Ve06).
^{x}5420.7 *12*	≈0.2					
5828.6 *15*	0.9 *3*	(7932.7)	1/2$^+$	2102.8	3/2$^-$	
5886.0 *4*	53[§] *8*	(7932.7)	1/2$^+$	2046.33	3/2$^-$	R=−0.50 *3* (1978Ve06).
5975.2 *15*	0.6 *3*	(7932.7)	1/2$^+$	1957.3	1/2$^+$	
7339.0 *7*	5.7 *9*	(7932.7)	1/2$^+$	593.31	3/2$^-$	R=−0.50 *11* (1978Ve06).

Continued on next page (footnotes at end of table)

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

γ(^{43}Ca) (continued)

† 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).
§ From measured elemental σ_γ=0.024 b *4* (2007ChZX, PGAA database), abundance of ^{42}Ca=0.647%, and σ_0=0.68 b *7* (2006MuZX), σ_γ=0.37 b *6* and Iγ=54 *10*/100 n-captures, which agrees with 53 *8* from 1969Gr08.
& Intensity per 100 neutron captures.
@ Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

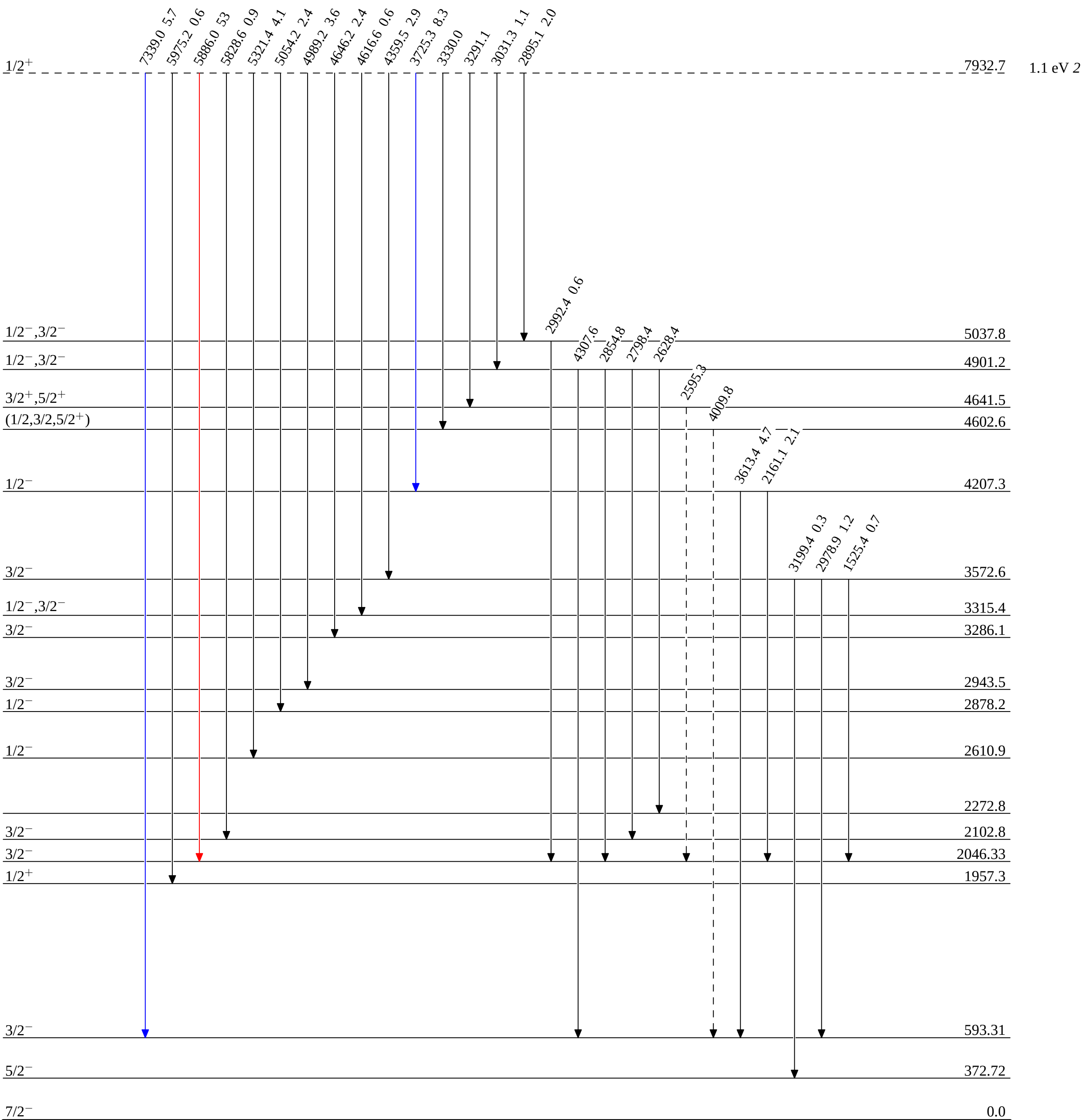
^{42}Ca(n,γ) E=thermal 1969Gr08,1978Ve06

Level Scheme

Intensities: Per about 100 n-captures

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)

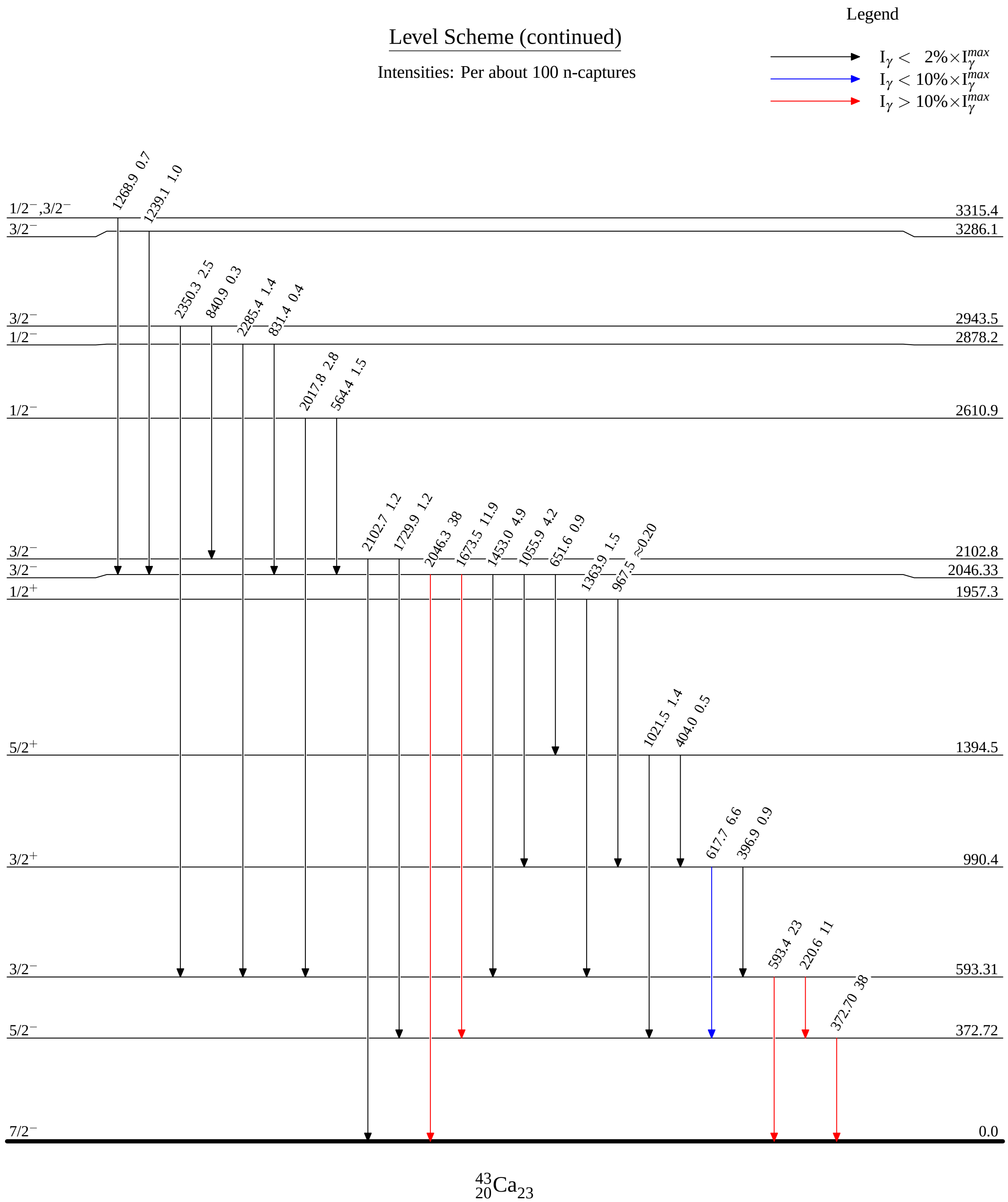


$^{43}_{20}Ca_{23}$

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

Level Scheme (continued)

Intensities: Per about 100 n-captures



^{42}Ca(n,γ),(n,n):resonances 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)†	Γ_γ	L	E_n(lab) (keV)	Comments
7929.2?	1.06 eV	0	−3.85	
7941.82 *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*.
7942.02 *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*.
7951.50 *17*		1	19.06 *1*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.13 eV *1*.
7955.07 *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*.
7956.11 *17*		1	23.78 *1*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.022 eV *4*.
7958.56 *17*	0.68 eV *10*	0	26.29 *1*	$g\Gamma_n$=3 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.56 eV *6*.
7968.85 *17*	0.56 eV *5*	1	36.82 *1*	$g\Gamma_n$=2 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.53 eV *6*.
7969.45 *17*	1.36 eV *15*	0	37.44 *1*	$g\Gamma_n$=1000 eV 300.
7972.04 *17*		1	40.09 *1*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.33 eV *4*.
7977.9		0	46	$g\Gamma_n$=300 eV.
7980.00 *17*	0.61 eV *6*	0	48.24 *2*	$g\Gamma_n$=15 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.59 eV *6*.
7981.42 *17*		1	49.70 *2*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.15 eV *2*.
7981.59 *17*	0.31 eV *5*	1	49.87 *2*	$g\Gamma_n$=10 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.30 eV *3*.
7989.86 *17*	0.79 eV *8*	0	58.34 *2*	$g\Gamma_n$=5 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.68 eV *7*.
7991.74 *17*	0.8 eV *1*	0	60.26 *2*	$g\Gamma_n$=20 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.77 eV *8*.
7996.53 *17*	0.38 eV *5*	0	65.17 *3*	$g\Gamma_n$=50 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.38 eV *5*.
8002.06 *17*		1	70.83 *3*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.21 eV *4*.
8006.39 *17*		1	75.27 *3*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.44 eV *5*.
8007.56 *17*	1.19 eV *15*	0	76.46 *3*	$g\Gamma_n$=10 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=1.06 eV *12*.
8013.58 *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*.
8014.19 *17*	0.5 eV *1*	1	83.25 *4*	$g\Gamma_n$=10 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.83 eV *10*.
8020.10 *17*			89.31 *4*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.79 eV *10*.
8020.46 *17*			89.68 *4*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.69 eV *10*.
8023.43 *19*			92.72 *8*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.51 eV *7*.
8023.71 *19*			93.00 *8*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.71 eV *8*.
8025.53 *19*			94.87 *8*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.47 eV *6*.
8028.49 *19*	0.98 eV *15*	0	97.90 *8*	$g\Gamma_n$=5 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.82 eV *10*.
8033.77 *20*		1	103.3 *1*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.40 eV *6*.

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

^{43}Ca Levels (continued)

E(level)†	Γ_γ	L	E_n(lab) (keV)	Comments
8047.14 *20*	1.60 eV *15*	0	117.0 *1*	$g\Gamma_n$=20 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=1.50 eV *15*.
8049.19 *20*	0.41 eV *8*	1	119.1 *1*	$g\Gamma_n$=10 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.76 eV *12*.
8052.0 *10*	1.55 eV	0	122 *1*	$g\Gamma_n$=3750 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=1.55 eV.
8055.93 *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.
8057.01 *20*		1	127.1 *1*	$g\Gamma_n\Gamma_\gamma/\Gamma$=1.03 eV *13*.
8057.40 *20*			127.5 *1*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.72 eV *10*.
8058.28 *20*			128.4 *1*	$g\Gamma_n\Gamma_\gamma/\Gamma$=1.26 eV *15*.
8061.0 *3*	0.56 eV *8*	1	131.2 *2*	$g\Gamma_n$=5 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.50 eV *8*.
8062.1 *3*		0	132.4 *2*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.87 eV *10*.
8066.0 *3*	0.41 eV *8*	1	136.3 *2*	$g\Gamma_n$=5 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.38 eV *6*.
8073.8 *3*	0.94 eV *15*	0	144.3 *2*	$g\Gamma_n$=75 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.93 eV *13*.
8074.5 *3*	0.47 eV *8*	1	145.1 *2*	$g\Gamma_n$=20 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.89 eV *13*.
8075.4 *3*			146.0 *2*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.67 eV *9*.
8078.3 *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*.
8086.0 *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*.
8089.3 *3*			160.2 *3*	$g\Gamma_n\Gamma_\gamma/\Gamma$=1.20 eV *14*.
8090.2 *4*			161.1 *4*	$g\Gamma_n\Gamma_\gamma/\Gamma$=1.53 eV *18*.
8099.2 *4*			170.4 *4*	$g\Gamma_n\Gamma_\gamma/\Gamma$=1.15 eV *14*.
8103.2 *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*.
8106.0 *4*	1.70 eV *18*	0	177.3 *4*	$g\Gamma_n$=200 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=1.69 eV *18*.
8113.6 *4*			185.1 *4*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.78 eV *11*.
8115.3 *4*	0.56 eV *10*	0	186.8 *4*	$g\Gamma_n$=300 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.56 eV *10*.
8128.2 *5*	1.02 eV *14*		200.0 *5*	$g\Gamma_n$=300 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=1.02 eV *14*.
8132.8 *5*			204.8 *5*	$g\Gamma_n\Gamma_\gamma/\Gamma$=1.25 eV *15*.
8134.0 *5*			206.0 *5*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.87 eV *11*.
8138.1 *5*			210.2 *5*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.40 eV *6*.
8139.8 *5*	1.30 eV *18*	0	211.9 *5*	$g\Gamma_n$=1750 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=1.33 eV *18*.
8141.5 *5*	0.49 eV *10*	1	213.7 *5*	$g\Gamma_n$=20 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=0.94 eV *15*.
8144.2 *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*.
8152.2 *5*	0.325 eV *60*	1	224.6 *5*	$g\Gamma_n\Gamma_\gamma/\Gamma$=0.31 eV *6*.
8157.1 *5*	1.08 eV *18*	0	229.6 *5*	$g\Gamma_n$=50 eV. $g\Gamma_n\Gamma_\gamma/\Gamma$=1.06 eV *18*.
8165.8		>1	238.5	$g\Gamma_n$=500 eV.
8176.0		>1	249	
8181.0		1	254	$g\Gamma_n$=800 eV.

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

^{43}Ca Levels (continued)

E(level)†	L	E_n(lab) (keV)	Comments
8186.3	0	259.5	$g\Gamma_n$=750 eV.
8201.0	0	274.5	$g\Gamma_n$=750 eV.
8201.4	>1	275	
8204.8	0	278.5	$g\Gamma_n$=1500 eV.
8206.8	1	280.5	$g\Gamma_n$=750 eV.
8223.0	>1	297	$g\Gamma_n$=238 eV.
8259.0	>1	334	$g\Gamma_n$=460 eV.
8263.0	>1	338	$g\Gamma_n$=550 eV.
8281.0	0	356.5	$g\Gamma_n$=1500 eV.
8302.5	>1	378.5	$g\Gamma_n$=295 eV.
8308.8	>1	385	
8323.0	0	399.5	$g\Gamma_n$=500 eV.
8341.0	0	418	$g\Gamma_n$=400 eV.
8348.0	0	425	$g\Gamma_n$=300 eV.
8367.4	>1	445	
8369.4	>1	447	$g\Gamma_n$=1000 eV.
8372.8	0	450.5	$g\Gamma_n$=1750 eV.
8399.6	0	478	$g\Gamma_n$=750 eV.
8412.8	0	491.5	$g\Gamma_n$=1000 eV.
8418.7	>1	497.5	
8430.0	>1	509	
8434.3	0	513.5	$g\Gamma_n$=5500 eV.
8452.4	0	532	$g\Gamma_n$=6500 eV.
8465.5	0	545.5	$g\Gamma_n$=2000 eV.
8474.8	0	555	$g\Gamma_n$=300 eV.
8479.7	0	560	$g\Gamma_n$=500 eV.
8484.1	>1	564.5	
8490.0	0	570.5	$g\Gamma_n$=10000 eV.
8492.0	>1	572.5	

† From $E_{c.m.}$+S(n) where S(n)=7932.89 *17* (2012Wa38) and $E_{c.m.}$ deduced from E_n(lab) in 2006MuZX.

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

Target ^{42}Ca $J\pi=0^+$.

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. Protons were analyzed by a multiple-gap spectrograph (FWHM=12 keV) and detected by nuclear emulsions. Measured $\sigma(\theta)$ 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, Aldermaston. Target of 93.7% enriched $CaCO_3$ on a carbon backing. Protons were analyzed by a multi-gap spectrograph (FWHM=12 keV). Measured $\sigma(\theta)$. 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 Ca isotopes.

1968An10: E=9.99 MeV. Measured $\sigma(\theta=35)$. Comparison of $7/2^-$ g.s. and $3/2^-$ state strengths amongst Ca 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. A total of 26 proton 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.

Cross section data at 10 MeV (1974Br19)

Level	$d\sigma/d\Omega$ (mb/sr) (max)	Level	$d\sigma/d\Omega$ (mb/sr) (max)
0	2.85	3737	0.04 a
373	0.06	3772	0.11
593	1.36	3810	0.08
990	0.29	3864	0.35
1393	0.03	3898	0.02 a
1676	0.03	3916	0.48
1899	0.05	3958	0.07 a
1928	0.02	3978	0.10
1954	2.79	4017	0.09
2041	28.2	4048	0.10
2096	0.04	4089	0.07
2219	0.02	4124	0.06
2246	0.06	4148	0.28
2269	0.06	4196	10.3
2523	0.11	4239	1.41
2607	2.90	4268	0.26
2669	0.06	4298	0.32
2693	0.11	4401	0.3 a
2758	0.15	4460	0.18
2843	0.11	4498	0.15
2874	2.05	4533	0.21
2939	2.10	4638	0.41
3022	0.02	4654	0.21
3045	0.03	4705	0.14
3071	0.30	4897	2.25
3091	0.1 a	4982	0.52
3287	1.34	5008	0.19
3314	0.37	5028	2.59

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3352                  0.03 a          5047                0.87
3376                  0.02 a          5072                0.69
3417                  0.16            5100                0.27
3566                  2.30            5170                0.29
3604                  0.06            5193                0.58
3655                  0.05            5215                1.46
3705                  0.02 a
Uncertainties in cross sections=10%.
a: Estimated from plots given by 1966Do02.
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^{43}Ca Levels

E(level)[†]	L[‡]	(2J+1)S[‡]	E(level)[†]	L[‡]	(2J+1)S[‡]	E(level)[†]	L[‡]	(2J+1)S[‡]
0	3	4.5	3314 *10*	1	0.03	4401 *10*		
373[@] *10*	3	3.9	3352 *10*			4429[#] *10*		
593[@] *10*	1	0.16	3376 *10*			4460 *10*	3[b]	0.36[b]
990 *10*	2[a]	0.28[a]	3417 *10*	3	0.19	4498 *10*		
1393 *10*	(2)	0.03	3566 *10*	1	0.19	4533 *10*	0	0.002
1676 *10*			3604 *10*	0	0.001	4585 *10*		
1899 *10*			3655 *10*	(2)	0.01	4609 *10*		
1928 *10*			3705 *10*			4638 *10*	2	0.06
1954 *10*	0	0.10	3737 *10*			4654[&] *10*	0	0.002
2041 *10*	1	2.9	3772 *10*	1	0.01	4705 *10*		
2096 *10*	1	0.04	3783 *10*			4736 *10*		
2219 *10*			3810 *10*	(3)[b]	0.16[b]	4758 *10*		
2246 *10*			3864 *10*	(1)[e]	0.05	4783 *10*		
2269 *10*	(2)	0.01	3898 *10*			4796 *10*		
2404 *10*			3916 *10*	(1,4)[c]	0.04[c]	4826 *10*		
2523 *10*	(1)	0.01	3958 *10*			4854 *10*		
2607 *10*	1	0.28	3978 *10*	2	0.01	4874 *10*		
2669 *10*	3	0.08	4017 *10*			4897 *10*	1	0.14
2693 *10*	2	0.02	4048 *10*	2	0.01	4922 *10*		
2758 *10*	0	0.002	4078 *10*			4944 *10*		
2843 *10*	0	0.001	4089 *10*	(3)	0.08	4982 *10*	2[f]	0.07[f]
2874 *10*	1	0.18	4124 *10*	4	0.19	5008 *10*		
2939 *10*	1	0.19	4148 *10*	0	0.003	5028 *10*	1	0.16
3022 *10*			4196 *10*	1	0.86	5047	1	0.06
3045 *10*			4239 *10*	1	0.10	5072	1	0.04
3071 *10*	0	0.003	4268 *10*	1[d]	0.04	5100	0	0.003
3091 *10*			4298 *10*	0	0.003	5170	2	0.04
3191 *10*			4324[#] *10*			5193	0	0.006
3287 *10*	1	0.12	4370 *10*			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).
[&] From 1974Br19.
[a] From 1968Be36.
[b] From 1966Do02.
[c] L=4, S=1.19 (1966Do02); but L=(1) in 1974Br19.
[d] L=1 in 1974Br19 but 2 in 1966Do02.
[e] 1 (1966Do02).
[f] L=1, S=0.05 (1966Do02). L=2 in 1974Br19.

^{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.

Cross section values

Level energy	dσ/dΩ (mb/sr)	Level energy	dσ/dΩ (mb/sr)
0	7.0	3645	0.019
373	0.105	3803	0.030
593	0.011	3913	0.062
990	0.180	4041	0.029
1395	0.013	4123	0.017
1678	0.014	4193	0.004
1957	0.023	4463	0.094
2046	0.093	4569	
2249	0.023	4826	0.037
2611	0.007	4880	0.022
2674	0.068	5001	0.052
2741	0.008	5040	0.018
2850	0.019	5200	0.120
2948	0.016	5251	0.018
3044	0.023	5410	0.006
3085	0.031	5548	0.035
3193	0.067	5647	0.012
3278	0.080	5727	0.025
3371	0.018	5805	0.022
3413	0.065	5889	0.027
3504	0.025	5991	0.049

^{43}Ca Levels

E(level)	L	(2J+1)S†	Comments
0	3	5.40	
373 *8*	3	0.15	
593 *8*	1	0.17	
990# *8*	2	0.87	σ(exp)/σ(theory-CRC)=8.5.
1395 *8*	2	0.06	
1678# *8*			σ(exp)/σ(theory-CRC)=0.04.
1957# *8*	(0)		σ(exp)/σ(theory-CRC)=3.
2046 *8*	1	4.26	
2249# *8*			σ(exp)/σ(theory-CRC)=0.70.
2611 *8*	1	0.33	
2674 *8*	3	0.28,0.18	
2741# *8*			σ(exp)/σ(theory-CRC)=1.
2850# *8*	2	0.32,0.27	σ(exp)/σ(theory-CRC)=2.1.
2948‡ *8*	(1)	0.74	11/2$^+$ component considered in CRC calculations. σ(exp)/σ(theory-CRC)=0.5 (for 11/2$^+$ component).
3044# *8*			σ(exp)/σ(theory-CRC)=0.06.
3085 *8*	2	0.70,0.55	
3193 *8*	4	0.10	
3278‡ *8*	(4)	0.13	
3371# *8*			σ(exp)/σ(theory-CRC)=0.11.

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$^{42}Ca(\alpha,^{3}He)$ 1982Ho17 (continued)

^{43}Ca Levels (continued)

E(level)	L	(2J+1)S†	Comments
3413 *8*	3	0.43,0.29	
3504# *8*			σ(exp)/σ(theory-CRC)=0.13.
3645# *8*			σ(exp)/σ(theory-CRC)=3.
3803 *8*	(3)	0.20	
3913‡ *8*	(4)	0.14	
4041 *8*			
4123 *8*	(4)	0.04	
4193 *8*	1	0.44	
4463 *8*	(3)	1.45	
4569 *8*			
4826 *8*	(3)	0.90	
4880 *8*			
5001 *8*	(3)	1.16	
5040 *8*			
5200 *8*	(3)	2.80	
5251# *8*			σ(exp)/σ(theory-CRC)=3.2.
5410 *8*			
5548‡ *8*			
5647‡ *8*			
5727‡ *8*			
5805 *8*			
5889‡ *8*			
5991 *8*	(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 are from 1957Br19 unless otherwise noted.

^{43}Ca Levels

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

† 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 μg/cm^2 *9* CaO evaporated onto a 185 μg/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 p′γ-coin..

1985Ki07: Measured thick target relative γ-yields.

^{43}Ca Levels

E(level)†	Jπ‡	T1/2#
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 p′γ(t) (1967Fo01).

γ(^{43}Ca)

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Measured limits of Iγ values of γ-rays (involving ΔJ>2 or
  ΔJ=2, Δπ=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      level
 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
```

Ei(level)	Jπi	Eγ†	Iγ	Ef	Jπf
372.76	5/2⁻	372.83 *10*	100	0	7/2⁻
593.38	3/2⁻	220.66 *10*	33 *2*	372.76	5/2⁻
		593.36 *10*	67 *2*	0	7/2⁻
990.27	3/2⁺	396.9 *2*	13 *2*	593.38	3/2⁻
		617.51 *7*	87 *2*	372.76	5/2⁻
1394.55	5/2⁺	404.3 *2*	13 *1*	990.27	3/2⁺
		801.1 *16*	6 *1*	593.38	3/2⁻
		1021.80 *7*	77 *2*	372.76	5/2⁻
		1394.5 *2*	3.7 *6*	0	7/2⁻
1677.89	11/2⁻	1677.8 *2*	100	0	7/2⁻
1901.99	7/2⁺	507.8‡ *3*	17 *2*	1394.55	5/2⁺
		911.7 *5*	13 *4*	990.27	3/2⁺
		1529§	<3	372.76	5/2⁻
		1901.8 *2*	70 *4*	0	7/2⁻
1931.48	5/2⁻	537§	<8.6	1394.55	5/2⁺
		941§	<19	990.27	3/2⁺
		1339.5‡ *16*	9 *4*	593.38	3/2⁻
		1558.7 *2*	33 *5*	372.76	5/2⁻
		1931.4 *2*	58 *5*	0	7/2⁻
2045.9	3/2⁻	2045.8 *6*	100	0	7/2⁻
2067.10	7/2⁻	389§	<2.5	1677.89	11/2⁻
		672§	<2.5	1394.55	5/2⁺
		1474§	<6.3	593.38	3/2⁻
		1694.2 *3*	20 *2*	372.76	5/2⁻

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^{43}Ca(p,p′γ) 1972Gr04 (continued)

γ(^{43}Ca) (continued)

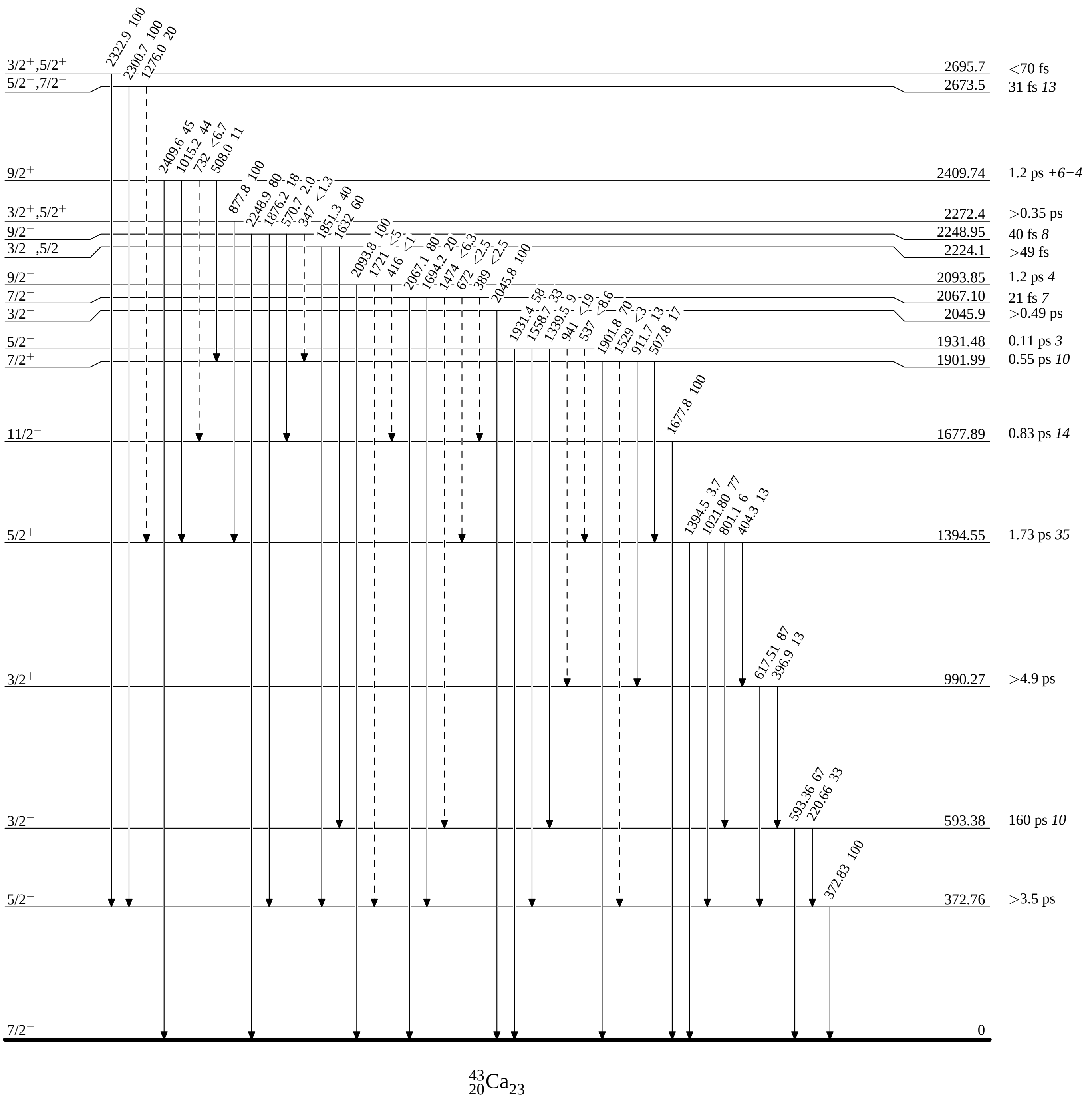
E_i(level)	J^π_i	E_γ †	I_γ	E_f	J^π_f
2067.10	7/2⁻	2067.1 *2*	80 *2*	0	7/2⁻
2093.85	9/2⁻	416§	<1	1677.89	11/2⁻
		1721§	<5	372.76	5/2⁻
		2093.8 *2*	100	0	7/2⁻
2224.1	3/2⁻,5/2⁻	1632 *2*	60 *8*	593.38	3/2⁻
		1851.3 *4*	40 *8*	372.76	5/2⁻
2248.95	9/2⁻	347§	<1.3	1901.99	7/2⁺
		570.7‡ *5*	2.0 *5*	1677.89	11/2⁻
		1876.2 *2*	18 *5*	372.76	5/2⁻
		2248.9 *2*	80 *5*	0	7/2⁻
2272.4	3/2⁺,5/2⁺	877.8‡ *5*	100	1394.55	5/2⁺
2409.74	9/2⁺	508.0‡ *10*	11 *2*	1901.99	7/2⁺
		732§	<6.7	1677.89	11/2⁻
		1015.2 *2*	44 *4*	1394.55	5/2⁺
		2409.6 *3*	45 *4*	0	7/2⁻
2673.5	5/2⁻,7/2⁻	1276.0§ *10*	20	1394.55	5/2⁺
		2300.7 *3*	100	372.76	5/2⁻
2695.7	3/2⁺,5/2⁺	2322.9‡ *15*	100	372.76	5/2⁻

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

^{43}Ca(p,p′γ) 1972Gr04

Level Scheme

Intensities: % photon branching from each level



^{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)	L	β_2
0		
369 *5*	2	0.114
595 *5*	2	0.087
1675 *5*	2	0.13
1932 *5*	(2)	0.06
2051 *5*	(2)	0.08
2070 *5*	4	
2098 *5*	2	0.09
2252 *5*	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*	5/2$^-$	2+4	0.0055	B(E4)↑=0.00011 L: 76%(L=2), 24%(L=4).
593 *5*	3/2$^-$	2+4	0.0027	B(E4)↑=0.000068 L: 73%(L=2), 27%(L=4).
1676 *5*	11/2$^-$	2+4	0.0068	B(E4)↑=0.000053 L: 80%(L=2), 20%(L=4).
1930 *5*	5/2$^-$	2+4	0.0020	B(E4)↑=0.000015 L: 86%(L=2), 14%(L=4).
2045 *5*	3/2$^-$	2+4	0.0015	B(E4)↑=0.000051 L: 62%(L=2), 38%(L=4).
2066 *5*	7/2$^-$	2+4	0.00073	B(E4)↑=0.000032 L: 58%(L=2), 42%(L=4).
2094 *5*	9/2$^-$	2+4	0.0026	B(E4)↑=0.000060 L: 70%(L=2), 30%(L=4).
2248 *5*	9/2$^-$	2+4	0.0068	B(E4)↑=0.000057 L: 83%(L=2), 17%(L=4).
2668 *5*		2+4	0.0011	B(E4)↑=0.000014 L: 75%(L=2), 25%(L=4).
2694 *5*		2+4	0.00075	B(E4)↑=0.000021 L: 65%(L=2), 35%(L=4).
2756 *5*		(4+6)		B(E4)↑=0.000073 B(E6)↑=0.0000032 L: 57%(L=4), 43%(L=6).
2850 *5*		3+5	0.00019	B(E5)↑=0.0000056 L: 73%(L=3), 27%(L=5).
2948 *5*	11/2$^+$	3+5	0.00063	B(E5)↑=0.0000097 L: 80%(L=3), 20%(L=5).
3025 *5*				
3048 *5*	11/2$^-$	2+4	0.0048	B(E4)↑=0.000038 L: 83%(L=2), 17%(L=4).
3091 *5*		3+5	0.00068	B(E5)↑=0.000013 L: 77%(L=3), 23%(L=5).
3194 *5*	7/2$^+$,9/2$^+$	3+5	0.000615	B(E5)↑=0.000011 L: 78%(L=3), 22%(L=5).
3277 *10*	(11/2 to 17/2)$^+$	3+5	0.00177	B(E5)↑=0.000040 L: 74%(L=3), 26%(L=5) for 3277+3297.
3297 *10*		3+5	0.00177	B(E5)↑=0.000040 L,BE(L)↑ (isoscalar): for 3277+3297.
3377 *5*	13/2$^+$	3+5	0.00116	B(E5)↑=0.000026 L: 72%(L=3), 28%(L=5).
3469 *5*				
3502 *5*	13/2$^+$	3+5	0.00129	B(E5)↑=0.000019 L: 79%(L=3), 21%(L=5).
3660 *5*	13/2$^-$	(2+4)	0.00092	B(E4)↑=0.00017 L: 31%(L=2), 69%(L=4).
3836 *10*				

Continued on next page (footnotes at end of table)

^{43}Ca(α,α') **1974De42** (continued)

^{43}Ca Levels (continued)

E(level)	J^{π} †	L	BE(L)↑ (isoscalar)‡	Comments
3929 *10*		3+5	0.00191	B(E5)↑=0.00011 L: 68%(L=3), 32%(L=5) for 3929+3942. L,BE(L)↑ (isoscalar): for 3929+3942.
3942 *10*	$15/2^+$	3+5	0.00191	B(E5)↑=0.00011 L,BE(L)↑ (isoscalar): for 3929+3942.
4140 *15*	$7/2^+,9/2^+$	3+5	0.00062	B(E5)↑=0.000029 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%.

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) values 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$^\pi$†	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 values from Adopted Levels.

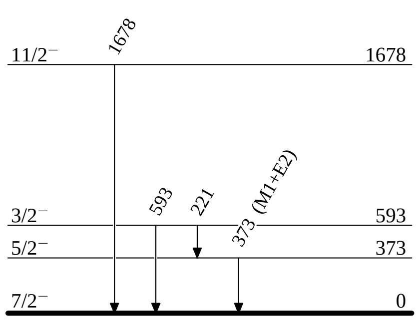
γ(^{43}Ca)

E$_\gamma$†	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.	δ	Comments
221	593	3/2$^-$	373	5/2$^-$			
373	373	5/2$^-$	0	7/2$^-$	(M1+E2)	0.161 *14*	δ: from B(E2)=0.0086 *7* (1971HoYN) and T$_{1/2}$(373)=34 ps *3*.
593	593	3/2$^-$	0	7/2$^-$			B(E2)=0.0071 *3* (1971HoYN), deduced from known lifetime of 593 level and measured (but not quoted) branching ratio.
1678	1678	11/2$^-$	0	7/2$^-$			B(E2)=0.0077 *19* (1971HoYN).

† Rounded values from Adopted Gammas.

Coulomb excitation 1971HoYN

Level Scheme



$^{43}_{20}Ca_{23}$

^{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 were 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 $\sigma(\theta)$ from 20° to 160° 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.

```
-------------------------------------------
Cross section data (1968Sm05)
Level energy      dσ/dΩ (mb/sr) (max)
   0                 6.26
373                 0.224
594                 0.545
992                 3.23
1395                 0.141
1680                 0.074
1959                 2.20
2050                 0.531
2252                 0.234
2690                 0.258
2870                 0.266
3050                 0.523
3280                 0.255
3600                 0.045
3920                 0.218
4200                 0.266
4460                 0.308
7970                 0.179
------------------------------------------
```

^{43}Ca Levels

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

E(level)[†]	Jπ[‡]	L[#]	C^{2}S[@]	Comments
0	7/2$^-$	3	2.8	C^{2}S: 3.7 (1968Sm05), 2.4 (1966Co06).
374 *25*	5/2$^-$	3	0.05	C^{2}S: 0.15 (1968Sm05).
594 *25*	3/2$^-$	1	0.04	C^{2}S: 0.10 (1968Sm05), 0.06 (1966Co06).
993 *25*	3/2$^+$	2	2.4	C^{2}S: 2.5 (1968Sm05), 0.8 (1966Co06).
1389 *25*	(3/2)$^+$	2	0.34	C^{2}S: 0.16 for 3/2, 0.12 for 5/2 (1968Sm05).
1680 *25*				
1960 *25*	1/2$^+$	0	1.0	C^{2}S: 0.62 (1968Sm05).
2050 *25*	3/2$^-$	1	0.05	C^{2}S: 0.18 (1968Sm05).
2250 *20*	(5/2)$^+$	2	0.26	C^{2}S: 0.20 for 5/2, 0.28 for 3/2 (1968Sm05).
2660 *20*	(5/2)$^+$	2	0.26	C^{2}S: 0.26 for 5/2, 0.36 for 3/2 (1968Sm05).
2840 *20*	(5/2)$^+$	2	0.34	C^{2}S: 0.22 for 5/2, 0.37 for 3/2 (1968Sm05).
3050 *20*	(5/2)$^+$&1/2$^+$	2+0	0.47,0.13	L: from 1972Ma23. Other: L=0, S=0.22 (1968Sm05).
3260 *20*		(2,3)		L: from 1972Ma23. Other: L=3, S=0.28 for 7/2$^-$ in 1968Sm05.
3620 *20*	(5/2)$^+$	2	0.05	L: from 1972Ma23. Other: L=(1), S=0.02 in 1968Sm05.

Continued on next page (footnotes at end of table)

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

^{43}Ca Levels (continued)

E(level)[†]	J^{π}[‡]	L[#]	C^2S[@]	Comments
3950 *20*	$(5/2)^+$	2	0.26	C^2S: 0.28 for 5/2, 0.40 for 3/2 (1968Sm05).
4210 *20*		(2,3)		L: from 1972Ma23. Other: L=(2), S=0.75 for 3/2, 0.53 for 5/2 (1968Sm05).
4460? *20*				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[&] *20*				
5020[&] *20*				
5210[&] *20*		(2,3)		
5430[&] *20*		(2,3)		
5730[&] *20*		(2,3)		
6010[&] *20*	$1/2^+$	0	0.05	
6200[&] *20*				
7970 *30*	$(3/2)^+$	2	0.31	C^2S: 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 *30*	$1/2^+$	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 *30*	$(7/2)^-$	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).
9000[&] *30*	$(3/2)^-$	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[&] *30*	$(5/2)^+$	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[&] *30*	$1/2^+$	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[&] *30*				Possible IAS of 2670 in ^{43}K (1972Ma23).
11390[&] *30*				Possible IAS of 3393 in ^{43}K (1972Ma23).
12060[&] *30*				Possible IAS of 4022 in ^{43}K (1972Ma23).
12280[&] *30*				Possible IAS of 4270 in ^{43}K (1972Ma23).
13260[&] *30*				Possible IAS of 5240 in ^{43}K (1972Ma23).
13700[&] *30*				
13950[&] *30*				

† 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. $\sigma(\theta)$, DWBA analysis. Deduced 1f7/2 neutron-orbital rms radius.

^{43}Ca Levels

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

E(level)†	L†	C^{2}S‡	Comments
0	3	3.20	C^{2}S: 4.0 (1969Yn01).
370 *20*	3	0.15	C^{2}S: <0.12 (1969Yn01). C^{2}S: for 1f5/2.
590 *20*	1	0.07	C^{2}S: 0.18 (1969Yn01).
990 *20*	2	2.10#	C^{2}S: 2.2 (1969Yn01).
1390 *20*	2	0.11#	C^{2}S: 0.06 (1969Yn01).
1670 *20*			
1960 *20*	0	0.75	C^{2}S: 0.9 (1969Yn01).
2050 *20*	1	0.11	C^{2}S: 0.2 (1969Yn01).
2260 *20*	2	0.15	C^{2}S: 0.2 for 2300 *40* (1969Yn01).
2610 *20*			
2680 *20*	2	0.14	C^{2}S: 0.22 for 2740 *40* (1969Yn01).
2850 *20*	2	0.23	C^{2}S: 0.3 for 2900 *40* (1969Yn01).
3070 *20*	2	0.56	L,C^{2}S: L=0, S=0.3 for 3150 *40* (1969Yn01).
3270 *20*	(2)	0.25	C^{2}S: 0.4 for 3330 *40* (1969Yn01).
3610 *20*			
3960 *20*	2	0.21	
4210 *20*	2	0.2	
4270 *20*	2	0.15	
4730 *20*	2	0.19	
5220 *20*			
5360 *20*			
5730 *20*	2	0.18	
6020 *20*	(2)	0.2	
6170 *20*	(2)	0.24	
7590 *20*			
7980 *20*	2	1.0#	1978En02 quote S=6.0 (C^2=1/6 for T=5/2).
8590 *20*	0	0.25	1978En02 quote S=1.5 (C^2=1/6 for T=5/2).
8770 *20*	3	0.35	1978En02 quote S=2.1 (C^2=1/6 for T=5/2).
8990 *20*	1	0.14	1978En02 quote S=0.84 (C^2=1/6 for T=5/2).
9140 *30*	2	0.2	C^{2}S: 0.3 for 1d3/2. 1978En02 quote S=1.8 for d3/2 (C^2=1/6 for T=5/2).
10470 *30*	0	0.12	1978En02 quote S=0.72 (C^2=1/6 for T=5/2).
10710 *30*	2	0.2	
11370 *30*			
12250 *30*	2	0.2	

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

^{43}Ca Levels (continued)

E(level)[†]	L[†]	C^2S[‡]
13200 *30*	(2)	0.2
14190 *30*		

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

† From Adopted Levels.

γ(^{43}Ca)

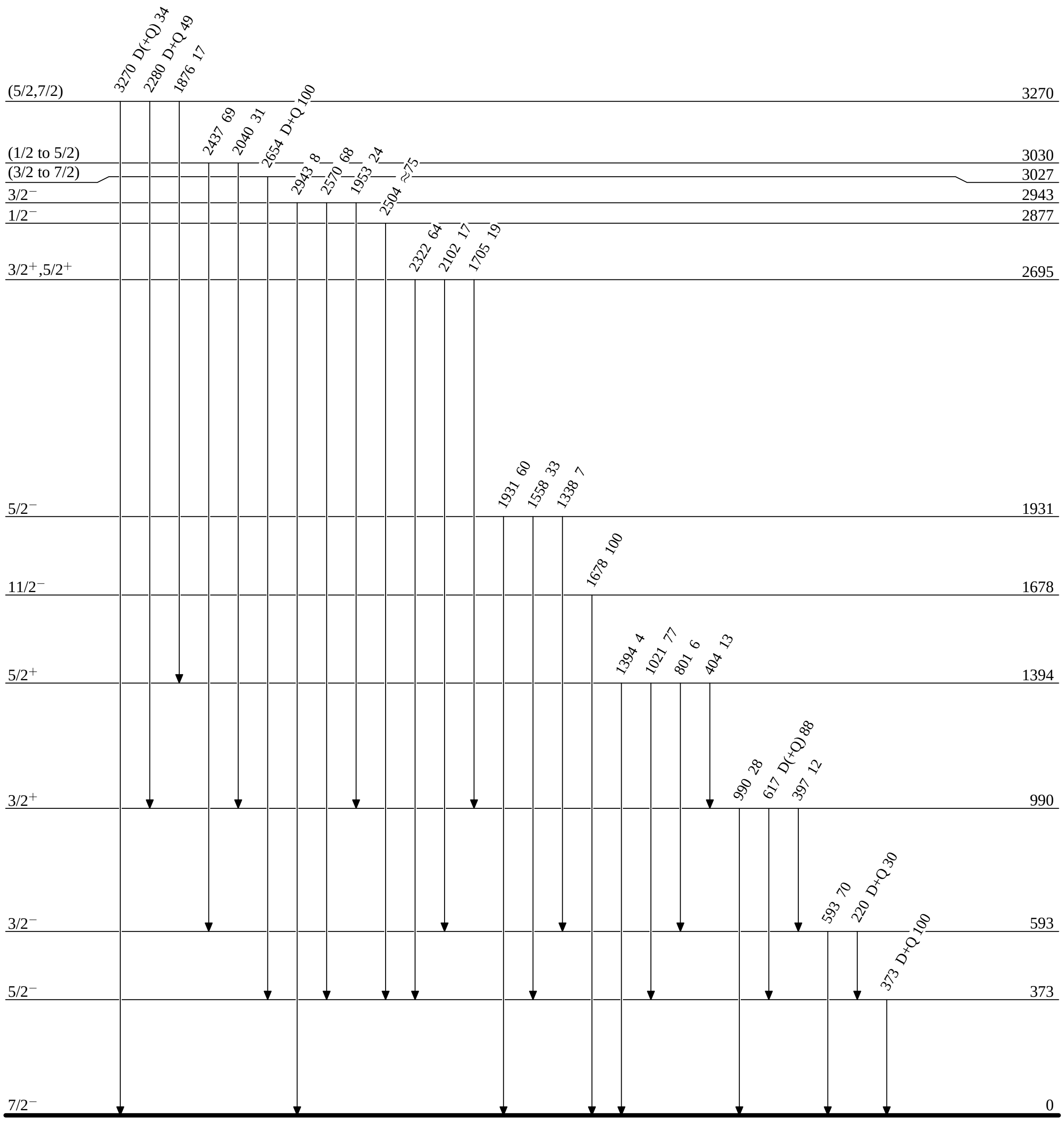
E$_i$(level)	J$^\pi_i$	E$_\gamma$	I$_\gamma$	E$_f$	J$^\pi_f$	Mult.†	δ†	Comments
373	5/2$^-$	373	100	0	7/2$^-$	D+Q	−0.15 *3*	A$_2$=+0.07 *4*, A$_4$=+0.01 *7*. δ: other: −0.18 *5* (1971HoYN).
593	3/2$^-$	220	30	373	5/2$^-$	D+Q	−0.10 *5*	A$_2$=+0.01 *5*, A$_4$=+0.08 *8*.
		593	70	0	7/2$^-$			
990	3/2$^+$	397	12	593	3/2$^-$			
		617	88	373	5/2$^-$	D(+Q)	−0.012 *17*	A$_2$=−0.085 *19*, A$_4$=−0.012 *28*.
		990	28	0	7/2$^-$			
1394	5/2$^+$	404	13	990	3/2$^+$			
		801	6	593	3/2$^-$			
		1021	77	373	5/2$^-$			
		1394	4	0	7/2$^-$			
1678	11/2$^-$	1678	100	0	7/2$^-$			
1931	5/2$^-$	1338	7	593	3/2$^-$			
		1558	33	373	5/2$^-$			
		1931	60	0	7/2$^-$			
2695	3/2$^+$,5/2$^+$	1705	19 *9*	990	3/2$^+$			
		2102	17 *9*	593	3/2$^-$			
		2322	64 *11*	373	5/2$^-$			
2877	1/2$^-$	2504	≈75	373	5/2$^-$			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$^-$	1953	24 *9*	990	3/2$^+$			
		2570	68 *9*	373	5/2$^-$			
		2943	8 *5*	0	7/2$^-$			
3027	(3/2 to 7/2)	2654	100	373	5/2$^-$	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	(1/2 to 5/2)	2040	31 *9*	990	3/2$^+$			
		2437	69 *9*	593	3/2$^-$			
3270	(5/2,7/2)	1876	17 *6*	1394	5/2$^+$			
		2280	49 *6*	990	3/2$^+$	D+Q	+0.07 *5*	A$_2$=−0.29 *11*, A$_4$=+0.38 *16*.
		3270	34 *6*	0	7/2$^-$	D(+Q)	−0.13 *13*	A$_2$=+0.029 *17*, A$_4$=+0.18 *26*.

† From $\gamma(\theta)$ data.

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

Level Scheme

Intensities: % photon branching from each level



$^{43}_{20}Ca_{23}$

^{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$^\pi$†
0.0	7/2$^-$
372.7	5/2$^-$

† From Adopted Levels.

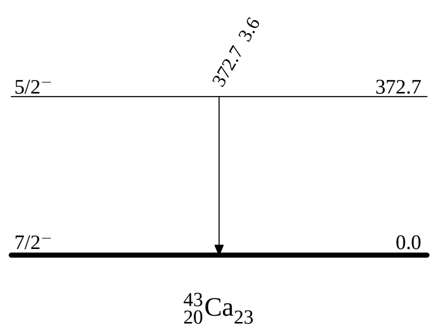
γ(^{43}Ca)

Eγ	Iγ	E$_i$(level)	J^π_i	E$_f$	J^π_f
372.7 *5*	3.6 *10*	372.7	5/2$^-$	0.0	7/2$^-$

^{45}Sc(μ^-,2nγ) **1971Ba10**

Level Scheme

Intensities: Per 100 muon-captures



^{45}Sc(d,α) 1964Bj01

1964Bj01: E=3-4.3 MeV deuteron beam was produced from an electrostatic 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)
0
385 *12*
607 *12*
1009 *12*
1407 *12*
1693 *12*

Adopted Levels, Gammas

Q(β^-)=−6867 *7*; S(n)=12138.3 *19*; S(p)=4929.8 *19*; Q(α)=−4805.8 *19* 2012Wa38
S(2n)=23688.3 *19*, S(2p)=15206.5 *19* (2012Wa38).
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

See (p,γ), (p,p) and (p,p′γ) resonance datasets for additional levels between 5919 keV and 8193 keV.

Cross Reference (XREF) Flags

A	^{43}Ti ε decay (509 ms)	H	^{40}Ca(α,pγ)	O	^{42}Ca(^{3}He,d)
B	^{24}Mg(^{24}Mg,αpγ)	I	^{40}Ca(^{6}Li,^{3}He)	P	^{42}Ca(^{16}O,^{15}N)
C	^{27}Al(^{18}O,2nγ)	J	^{42}Ca(p,γ):resonances	Q	^{43}Ca(p,n),(p,nγ)
D	^{27}Al(^{19}F,p2nγ)	K	^{42}Ca(p,γ) E=res	R	^{43}Ca(^{3}He,t)
E	^{28}Si(^{20}Ne,αpγ)	L	^{42}Ca(p,p):resonances	S	^{45}Sc(p,t)
F	^{29}Si(^{16}O,pnγ)	M	^{42}Ca(p,p′γ):resonances	T	^{46}Ti(p,α),(pol p,α)
G	^{40}Ca(α,p)	N	^{42}Ca(d,n)		

E(level)[†]	J^π[#]	$T_{1/2}$[‡]	XREF	Comments
0.0[&]	7/2$^-$	3.891 h *12*	ABCDEFGHI K NOPQRST	%ε+%β^+=100 μ=+4.528 *10* (2011Av01,2014StZZ) Q=−0.27 *5* (2011Av01,2014StZZ) Evaluated rms charge radius=3.558 fm *15* (2013An02). μ,Q: from 2011Av01 (also 2006Ga47) using laser spectroscopy. Others: μ=+4.503 *4*, Q=−0.208 *22* (2006Ga47,laser spectroscopy); μ=+4.61 *4*, Q=−0.26 *6* (1966Co13, atomic-beam method). Adopted (by 1977En02) spectroscopic factor S=0.81 *12* (proton stripping). Measured δ<r^2>(^{45}Sc,^{43}Sc)=+0.082 fm^2 *14*(stat) *88*(syst) (2011Av01). J^π: 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).
151.79[c] *8*	3/2$^+$	438 μs *7*	AB DE GH K NO QR T	%IT=100 μ=+0.348 *6* (1977Mi10,2014StZZ) μ: TDPAD 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; M2 γ to 7/2$^-$.
472.60 *14*	3/2$^-$	158 ps *13*	A D GHI K NOPQRST	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*	AB E GH K O RST	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*	GH K NO QR T	Adopted (by 1977En02) spectroscopic factor S=0.08 *2* (proton stripping). J^π: L(^{3}He,d)=L(d,n)=0.
880.64[d] *8*	5/2$^+$	4.6 ps *10*	B DE GH K O QR T	J^π: M1+E2 γ to 3/2$^+$; γ to 7/2$^-$. Anisotropic $\gamma(\theta)$ rules out 1/2$^+$.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

E(level)[†]	J^{π}[#]	$T_{1/2}$[‡]	XREF	Comments
1158.76 *24*	3/2$^+$	4.4 ps *10*	GH K	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*	GHI K NOPQRST	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$^-$.
1337.53[c] *7*	7/2$^+$	0.83 ps *35*	B DE GH K Q	J^π: stretched E2 γ to 3/2$^+$.
1408.09[a] *10*	7/2$^-$	0.19 ps *6*	AB E GHI K N QRST	XREF: G(1418)N(1395)Q(1424). J^π: L(p,t)=0 from 7/2$^-$; M1+E2 to 7/2$^-$; γs to 5/2$^-$ and 3/2$^-$.
1651.22 *25*	5/2$^+$	0.18 ps *3*	GH K O Q T	XREF: Q(1677). J^π: M1 γ to 3/2$^+$; γ to 7/2$^-$.
1811.1 *4*	3/2$^-$	16 fs *6*	GHI K NOP RS	J^π: L(^{3}He,d)=L(d,n)=1. Anisotropic $\gamma(\theta)$ rules out 1/2.
1830.33[&] *11*	11/2$^-$	0.20 ps *3*	BCDEFGHI RST	J^π: ΔJ=2, 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 GH K RS	J^π: L(p,t)=2 from 7/2$^-$; M1+E2 γ to 7/2$^-$. J=7/2 ruled out by $\gamma(\theta)$ in (α,pγ). If 1730γ to 151.8, 3/2$^+$ exists, 9/2 will be ruled out.
1912 *6*			G	
1932.55[d] *9*	9/2$^+$	2.4 ps *6*	B DE GH K S	J^π: L(p,t)=5 from 7/2$^-$; ΔJ=2, E2 to 5/2$^+$; M1+E2 γ to 7/2$^+$.
1962.89 *20*	(3/2,5/2)$^-$	70 fs *11*	A GH K NO	XREF: N(1947). J^π: M1+E2 γ to 3/2$^-$; $\gamma(\theta)$ in (p,γ) rules out 1/2, prefers 5/2 over 3/2, L(^{3}He,d)=L(d,n)=1 support 3/2$^-$. The log *ft*=6.4 from 7/2$^-$ disfavors 3/2$^-$, but the β feeding is small and a strong argument cannot be made to rule out 3/2 completely.
2094.8 *3*	3/2$^-$	0.29 ps *+8−6*	GH K O s	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*	GH K n s	J^π: γs 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 nO st	XREF: O(?). 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.
2142.0 *3*	(3/2$^-$,5/2$^+$)	0.19 ps *4*	GH K t	J^π: γs 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.
2242.8 *6*	(3/2,5/2,7/2)$^-$	0.19 ps *9*	GH RSt	J^π: L(p,t)=2 from 7/2$^-$; γs to 3/2$^-$ and 7/2$^-$.
2288.65 *8*	5/2$^-$	<21 fs	A GHI K O RS	J^π: L(^{3}He,d)=3; γ to 3/2$^+$.
2335.47 *10*	5/2$^-$	28 fs *14*	A GH K NO RS	J^π: L(d,n)=3; L(p,t)=2 from 7/2$^-$. J=7/2 not allowed by $\gamma(\theta)$ in (α,pγ) and RUL.
2383.1 *4*	3/2$^{(+)}$	>0.31 ps	GH K O	J^π: (M1+E2) γ to 1/2$^+$ and $\gamma(\theta)$ in (α,pγ).
2458.68 *10*	(5/2,9/2)$^-$	38 fs *14*	A GH RS	J^π: L(p,t)=2 from 7/2$^-$; ΔJ=1, M1 γ to 7/2$^-$; log *ft*=4.5 from 7/2$^-$.
2553.54[c] *11*	11/2$^+$	0.51 ps *7*	B DE GH K S	J^π: ΔJ=1, dipole γ to 9/2$^+$, ΔJ=2, Q γ to 7/2$^+$.
2580.8 *4*	(5/2)	0.10 ps *3*	GH K	J^π: primary transitions from 3/2 and 7/2 resonances in (p,γ).
2606 *10*			O	
2635.35[a] *13*	(11/2)$^-$	0.21 ps *7*	B E GHI RSt	J^π: L(p,t)=2 from 7/2$^-$; D γ to 11/2$^-$; γ to 7/2$^-$; γ sequence. J=9/2 is not completely ruled out.
2650.5 *16*			H	E(level): this level may be the same as 2657, 1/2$^+$ level but γ to 5/2$^-$ suggests a different level.
2657 *10*	1/2$^+$		nO t	E(level): see comment for 2650.5 level. J^π: L(^{3}He,d)=0.

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Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

E(level)[†]	J^π[#]	$T_{1/2}$[‡]	XREF	Comments
2670.5 *4*	$3/2^-$		GH K nO RSt	J^π: L(p,t)=2 from $7/2^-$; γ to $1/2^+$.
2760.10 *10*	$(5/2,7/2,9/2)^-$	<28 fs	A GH RS	J^π: L(p,t)=4 from $7/2^-$; γ to $7/2^-$; log *ft*=4.94 from $7/2^-$.
2795.4 *5*	$3/2^-,5/2^-$	0.28 ps *16*	H K S	J^π: L(p,t)=2 from $7/2^-$; γs to $3/2^+$ and $7/2^-$; RUL.
2811.1 *6*	(5/2,7/2,9/2)	<62 fs	GH K	J^π: γs to $7/2^-$ and $7/2^+$.
2840.7 *5*	$(5/2,7/2)^+$		GH K n S	J^π: L(p,t)=5 from $7/2^-$; γs to $7/2^-$ and $(3/2)^+$; inconsistent with L(d,n)=1+3.
2846.2 *8*			H K n	J^π: L(d,n)=1+3 for a 2830 group suggests a doublet with $J\pi=1/2^-,3/2^-$ and $5/2^-,7/2^-$ near this energy.
2860.8 *4*	$(1/2,3/2,5/2)^+$		H K S	J^π: L(p,t)=3 from $7/2^-$; γ transitions to $3/2^-$ and $3/2^+$.
2874.7 *6*	$(5/2)^+$		K O T	XREF: T(2870). J^π: fit to $\sigma(\theta)$ and Ay in (pol p,α) gives $5/2^+,9/2^+$; γ to $3/2^+$ disfavors $9/2^+$.
2930?	$3/2^+,5/2^+$		N	J^π: L(d,n)=2.
2985.0 *5*	(3/2,5/2)	54 fs *11*	H K NO Rs	J^π: γs to $3/2^+$, $5/2^-$, $5/2^+$ and $3/2^-$.
2988.12[&] *12*	$15/2^-$	5.6 ps *7*	BCDEFGHI sT	J^π: ΔJ=2, E2 γ to $11/2^-$.
3123.73[&] *15*	$19/2^-$	472 ns *4*	BCDEFGHI RST	μ=+3.122 *7* (1978Ha07,2014StZZ) Q=0.199 *14* (1981Da06,2014StZZ,2013StZZ) J^π: L(p,t)=6 from $7/2^-$; ΔJ=2, E2 γ to $15/2^-$. μ,Q: TDPAD method (1978Ha07,1981Da06). Others: μ=3.108 *18* (1994Zh43), 3.15 *2* (1971Na10).
3142.05[d] *12*	$13/2^+$	>0.55 ps	B DE GH	J^π: ΔJ=2, E2 γ to $9/2^+$; γ to $11/2^+$.
3159.3 *5*	$(3/2^-,5/2,7/2^+)$	<0.42 ps	H K	J^π: γs to $7/2^-$ and $3/2^+$.
3198.2 *10*	(1/2 to $7/2^-$)	<0.28 ps	H O S	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 GH K O RS	J^π: L(p,t)=4 from $7/2^-$; log *ft*=5.9 from $7/2^-$; possible γ to $11/2^-$.
3292.4 *3*	$7/2^-$		B E GH K S	J^π: L(p,t)=2 from $7/2^-$; γs to $3/2^-$ and $9/2^+$. $T_{1/2}$: values <3.5 fs from (p,γ) and >55 fs from (α,pγ) are discrepant.
3326.8 *8*	($3/2^-$ to 9/2)		K no Rs	J^π: γ to $7/2^-$; γ from 6696, 5/2. 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*	$(3/2^-,5/2)$	0.13 ps *10*	H K no s	J^π: γs to $3/2^-$, $5/2^-$ and $3/2^+$; possible γ to $7/2^-$. 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	H K S	J^π: L(p,t)=2 from $7/2^-$; γs to $7/2^-$, $7/2^+$ and $11/2^-$.
3452.1 *5*	$5/2^+$	<2.1 fs	gH K No S	J^π: L(d,n)=2; L(p,t)=5 from $7/2^-$; $3/2^+$ ruled out by γ to $7/2^-$ and RUL.
3463.3 *6*	$5/2^-$		gH K O r T	XREF: O(3474). J^π: L(^{3}He,d)=3; γ to $3/2^+$.
3480 *10*	$(\leq 13/2)^+$		G L rSt	J^π: L(p,t)=3 from $7/2^-$.
3503.2 *6*	$7/2^-$		K O S	J^π: L(p,t)=0 from $7/2^-$.
3613 *10*			nO	
3631.7 *10*	$(5/2^-,7/2^-,9/2^-)$		A n	J^π: possible allowed ε feeding from $7/2^-$.
3645.6 *5*	$(3/2,5/2,7/2^-)$		K	J^π: γs to $5/2^+,5/2^-$ and $3/2^-$.
3683.2 *5*	(3/2,5/2,7/2)		G K NO RS	E(level),J^π: 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 *10*	(5/2 to $19/2)^-$		S	J^π: L(p,t)=6 from $7/2^-$.
3734.0 *5*			K	
3755.43[c] *16*	$15/2^+$		B DE	J^π: ΔJ=2, Q γ to $11/2^+$; ΔJ=1, M1+E2 γ to $13/2^+$.

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Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

E(level)[†]	J^{π}[#]	$T_{1/2}$[‡]	XREF	Comments
3756.5 *5*	$(3/2^-,5/2,7/2^+)$		K	J^{π}: γs to $3/2^+$ and $7/2^-$.
3771 *10*	$(3/2$ to $17/2)^+$		S	J^{π}: L(p,t)=5 from $7/2^-$.
3807.2 *4*	$7/2^-$	<3.5 fs	G K O ST	XREF: O(3786). J^{π}: ΔJ=1 γ to $5/2^+$; γs to $3/2^-$ and $7/2^+$; $3/2^+$ excluded by RUL. L(p,t)=5 from $7/2^-$ for 3807 group is incompatible.
3843.0 *6*	$(\le 9/2)$		g K Rs	J^{π}: γ to $5/2^-$. L(p,t)=5 from $7/2^-$ implies positive parity for 3843 or 3860 level.
3860.1 *6*	$(\le 7/2)$		g K s	J^{π}: γ to $3/2^+$. See also comment for 3843 level.
3894 *8*			R	
3939 *10*	$5/2^-,7/2^-$		g NO R	J^{π}: L(^{3}He,d)=L(d,n)=3.
3949 *10*	$(\le 13/2)^+$		gH S	XREF: H(3956)S(3949). J^{π}: L(p,t)=3 from $7/2^-$.
3959.87[a] *12*	$15/2^-$		B E	J^{π}: ΔJ=2, Q γs to $11/2^-$; D γ to $15/2^-$.
3985 *10*			G O	
4007.3 *5*	$(3/2,5/2)^+$		K N S	J^{π}: L(p,t)=5 from $7/2^-$; γs to $1/2^+$ and $5/2^+$.
4038.8 *6*	$7/2^-$		K S	J^{π}: L(p,t)=4 from $7/2^-$; γs to $3/2^-$ and $9/2^+$.
4132 *8*	$(3/2$ to $17/2)^+$		RS	J^{π}: L(p,t)=5 from $7/2^-$. E(level): population uncertain in (^{3}He,t).
4158.6 *10*	$(9/2,11/2,13/2)^-$		GH S	J^{π}: L(p,t)=4 from $7/2^-$; γ to $11/2^+$.
4211 *10*	$(9/2,13/2)^+$		ST	XREF: T(4180). J^{π}: L(p,t)=3 from $7/2^-$; $\sigma(\theta)$ and Ay in (pol p,α).
4236 *8*	$7/2^-$		NO RST	T=3/2 J^{π}: L(p,t)=0 from $7/2^-$; L(^{3}He,d)=L(d,n)=3.
4276 *8*			K R	XREF: K(4272).
4301.2 *5*	$(9/2,11/2,13/2^+)$		B E	J^{π}: γ to $9/2^+$.
4343 *8*			R	
4360	$(17/2^-)$		T	J^{π}: $\sigma(\theta)$ and Ay in (pol p,α).
4371.5 *5*	$5/2^-,7/2^-$		G K O R	XREF: O(4363). J^{π}: L(^{3}He,d)=3. $\gamma(\theta)$ in (p,γ) preferred $7/2^+$.
4383 *9*	$5/2^-,7/2^-$		NO	J^{π}: L(^{3}He,d)=L(d,n)=3.
4383.03 *23*	$17/2^{(-)}$	40 fs *17*	B DE	J^{π}: D γ to $15/2^-$; D+Q γ to $19/2^-$.
4430.2 *5*	$(1/2^+,3/2,5/2)$		K	J^{π}: γs to $3/2^-$, $3/2^+$ and $5/2^+$.
4455.3 *8*	$(5/2$ to $9/2)$	<3.5 fs	K	J^{π}: ΔJ=1 γ to $7/2^-$.
4511 *8*			R	
4555 *10*	$(11/2^+,13/2^-)$		O T	J^{π}: $\sigma(\theta)$ and Ay in (pol p,α).
4583 *10*			NO T	
4633.6 *19*	$(17/2,21/2)$	<110 fs	D	J^{π}: ΔJ=1 γ to $19/2^-$.
4660 *8*	$1/2^-,3/2^-$		G NO RS	XREF: G(4630). J^{π}: L(^{3}He,d)=L(d,n)=1.
4700	$(15/2^+)$		T	J^{π}: $\sigma(\theta)$ and Ay in (pol p,α).
4719 *9*	$1/2^-,3/2^-$		NO	J^{π}: L(^{3}He,d)=L(d,n)=1.
4766 *8*	$1/2^-,3/2^-$		O R	J^{π}: L(^{3}He,d)=1.
4817 *8*	$1/2^-,3/2^-$		O R	J^{π}: L(^{3}He,d)=1.
4873 *8*			O R	
4893 *9*	$1/2^-,3/2^-$		NO	J^{π}: L(^{3}He,d)=1.
4927 *10*			G O	
5018 *9*	$1/2^-,3/2^-$		NO	J^{π}: L(^{3}He,d)=L(d,n)=1.
5187 *10*			O	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	$(17/2^+)$		T	J^{π}: $\sigma(\theta)$ and Ay in (pol p,α).
5231.33[d] *17*	$(17/2^+)$		B DE	J^{π}: ΔJ=1 γ to $15/2^+$; γ sequence.
5236 *10*			G ST	

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Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

E(level)[†]	Jπ[#]	T1/2[‡]	XREF	Comments
5258 *10*	1/2⁻,3/2⁻		NO	Jπ: L(^{3}He,d)=L(d,n)=1.
5317 *10*			G O	
5446 *10*			O	
5502 *9*	1/2⁻,3/2⁻		NO	Jπ: L(^{3}He,d)=L(d,n)=1.
5519.00[c] *15*	19/2⁺	<62 fs	B DEF	Jπ: ΔJ=2, E2 γ to 15/2⁺; ΔJ=1, dipole γ to 19/2⁻.
5530 *10*	1/2⁻,3/2⁻		O	Jπ: L(^{3}He,d)=1.
5641 *9*	1/2⁻,3/2⁻		NO	Jπ: L(^{3}He,d)=L(d,n)=1.
5719 *9*	1/2⁻,3/2⁻		G NO	Jπ: L(^{3}He,d)=L(d,n)=1.
5793.51 *24*	(15/2,17/2,19/2⁻)		B E	Jπ: γ to 15/2⁻.
5823 *9*			NO	
5871 *10*			O	
5919.4 *4*	3/2		JK O	Jπ: γ(θ) in (p,γ).
5950.5 *3*	(3/2,5/2)		JK	Jπ: γ(θ) in (p,γ).
5977 *12*			NO	
6033 *9*	1/2⁻,3/2⁻		NO	Jπ: L(^{3}He,d)=L(d,n)=1.
6060.5 *10*	(5/2)		JK	Jπ: γ(θ) in (p,γ).
6067.23[a] *14*	19/2⁻	55 fs *12*	B DE	Jπ: ΔJ=2, E2 γs to 15/2⁻, γ sequence.
6079 *10*			G O	
6103.2 *3*	(3/2⁻,5/2⁺)		JK O	Jπ: from γ decay of resonance in (p,γ).
6116			J	
6127			J	
6136.2 *3*	3/2		JK	Jπ: from γ(θ) in (p,γ).
6143.4 *3*	3/2⁻		JK	Jπ: γ decay of resonance and γ(θ) in (p,γ).
6146 *3*	1/2⁻,3/2⁻		J NO	T=3/2 Jπ: L(^{3}He,d)=L(d,n)=1.
6151 *3*	3/2⁻		J L N	Γ=125 eV *15* Jπ: from fit to resonance in (p,p).
6172.98[b] *17*	(19/2⁺)		B E	Jπ: γs to 15/2⁺, 19/2⁺ and 19/2⁻; γ sequence.
6174			J	
6182			J	
6184.2 *10*	5/2		JK	Jπ: γ decay of resonance and γ(θ) in (p,γ).
6190			J	
6198.1 *4*	(3/2,5/2⁺)		JK	Jπ: γ decay of resonance and γ(θ) in (p,γ).
6200			J	
6210			J	
6211			J	
6217.4 *3*	(3/2⁻,5/2⁺)		JK	Jπ: γ decay of resonance and γ(θ) in (p,γ).
6223	1/2⁺		L T	T=3/2 Γ=50 eV *10* Jπ: fit to resonance in (p,p).
6228 *3*			G J	
6242			J	
6247.2 *4*	(3/2,5/2)		JK	Jπ: γ decay of resonance and γ(θ) in (p,γ).
6253			J	
6262			J	
6280 *3*			J O	
6283.49[d] *17*	(21/2⁺)	110 fs *38*	B DE	Jπ: γ to (17/2⁺); ΔJ=1, D γ to 19/2⁻ and 19/2⁺.
6286			J	
6291			J	
6297			J	
6312			J	
6315			J	
6320.4 *3*	5/2⁺		JK	Jπ: γ decay of resonance and γ(θ) in (p,γ).
6348			J	

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Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

E(level)[†]	J^π[#]	$T_{1/2}$[‡]	XREF	Comments
6355			J	
6370			J	
6374			J	
6384 *3*			J O	
6391			J	
6395			J	
6403			J	
6410			J	
6416			J	
6417.6			J L	
6426			J	
6431.04[c] *17*	23/2$^+$	16.3 ps *15*	B DEF	J^π: ΔJ=2, E2 γ to 19/2$^+$; γ to 19/2$^-$.
6432			J	
6439 *3*	1/2$^+$		J L O	Γ=1.5 eV *5* J^π: fit to resonance in (p,p).
6453			J	
6461			J	
6469			J	
6479			J	
6481			J	
6493			J	
6499			J	
6503			J	
6508			J	
6510.7	1/2$^+$[@]		L	
6515			J	
6535			J	
6547			J	
6551			J	
6558			J	
6561.4	1/2$^-$[@]		L	
6564.1	1/2$^+$[@]		J L	
6570.1	1/2$^+$[@]		J L	
6576			J	
6584			J	
6596			J	
6604			J	
6625			J	
6630.0	1/2$^-$[@]		J L	
6651.0	1/2$^+$[@]		L	
6665			J	
6674			J	
6677.4	(1/2$^-$)[@]		J L	
6680			J	
6684.4	1/2$^+$[@]		L	
6685.1 *4*	1/2$^-$		JK	T=1/2&3/2 J^π: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
6685.3	3/2$^-$[@]		L	
6694.8	1/2$^-$[@]		J L	
6696.2 *3*	5/2		JK	J^π: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
6709 *3*	1/2$^-$		jkL o	T=1/2&3/2 J^π: γ decay of resonance in (p,γ).

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Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

E(level)[†]	J^{π}[#]	$T_{1/2}$[‡]	XREF	Comments
6709.5	$1/2^{-}$[@]		jkL o	
6713			J	
6716			J	
6719			J	
6730			J	
6736.6	$3/2^{-}$[@]		J L	
6749			J	
6759			J	
6777.3 *3*	5/2		JK N	J^{π}: γ decay of resonance and $\gamma(\theta)$ in (p,γ); L(d,n)=1 is inconsistent.
6786			J	
6794			J	
6795.1	$1/2^{-}$[@]		L	
6795.4	$1/2^{-}$[@]		L	
6801			J	
6811 *10*			O	
6814			J	
6814.5 *19*	($15/2^{-}$ to $23/2^{-}$)	94 fs *20*	D	
6815.3	$1/2^{+}$[@]		L	
6818.42 *17*	($21/2^{+}$)		B E	J^{π}: γs to ($17/2^{+}$) and ($19/2^{+}$).
6827.0	$3/2^{-}$[@]		L	
6830			J	
6834			J	
6846			J	
6849.7	($3/2^{+}$)[@]		L	
6850.8	$1/2^{-}$[@]		L	
6853.9	($3/2^{+}$)[@]		L	
6855.0	$1/2^{-}$[@]		J L	
6859.0	($3/2^{+}$)[@]		L	
6861			J	
6868.2	$1/2^{+}$[@]		L	
6871			J	
6877			J	
6880.1	$1/2^{+}$[@]		J L	
6889			J	
6899.7	$1/2^{-}$[@]		J L	XREF: J(6901).
6906			J	
6912.4	$1/2^{+}$[@]		J L	
6918.6 *4*	7/2		K O	J^{π}: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
6920			J	
6925			J	
6934			J	
6936.4	$1/2^{+}$[@]		L	
6942			J	
6943.7	$1/2^{-}$[@]		L	
6946			J	
6961			J	
6966.0	($3/2^{+}$)[@]		J L	
6971			J	
6978.9	($3/2^{+}$)[@]		J L	
6983.6	$1/2^{-}$[@]		J L	

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Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

E(level)[†]	J^{π}[#]	XREF	Comments
6991		J	
6996		J	
6999		J	
7004		J	
7013.7	$(3/2^-)$[@]	J L	XREF: J(7015).
7022		J	
7024.7	$(3/2^+)$[@]	J L	
7027.7	$1/2^-$	L N	J^{π}: fit to resonance in (p,p); L(d,n)=1.
7032.1	$1/2^+$[@]	L	
7033		J	
7037.2	$3/2^-$[@]	L	
7042		J	
7046.4	$(5/2^+)$[@]	L	
7051		J	
7058		J	
7063		J	
7067.5	$1/2^+$[@]	L	
7072		J	
7074.9	$1/2^-$[@]	L	
7080		J	
7085.6	$1/2^-$[@]	L	
7091		J	
7094.4	$3/2^-$[@]	J L	
7099.1	$1/2^+$[@]	J L	
7106.88[b] *17*	$(23/2^+)$	B DE	J^{π}: ΔJ=1, D γ to $(21/2^+)$; γ to $(19/2^+)$.
7108		J	
7116.8	$1/2^-$[@]	J L	XREF: J(7118).
7118.8 *11*	$(15/2,17/2,19/2^+)$	B E	J^{π}: γ to $15/2^+$.
7123.4	$(3/2^+)$[@]	L	
7125.0	$1/2^+$[@]	L	
7127		J	
7132.3	$(3/2^+)$[@]	L	
7135		J	
7138.0	$3/2^-$[@]	L	
7140.2	$1/2^+$[@]	J L	
7146		J	
7150.5	$(3/2^+)$[@]	L	
7154		J	
7155.8	$3/2^-$[@]	L	
7159	$3/2^+,5/2^+$	J N	J^{π}: L(d,n)=2.
7170.2	$1/2^-$[@]	J L	
7174		J	
7176.5	$(5/2^-)$[@]	J L	
7180		J	
7183		J	
7185.2	$(3/2^+)$[@]	L	
7198		J	
7211.0	$(1/2^-)$[@]	J L	
7214		J	
7215.3	$(1/2^+)$[@]	L	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

E(level)[†]	J^{π}[#]	$T_{1/2}$[‡]	XREF	Comments
7222.9	$3/2^{+}$[@]		J L	
7227.1	$(3/2^{+})$[@]		J L	
7231.2	$1/2^{-}$[@]		L	
7240.8	$(3/2^{+})$[@]		J L	
7247.5	$1/2^{-}$[@]		L	
7251.0	$(3/2^{+})$[@]		J L	
7255.4	$1/2^{+}$[@]		L	
7256.8	$3/2^{-}$[@]		L	
7263			J	
7266.3	$(3/2^{+})$[@]		L	
7269			J	
7273.5 *7*	$(15/2,17/2,19/2^{+})$		B E	J^{π}: γ to $15/2^{+}$.
7275			J	
7281.0	$(1/2^{-})$[@]		J L	
7285			J	
7288			J	
7289.8	$3/2^{+}$[@]		L	
7290.9	$(3/2^{+})$[@]		L	
7295			J	
7302			J	
7305			J	
7307.6	$3/2^{-}$[@]		L	
7309.1	$1/2^{-}$[@]		L	
7311.2	$(3/2^{+})$[@]		L	
7313			J	
7315.8	$1/2^{+}$[@]		L	
7326.9	$1/2^{-}$[@]		L	
7329.5	$(3/2^{+})$[@]		L	
7339.4	$1/2^{+}$[@]		L	
7344.1 *3*	$3/2^{-},5/2$		JK	J^{π}: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
7349			J	
7354			J	
7359.16[d] *17*	$(25/2)^{+}$	340 fs *21*	B DEF	J^{π}: $\Delta J=1$, M1 γ to $23/2^{+}$; γ to $(21/2^{+})$.
7363.5	$1/2^{+}$[@]		L	
7365.1	$1/2^{-}$[@]		J L	
7369.7	$1/2^{-}$[@]		L	
7370.8	$1/2^{-}$[@]		L	
7373			J	
7378.5	$1/2^{+}$[@]		L	
7380	$1/2^{-},3/2^{-}$		N	J^{π}: L(d,n)=1.
7382			J	
7385.5	$(5/2^{-})$[@]		L	
7388			J	
7390.3	$1/2^{+}$[@]		L	
7394.18 *23*	$3/2^{-},5/2^{+}$		JK	J^{π}: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
7395.7	$3/2^{+}$[@]		L	
7402			J	
7412.4	$1/2^{-}$[@]		J L	XREF: J(7411).

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Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

E(level)[†]	J^{π}[#]	XREF	Comments
7414.5	$(3/2^+)$[@]	J L	
7419.4	$3/2^-$[@]	J L	XREF: J(7418).
7423		J	
7424.7	$5/2^+$[@]	L	
7429		J	
7433		J	
7439.9	$5/2^+$[@]	L	
7443		J	
7445.0	$1/2^+$[@]	L	
7448.4	$1/2^-$[@]	L	
7450		J	
7461.7	$(3/2^+)$[@]	L	
7463.7	$3/2^-$[@]	L	
7466		J	
7471		J	
7476.6	$1/2^-$[@]	L	
7477.1	$(5/2^+)$[@]	L	
7478.6	$3/2^-$[@]	J L	XREF: J(7480).
7483.8	$(5/2^-)$[@]	J L	
7492.0	$1/2^+$[@]	J L	
7498		J	
7502.0	$(5/2^-)$[@]	J L	
7508.5	$3/2^-$[@]	L	
7512.3 *4*	$(7/2^+)$	JKL	J^{π}: γ decay of resonance and $\gamma(\theta)$ in (p,γ). $1/2^-$ from (p,p) is inconsistent which may indicate a separate level.
7513		J	
7517.6	$(5/2^+)$[@]	J L	
7522		J	
7527.5	$(3/2^-)$[@]	L	
7530	$1/2^-,3/2^-$	J L N	J^{π}: L(d,n)=1; $(3/2^-)$ from (p,p).
7536		J	
7539.1	$3/2^-$[@]	L	
7540.0	$1/2^+$[@]	L	
7544		J	
7551		J	
7557.1	$(5/2^+)$[@]	L	
7559		J	
7560.2	$3/2^-$[@]	L	
7564.1	$(3/2^+)$[@]	J L	
7570.1	$1/2^+$[@]	L	
7581.4 *4*	$(3/2^-,5/2,7/2^+)$	JK	J^{π}: γ decay of resonance and $\gamma(\theta)$ in (p,γ).
7586.6	$1/2^-$[@]	L	
7592		J	
7595.5	$(3/2^+)$[@]	L	
7596.9	$1/2^-$[@]	L	
7599.6	$1/2^+$[@]	J L	
7604.5	$(3/2^+)$[@]	J L	XREF: J(7603).
7607		J	
7611		J	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

E(level)[†]	J^{π}[#]	XREF	Comments
7614.2	$3/2^-$[@]	L	
7615.6	$(1/2^-)$[@]	L	
7619.5	$1/2^-$[@]	J L	XREF: J(7418).
7620.8	$(3/2^+)$[@]	L	
7624		J	
7625.8	$(3/2^+)$[@]	L	
7627.1	$(5/2^+)$[@]	L	
7630.7	$3/2^-$[@]	L	
7639.4	$3/2^-$[@]	L	
7644.1	$(3/2^+)$[@]	L	
7646.1	$(3/2^+)$[@]	L	
7659.6	$3/2^-$[@]	L	
7666.6	$1/2^+$[@]	L	
7668.0	$1/2^+$[@]	L	
7675.7	$3/2^-$[@]	L	
7683.6	$(5/2^-)$[@]	L	
7693.2	$1/2^-$[@]	L	
7700	$5/2^-,7/2^-$	N	J^{π}: L(d,n)=3.
7703.3	$(5/2^+)$[@]	L	
7708.3	$1/2^+$[@]	L	
7711.1	$1/2^-$[@]	L	
7714.8	$(5/2^-)$[@]	L	
7721.7	$1/2^-$[@]	L	
7733.7	$(5/2^+)$[@]	L	
7738.3	$1/2^-$[@]	L	
7738.5	$1/2^+$[@]	L	
7744.3	$3/2^-$[@]	L	
7747.3	$1/2^-$[@]	L	
7751.4	$1/2^-$[@]	L	
7754.0	$(5/2^+)$[@]	L	
7760.9	$(5/2^+)$[@]	L	
7761.3	$1/2^-$[@]	L	
7769.4	$1/2^+$[@]	L	
7784.7	$(3/2^+)$[@]	L	
7785.3	$(5/2^-)$[@]	L	
7797.5	$(5/2^+)$[@]	L	
7803.6	$1/2^+$[@]	L	
7807.2	$3/2^-$[@]	L	
7807.7	$1/2^-$[@]	L	
7810.8	$(3/2^+)$[@]	L	
7815.6	$(5/2^+)$[@]	L	
7818.6	$1/2^+$[@]	L	
7819.0	$1/2^+$[@]	L	
7820.5	$(5/2^+)$[@]	L	
7829.6	$1/2^-$[@]	L	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

E(level)[†]	J^{π}[#]	$T_{1/2}$[‡]	XREF	Comments
7830.3	$3/2^-$[@]		L	
7832.0	$(5/2^-)$[@]		L	
7832.8	$(3/2^+)$[@]		L	
7836.2	$(5/2^-)$[@]		L	
7838.0	$(3/2^+)$[@]		L	
7841.4	$1/2^+$[@]		L	
7844.2	$3/2^-$[@]		L	
7850.5	$3/2^-$[@]		L	
7859.2	$1/2^-$[@]		L	
7859.8	$1/2^-$[@]		L	
7861.6	$3/2^+$[@]		L	
7868.5	$3/2^-$[@]		L	
7900	$5/2^-,7/2^-$		N	J^{π}: L(d,n)=3.
7919	$3/2^+,(5/2^+)$[@]		L	
7926	$1/2^-,(3/2^-)$[@]		L	
7933	$1/2^+$[@]		L	
7941	$1/2^+$[@]		L	
7954	$1/2^-,(3/2^-)$[@]		L	
7961	$1/2^-,(3/2^-)$[@]		L	
8010.1 *4*	$(19/2,21/2,23/2^+)$		B E	J^{π}: γ to $19/2^+$.
8014	$1/2^-$[@]		L	
8019	$(3/2^+,5/2^+)$[@]		L	
8021			M	
8027			M	
8034	$(3/2^+,5/2^+)$[@]		L	
8045	$(3/2^+,5/2^+)$[@]		L	
8048	$1/2^+$[@]		L	
8054			M	
8061	$1/2^-$[@]		L	
8063			M	
8065	$3/2^-,(1/2^-)$[@]		L	
8068	$3/2^-$[@]		M	
8071	$3/2^-$[@]		L	
8074	$3/2^-$[@]		M	
8075	$9/2^+,(7/2^+)$[@]		L	
8093			M	
8111	$5/2^-,7/2^-$		MN	J^{π}: L(d,n)=3.
8122			M	
8132			M	
8139			M	
8149			M	
8193			M	
8380	$5/2^-,7/2^-$		N	J^{π}: L(d,n)=3.
8434.37 *17*	$23/2^{(-)}$		B E	J^{π}: ΔJ=2, Q γ to $19/2^-$.
8555.56[a] *19*	$23/2^{(-)}$		B E	J^{π}: ΔJ=2, Q γ to $19/2^-$; γ sequence.
8690	$5/2^-,7/2^-$		N	J^{π}: L(d,n)=3.
8703.06 *18*	$(25/2^+)$		B DE	J^{π}: ΔJ=1, D γ to $23/2^+$.
8831.84[c] *18*	$(27/2^+)$	74 fs *15*	B DE	J^{π}: ΔJ=1, D γ to $(25/2)^+$; γ to $(23/2^+)$.

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Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

E(level)[†]	J^{π}[#]	XREF	Comments
8910	$5/2^-,7/2^-$	N	J^{π}: L(d,n)=3.
9170	$5/2^-,7/2^-$	N	J^{π}: L(d,n)=3.
9218.8 *4*	$(21/2^-)$	B E	J^{π}: (D) γ to $19/2^-$.
9450	$5/2^-,7/2^-$	N	J^{π}: L(d,n)=3.
9578.86 *20*	$(27/2^+)$	B E	J^{π}: γs to $(25/2)^+$ and $23/2^+$.
9750	$5/2^-,7/2^-$	N	J^{π}: L(d,n)=3.
9995.10 *20*	$(25/2^-)$	B E	J^{π}: ΔJ=1, D γ to $23/2^-$; γ to $(23/2^+)$.
10040	$5/2^-,7/2^-$	N	J^{π}: L(d,n)=3.
10084.47 *17*	$27/2^{(-)}$	B E	J^{π}: ΔJ=1, D γ to $(25/2^+)$; ΔJ=2, Q γ to $23/2^-$.
10178.6 *6*	$(23/2,25/2,27/2^+)$	B E	J^{π}: γ to $(23/2^+)$.
10230	$3/2^+,5/2^+$	N	J^{π}: L(d,n)=2.
10436.84[b] *23*	$(25/2^+)$	B E	J^{π}: γ to $(23/2^+)$; member of a sequence based on $(19/2^+)$.
10613.21 *19*	$(27/2^-)$	B E	J^{π}: ΔJ=1, D γ to $(25/2^+)$; ΔJ=2, Q γ to $23/2^{(-)}$.
10750	$5/2^-,7/2^-$	N	J^{π}: L(d,n)=3.
10856.18 *19*	$(27/2^-)$	B E	J^{π}: ΔJ=1 d γs to $(25/2^-)$ and $(25/2)^+$.
10910	$5/2^-,7/2^-$	N	J^{π}: L(d,n)=3.
11252.0 *4*	$(25/2^+)$	B E	J^{π}: ΔJ=(0) γ to $(25/2^+)$ from $\gamma(\theta)$.
11260	$5/2^-,7/2^-$	N	J^{π}: L(d,n)=3.
11355.60[a] *23*	$27/2^{(-)}$	B E	J^{π}: ΔJ=2, Q γ to $23/2^-$; γ to $(25/2)^+$; γ sequence.
11560	$5/2^-,7/2^-$	N	J^{π}: L(d,n)=3.
11661.0 *5*		B E	
11807.36 *19*	$(29/2^-)$	B E	J^{π}: ΔJ=1 γs to $(27/2^+)$ and $(27/2^-)$.
11840	$1/2^-,3/2^-$	N	J^{π}: L(d,n)=1.
11920.54 *25*	$(25/2^+)$	B E	J^{π}: D γs to $23/2^+$ and $(25/2)^+$.
12053.33 *19*	$(29/2^-)$	B E	J^{π}: ΔJ=1, D γ to $27/2^{(-)}$; γ to $(25/2^-)$.
12073.15 *21*	$(29/2^-)$	B E	J^{π}: ΔJ=1, D γ to $27/2^{(-)}$.
12090	$1/2^-,3/2^-$	N	J^{π}: L(d,n)=1.
12614.84 *19*	$(31/2^-)$	B E	J^{π}: ΔJ=2, Q γ to $27/2^{(-)}$.
12703.9 *9*		B E	
12804.39 *24*	(27/2,29/2)	B E	J^{π}: γs to $27/2^{(-)}$ and $(27/2^+)$.
13044.65[b] *22*	$(29/2^+)$	B E	J^{π}: ΔJ=1, D γ to $(27/2^+)$; γ to $(25/2^+)$.
13116.57 *21*	$(31/2^-)$	B E	J^{π}: ΔJ=2, Q to $27/2^{(-)}$; ΔJ=1, D γ to $(29/2^-)$.
13122.7 *6*		B E	
13584.1 *4*	$(29/2^+)$	B E	J^{π}: ΔJ=1, D γ to $(27/2^+)$.
14405.80 *19*	$(33/2^-)$	B E	J^{π}: ΔJ=1, D γ to $(31/2^-)$; ΔJ=2, Q γ to $(29/2^-)$.
14451.1 *3*	$(29/2^+)$	B E	J^{π}: γs to $(25/2^+)$ and $(27/2^+)$.
14561.2[a] *3*	$(31/2^-)$	B E	J^{π}: γ to $(29/2^-)$; ΔJ=2, Q γ to $27/2^{(-)}$; γ sequence.
14914.3 *3*	(31/2)	B E	J^{π}: ΔJ=2, Q γ to $(27/2^+)$.
15910.7[b] *3*	$(33/2^+)$	B E	J^{π}: γs to $(29/2^+)$ and $31/2^-$.
16703.6 *6*		B E	
16708.4 *5*		B E	
16711.2 *6*		B E	
17767.4 *3*	(35/2)	B E	J^{π}: ΔJ=(2), (Q) γ to (31/2).
17921.1 *4*	$(31/2^+)$	B E	J^{π}: ΔJ=1, (D) γ to $(29/2^+)$.
18196.8[a] *5*	$(35/2^-)$	B E	J^{π}: ΔJ=2, Q γ to $(31/2^-)$.
18765.3 *4*	(37/2)	B E	J^{π}: ΔJ=1, D γ to (35/2).
19208.6[b] *4*	$(37/2^+)$	B E	J^{π}: 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. Values for proton resonances in (p,γ) and (p,p) reactions are considered to be associated with different excitation energies if separated by more than ≈1 keV. Relative uncertainty of excitation energies deduced from proton resonances is 0.1 keV in (p,p) and 1 keV in (p,γ), whereas the absolute uncertainty is 2 keV, essentially due to uncertainty in S(p).

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Adopted Levels, Gammas (continued)

^{43}Sc Levels (continued)

‡ 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. In heavy-ion fusion experiments leading to high-spin (>13/2 or so) it is assumed that spins generally ascend with excitation energy due to yrast nature of population of levels in such studies.

@ From (p,p) resonance.

& Band(A): γ sequence based on g.s..

[a] Band(B): γ sequence based on 7/2$^-$.

[b] Band(C): γ sequence based on (19/2$^+$).

[c] Band(D): γ sequence based on 3/2$^+$.

[d] Band(E): γ sequence based on 5/2$^+$.

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

E_i(level)	J^π_i	E_γ[†]	I_γ[§]	E_f	J^π_f	Mult.[&@]	δ[@]	α[#]	Comments
151.79	3/2$^+$	151.65 *17*	100	0.0	7/2$^-$	M2		0.0406	B(M2)(W.u.)=0.0691 *11* Mult.: from α(expt)=0.041 *4* (1972Bi13) in ^{43}Ca(p,nγ); α(K)(expt)=0.031 *2*, K/L(expt)=9.0 *7* (1966WaZW) in ^{40}Ca(α,pγ).
472.60	3/2$^-$	320.1	4.2 *11*	151.79	3/2$^+$	[E1]			B(E1)(W.u.)=4.3×10^{-6} *12*
		472.5 *2*	100.0 *21*	0.0	7/2$^-$	E2			B(E2)(W.u.)=16.3 *15* Mult.: from α(K)(expt)=7.7×10^{-4} *19* (1966WaZW) in ^{40}Ca(α,pγ).
845.18	5/2$^-$	373.2	<5	472.60	3/2$^-$				E_γ,I_γ: as quoted by 1978En02.
		692.3	<4	151.79	3/2$^+$				E_γ,I_γ: as quoted by 1978En02.
		845.2 *1*	100	0.0	7/2$^-$	M1+E2	+0.15 *4*		B(M1)(W.u.)=0.228 *17*; B(E2)(W.u.)=21 *11* E_γ,I_γ: as quoted by 1978En02.
855.65	1/2$^+$	383.1	26 *4*	472.60	3/2$^-$	[E1]			B(E1)(W.u.)=9.2×10^{-5} *20*
		703.2	100 *4*	151.79	3/2$^+$				
880.64	5/2$^+$	408.3	<5	472.60	3/2$^-$				E_γ,I_γ: as quoted by 1978En02.
		728.7 *1*	100 *1*	151.79	3/2$^+$	M1+E2	−0.52 *7*		B(M1)(W.u.)=0.0092 *21*; B(E2)(W.u.)=13 *5*
		880.5 *2*	3.6 *2*	0.0	7/2$^-$	[E1]			B(E1)(W.u.)=5.0×10^{-6} *20*
1158.76	3/2$^+$	278.1	36 *5*	880.64	5/2$^+$	M1(+E2)	+0.2 *2*		B(M1)(W.u.)=0.041 *12*; B(E2)(W.u.)<180
		303.3	53 *16*	855.65	1/2$^+$	M1(+E2)	+0.2 *2*		B(M1)(W.u.)=0.047 *19*; B(E2)(W.u.)<180
		313.2	<6	845.18	5/2$^-$				
		686.4	4 *2*	472.60	3/2$^-$	[E1]			B(E1)(W.u.)=8.E−6 *5*
		1006.5	100 *4*	151.79	3/2$^+$	M1+E2	−1.3 *+6−15*		B(M1)(W.u.)=0.0009 *6*; B(E2)(W.u.)=4.5 *19*
1178.98	3/2$^-$	298.6[‡a]	1	880.64	5/2$^+$				
		333.7	18 *3*	845.18	5/2$^-$	[M1]			B(M1)(W.u.)=0.27 *12*
		706.9	100 *6*	472.60	3/2$^-$	M1+E2	−0.18 *13*		B(M1)(W.u.)=0.15 *7*; B(E2)(W.u.)=30 *+50−28*
		1178.9	22 *3*	0.0	7/2$^-$	[E2]			B(E2)(W.u.)=15 *7*
1337.53	7/2$^+$	456.73 *10*	39.4 *15*	880.64	5/2$^+$	M1+E2	−0.23 *4*		B(M1)(W.u.)=0.06 *3*; B(E2)(W.u.)=46 *24* I_γ: 26 *2* in (p,γ) E=res seems discrepant and is not included in averaging.
		1185.6 *1*	100 *2*	151.79	3/2$^+$	E2			B(E2)(W.u.)=20 *9*
		1338.0 *1*	26.9 *13*	0.0	7/2$^-$	E1+M2	−0.10 *8*		B(E1)(W.u.)=4.5×10^{-5} *19*; B(M2)(W.u.)<3
1408.09	7/2$^-$	562.9 *2*	17.1 *12*	845.18	5/2$^-$	[M1]			B(M1)(W.u.)=0.09 *3*
		936.0 *8*	6.3 *11*	472.60	3/2$^-$	[E2]			B(E2)(W.u.)=24 *9*
		1408.06 *12*	100 *2*	0.0	7/2$^-$	M1+E2	+0.15 *5*		B(M1)(W.u.)=0.033 *11*; B(E2)(W.u.)=1.1 *8*
1651.22	5/2$^+$	492.4	32 *4*	1158.76	3/2$^+$	M1(+E2)	0.0 *2*		B(M1)(W.u.)=0.19 *4*
		770.5	12 *3*	880.64	5/2$^+$				
		795.7	5.4 *20*	855.65	1/2$^+$	[E2]			B(E2)(W.u.)=34 *14*
		1498.9	100 *5*	151.79	3/2$^+$	M1(+E2)	−0.05 *18*		B(M1)(W.u.)=0.021 *4*; B(E2)(W.u.)<0.6
		1650.8	25 *4*	0.0	7/2$^-$	[E1]			B(E1)(W.u.)=9.8×10^{-5} *23*
1811.1	3/2$^-$	631.8	100 *7*	1178.98	3/2$^-$	M1+E2	−0.22 *7*		B(M1)(W.u.)=2.1 *8* B(E2)(W.u.)=720 *+1230−470* as compared to RUL(E2)=300 suggests δ(E2/M1)≤0.15.

$^{43}_{21}Sc_{22}$-15

γ(^{43}Sc) (continued)

E$_i$(level)	J$^\pi_i$	E$_\gamma$[†]	I$_\gamma$[§]	E$_f$	J$^\pi_f$	Mult.[&@]	δ[@]	Comments
1811.1	3/2$^-$	955.6	41 *10*	855.65	1/2$^+$	[E1]		B(E1)(W.u.)=0.006 *3*
		1338.7	85 *7*	472.60	3/2$^-$	M1+E2	−0.22 *7*	B(M1)(W.u.)=0.18 *8*; B(E2)(W.u.)=14 *11*
		1658.8	26 *8*	151.79	3/2$^+$	[E1]		B(E1)(W.u.)=0.0008 *4*
1830.33	11/2$^-$	1830.10 *13*	100	0.0	7/2$^-$	E2		B(E2)(W.u.)=15.4 *24*
1882.8	(5/2,9/2)$^-$	1002.3[‡a]	21	880.64	5/2$^+$			
		1038.4[a]	<5	845.18	5/2$^-$			I$_\gamma$: from (α,pγ), Iγ=16 in (p,γ).
		1730[a]		151.79	3/2$^+$			
		1882.5 *3*	100 *14*	0.0	7/2$^-$	M1+E2	−0.19 *2*	B(M1)(W.u.)=0.07 *4*; B(E2)(W.u.)=2.2 *12* δ: for J=9/2, +0.42 *3* for J=5/2 in (α,pγ).
1932.55	9/2$^+$	595.1 *1*	37.5 *10*	1337.53	7/2$^+$	M1+E2	−0.19 *4*	B(M1)(W.u.)=0.011 *3*; B(E2)(W.u.)=3.3 *16* I$_\gamma$: 19 *2* in (p,γ) E=res seems discrepant and is not included in averaging.
		1051.9 *1*	100 *3*	880.64	5/2$^+$	E2		B(E2)(W.u.)=15 *4*
		1931.4[‡a]	1	0.0	7/2$^-$			
1962.89	(3/2,5/2)$^-$	784.0	15 *2*	1178.98	3/2$^-$	M1(+E2)	−0.04 *25*	B(M1)(W.u.)=0.082 *18*; B(E2)(W.u.)<0.8
		804.5	4 *1*	1158.76	3/2$^+$	[E1]		B(E1)(W.u.)=0.00051 *15*
		1490.2 *2*	100 *2*	472.60	3/2$^-$	M1+E2	+0.21 *6*	B(M1)(W.u.)=0.077 *13*; B(E2)(W.u.)=4.4 *25*
		1962.5[‡a]		0.0	7/2$^-$			
2094.8	3/2$^-$	915.4	100 *9*	1178.98	3/2$^-$	M1(+E2)	0.00 *10*	B(M1)(W.u.)=0.033 *10* I$_\gamma$: from (p,γ):E=res, also for other γ transitions from the same level.
		1214.0[‡]	30 *6*	880.64	5/2$^+$	[E1]		B(E1)(W.u.)=0.00011 *4*
		1239.2	55 *6*	855.65	1/2$^+$	[E1]		B(E1)(W.u.)=0.00018 *6*
		1249.1[‡]	33 *6*	845.18	5/2$^-$			E$_\gamma$: Seen also in (α,pγ), but the placement is uncertain.
		1622.3	33 *9*	472.60	3/2$^-$			
		1942.4	54 *9*	151.79	3/2$^+$	[E1]		B(E1)(W.u.)=4.6×10^{-5} *15*
2106.6	(3/2,5/2)	455.4[a]	17 *9*	1651.22	5/2$^+$			
		947.6	33 *8*	1158.76	3/2$^+$			
		1225.7	100 *6*	880.64	5/2$^+$			
		1954.1[a]	10	151.79	3/2$^+$			
2114.5		955.9[‡]	79 *9*	1158.76	3/2$^+$			
		1962.4[‡]	100 *13*	151.79	3/2$^+$			
2142.0	(3/2$^-$,5/2$^+$)	490.9[‡]	38	1651.22	5/2$^+$			I$_\gamma$: from (p,γ):E=res, also for other γ transitions from the same level.
		962.8[‡]	6 *3*	1178.98	3/2$^-$			
		983.3	15 *6*	1158.76	3/2$^+$			
		1261.4	100 *9*	880.64	5/2$^+$	(D+Q)	+0.27 *10*	
		1286.6[‡]	12 *6*	855.65	1/2$^+$			
		1669.7	42 *8*	472.60	3/2$^-$			
		1989.8	74 *6*	151.79	3/2$^+$			I$_\gamma$: from ^{42}Ca(p,γ) E=Res. Other: 29 *6* from ^{40}Ca(α,pγ). Unweighted average is 52 *22*.
		2141.6	18 *7*	0.0	7/2$^-$	D(+Q)	0.00 *4*	

$^{43}_{21}$Sc$_{22}$-16

Adopted Levels, Gammas (continued)

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

E_i(level)	J^π_i	E_γ[†]	I_γ[§]	E_f	J^π_f	Mult.[&@]	δ[@]	Comments
2242.8	$(3/2,5/2,7/2)^-$	1397.4	44	845.18	$5/2^-$			
		1770.6	100	472.60	$3/2^-$			
		2242.5	32	0.0	$7/2^-$			
2288.65	$5/2^-$	880.7 5	1.1 2	1408.09	$7/2^-$			
		1443.5 3	1.3 3	845.18	$5/2^-$			
		1815.4 4	0.9 5	472.60	$3/2^-$			
		2137.1 1	2.1 4	151.79	$3/2^+$	[E1]		B(E1)(W.u.)>5.4×10^{-5}
		2288.3 1	100 4	0.0	$7/2^-$	M1+E2	+0.08 5	B(M1)(W.u.)>0.082
2335.47	$5/2^-$	2335.4 1	100	0.0	$7/2^-$	M1(+E2)	+0.08 5	B(M1)(W.u.)=0.06 3; B(E2)(W.u.)<0.5
2383.1	$3/2^{(+)}$	731.9	100	1651.22	$5/2^+$			
		1527.6	45	855.65	$1/2^+$	(M1+E2)	+0.49 7	B(M1)(W.u.)<0.0053; B(E2)(W.u.)<1.8
2458.68	$(5/2,9/2)^-$	2458.6 1	100	0.0	$7/2^-$	M1(+E2)	+0.15 7	B(M1)(W.u.)=0.038 14; B(E2)(W.u.)<0.8 δ: for J=5/2, −0.02 5 for J=9/2.
2553.54	$11/2^+$	620.35 15	100 3	1932.55	$9/2^+$	(M1)		B(M1)(W.u.)=0.103 15
		1216.07 12	76 3	1337.53	$7/2^+$	(E2)		B(E2)(W.u.)=20 3
2580.8	(5/2)	1421.6	52 10	1158.76	$3/2^+$			
		1699.7	40 8	880.64	$5/2^+$			
		2428.0	100 13	151.79	$3/2^+$			
2635.35	$(11/2)^-$	804.4 3	34 3	1830.33	$11/2^-$	(M1)		B(M1)(W.u.)=0.031 11
		1227.1 3	89 7	1408.09	$7/2^-$	[E2]		B(E2)(W.u.)=43 16
		2636.0 3	100 15	0.0	$7/2^-$	[E2]		B(E2)(W.u.)=1.1 4
2650.5		1806.6		845.18	$5/2^-$			
2670.5	$3/2^-$	1491.4[‡]	16 4	1178.98	$3/2^-$			
		1790.0[‡]	43 8	880.64	$5/2^+$			
		1815.2	100 4	855.65	$1/2^+$			
		2198.2	45 6	472.60	$3/2^-$			
2760.10	$(5/2,7/2,9/2)^-$	2760.0 1	100	0.0	$7/2^-$			
2795.4	$3/2^-,5/2^-$	1387.2	36	1408.09	$7/2^-$			
		1950.0	87	845.18	$5/2^-$			
		2643.8[‡a]	29	151.79	$3/2^+$			
		2795.1	100	0.0	$7/2^-$			
2811.1	(5/2,7/2,9/2)	704.7	76 9	2106.6	(3/2,5/2)			
		1473.9	100 11	1337.53	$7/2^+$			
		2810.6	70 30	0.0	$7/2^-$			
2840.7	$(5/2,7/2)^+$	457.3	41	2383.1	$3/2^{(+)}$			
		1503.2	100	1337.53	$7/2^+$			
		1959.7[‡a]	37	880.64	$5/2^+$			
		2839.9	86	0.0	$7/2^-$			
2846.2		2846.1	100	0.0	$7/2^-$			
2860.8	$(1/2,3/2,5/2)^+$	1210.2	14 5	1651.22	$5/2^+$			
		1682.1[‡]	16 5	1178.98	$3/2^-$			

γ(^{43}Sc) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[§]	E_f	J^π_f	Mult.[&@]	α[#]	Comments
2860.8	(1/2,3/2,5/2)$^+$	1702.6[‡]	23 *7*	1158.76	3/2$^+$			
		1980.7	100 *5*	880.64	5/2$^+$			
		2709.0	75 *7*	151.79	3/2$^+$			
2874.7	(5/2)$^+$	2723[‡]		151.79	3/2$^+$			
2985.0	(3/2,5/2)	1648.1[a]		1337.53	7/2$^+$			I_γ: 84 in (α,pγ) but this branch is either absent (see 1977Di17) in (p,γ) or at the most Iγ=16.
		1806.0[‡]	34 *8*	1178.98	3/2$^-$			
		2104.5	71 *5*	880.64	5/2$^+$			
		2139.6	58 *8*	845.18	5/2$^-$			
		2832.9	100 *8*	151.79	3/2$^+$			
2988.12	15/2$^-$	1157.5 *1*	100	1830.33	11/2$^-$	E2		B(E2)(W.u.)=5.4 *7*
3123.73	19/2$^-$	135.6 *1*	100	2988.12	15/2$^-$	E2	0.0934	B(E2)(W.u.)=2.67 *2*
3142.05	13/2$^+$	588.2 *1*	9.4 *3*	2553.54	11/2$^+$	(M1+E2)		B(M1)(W.u.)<0.017
		1209.8 *1*	100 *3*	1932.55	9/2$^+$	E2		B(E2)(W.u.)<41
3159.3	(3/2$^-$,5/2,7/2$^+$)	2278.4	50	880.64	5/2$^+$			
		3006.8	88	151.79	3/2$^+$			
		3158.7	100	0.0	7/2$^-$			
3198.2	(1/2 to 7/2$^-$)	2725.5	100	472.60	3/2$^-$			
3260.1	(7/2,9/2)$^-$	1432[a]	4.2	1830.33	11/2$^-$			E_γ: from (α,pγ) only.
		3259.6 *10*	100	0.0	7/2$^-$			
3292.4	7/2$^-$	1360.6 *4*	90	1932.55	9/2$^+$			E_γ: seen only in (α,pγ).
		1479.9[‡a]	21 *5*	1811.1	3/2$^-$			
		2113.9	100 *12*	1178.98	3/2$^-$			
		2412.5	21 *7*	880.64	5/2$^+$			
		2447.6	91 *9*	845.18	5/2$^-$			
3326.8	(3/2$^-$ to 9/2)	3327.1[‡]		0.0	7/2$^-$			
3332.2	(3/2$^-$,5/2)	1369[‡]	4 *2*	1962.89	(3/2,5/2)$^-$			
		1521[‡]	13 *4*	1811.1	3/2$^-$			
		2153	100 *4*	1178.98	3/2$^-$			
		2174[‡]	44 *4*	1158.76	3/2$^+$			
		2487	29 *6*	845.18	5/2$^-$			
		2860	19 *4*	472.60	3/2$^-$			
		3334		0.0	7/2$^-$			E_γ: seen only in (α,pγ).
3375.3	(7/2,9/2)$^-$	1492.6	53	1882.8	(5/2,9/2)$^-$			
		1545.3	63	1830.33	11/2$^-$			
		1967.2	100	1408.09	7/2$^-$			
		2038.3	40	1337.53	7/2$^+$	[E1]		B(E1)(W.u.)>0.00013
		3375.1	77	0.0	7/2$^-$			
3452.1	5/2$^+$	1640.8[a]	270	1811.1	3/2$^-$			γ from (α,pγ) only.
		2571.1	100 *7*	880.64	5/2$^+$			

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

E_i(level)	J^{π}_i	E_γ[†]	I_γ[§]	E_f	J^{π}_f	Mult.[&@]	δ[@]
3452.1	5/2$^+$	2606.2	45 *7*	845.18	5/2$^-$		
		3299.9[‡]	55 *7*	151.79	3/2$^+$		
		3451.3[‡]	27 *9*	0.0	7/2$^-$		
3463.3	5/2$^-$	2582.9[‡]	37 *4*	880.64	5/2$^+$		
		3311.3	100 *7*	151.79	3/2$^+$		
3503.2	7/2$^-$	2658[‡]	100 *10*	845.18	5/2$^-$		
		3503[‡]	100 *10*	0.0	7/2$^-$		
3631.7	(5/2$^-$,7/2$^-$,9/2$^-$)	3631.5 *10*	100	0.0	7/2$^-$		
3645.6	(3/2,5/2,7/2$^-$)	1682.5	34 *11*	1962.89	(3/2,5/2)$^-$		
		1994.5	66 *13*	1651.22	5/2$^+$		
		2466.4	100 *16*	1178.98	3/2$^-$		
		2765.0	63 *13*	880.64	5/2$^+$		
3683.2	(3/2,5/2,7/2)	2803	25 *4*	880.64	5/2$^+$		
		2838	56 *6*	845.18	5/2$^-$		
		3531	100 *7*	151.79	3/2$^+$		
3734.0		1445.5	31	2288.65	5/2$^-$		
		2325.7	83	1408.09	7/2$^-$		
		2888.5	100	845.18	5/2$^-$		
3755.43	15/2$^+$	614.1 *6*	100 *3*	3142.05	13/2$^+$	M1+E2	−0.11 *8*
		766.9 *2*	3.00 *14*	2988.12	15/2$^-$	D	
		1202.4 *3*	18.9 *6*	2553.54	11/2$^+$	Q	
3756.5	(3/2$^-$,5/2,7/2$^+$)	3605	100 *10*	151.79	3/2$^+$		
		3757	43 *7*	0.0	7/2$^-$		
3807.2	7/2$^-$	2469.7	24 *6*	1337.53	7/2$^+$		
		2926.2	100 *5*	880.64	5/2$^+$		
		3334.5	35 *8*	472.60	3/2$^-$		
3843.0	(≤9/2)	2998		845.18	5/2$^-$		
3860.1	(≤7/2)	3708		151.79	3/2$^+$		
3959.87	15/2$^-$	971.5 *1*	14.8 *6*	2988.12	15/2$^-$	D	
		1324.5 *1*	17.2 *7*	2635.35	(11/2)$^-$	Q	
		2129.7 *1*	100 *3*	1830.33	11/2$^-$	Q	
4007.3	(3/2,5/2)$^+$	3126	83 *20*	880.64	5/2$^+$		
		3152	100 *20*	855.65	1/2$^+$		
		3535	50 *13*	472.60	3/2$^-$		
		3855	100 *17*	151.79	3/2$^+$		
4038.8	7/2$^-$	2107	100 *13*	1932.55	9/2$^+$		
		3566	67 *15*	472.60	3/2$^-$		
4158.6	(9/2,11/2,13/2)$^-$	1605	100	2553.54	11/2$^+$		
4301.2	(9/2,11/2,13/2$^+$)	2368.6 *5*	100	1932.55	9/2$^+$		
4371.5	5/2$^-$,7/2$^-$	2265	37 *7*	2106.6	(3/2,5/2)		
		2720	32 *10*	1651.22	5/2$^+$		

γ(^{43}Sc) (continued)

E$_i$(level)	J$^\pi_i$	E$_\gamma$[†]	I$_\gamma$[§]	E$_f$	J$^\pi_f$	Mult.[&@]	Comments
4371.5	5/2$^-$,7/2$^-$	2963	49 *12*	1408.09	7/2$^-$		
		3034	100 *10*	1337.53	7/2$^+$		
		3491	27 *7*	880.64	5/2$^+$		
4383.03	17/2$^{(-)}$	1258.8 *9*	100	3123.73	19/2$^-$	D+Q	E$_\gamma$: γ not seen in ^{24}Mg(^{24}Mg,αpγ) and ^{28}Si(^{20}Ne,αpγ) (2007Ch40) due to this transition feeding 470-ns isomer.
		1394.9 *2*	24	2988.12	15/2$^-$	D	
4430.2	(1/2$^+$,3/2,5/2)	3251	100 *15*	1178.98	3/2$^-$		
		3271	75 *13*	1158.76	3/2$^+$		
		3550	75 *10*	880.64	5/2$^+$		
4455.3	(5/2 to 9/2)	4455	100	0.0	7/2$^-$	D+Q	
4633.6	(17/2,21/2)	1509.8 *19*	100	3123.73	19/2$^-$	D+Q	
5231.33	(17/2$^+$)	1475.5 *6*	100	3755.43	15/2$^+$	D+Q	
5519.00	19/2$^+$	287.9 *1*	2.34 *9*	5231.33	(17/2$^+$)	(M1)	B(M1)(W.u.)>0.26
		1763.3 *1*	27.9 *11*	3755.43	15/2$^+$	E2	B(E2)(W.u.)>13
		2394.86 *12*	100	3123.73	19/2$^-$	(E1)	B(E1)(W.u.)>0.00050
5793.51	(15/2,17/2,19/2$^-$)	1833.6 *2*	100	3959.87	15/2$^-$		
5919.4	3/2	2629	33	3292.4	7/2$^-$		
		3249	33	2670.5	3/2$^-$		
		3338	33	2580.8	(5/2)		
		3536	67	2383.1	3/2$^{(+)}$		
		4268	67	1651.22	5/2$^+$		
		4740	33	1178.98	3/2$^-$		
		4760	67	1158.76	3/2$^+$		
		5038	67	880.64	5/2$^+$		
		5074	100	845.18	5/2$^-$		
		5446	67	472.60	3/2$^-$		
		5767	100	151.79	3/2$^+$		
5950.5	(3/2,5/2)	2619	62	3332.2	(3/2$^-$,5/2)		
		2660	19	3292.4	7/2$^-$		
		3369	14	2580.8	(5/2)		
		3615	5	2335.47	5/2$^-$		
		3661	5	2288.65	5/2$^-$		
		3808	10	2142.0	(3/2$^-$,5/2$^+$)		
		3836	5	2114.5			
		3856	10	2094.8	3/2$^-$		
		3987	33	1962.89	(3/2,5/2)$^-$		
		4139	5	1811.1	3/2$^-$		
		4299	67	1651.22	5/2$^+$		
		4771	100	1178.98	3/2$^-$		
		4791	14	1158.76	3/2$^+$		
		5094	43	855.65	1/2$^+$		

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

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

E_i(level)	J^π_i	E_γ[†]	I_γ[§]	E_f	J^π_f	Mult.[&@]	Comments
5950.5	(3/2,5/2)	5105[a]		845.18	5/2⁻		
		5477	43	472.60	3/2⁻		
		5798	43	151.79	3/2⁺		
6060.5	(5/2)	6060		0.0	7/2⁻		
6067.23	19/2⁻	2107.3 *1*	100 *3*	3959.87	15/2⁻	E2	B(E2)(W.u.)=21 *5*
		3079.0 *1*	30.5 *10*	2988.12	15/2⁻	E2	B(E2)(W.u.)=0.97 *22*
6103.2	(3/2⁻,5/2⁺)	2260	1.6	3843.0	(≤9/2)		
		2651	10	3452.1	5/2⁺		
		2943	1.6	3159.3	(3/2⁻,5/2,7/2⁺)		
		3116	1.6	2985.0	(3/2,5/2)		
		3257	1.6	2846.2			
		3262	<1.6	2840.7	(5/2,7/2)⁺		
		3961	13	2142.0	(3/2⁻,5/2⁺)		
		3996	5	2106.6	(3/2,5/2)		
		4695	5	1408.09	7/2⁻		
		4766	8	1337.53	7/2⁺		
		4924	3	1178.98	3/2⁻		
		5247	1.6	855.65	1/2⁺		
		5258	3	845.18	5/2⁻		
		5630	1.6	472.60	3/2⁻		
		5951	100	151.79	3/2⁺		
		6103	5	0.0	7/2⁻		
6136.2	3/2	3150[a]	30	2985.0	(3/2,5/2)		
		3466[a]	15	2670.5	3/2⁻		
		3555	35	2580.8	(5/2)		
		3994	24	2142.0	(3/2⁻,5/2⁺)		
		4041	71	2094.8	3/2⁻		
		4173	100	1962.89	(3/2,5/2)⁻		
		4485	35	1651.22	5/2⁺		
		4957	65	1178.98	3/2⁻		
		4977	53	1158.76	3/2⁺		
		5255	41	880.64	5/2⁺		
		5280	18	855.65	1/2⁺		
		5291	24	845.18	5/2⁻		
		5663	24	472.60	3/2⁻		
		5984	100	151.79	3/2⁺		
6143.4	3/2⁻	2336	21	3807.2	7/2⁻		
		2853	21	3292.4	7/2⁻		
		3156	37	2985.0	(3/2,5/2)		
		3473	32	2670.5	3/2⁻		
		4048	32	2094.8	3/2⁻		

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

Adopted Levels, Gammas (continued)

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

E_i(level)	J^{π}_i	E_{γ}†	I_{γ}§	E_f	J^{π}_f
6143.4	$3/2^-$	4180	26	1962.89	$(3/2,5/2)^-$
		4332	11	1811.1	$3/2^-$
		4964	68	1178.98	$3/2^-$
		4984	16	1158.76	$3/2^+$
		5262	11	880.64	$5/2^+$
		5287	100	855.65	$1/2^+$
		5298	53	845.18	$5/2^-$
		5670	16	472.60	$3/2^-$
		5991	74	151.79	$3/2^+$
		6143	11	0.0	$7/2^-$
6172.98	$(19/2^+)$	653.9 *2*	56 *5*	5519.00	$19/2^+$
		941.4 *1*	94 *4*	5231.33	$(17/2^+)$
		2418.3 *2*	100 *5*	3755.43	$15/2^+$
		3048.6 *8*	33 *8*	3123.73	$19/2^-$
6184.2	5/2	6032		151.79	$3/2^+$
6198.1	$(3/2,5/2^+)$	2464	16	3734.0	
		3862	20	2335.47	$5/2^-$
		4056	16	2142.0	$(3/2^-,5/2^+)$
		4103	52	2094.8	$3/2^-$
		4235	12	1962.89	$(3/2,5/2)^-$
		4547	48	1651.22	$5/2^+$
		5317	100	880.64	$5/2^+$
		5342	60	855.65	$1/2^+$
		5353	12	845.18	$5/2^-$
		6046	64	151.79	$3/2^+$
6217.4	$(3/2^-,5/2^+)$	2357	2	3860.1	$(\leq 7/2)$
		2572	6	3645.6	$(3/2,5/2,7/2^-)$
		2765	6	3452.1	$5/2^+$
		3230	8	2985.0	(3/2,5/2)
		3357	12	2860.8	$(1/2,3/2,5/2)^+$
		3547	10	2670.5	$3/2^-$
		4075	4	2142.0	$(3/2^-,5/2^+)$
		4110	2	2106.6	(3/2,5/2)
		4122	4	2094.8	$3/2^-$
		4406	6	1811.1	$3/2^-$
		4809	2	1408.09	$7/2^-$
		4880	<2	1337.53	$7/2^+$
		5336	6	880.64	$5/2^+$
		5361	100	855.65	$1/2^+$
		5744	16	472.60	$3/2^-$
		6065	8	151.79	$3/2^+$
		6217	8	0.0	$7/2^-$

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

Adopted Levels, Gammas (continued)

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

E_i(level)	J_i^π	E_γ[†]	I_γ[§]	E_f	J_f^π	Mult.[&@]	δ[@]	Comments
6247.2	(3/2,5/2)	4105	50	2142.0	$(3/2^-,5/2^+)$			
		4152	17	2094.8	$3/2^-$			
		4284	33	1962.89	$(3/2,5/2)^-$			
		5068	17	1178.98	$3/2^-$			
		5366	33	880.64	$5/2^+$			
		5402	83	845.18	$5/2^-$			
		6095	100	151.79	$3/2^+$			
6283.49	$(21/2^+)$	764.3 *1*	24.2 *20*	5519.00	$19/2^+$	(M1)		B(M1)(W.u.)=0.07 *3*
		1052.9 *4*	1.3 *10*	5231.33	$(17/2^+)$	[E2]		B(E2)(W.u.)=8 *4*
		1648[a]	39	4633.6	(17/2,21/2)			E_γ: reported as tentative γ only in $^{27}Al(^{19}F,p2n\gamma)$.
		3159.8 *2*	100 *5*	3123.73	$19/2^-$	(E1)		B(E1)(W.u.)=9.E−5 *4*
6320.4	$5/2^+$	2513	11	3807.2	$7/2^-$			
		2868	5	3452.1	$5/2^+$			
		3333	11	2985.0	(3/2,5/2)	D+Q	−0.02 *4*	
		3739	3	2580.8	(5/2)			
		3937	2	2383.1	$3/2^{(+)}$	D+Q	−0.18 *8*	
		4178	10	2142.0	$(3/2^-,5/2^+)$	D+Q	+0.07 *6*	
		4669	2	1651.22	$5/2^+$			
		4983	3	1337.53	$7/2^+$			
		5141	6	1178.98	$3/2^-$	D+Q	0.00 *3*	
		5439	10	880.64	$5/2^+$	D+Q	+0.14 *5*	
		5464	10	855.65	$1/2^+$			δ(Q/D)=+0.01 *3* or −3.1 *5*.
		5475	8	845.18	$5/2^-$			
		6168	100	151.79	$3/2^+$	D+Q	+0.03 *3*	
6431.04	$23/2^+$	912.0 *1*	100 *3*	5519.00	$19/2^+$	E2		B(E2)(W.u.)=5.7 *6*
		3307.4 *4*	8.7 *3*	3123.73	$19/2^-$	[M2]		B(M2)(W.u.)=0.031 *4*
6685.1	$1/2^-$	4104	13	2580.8	(5/2)			
		4590	79	2094.8	$3/2^-$			
		4722	42	1962.89	$(3/2,5/2)^-$			
		5506	38	1178.98	$3/2^-$			
		5804	33	880.64	$5/2^+$			
		5829	25	855.65	$1/2^+$			
		6212	29	472.60	$3/2^-$			
		6533	100	151.79	$3/2^+$			
6696.2	5/2	3013	5	3683.2	(3/2,5/2,7/2)			
		3369[a]	5	3326.8	$(3/2^-$ to 9/2)			
		4313	9	2383.1	$3/2^{(+)}$			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.
		4733	5	1962.89	$(3/2,5/2)^-$	D+Q	−0.47 *8*	
		5044	11	1651.22	$5/2^+$	D+Q	−0.07 *7*	
		5359	11	1337.53	$7/2^+$			δ(Q/D)=−0.14 *6* or −23 +∞−12.

Adopted Levels, Gammas (continued)

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

E_i(level)	J^π_i	E_γ [†]	I_γ [§]	E_f	J^π_f	Mult. [&@]	δ [@]
6696.2	5/2	5517	7	1178.98	$3/2^-$		
		5537	7	1158.76	$3/2^+$		
		5815	32	880.64	$5/2^+$	D+Q	+0.03 *3*
		5851	7	845.18	$5/2^-$	D+Q	−0.27 *10*
		6223	2	472.60	$3/2^-$	D+Q	+0.22 *5*
		6544	100	151.79	$3/2^+$	D+Q	−0.14 *4*
		6695	27	0.0	$7/2^-$	D+Q	+0.02 *4*
6777.3	5/2	2322	64	4455.3	(5/2 to 9/2)		
		3790	45	2985.0	(3/2,5/2)		
		4196	55	2580.8	(5/2)		
		4394	36	2383.1	$3/2^{(+)}$		
		4635	82	2142.0	$(3/2^-,5/2^+)$		
		5125	91	1651.22	$5/2^+$		
		5369	18	1408.09	$7/2^-$		
		5440	27	1337.53	$7/2^+$		
		5598	100	1178.98	$3/2^-$		
		5896	91	880.64	$5/2^+$		
		5921	45	855.65	$1/2^+$		
		5932	82	845.18	$5/2^-$		
		6304	91	472.60	$3/2^-$		
		6625	82	151.79	$3/2^+$		
6814.5	$(15/2^-$ to $23/2^-)$	3691.0 *18*	100	3123.73	$19/2^-$		
6818.42	$(21/2^+)$	645.4 *1*	100 *5*	6172.98	$(19/2^+)$		
		1586.9 *3*	29 *3*	5231.33	$(17/2^+)$		
6918.6	7/2	3076	3	3843.0	(≤9/2)		
		3592	6	3326.8	$(3/2^-$ to 9/2)		
		3658	6	3260.1	$(7/2,9/2)^-$		
		4044	3	2874.7	$(5/2)^+$		
		4123	3	2795.4	$3/2^-,5/2^-$		
		5034	5	1882.8	$(5/2,9/2)^-$		
		5511	5	1408.09	$7/2^-$	D+Q	−0.04 *4*
		6037	3	880.64	$5/2^+$		
		6074	100	845.18	$5/2^-$	D+Q	0.00 *2*
		6917	11	0.0	$7/2^-$	D+Q	−0.29 *8*
7106.88	$(23/2^+)$	288.4 *1*	8.0 *4*	6818.42	$(21/2^+)$		
		675.9 *1*	100 *4*	6431.04	$23/2^+$	D	
		823.3 *1*	69 *3*	6283.49	$(21/2^+)$	D	
		933.0 *5*	12.6 *8*	6174			
7118.8	$(15/2,17/2,19/2^+)$	3362.2 *10*	100	3755.43	$15/2^+$		
7273.5	$(15/2,17/2,19/2^+)$	3516.9 *5*	100	3755.43	$15/2^+$		
7344.1	$3/2^-,5/2$	3484	13	3860.1	(≤7/2)		
		3537	39	3807.2	$7/2^-$		

$^{43}_{21}Sc_{22}$-24

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

E_i(level)	J^π_i	E_γ †	I_γ §	E_f	J^π_f	Mult. &@	δ @	Comments
7344.1	3/2$^-$,5/2	3661	10	3683.2	(3/2,5/2,7/2)			
		3698	10	3645.6	(3/2,5/2,7/2$^-$)			
		4184	19	3159.3	(3/2$^-$,5/2,7/2$^+$)			
		5229	6	2114.5				
		5692	19	1651.22	5/2$^+$			
		6007	6	1337.53	7/2$^+$			
		6165	6	1178.98	3/2$^-$			
		6185	6	1158.76	3/2$^+$			
		6463	100	880.64	5/2$^+$			
		7191	55	151.79	3/2$^+$			
		7343	32	0.0	7/2$^-$			
7359.16	(25/2)$^+$	252.3 *1*	2.84 *16*	7106.88	(23/2$^+$)	[M1]		B(M1)(W.u.)=0.109 *11*
		928.2 *1*	100 *3*	6431.04	23/2$^+$	M1(+E2)	−0.1 *1*	B(M1)(W.u.)=0.078 *6*
		1075.6 *3*	0.85 *10*	6283.49	(21/2$^+$)	[E2]		B(E2)(W.u.)=1.00 *15*
7394.18	3/2$^-$,5/2$^+$	2964	20	4430.2	(1/2$^+$,3/2,5/2)			
		3387	28	4007.3	(3/2,5/2)$^+$			
		3637	8	3756.5	(3/2$^-$,5/2,7/2$^+$)			
		3931	12	3463.3	5/2$^-$			
		3942	12	3452.1	5/2$^+$			
		4519	8	2874.7	(5/2)$^+$			
		4534	8	2860.8	(1/2,3/2,5/2)$^+$			
		4598	4	2795.4	3/2$^-$,5/2$^-$			
		4813	4	2580.8	(5/2)			
		5011	4	2383.1	3/2$^{(+)}$			
		5252	4	2142.0	(3/2$^-$,5/2$^+$)			
		5279	28	2114.5				
		5583	8	1811.1	3/2$^-$			
		5742	8	1651.22	5/2$^+$			
		5986	4	1408.09	7/2$^-$			
		6057	4	1337.53	7/2$^+$			
		6215	16	1178.98	3/2$^-$			
		6235	40	1158.76	3/2$^+$			
		6513	32	880.64	5/2$^+$			
		6538	20	855.65	1/2$^+$			
		6548	16	845.18	5/2$^-$			
		6921	8	472.60	3/2$^-$			
		7241	100	151.79	3/2$^+$			
		7393	4	0.0	7/2$^-$			
7512.3	(7/2$^+$)	3141	12	4371.5	5/2$^-$,7/2$^-$			
		3474	3	4038.8	7/2$^-$			
		3705	10	3807.2	7/2$^-$			
		4671	3	2840.7	(5/2,7/2)$^+$			

$^{43}_{21}Sc_{22}$-25

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

E_i(level)	J^π_i	E_γ†	I_γ§	E_f	J^π_f	Mult.&@	Comments
7512.3	$(7/2^+)$	4701	3	2811.1	(5/2,7/2,9/2)		
		4960	3	2553.54	$11/2^+$		
		5580	100	1932.55	$9/2^+$		
		5627	3	1882.8	$(5/2,9/2)^-$		
		6353	5	1158.76	$3/2^+$		
		6666	3	845.18	$5/2^-$		
		7511	22	0.0	$7/2^-$		
7581.4	$(3/2^-,5/2,7/2^+)$	3151	3	4430.2	$(1/2^+,3/2,5/2)$		
		3898	18	3683.2	(3/2,5/2,7/2)		
		4078	5	3503.2	$7/2^-$		
		4129	8	3452.1	$5/2^+$		
		4207	5	3375.3	$(7/2,9/2)^-$		
		4721	3	2860.8	$(1/2,3/2,5/2)^+$		
		5439	13	2142.0	$(3/2^-,5/2^+)$		
		6700	100	880.64	$5/2^+$		
		7428	93	151.79	$3/2^+$		
		7580	5	0.0	$7/2^-$		
8010.1	$(19/2,21/2,23/2^+)$	2491.0 *3*	100	5519.00	$19/2^+$		
8434.37	$23/2^{(-)}$	2369.6 *4*	9.9 *12*	6067.23	$19/2^-$		E_γ: poor fit in the level scheme. Level-energy difference=2367.1.
		5310.5 *1*	100 *7*	3123.73	$19/2^-$	Q	
8555.56	$23/2^{(-)}$	2488.2 *1*	100	6067.23	$19/2^-$	Q	
8703.06	$(25/2^+)$	1595.2 *3*	11.3 *6*	7108			
		2271.8 *2*	100 *4*	6431.04	$23/2^+$	D	
8831.84	$(27/2^+)$	1472.5 *1*	100 *3*	7359.16	$(25/2)^+$	(M1)	B(M1)(W.u.)=0.089 *19*
		1724.8 *2*	5.0 *9*	7106.88	$(23/2^+)$	[E2]	B(E2)(W.u.)=2.7 *8*
9218.8	$(21/2^-)$	3151.4 *3*	100	6067.23	$19/2^-$	(D)	
9578.86	$(27/2^+)$	2219.2 *2*	70 *17*	7359.16	$(25/2)^+$		
		3147.7 *2*	100 *4*	6431.04	$23/2^+$		
9995.10	$(25/2^-)$	1439.5 *1*	100 *4*	8555.56	$23/2^{(-)}$	D	
		2887.4 *6*	39 *9*	7106.88	$(23/2^+)$		
10084.47	$27/2^{(-)}$	1381.2 *1*	35 *4*	8703.06	$(25/2^+)$	D	
		1529.0 *1*	49 *6*	8555.56	$23/2^{(-)}$	Q	
		1650.3 *1*	100 *4*	8434.37	$23/2^{(-)}$	Q	
		2725.6 *2*	21 *5*	7359.16	$(25/2)^+$	D	
10178.6	$(23/2,25/2,27/2^+)$	3071.6 *5*	100	7106.88	$(23/2^+)$		
10436.84	$(25/2^+)$	3329.9 *2*	100	7106.88	$(23/2^+)$		
10613.21	$(27/2^-)$	2177.8 *6*	4.4 *6*	8434.37	$23/2^{(-)}$	Q	
		3253.9 *1*	100 *4*	7359.16	$(25/2)^+$	D	
10856.18	$(27/2^-)$	771.6 *4*	10.3 *12*	10084.47	$27/2^{(-)}$		
		860.4 *2*	12.2 *20*	9995.10	$(25/2^-)$	D	
		3497.0 *1*	100 *4*	7359.16	$(25/2)^+$	D	

$^{43}_{21}Sc_{22}$-26

Adopted Levels, Gammas (continued)

γ(^{43}Sc) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[§]	E_f	J^π_f	Mult.[&@]
11252.0	(25/2$^+$)	3892.6 *3*	100	7359.16	(25/2)$^+$	
11355.60	27/2$^{(-)}$	2799.5 *2*	100 *4*	8555.56	23/2$^{(-)}$	Q
		2920.2 *10*	12.7 *22*	8434.37	23/2$^{(-)}$	
		3997.1 *3*	49 *4*	7359.16	(25/2)$^+$	
11661.0		3105.3 *4*	100	8555.56	23/2$^{(-)}$	
11807.36	(29/2$^-$)	951.0 *3*	19.7 *10*	10856.18	(27/2$^-$)	D
		2228.0 *2*	28.5 *19*	9578.86	(27/2$^+$)	
		2975.2 *1*	100 *3*	8831.84	(27/2$^+$)	D
11920.54	(25/2$^+$)	4560.5 *3*	66 *6*	7359.16	(25/2)$^+$	D
		5489.0 *3*	100 *4*	6431.04	23/2$^+$	D
12053.33	(29/2$^-$)	1968.8 *1*	100 *4*	10084.47	27/2$^{(-)}$	D
		2058.7 *2*	25 *6*	9995.10	(25/2$^-$)	
12073.15	(29/2$^-$)	1460.1 *1*	100	10613.21	(27/2$^-$)	D
12614.84	(31/2$^-$)	1757.9 *7*	14.1 *8*	10856.18	(27/2$^-$)	
		2530.6 *1*	100 *3*	10084.47	27/2$^{(-)}$	Q
12703.9		4148.1 *8*	100	8555.56	23/2$^{(-)}$	
12804.39	(27/2,29/2)	2190.8 *3*	56 *12*	10613.21	(27/2$^-$)	
		3972.5 *2*	100 *4*	8831.84	(27/2$^+$)	
13044.65	(29/2$^+$)	2607.8 *2*	61 *3*	10436.84	(25/2$^+$)	
		4213.0 *3*	100 *4*	8831.84	(27/2$^+$)	D
		4341.7 *3*	81 *8*	8703.06	(25/2$^+$)	
		5684.9 *4*	83 *4*	7359.16	(25/2)$^+$	
13116.57	(31/2$^-$)	1043.6 *1*	32.3 *16*	12073.15	(29/2$^-$)	D
		2503.1 *1*	100 *4*	10613.21	(27/2$^-$)	Q
13122.7		3038.1 *5*	100	10084.47	27/2$^{(-)}$	
13584.1	(29/2$^+$)	4752.0 *3*	100	8831.84	(27/2$^+$)	D
14405.80	(33/2$^-$)	1289.2 *3*	7.9 *7*	13116.57	(31/2$^-$)	
		1791.2 *1*	100 *4*	12614.84	(31/2$^-$)	D
		2353.2 *3*	26.9 *17*	12053.33	(29/2$^-$)	Q
		2598.0 *1*	48.2 *18*	11807.36	(29/2$^-$)	(Q)
14451.1	(29/2$^+$)	2530.4 *1*	100 *4*	11920.54	(25/2$^+$)	
		2644.5 *5*	38 *9*	11807.36	(29/2$^-$)	
		5620.1 *5*	58 *13*	8831.84	(27/2$^+$)	
14561.2	(31/2$^-$)	2508.0 *3*	61 *19*	12053.33	(29/2$^-$)	
		3205.3 *3*	100 *4*	11355.60	27/2$^{(-)}$	Q
14914.3	(31/2)	6081.0 *3*	100	8831.84	(27/2$^+$)	Q
15910.7	(33/2$^+$)	2866.3 *2*	100 *5*	13044.65	(29/2$^+$)	
		3296.0 *4*	35.2 *20*	12614.84	(31/2$^-$)	
16703.6		3586.9 *5*	100	13116.57	(31/2$^-$)	
16708.4		3124.2 *3*	100	13584.1	(29/2$^+$)	
16711.2		3906.6 *5*	100	12804.39	(27/2,29/2)	

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

E_i(level)	J^π_i	E_γ[†]	I_γ[§]	E_f	J^π_f	Mult.[&@]
17767.4	(35/2)	2852.9 *1*	100	14914.3	(31/2)	(Q)
17921.1	(31/2$^+$)	3469.8 *2*	100	14451.1	(29/2$^+$)	(D)
18196.8	(35/2$^-$)	3635.4 *3*	100	14561.2	(31/2$^-$)	Q
18765.3	(37/2)	997.9 *1*	100	17767.4	(35/2)	D
19208.6	(37/2$^+$)	1440.7 *2*	59 *10*	17767.4	(35/2)	
		3298.8 *3*	100 *5*	15910.7	(33/2$^+$)	

[†] 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.

[‡] γ seen in (p,γ) only.

[§] Weighted average of all available γ-ray data, unless otherwise noted. In some cases unweighted averages are taken when values from two or more reactions are very different, and there does not seem a preference for any one value.

[&] From $\gamma(\theta)$, γ(lin pol) or $\gamma\gamma(\theta)$ data in (p,γ), (α,pγ), (^{16}O,pnγ), (^{19}F,p2nγ), (^{20}Ne,αpγ) and (^{24}Mg,αpγ).

[@] Primarily from (α,pγ), (p,γ), (^{16}O,pnγ), (^{19}F,p2nγ). For δ, weighted average is taken when data from different reactions are available. 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.

[#] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

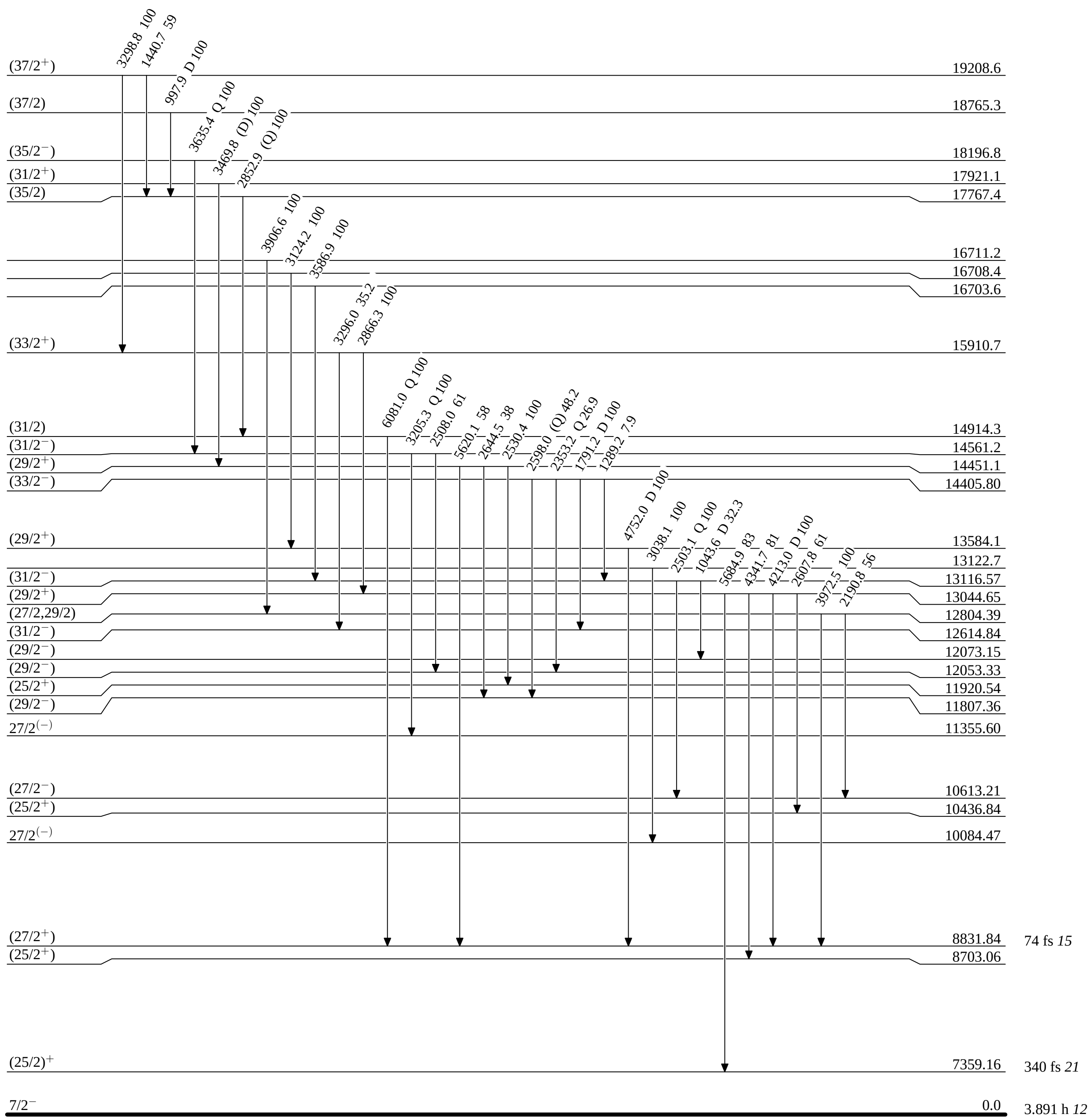
[a] Placement of transition in the level scheme is uncertain.

$^{43}_{21}Sc_{22}$-28

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

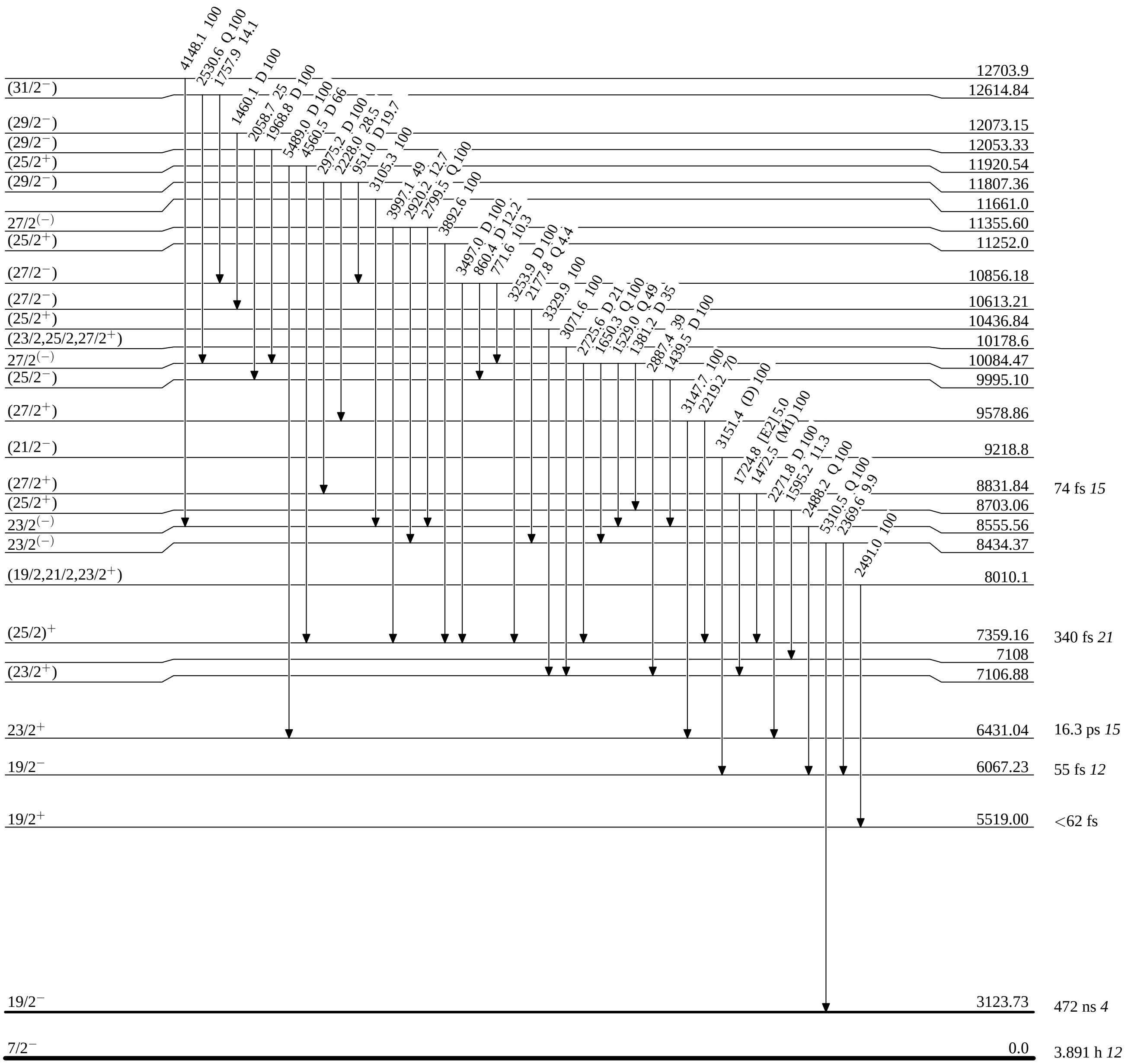


$^{43}_{21}Sc_{22}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

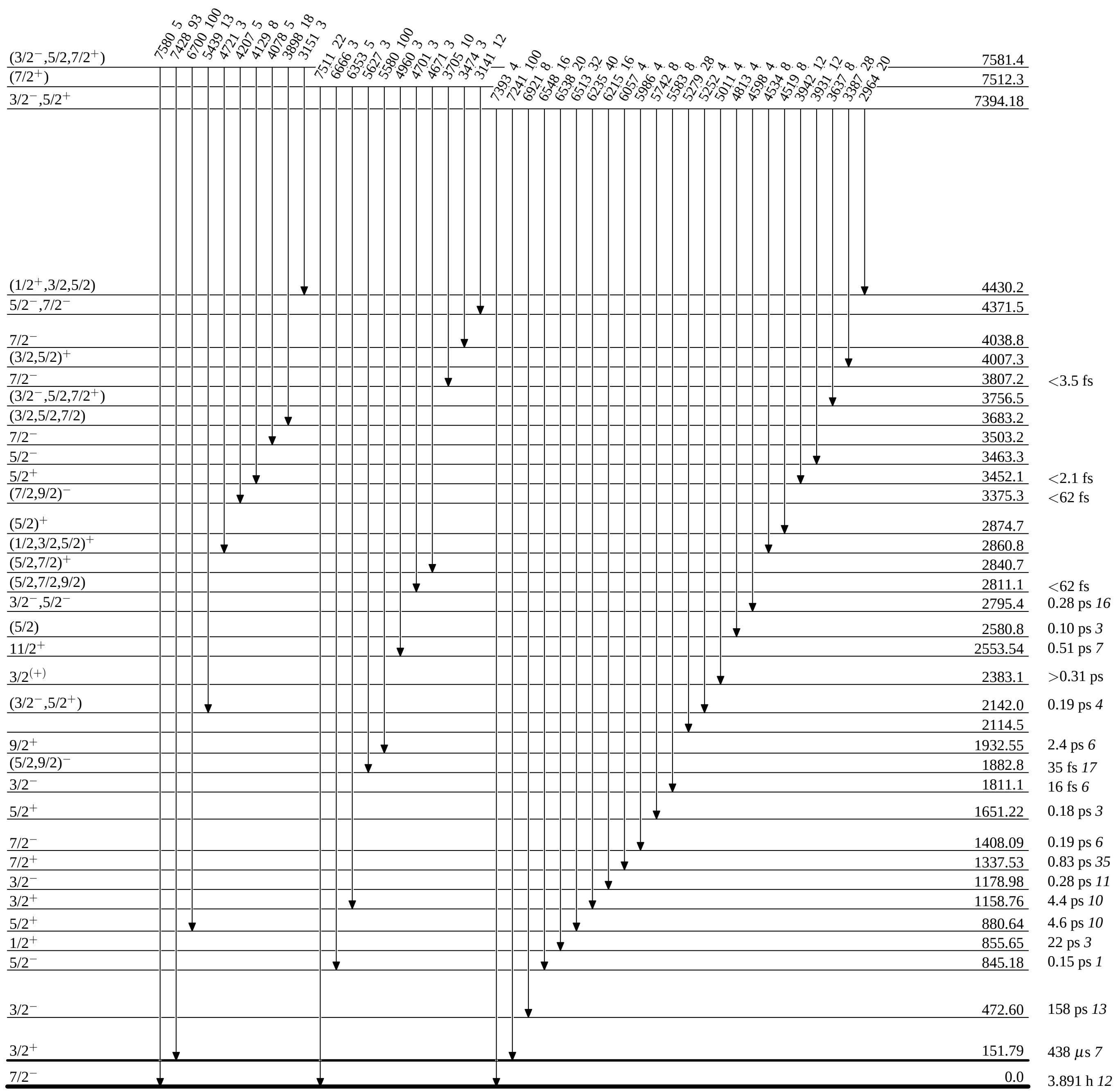


$^{43}_{21}Sc_{22}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

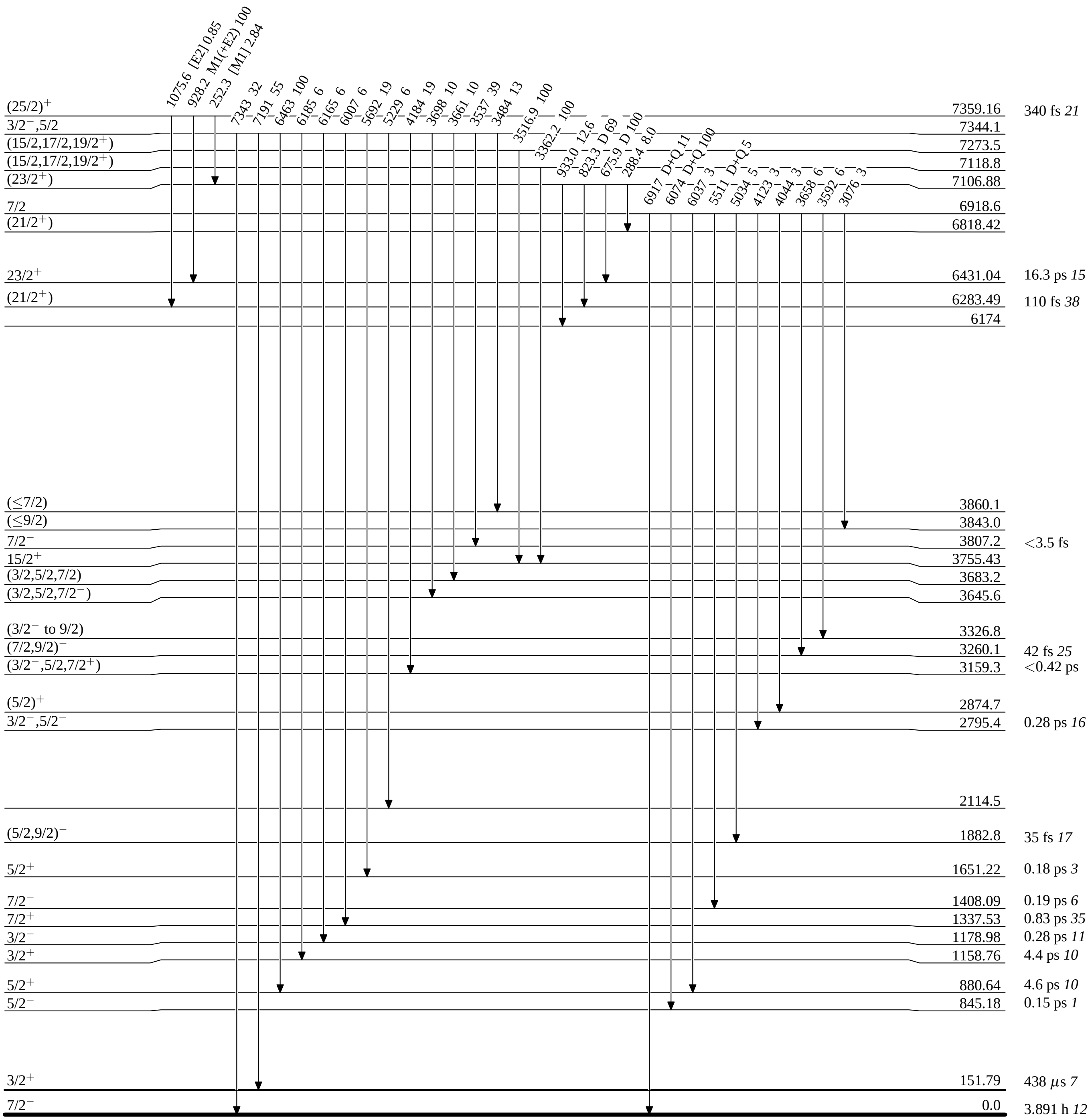


$^{43}_{21}Sc_{22}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

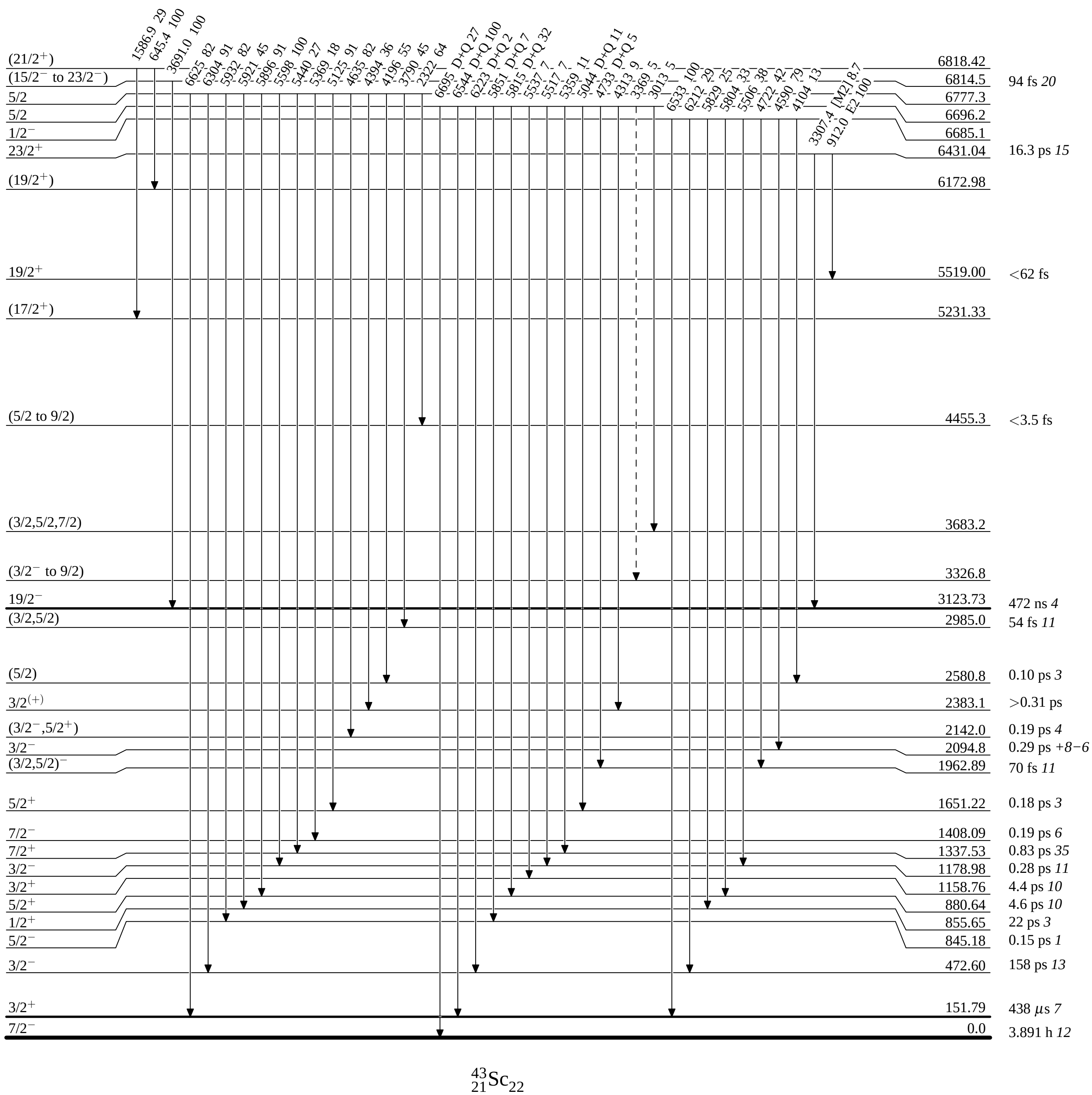


$^{43}_{21}Sc_{22}$

Adopted Levels, Gammas

Level Scheme (continued)

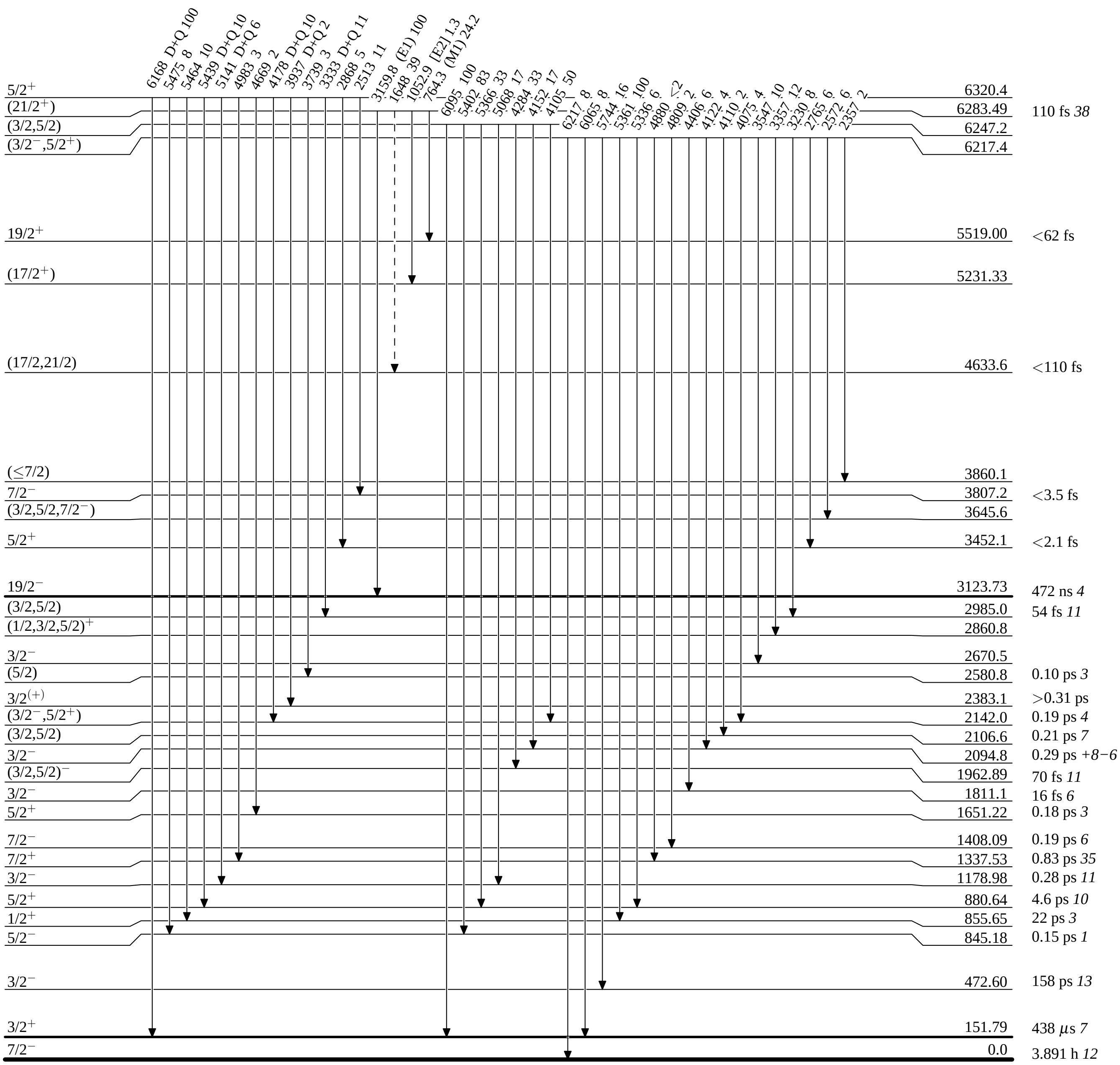
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

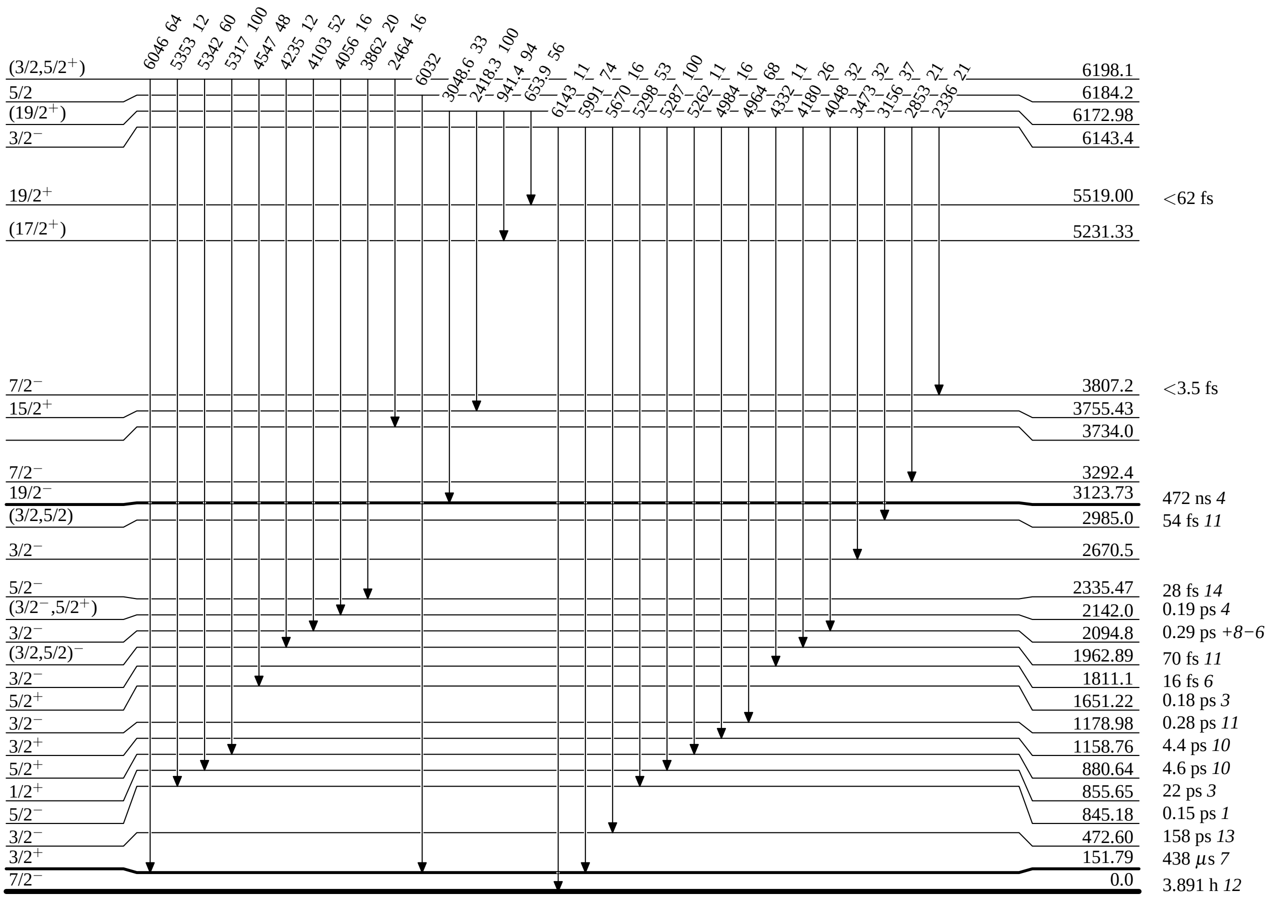


$^{43}_{21}Sc_{22}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

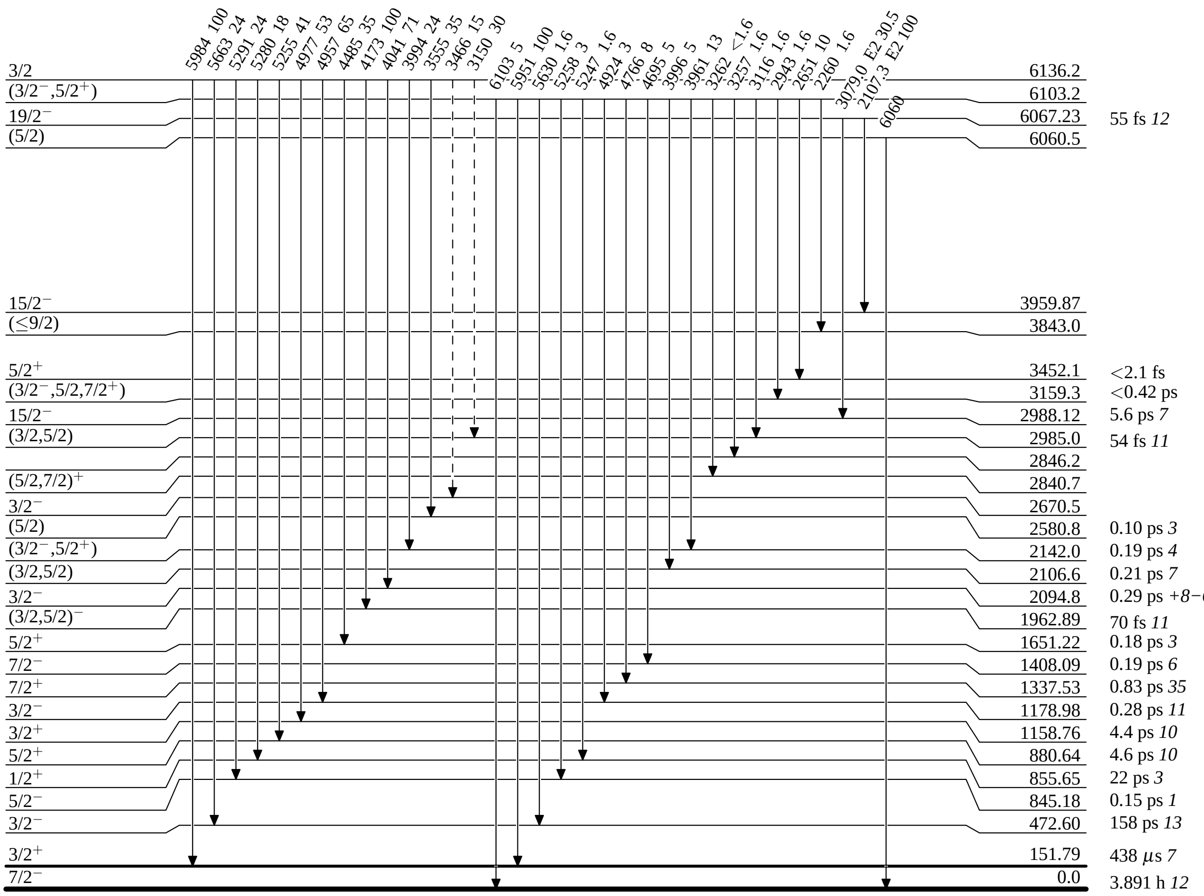


$^{43}_{21}Sc_{22}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

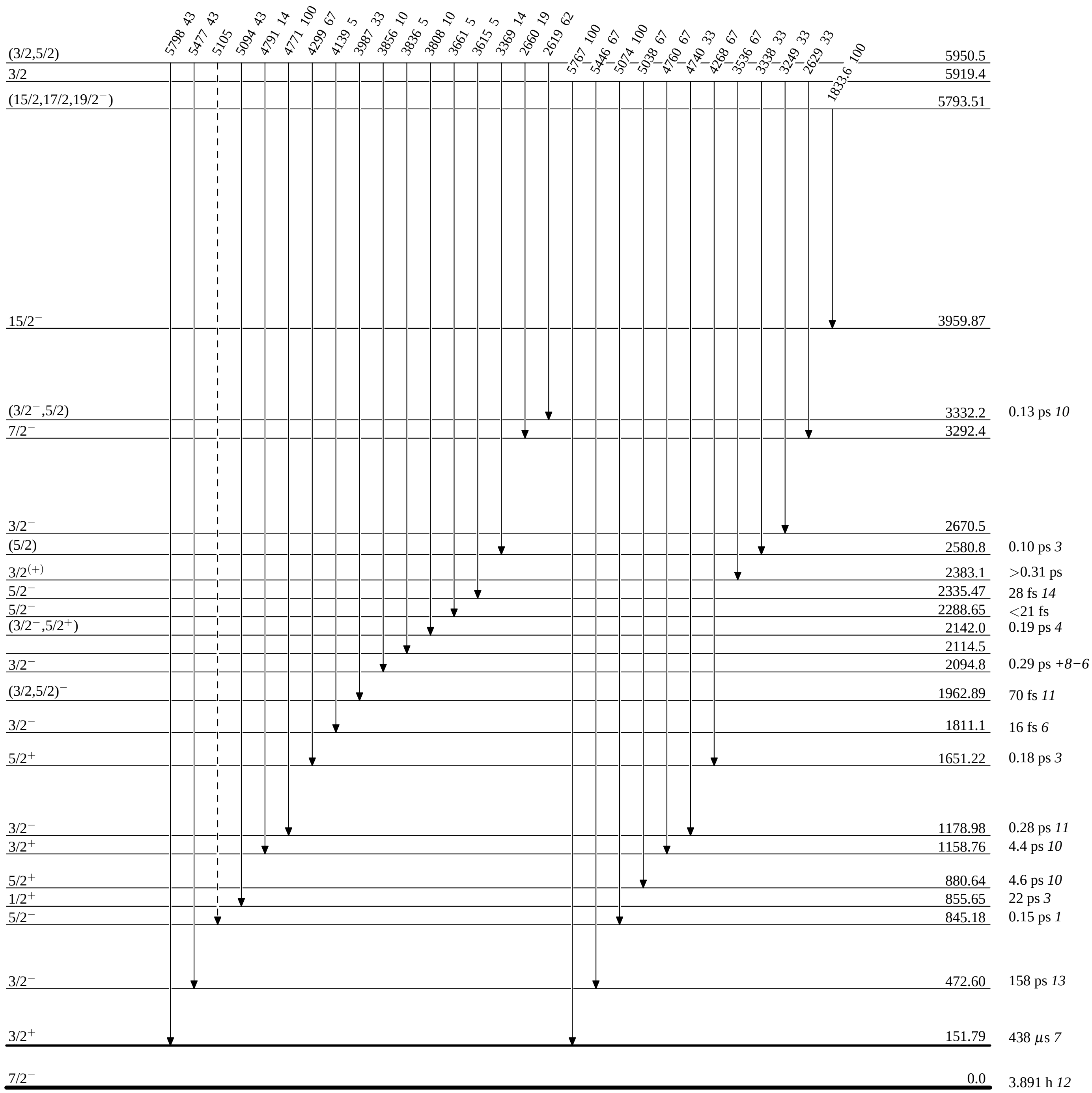


$^{43}_{21}Sc_{22}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

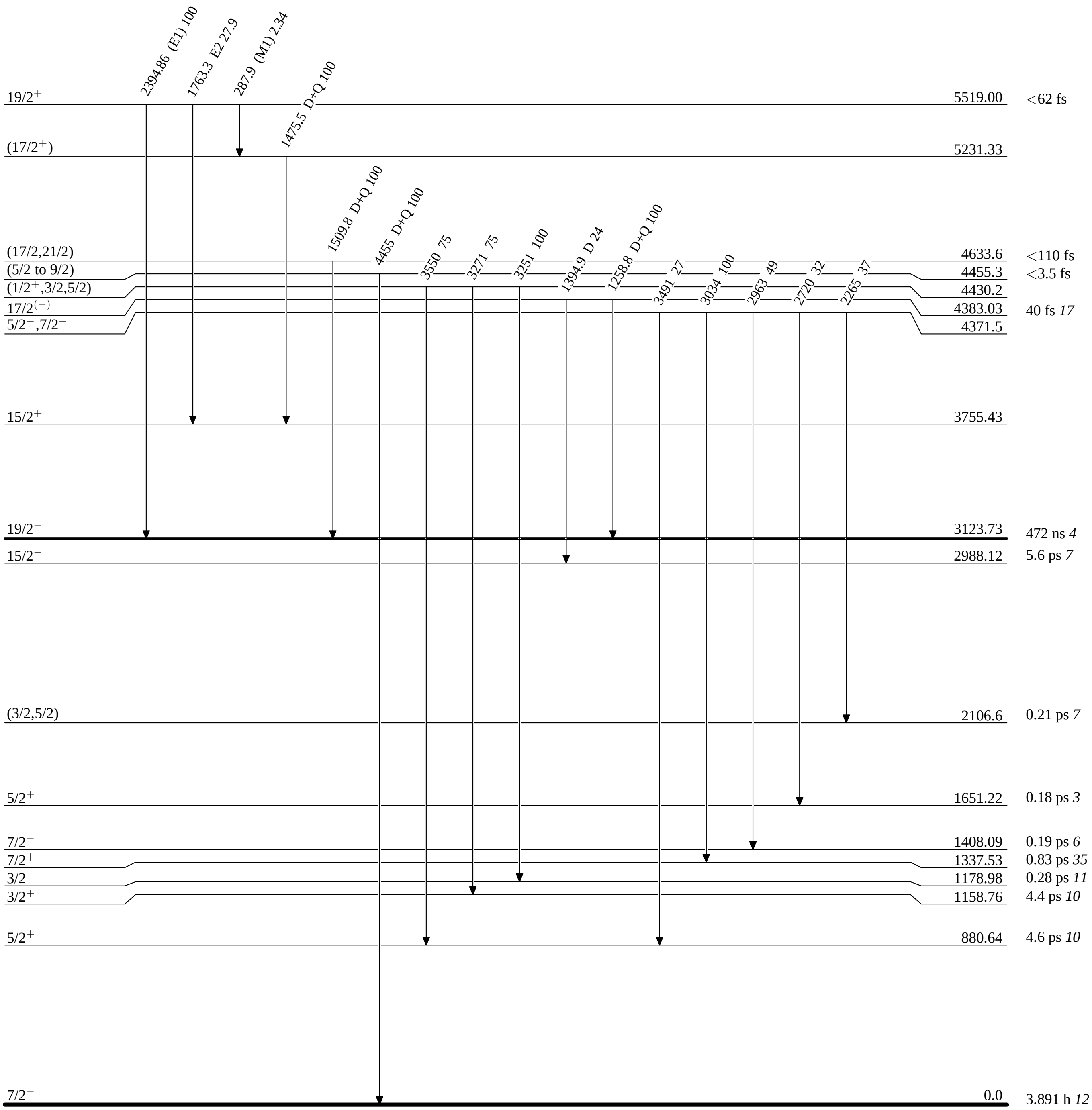


$^{43}_{21}Sc_{22}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

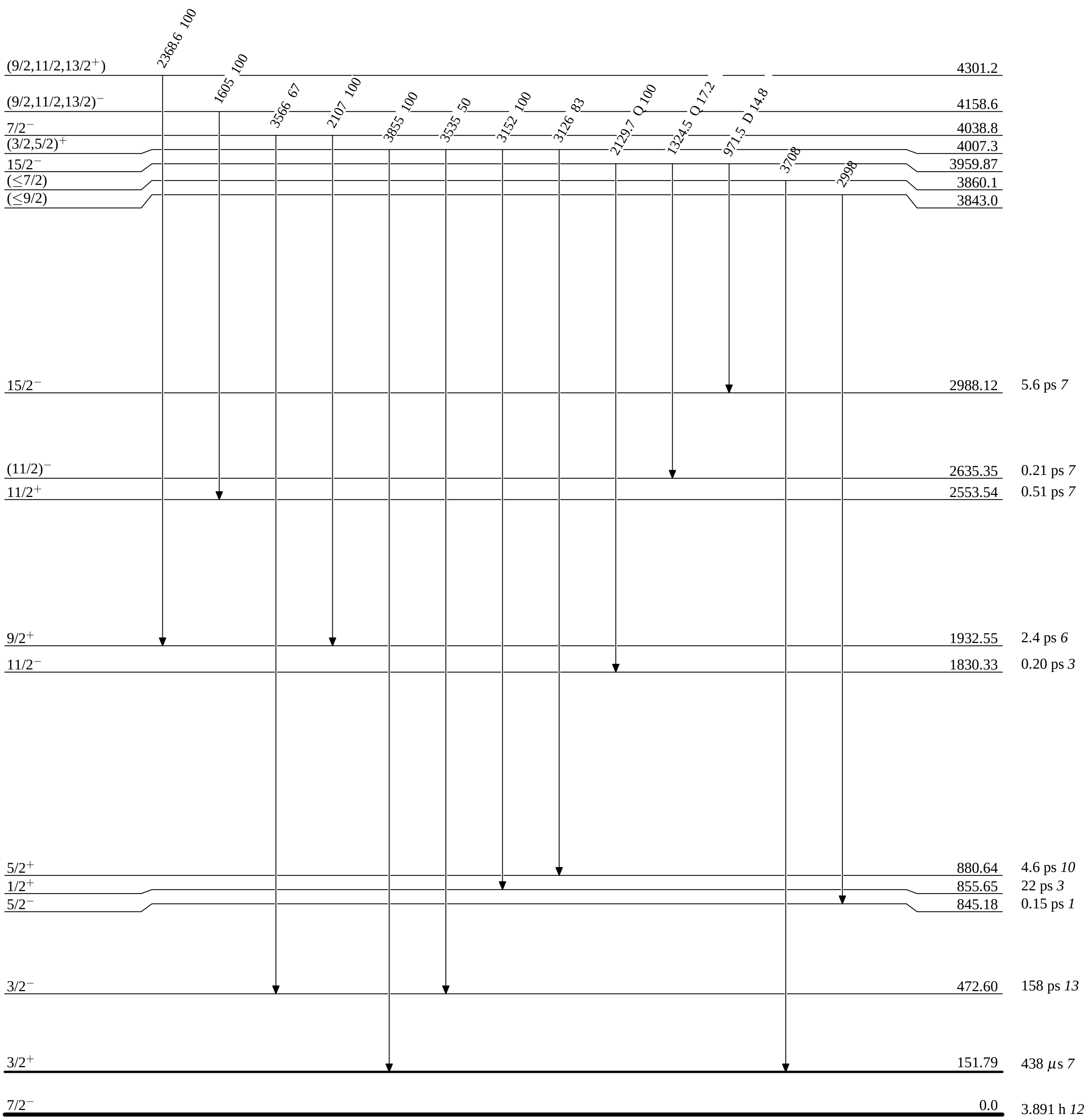


$^{43}_{21}Sc_{22}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

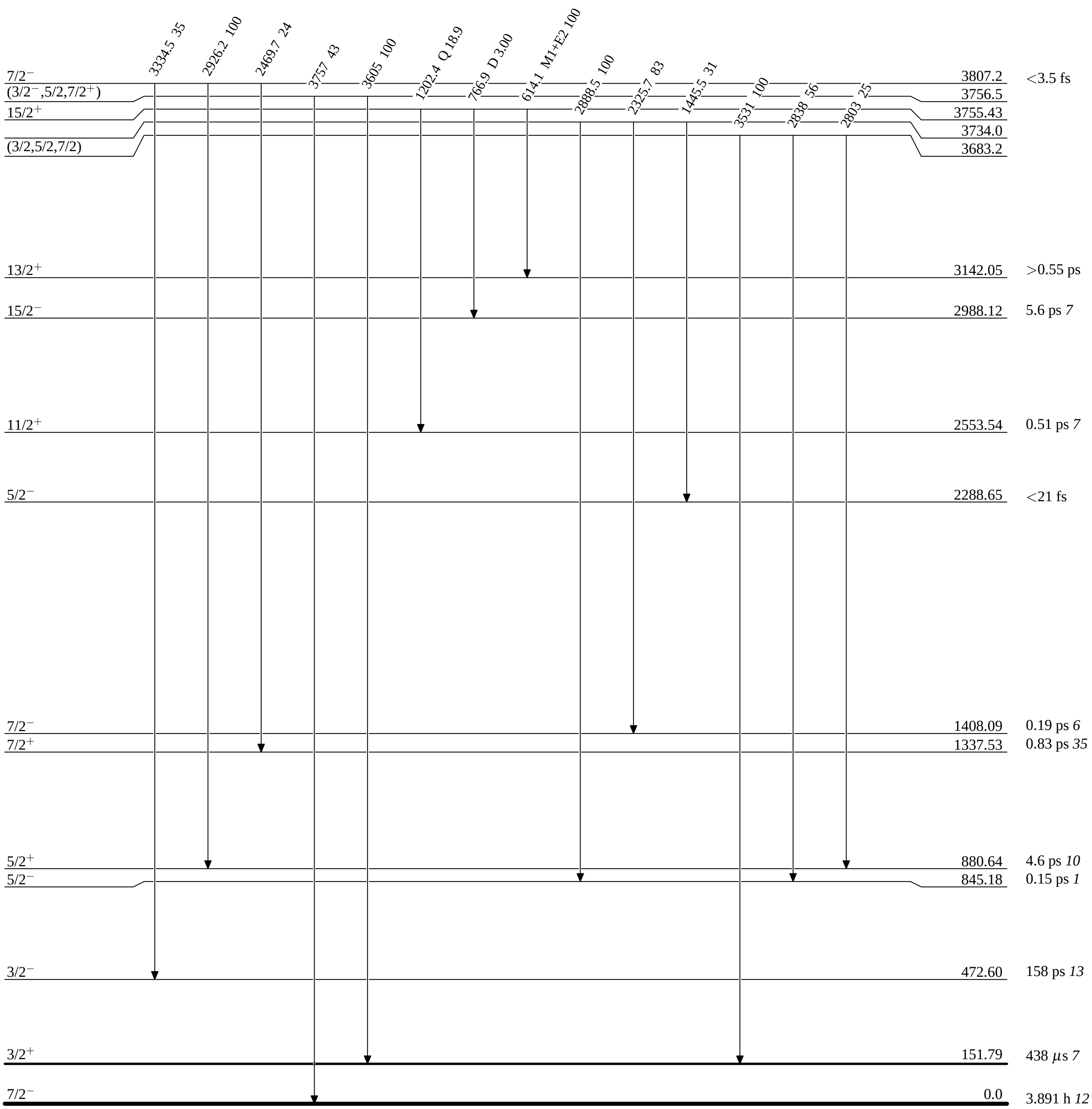


$^{43}_{21}Sc_{22}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

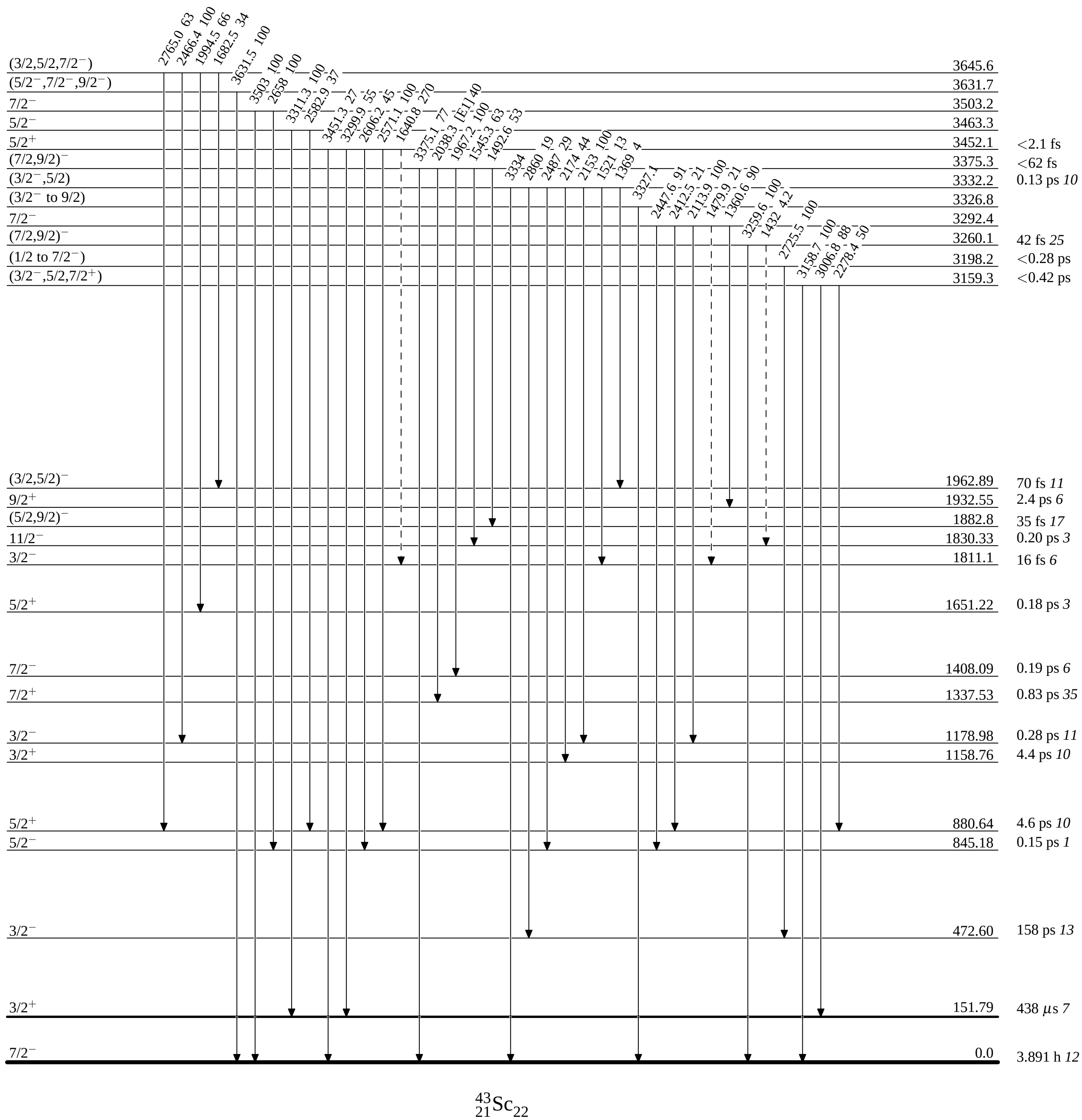


$^{43}_{21}Sc_{22}$

Adopted Levels, Gammas

Level Scheme (continued)

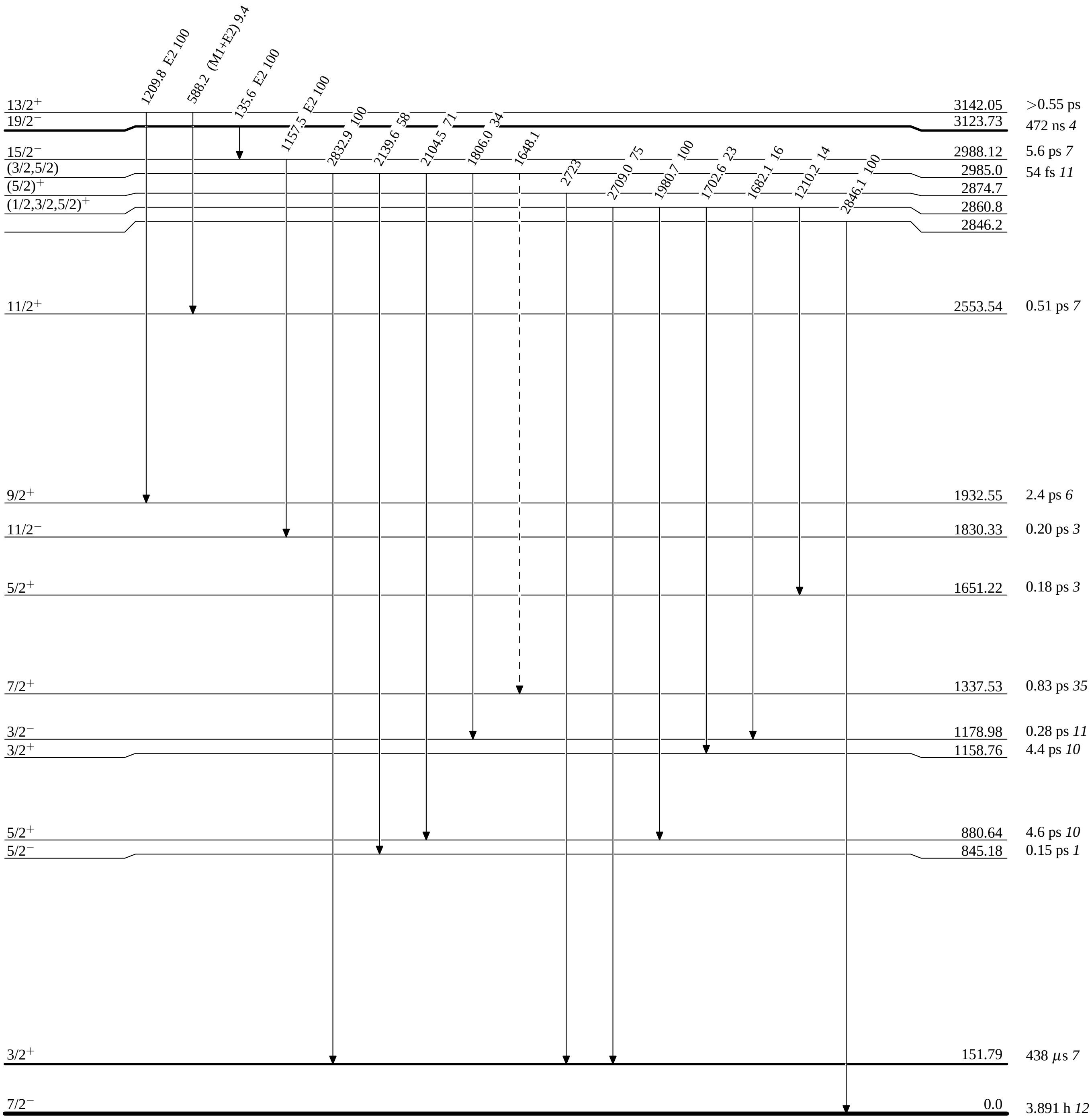
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

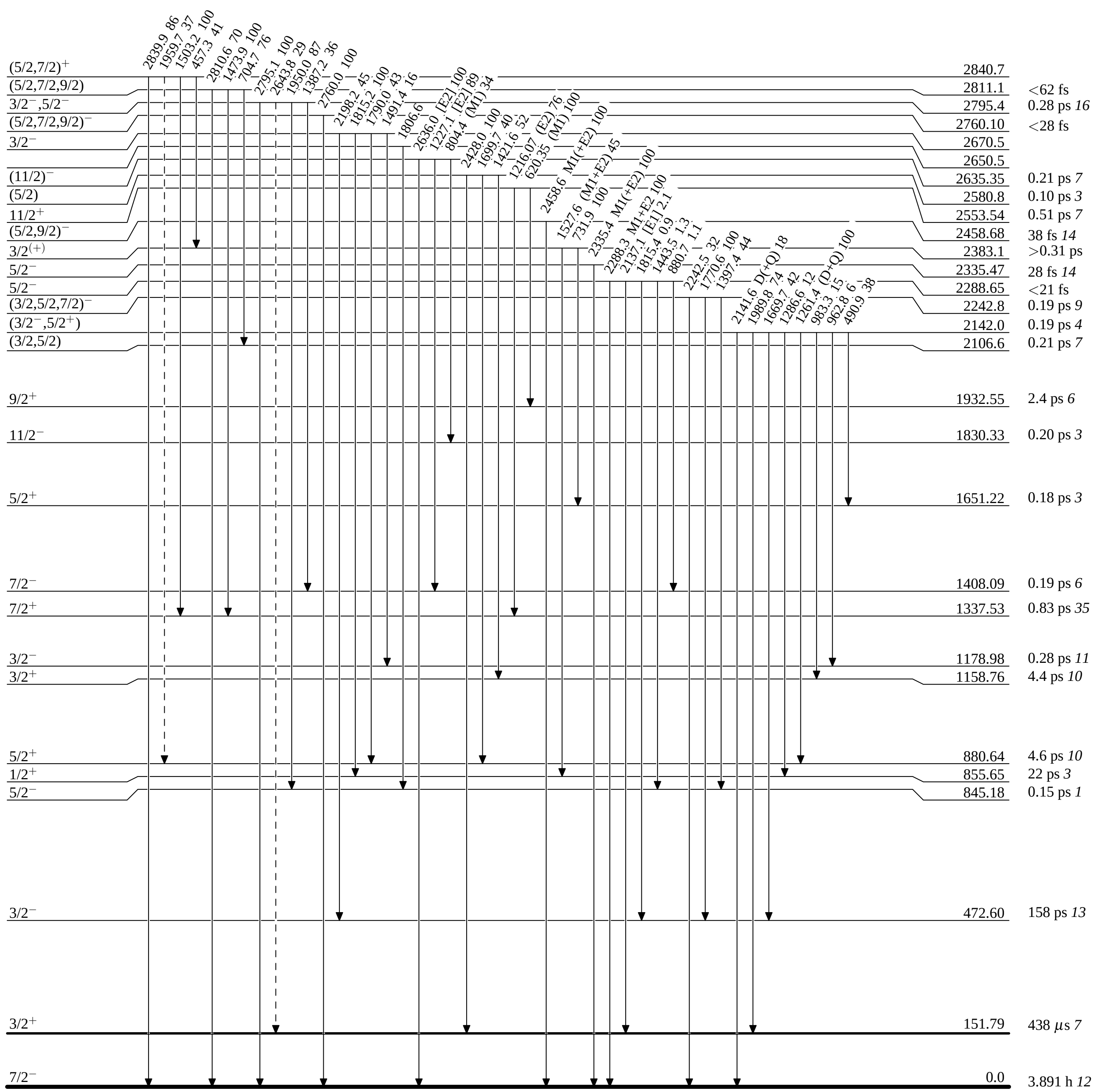


$^{43}_{21}Sc_{22}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

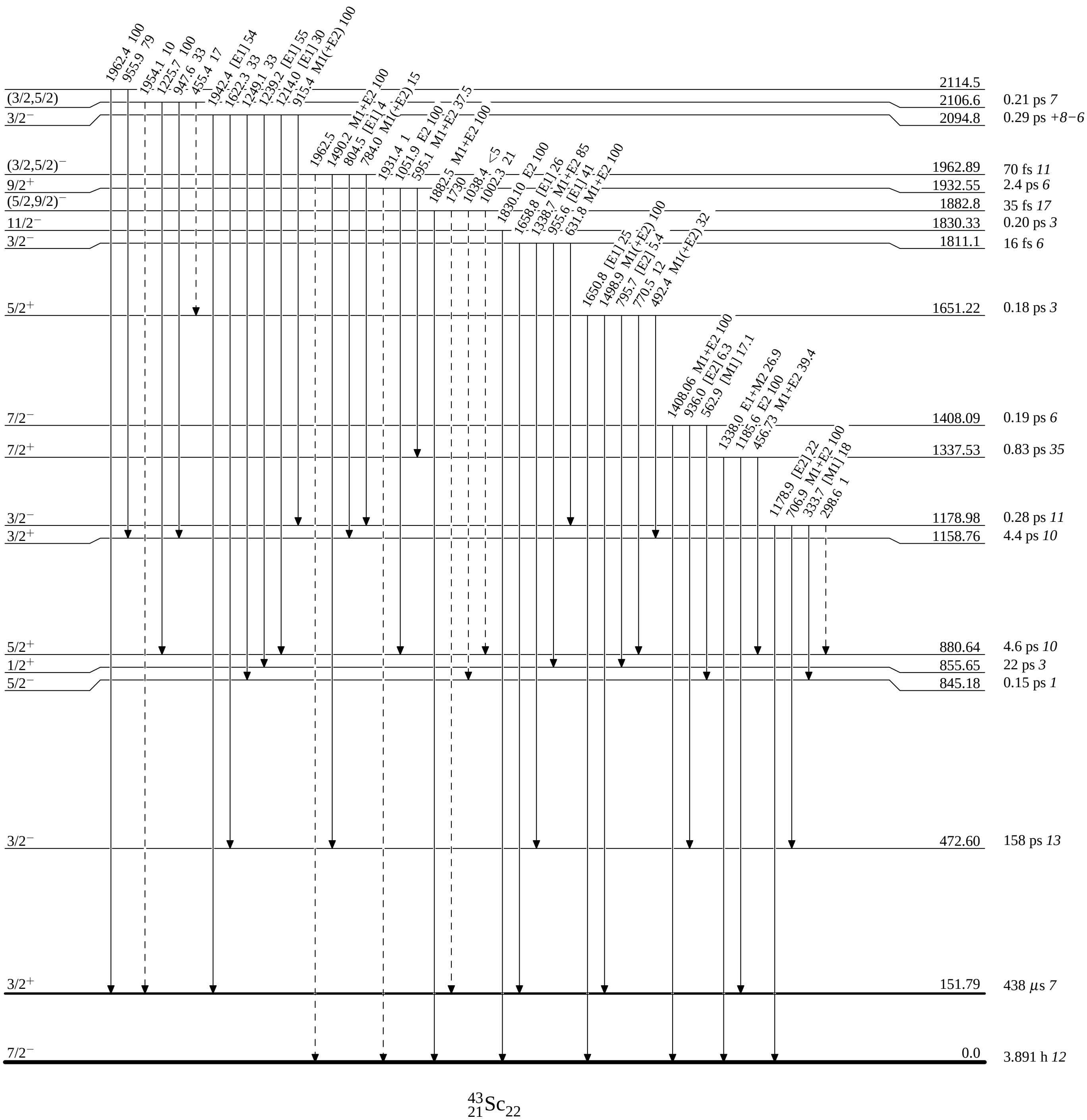


$^{43}_{21}Sc_{22}$

Adopted Levels, Gammas

Level Scheme (continued)

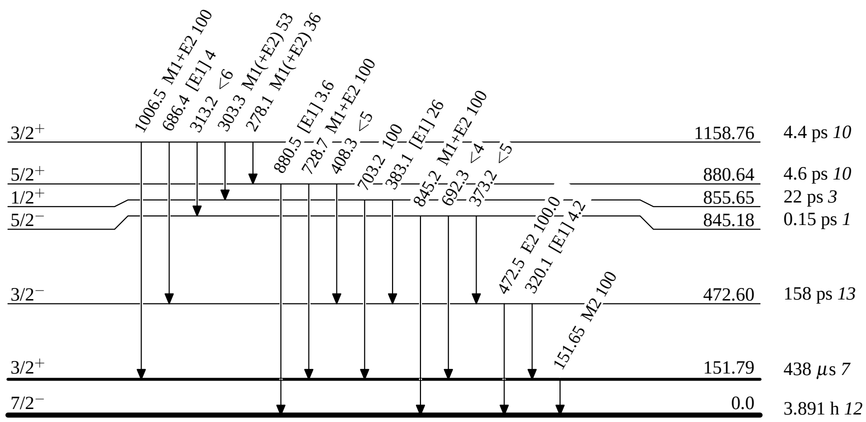
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

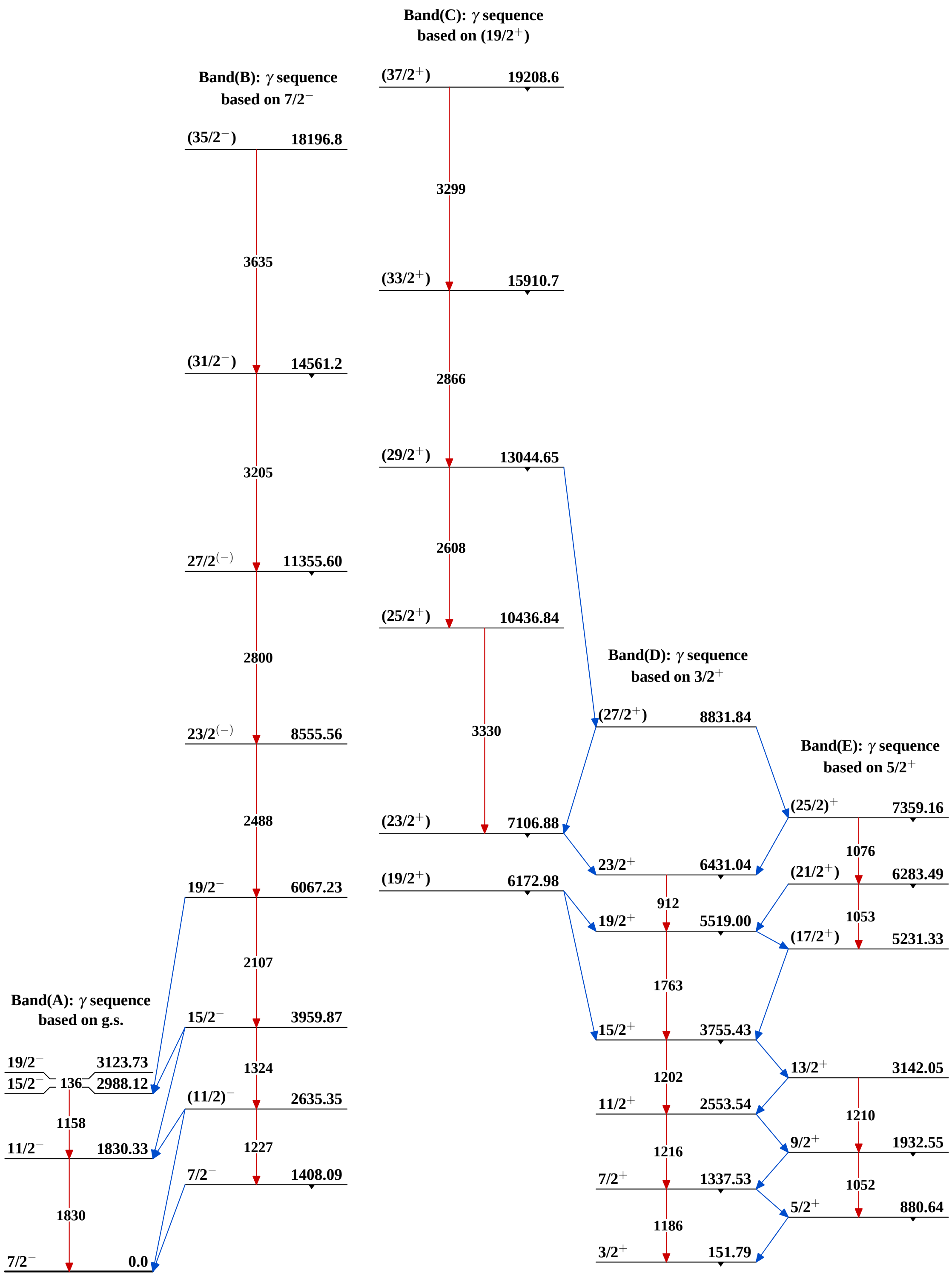
Level Scheme (continued)

Intensities: Relative photon branching from each level



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

Adopted Levels, Gammas



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

^{43}Ti ε decay (509 ms) 1987Ho14

Parent: ^{43}Ti: E=0; J^π=7/2$^-$; $T_{1/2}$=509 ms *5*; Q(ε)=6867 *7*; %ε+%β^+ decay=100.0
^{43}Ti-J^π,$T_{1/2}$: From Adopted Levels of ^{43}Ti.
^{43}Ti-Q(ε): From 2012Wa38.
1987Ho14: ^{43}Ti nuclides were produced by the ^{40}Ca(α,n) reaction with an 18 MeV alpha beam from the α(M)−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)†	J^π‡	Comments
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)$^-$	J^π: log *ft*=6.35 *20* from 7/2$^-$ parent state disfavors 3/2, but the level is weakly populated and this argument is not strong enough to reject 3/2 which is supported by L-transfers in other experiments.
2288.40 *10*	5/2$^-$	
2335.47 *10*	5/2$^-$	
2458.68 *10*	(5/2 to 9/2)$^-$	
2760.10 *10*	(5/2 to 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*.

ε,β^+ radiations

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. Due to the large difference between the Q(β^-)value and the energy of highest populated level, this decay scheme seems incomplete.

E(decay)	E(level)	Iβ^+ †	Iε†	Log *ft*	I(ε+β^+)†
(3235‡ *7*)	3631.7?	0.016 *4*	0.00026 *7*	5.40 *11*	0.016 *4*
(3607 *7*)	3259.7	0.011 *2*	0.00011 *2*	5.86 *8*	0.011 *2*
(4107 *7*)	2760.10	0.20 *3*	0.0012 *2*	4.94 *7*	0.20 *3*
(4408 *7*)	2458.68	0.91 *13*	0.0042 *6*	4.46 *7*	0.91 *13*
(4532 *7*)	2335.47	0.38 *6*	0.0016 *3*	4.91 *7*	0.38 *6*
(4579 *7*)	2288.40	4.6 *7*	0.018 *3*	3.85 *7*	4.6 *7*
(4904 *7*)	1963.0	0.022 *10*	7.×10^{-5} *3*	6.35 *20*	0.022 *10*
(4985 *7*)	1882.5	0.26 *5*	0.00075 *15*	5.32 *9*	0.26 *5*
(5459 *7*)	1408.03	0.67 *10*	0.0014 *2*	5.13 *7*	0.67 *10*
(6022 *7*)	845.17	2.6 *4*	0.0038 *6*	4.78 *7*	2.6 *4*

Continued on next page (footnotes at end of table)

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

ϵ,β^+ radiations (continued)

E(decay)	E(level)	Iβ^+ †	Iε†	Log *ft*	I($\varepsilon+\beta^+$)†	Comments
(6716‡ *7*)	151.25	<0.07	<0.0001	>8.5^{1u}	<0.07	
(6867 *7*)	0	90.2 *14*	0.0826 *16*	3.554 *9*	90.3 *14*	I($\varepsilon+\beta^+$): 100-summed feeding to higher levels.

† Absolute intensity per 100 decays.
‡ Existence of this branch is questionable.

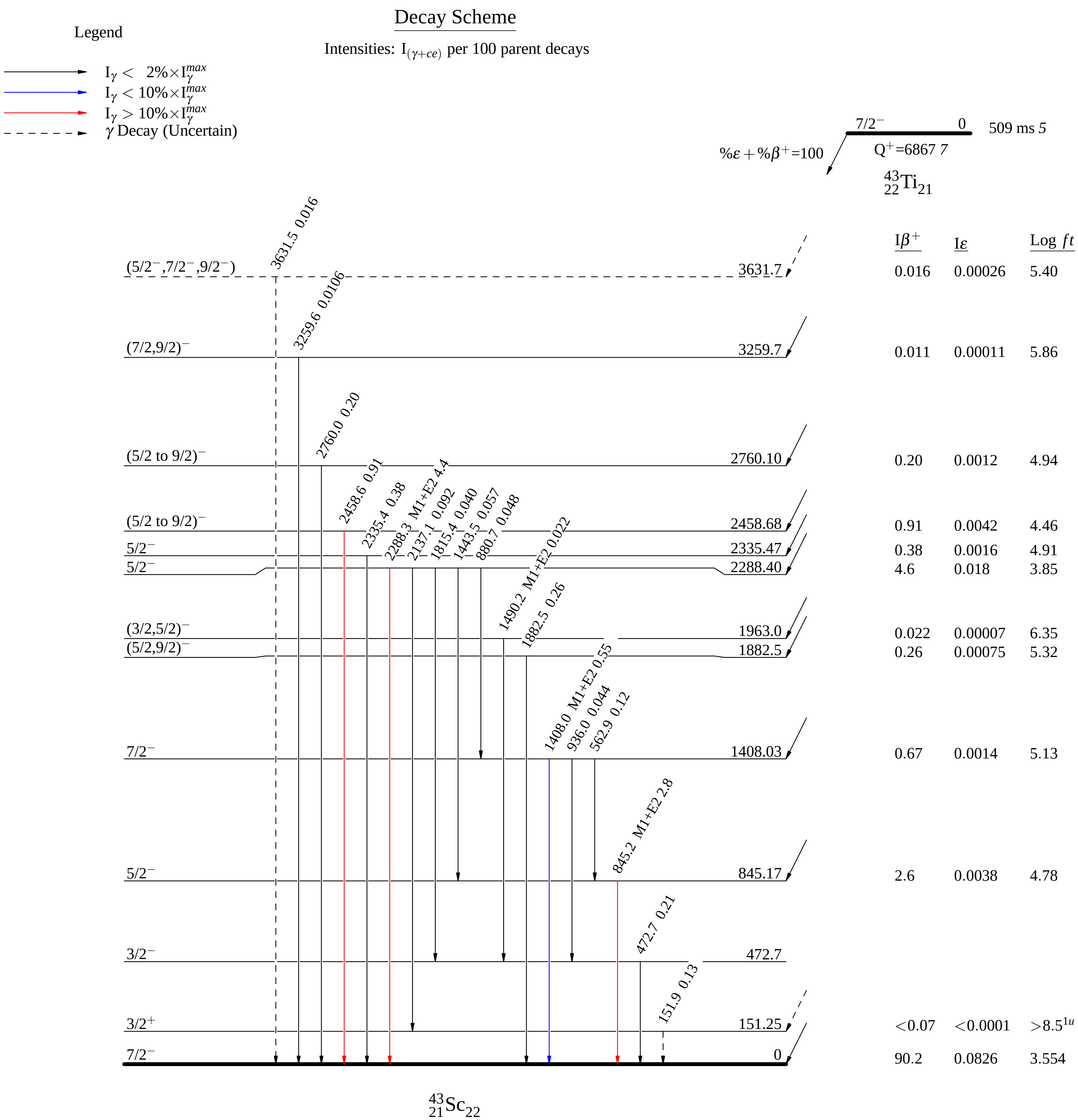
γ(^{43}Sc)

Iγ normalization: Iγ(845γ)(per 100 decays)=2.8 *4*, from comparison of γ-ray yield to the yield of 0.5-s component of $\gamma^{\pm}$ radiation (1987Ho14).

E$_\gamma$	I$_\gamma$§	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.†	δ†
(151.9)	2.9‡ *12*	151.25	3/2$^+$	0	7/2$^-$		
472.7 *4*	4.8 *10*	472.7	3/2$^-$	0	7/2$^-$		
562.9 *2*	2.8 *5*	1408.03	7/2$^-$	845.17	5/2$^-$		
845.2 *1*	62.9 *19*	845.17	5/2$^-$	0	7/2$^-$	M1+E2	+0.15 *4*
880.7 *5*	1.1 *2*	2288.40	5/2$^-$	1408.03	7/2$^-$		
936.0 *8*	1.0 *2*	1408.03	7/2$^-$	472.7	3/2$^-$		
1408.0 *1*	12.6 *4*	1408.03	7/2$^-$	0	7/2$^-$	M1+E2	+0.15 *5*
1443.5 *3*	1.3 *3*	2288.40	5/2$^-$	845.17	5/2$^-$		
1490.2 *2*	0.5 *2*	1963.0	(3/2,5/2)$^-$	472.7	3/2$^-$	M1+E2	+0.21 *6*
1815.4 *4*	0.9 *5*	2288.40	5/2$^-$	472.7	3/2$^-$		
1882.5 *3*	5.9 *8*	1882.5	(5/2,9/2)$^-$	0	7/2$^-$		
2137.1 *1*	2.1 *4*	2288.40	5/2$^-$	151.25	3/2$^+$		
2288.3 *1*	100 *4*	2288.40	5/2$^-$	0	7/2$^-$	M1+E2	+0.08 *5*
2335.4 *1*	8.7 *7*	2335.47	5/2$^-$	0	7/2$^-$		
2458.6 *1*	20.7 *8*	2458.68	(5/2 to 9/2)$^-$	0	7/2$^-$		
2760.0 *1*	4.5 *3*	2760.10	(5/2 to 9/2)$^-$	0	7/2$^-$		
3259.6 *10*	0.24 *4*	3259.7	(7/2,9/2)$^-$	0	7/2$^-$		
3631.5& *10*	0.36 *6*	3631.7?	(5/2$^-$,7/2$^-$,9/2$^-$)	0	7/2$^-$		

† Multipolarities and mixing ratios from Adopted Gammas.
‡ Estimated (evaluators) from log $f^{1u}t$>8.5 and Iγ(2137γ).
§ For absolute intensity per 100 decays, multiply by 0.044 *6*.
& Placement of transition in the level scheme is uncertain.

^{43}Ti ε decay (509 ms) 1987Ho14



^{24}Mg(^{24}Mg,αpγ) 2007Ch40

2007Ch40: E=94 MeV beam from Berkeley 88-in cyclotron. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$, $\gamma\gamma(\theta)$(DCO) using Gammasphere with 102 Compton-suppressed HPGe detectors. Particles detected with an array of 95 CsI(T1) detectors with a 65% efficiency for detection of α particles and 50% for protons.

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. These coefficients are listed only with this dataset.

^{43}Sc Levels

E(level)[†]	J$^\pi$[#]	T$_{1/2}$	E(level)[†]	J$^\pi$[#]
0.0[@]	7/2$^-$		9219.2 *4*	(21/2$^-$)
152.25[b] *11*	3/2$^+$	438[‡] μs *7*	9579.35 *18*	(27/2$^+$)
845.42 *20*	5/2$^-$		9995.34 *16*	25/2$^{(-)}$
880.97[c] *10*	5/2$^+$		10084.85 *14*	27/2$^-$
1337.85[b] *9*	7/2$^+$		10179.1 *6*	
1408.38[&] *16*	7/2$^-$		10437.43[a] *22*	(25/2$^+$)
1830.62[@] *9*	11/2$^-$		10613.82 *17*	(27/2$^-$)
1932.83[c] *10*	9/2$^+$		10856.86 *16*	(27/2$^-$)
2554.07[b] *10*	11/2$^+$		11252.6 *10*	25/2$^+$
2635.72[&] *12*	11/2$^-$		11355.67[&] *22*	27/2$^-$
2988.74[@] *11*	15/2$^-$		11661.3 *5*	
3124.32[@] *13*	19/2$^-$	470[‡] ns *4*	11807.67 *17*	29/2$^{(-)}$
3142.46[c] *11*	13/2$^+$		11921.6 *5*	25/2$^{(+)}$
3293.5 *5*	7/2$^-$		12053.72 *16*	29/2$^{(-)}$
3756.04[b] *11*	15/2$^+$		12073.76 *18*	(29/2$^-$)
3960.31[&] *11*	15/2$^-$		12615.45 *16*	(31/2)$^-$
4301.5 *5*			12704.2 *10*	
4383.67 *23*	17/2$^{(-)}$		12804.7 *4*	
5232.02[c] *13*	17/2$^+$		13045.3[a] *3*	(29/2$^+$)
5519.53[b] *12*	19/2$^+$		13117.20 *18*	(31/2$^-$)
5793.95 *23*			13123.1 *6*	
6067.70[&] *12*	19/2$^-$		13584.6 *11*	(29/2$^+$)
6173.53[a] *14*	19/2$^+$		14406.61 *17*	(33/2$^-$)
6284.04[c] *14*	21/2$^+$		14452.1 *4*	(29/2$^+$)
6431.60[b] *13*	23/2$^+$		14561.4[&] *3*	31/2$^-$
6818.98 *15*	(21/2$^+$)		14916.7 *5*	31/2
7107.43[a] *13*	23/2$^+$		15911.6[a] *3*	(33/2$^+$)
7118.4 *10*			16704.3 *11*	
7273.1 *10*			16708.9 *11*	
7359.77[c] *14*	25/2$^+$		16711.5 *11*	
8010.6 *4*			17769.8 *5*	(35/2)
8434.56 *17*	23/2$^-$		17922.0 *5*	(31/2$^+$)
8555.89[&] *14*	23/2$^-$		18197.0[&] *11*	35/2$^-$
8703.53 *15*	25/2$^{(+)}$		18767.7 *5*	(37/2)
8832.32[b] *16*	27/2$^+$		19210.5[a] *4*	(37/2$^+$)

† From least-squares fit to Eγ data. 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.

From 2007Ch40 based on multipolarities deduced from $\gamma(\theta)$ and $\gamma\gamma(\theta)$(DCO) data, and band associations.

Continued on next page (footnotes at end of table)

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

^{43}Sc Levels (continued)

[@] Band(A): γ sequence based on g.s.
[&] Band(B): γ sequence based on 7/2$^-$.
[a] Band(C): γ sequence based on 19/2$^+$.
[b] Band(D): γ sequence based on 3/2$^+$.
[c] Band(E): γ sequence based on 5/2$^+$.

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_γ[†]	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	Comments
135.5 *1*	1.73 *8*	3124.32	19/2$^-$	2988.74	15/2$^-$		
252.3 *1*	2.04 *9*	7359.77	25/2$^+$	7107.43	23/2$^+$		
287.9[§] *1*	1.81 *7*	5519.53	19/2$^+$	5232.02	17/2$^+$	D	A_2=−0.43 *12*; A_4=+0.09 *17*
288.4 *1*	0.60 *5*	7107.43	23/2$^+$	6818.98	(21/2$^+$)		
456.7 *1*	3.72 *16*	1337.85	7/2$^+$	880.97	5/2$^+$		
562.9 *2*	0.45 *6*	1408.38	7/2$^-$	845.42	5/2$^-$		
588.2 *1*	3.02 *11*	3142.46	13/2$^+$	2554.07	11/2$^+$		
595.1 *1*	10.8 *3*	1932.83	9/2$^+$	1337.85	7/2$^+$		
613.5 *1*	32.4 *10*	3756.04	15/2$^+$	3142.46	13/2$^+$	D	A_2=−0.42 *8*; A_4=+0.06 *10*
621.3 *1*	5.94 *21*	2554.07	11/2$^+$	1932.83	9/2$^+$	D	A_2=−0.43 *8*; A_4=−0.01 *10*
645.4 *1*	2.19 *11*	6818.98	(21/2$^+$)	6173.53	19/2$^+$		
653.9 *2*	1.08 *9*	6173.53	19/2$^+$	5519.53	19/2$^+$		
675.9 *1*	7.3 *3*	7107.43	23/2$^+$	6431.60	23/2$^+$	D	DCO=1.06 *4*; A_2=+0.54 *7*; A_4=+0.21 *10*
728.7 *1*	49.1 *16*	880.97	5/2$^+$	152.25	3/2$^+$	D	A_2=−0.35 *5*; A_4=+0.13 *6*
764.3 *1*	2.23 *15*	6284.04	21/2$^+$	5519.53	19/2$^+$	D	DCO=0.70 *23*
766.9 *2*	0.91 *7*	3756.04	15/2$^+$	2988.74	15/2$^-$	D	DCO=0.73 *12*
771.6 *4*	0.42 *9*	10856.86	(27/2$^-$)	10084.85	27/2$^-$		
804.4 *3*	0.76 *10*	2635.72	11/2$^-$	1830.62	11/2$^-$	D	DCO=0.49 *14*
823.3 *1*	4.86 *20*	7107.43	23/2$^+$	6284.04	21/2$^+$	D	DCO=0.60 *15*
845.3 *3*	0.48 *7*	845.42	5/2$^-$	0.0	7/2$^-$		
860.4[&] *2*	0.64 *6*	10856.86	(27/2$^-$)	9995.34	25/2$^{(-)}$	D	DCO=0.43 *10*
880.5 *2*	1.95 *12*	880.97	5/2$^+$	0.0	7/2$^-$		
912.0 *1*	100 *3*	6431.60	23/2$^+$	5519.53	19/2$^+$	Q	DCO=1.01 *2*; A_2=+0.37 *3*; A_4=+0.03 *4*
928.2 *1*	76.2 *24*	7359.77	25/2$^+$	6431.60	23/2$^+$	D	DCO=0.68 *1*; A_2=−0.18 *3*; A_4=+0.10 *4*
933.0 *5*	0.90 *11*	7107.43	23/2$^+$	6173.53	19/2$^+$		
941.4 *1*	1.82 *8*	6173.53	19/2$^+$	5232.02	17/2$^+$		
951.0 *3*	1.20 *8*	11807.67	29/2$^{(-)}$	10856.86	(27/2$^-$)	D	DCO=0.70 *11*
971.5 *1*	2.28 *10*	3960.31	15/2$^-$	2988.74	15/2$^-$	D	DCO=1.01 *18*
997.9 *1*	0.65 *4*	18767.7	(37/2)	17769.8	(35/2)	D	DCO=0.65 *17*
1043.6 *1*	0.95 *17*	13117.20	(31/2$^-$)	12073.76	(29/2$^-$)	D	DCO=0.64 *15*
1051.9 *1*	29.4 *9*	1932.83	9/2$^+$	880.97	5/2$^+$	Q	A_2=+0.25 *5*; A_4=−0.07 *7*
1052.9 *4*	0.25 *6*	6284.04	21/2$^+$	5232.02	17/2$^+$		
1075.6 *3*	0.56 *8*	7359.77	25/2$^+$	6284.04	21/2$^+$		
1157.5[&] *1*	15.2 *5*	2988.74	15/2$^-$	1830.62	11/2$^-$	Q	DCO=1.05 *5*; A_2=+0.38 *6*; A_4=−0.02 *8*
1185.6 *1*	9.1 *4*	1337.85	7/2$^+$	152.25	3/2$^+$	Q	A_2=+0.41 *5*; A_4=−0.08 *7*
1202.1 *1*	6.32 *22*	3756.04	15/2$^+$	2554.07	11/2$^+$		
1209.7 *1*	31.0 *10*	3142.46	13/2$^+$	1932.83	9/2$^+$	Q	A_2=+0.27 *3*; A_4=+0.08 *5*

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

γ(^{43}Sc) (continued)

E_γ †	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.‡	Comments
1216.1 *1*	4.60 *20*	2554.07	11/2+	1337.85	7/2+		
1227.1 *3*	1.90 *25*	2635.72	11/2−	1408.38	7/2−		
1289.2 *3*	0.44 *7*	14406.61	(33/2−)	13117.20	(31/2−)		
1324.5 *1*	2.52 *13*	3960.31	15/2−	2635.72	11/2−	Q	DCO=0.96 *10*
1338.0 *1*	2.41 *13*	1337.85	7/2+	0.0	7/2−	D	DCO=1.03 *11*
1360.6 *4*	0.52 *10*	3293.5	7/2−	1932.83	9/2+		
1381.2 *1*	3.37 *14*	10084.85	27/2−	8703.53	25/2(+)	D	DCO=0.47 *3*
1394.9 *2*	1.43 *11*	4383.67	17/2(−)	2988.74	15/2−	D	DCO=0.54 *5*
1408.3 *2*	2.1 *5*	1408.38	7/2−	0.0	7/2−	D	DCO=1.19 *23*
1439.5 *1*	2.02 *11*	9995.34	25/2(−)	8555.89	23/2−	D	DCO=0.66 *4*
1440.7 *2*	0.75 *4*	19210.5	(37/2+)	17769.8	(35/2)		
1460.1 *1*	2.26 *14*	12073.76	(29/2−)	10613.82	(27/2−)	D#	DCO=1.05 *15*
1472.5 *1*	36.1 *11*	8832.32	27/2+	7359.77	25/2+	D	DCO=0.73 *3*; A_2=−0.15 *3*; A_4=+0.10 *4*
1476.0 *1*	5.54 *21*	5232.02	17/2+	3756.04	15/2+		
1529.0 *1*	4.57 *18*	10084.85	27/2−	8555.89	23/2−	Q	DCO=1.19 *8*
1586.9 *3*	0.64 *6*	6818.98	(21/2+)	5232.02	17/2+		
1595.2§ *3*	0.95 *9*	8703.53	25/2(+)	7107.43	23/2+		
1650.3 *1*	8.3 *3*	10084.85	27/2−	8434.56	23/2−	Q	DCO=0.94 *7*; A_2=+0.33 *6*; A_4=+0.06 *8*
1724.8 *2*	1.47 *11*	8832.32	27/2+	7107.43	23/2+		
1757.9 *7*	1.62 *11*	12615.45	(31/2)−	10856.86	(27/2−)		
1763.3 *1*	23.0 *7*	5519.53	19/2+	3756.04	15/2+	Q	A_2=+0.50 *10*; A_4=−0.04 *10*
1791.2 *1*	4.80 *20*	14406.61	(33/2−)	12615.45	(31/2)−	D	DCO=0.47 *7*; A_2=−0.52 *13*; A_4=−0.17 *18*
1830.5 *1*	37.7 *24*	1830.62	11/2−	0.0	7/2−	Q	DCO=1.04 *3*; A_2=+0.36 *3*; A_4=−0.01 *4*
1833.6 *2*	1.90 *18*	5793.95		3960.31	15/2−		
1968.8 *1*	4.89 *24*	12053.72	29/2(−)	10084.85	27/2−	D	DCO=0.92 *12*; A_2=−0.14 *9*; A_4=+0.06 *12*
2058.7 *2*	1.51 *9*	12053.72	29/2(−)	9995.34	25/2(−)		
2107.3 *1*	15.1 *5*	6067.70	19/2−	3960.31	15/2−	Q	DCO=0.96 *3*; A_2=+0.37 *4*; A_4=−0.08 *6*
2129.7 *1*	14.5 *5*	3960.31	15/2−	1830.62	11/2−	Q	DCO=1.03 *4*; A_2=+0.32 *4*; A_4=−0.14 *5*
2177.8§ *6*	0.32 *6*	10613.82	(27/2−)	8434.56	23/2−	Q@	DCO=1.1 *4*
2190.8 *3*	0.60 *6*	12804.7		10613.82	(27/2−)		
2219.2 *2*	1.28 *11*	9579.35	(27/2+)	7359.77	25/2+		
2228.0 *2*	1.78 *11*	11807.67	29/2(−)	9579.35	(27/2+)		
2271.8 *1*	8.0 *3*	8703.53	25/2(+)	6431.60	23/2+	D	DCO=0.54 *5*; A_2=−0.31 *16*; A_4=−0.22 *21*
2353.2 *3*	1.42 *10*	14406.61	(33/2−)	12053.72	29/2(−)	Q@	DCO=1.0 *4*
2368.6 *5*	0.54 *9*	4301.5		1932.83	9/2+		
2369.6& *4*	1.26 *9*	8434.56	23/2−	6067.70	19/2−		
2394.9 *1*	79.4 *25*	5519.53	19/2+	3124.32	19/2−	D	DCO=1.02 *1*; A_2=+0.40 *1*; A_4=+0.01 *2*
2418.3§ *2*	1.93 *10*	6173.53	19/2+	3756.04	15/2+		
2488.2 *1*	13.3 *4*	8555.89	23/2−	6067.70	19/2−	Q	DCO=1.14 *7*; A_2=+0.15 *5*; A_4=−0.18 *7*
2491.0 *3*	2.17 *18*	8010.6		5519.53	19/2+		
2503.1 *1*	3.00 *14*	13117.20	(31/2−)	10613.82	(27/2−)	Q#	DCO=1.73 *20*
2508.0 *3*	0.71 *9*	14561.4	31/2−	12053.72	29/2(−)		
2530.4 *1*	2.45 *12*	14452.1	(29/2+)	11921.6	25/2(+)		
2530.6 *1*	10.6 *4*	12615.45	(31/2)−	10084.85	27/2−	Q	DCO=1.3 *3*; A_2=+0.18 *6*; A_4=−0.33 *8*
2598.0& *1*	2.33 *11*	14406.61	(33/2−)	11807.67	29/2(−)	(Q)	A_2=+0.41 *24*; A_4=+0.4 *3*
2607.8 *2*	1.11 *6*	13045.3	(29/2+)	10437.43	(25/2+)		
2636.0 *3*	2.3 *4*	2635.72	11/2−	0.0	7/2−		
2644.5 *5*	1.23 *8*	14452.1	(29/2+)	11807.67	29/2(−)		
2725.6§ *2*	2.36 *11*	10084.85	27/2−	7359.77	25/2+	D	DCO=0.68 *14*
2799.5 *2*	2.53 *12*	11355.67	27/2−	8555.89	23/2−	Q	DCO=0.99 *10*
2852.9 *1*	2.57 *11*	17769.8	(35/2)	14916.7	31/2	(Q)	A_2=+0.10 *18*; A_4=−0.4 *3*
2866.3 *2*	2.89 *13*	15911.6	(33/2+)	13045.3	(29/2+)		

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

γ(^{43}Sc) (continued)

E_γ [†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult. [‡]	Comments
2887.4 *6*	1.10 *9*	9995.34	25/2$^{(-)}$	7107.43	23/2$^+$		
2920.2 *10*	0.25 *6*	11355.67	27/2$^-$	8434.56	23/2$^-$		
2975.2 *1*	5.66 *20*	11807.67	29/2$^{(-)}$	8832.32	27/2$^+$	D[@]	DCO=0.71 *5*; A_2=−0.35 *12*; A_4=+0.10 *16*
3038.1 *5*	1.04 *10*	13123.1		10084.85	27/2$^-$		
3048.6 *8*	0.63 *15*	6173.53	19/2$^+$	3124.32	19/2$^-$		
3071.6 *5*	0.57 *8*	10179.1		7107.43	23/2$^+$		
3079.0 *1*	4.76 *18*	6067.70	19/2$^-$	2988.74	15/2$^-$	Q	DCO=1.07 *5*; A_2=+0.16 *6*; A_4=−0.27 *8*
3105.3 *4*	0.58 *5*	11661.3		8555.89	23/2$^-$		
3124.2 *3*	0.64 *5*	16708.9		13584.6	(29/2$^+$)		
3147.7 *2*	2.43 *15*	9579.35	(27/2$^+$)	6431.60	23/2$^+$		
3151.4 *3*	1.62 *9*	9219.2	(21/2$^-$)	6067.70	19/2$^-$	(D)[@]	DCO=1.14 *15*
3159.8 *2*	8.2 *8*	6284.04	21/2$^+$	3124.32	19/2$^-$	D[#]	DCO=0.91 *8*
3205.3 *3*	1.69 *11*	14561.4	31/2$^-$	11355.67	27/2$^-$	Q[@]	DCO=1.11 *16*
3253.9 *1*	8.2 *3*	10613.82	(27/2$^-$)	7359.77	25/2$^+$	D	DCO=0.55 *3*; A_2=−0.15 *4*; A_4=−0.08 *6*
3296.0 *4*	1.01 *7*	15911.6	(33/2$^+$)	12615.45	(31/2)$^-$		
3298.8 *3*	1.09 *7*	19210.5	(37/2$^+$)	15911.6	(33/2$^+$)		
3307.6 *2*	8.5 *3*	6431.60	23/2$^+$	3124.32	19/2$^-$	[M2]	
3329.9 *2*	1.71 *10*	10437.43	(25/2$^+$)	7107.43	23/2$^+$		
3362.2 *10*	0.26 *7*	7118.4		3756.04	15/2$^+$		
3469.8 *2*	1.70 *9*	17922.0	(31/2$^+$)	14452.1	(29/2$^+$)	(D)	DCO=0.77 *10*
3497.0 *1*	4.54 *18*	10856.86	(27/2$^-$)	7359.77	25/2$^+$	D	DCO=0.59 *6*; A_2=−0.04 *6*; A_4=−0.03 *8*
3516.9 *5*	0.48 *5*	7273.1		3756.04	15/2$^+$		
3586.9 *5*	0.54 *6*	16704.3		13117.20	(31/2$^-$)		
3635.4 *3*	0.98 *6*	18197.0	35/2$^-$	14561.4	31/2$^-$	Q[@]	DCO=1.2 *3*
3892.6 *3*	2.67 *13*	11252.6	25/2$^+$	7359.77	25/2$^+$		
3906.6 *5*	0.76 *6*	16711.5		12804.7			
3972.5 *2*	1.37 *7*	12804.7		8832.32	27/2$^+$		
3997.1 *3*	1.34 *8*	11355.67	27/2$^-$	7359.77	25/2$^+$		
4148.1 *8*	0.16 *3*	12704.2		8555.89	23/2$^-$		
4213.0 *3*	1.71 *8*	13045.3	(29/2$^+$)	8832.32	27/2$^+$	D[@]	DCO=0.76 *17*
4341.7 *3*	1.25 *7*	13045.3	(29/2$^+$)	8703.53	25/2$^{(+)}$		
4560.5 *3*	1.76 *8*	11921.6	25/2$^{(+)}$	7359.77	25/2$^+$	D	DCO=1.02 *8*
4752.0 *3*	1.23 *7*	13584.6	(29/2$^+$)	8832.32	27/2$^+$	D[@]	DCO=0.48 *9*; A_2=−0.28 *21*; A_4=+0.2 *3*
5310.5 *1*	10.7 *12*	8434.56	23/2$^-$	3124.32	19/2$^-$	Q[@]	DCO=1.42 *22*; A_2=+0.19 *9*; A_4=−0.08 *12*
5489.0 *3*	2.43 *11*	11921.6	25/2$^{(+)}$	6431.60	23/2$^+$	D	DCO=0.84 *11*
5620.1 *5*	1.82 *8*	14452.1	(29/2$^+$)	8832.32	27/2$^+$		
5684.9 *4*	1.47 *8*	13045.3	(29/2$^+$)	7359.77	25/2$^+$		
6081.0[§] *3*	4.05 *14*	14916.7	31/2	8832.32	27/2$^+$	Q	DCO=1.19 *12*; A_2=+0.44 *5*; A_4=−0.21 *7*

† The quoted uncertainties are statistical only. Above 3.5 MeV (maximum range of calibration curve), systematic uncertainties can be 1-2 keV.

‡ 2007Ch40 assign multipolarities for most of the transitions, many based only on Jπ assignments. The evaluators assign mult=D for ΔJ=0,1 M1 or E1 and Q for ΔJ=2, Q transitions for which supporting angular distribution/correlation data are available. Dipole transitions with expected M1 character may include E2 component.

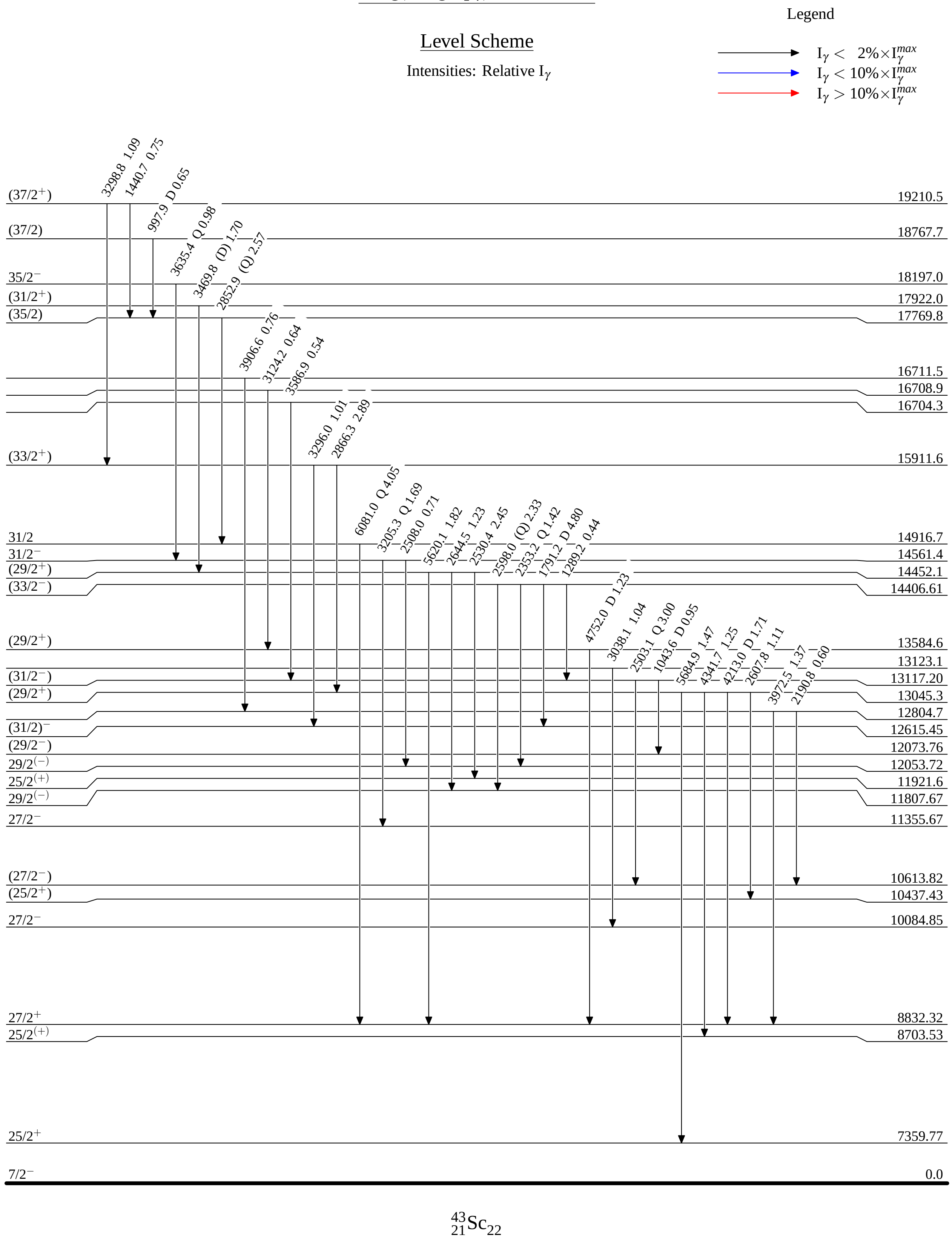
§ Poor fit in the level scheme. The uncertainty is increased by a factor of 2 for fitting purposes.

& Poor fit in the level scheme. The uncertainty is increased by a factor of 3 for fitting purposes.

@ DCO value corresponds to an alternative DCO-like analysis (1989Kr01).

\# DCO value corresponds to gate on ΔJ=1, stretched dipole transition.

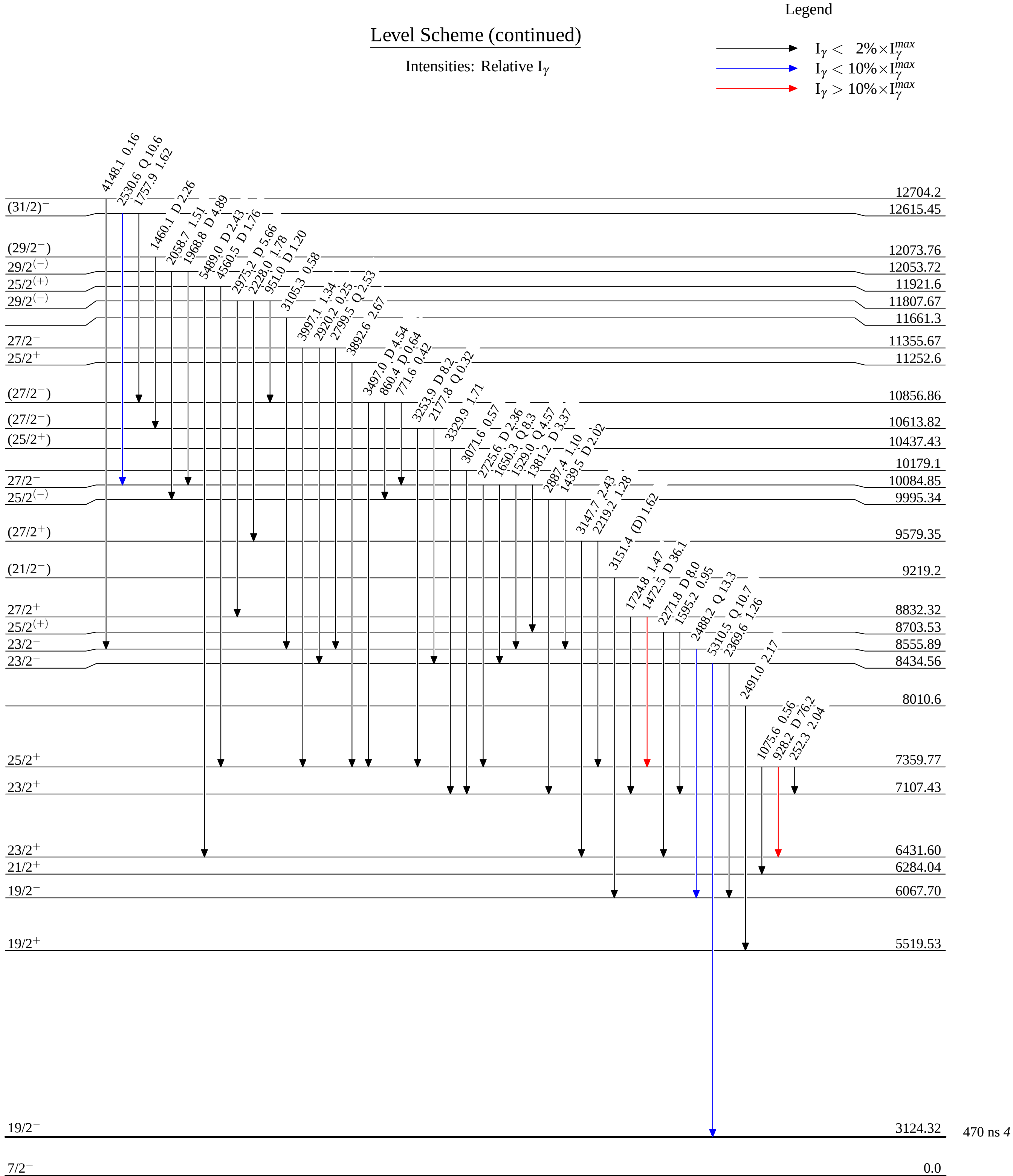
^{24}Mg(^{24}Mg,αpγ) 2007Ch40



^{24}Mg(^{24}Mg,αpγ) 2007Ch40

Level Scheme (continued)

Intensities: Relative I_γ



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

^{24}Mg(^{24}Mg,αpγ) 2007Ch40

Level Scheme (continued)

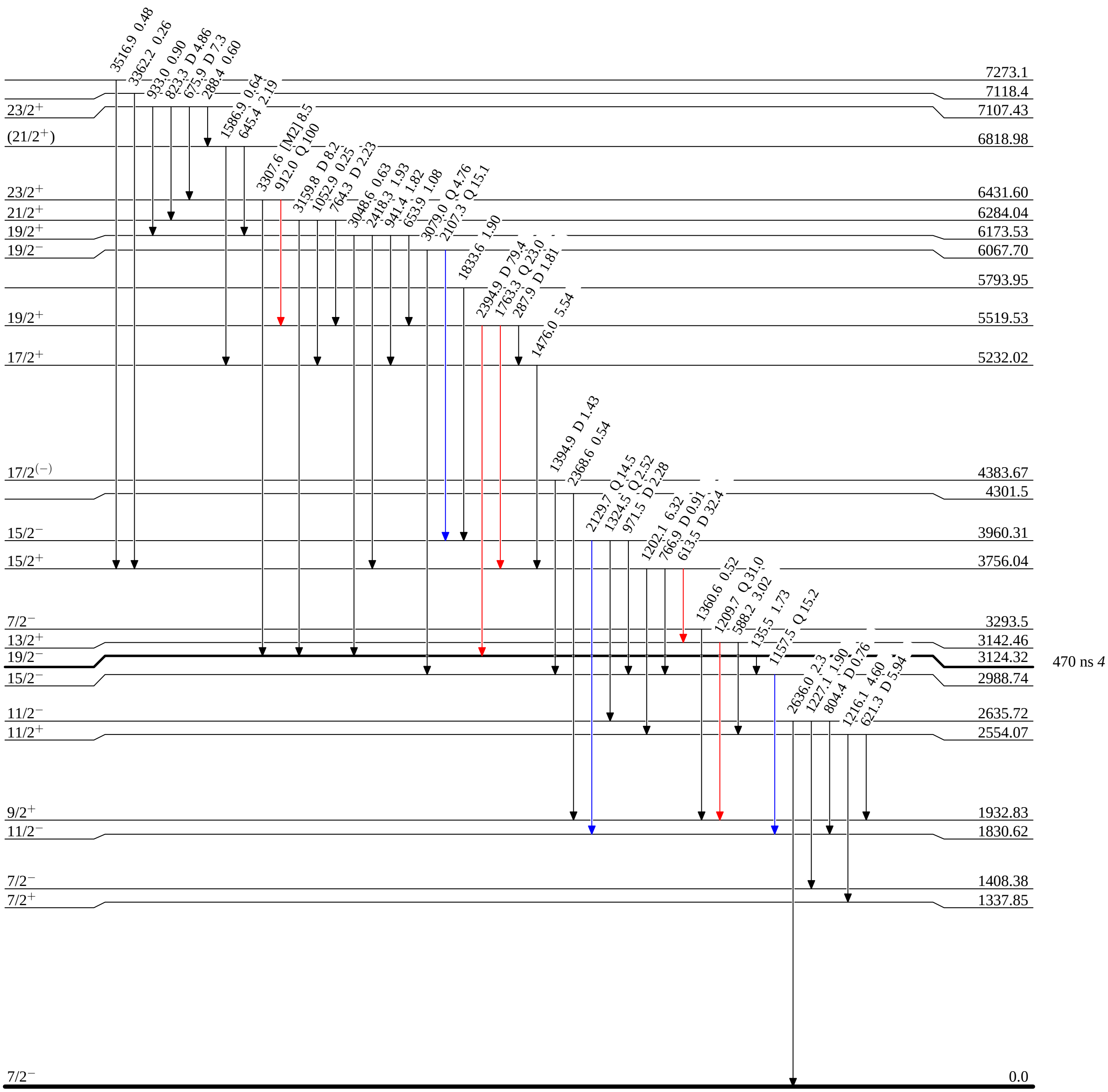
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

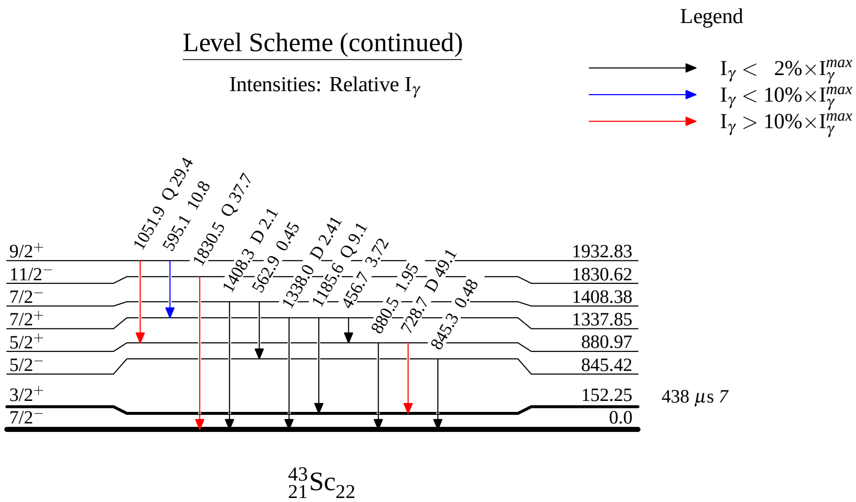


$^{43}_{21}Sc_{22}$

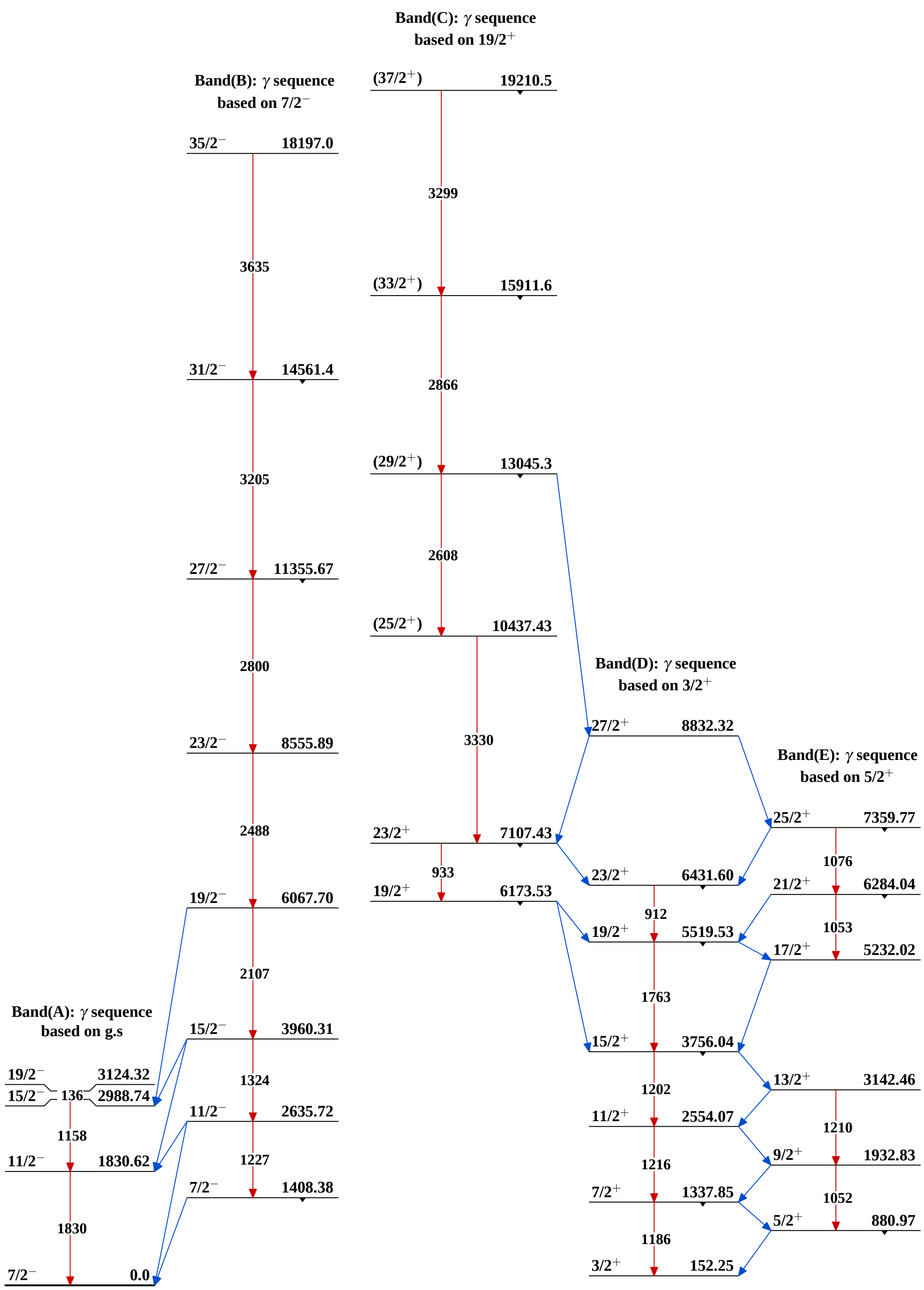
^{24}Mg(^{24}Mg,αpγ) 2007Ch40

Level Scheme (continued)

Intensities: Relative I_γ



$^{24}Mg(^{24}Mg,\alpha p\gamma)$ 2007Ch40



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

^{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 aluminum.

^{43}Sc Levels

E(level)	J^{π}†	$T_{1/2}$
0	7/2⁻	
1830	11/2⁻	
2988	15/2⁻	
3124	19/2⁻	481‡ ns *9*

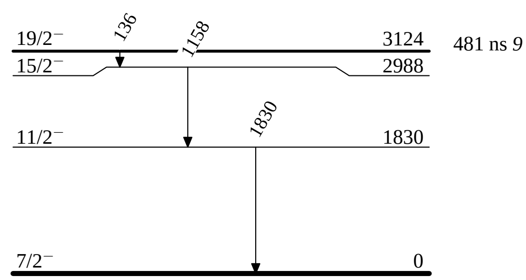
† From Adopted Levels.
‡ From γ(t) (2008Fe02).

γ(^{43}Sc)

E_{γ}	E_i(level)	J^{π}_i	E_f	J^{π}_f
136	3124	19/2⁻	2988	15/2⁻
1158	2988	15/2⁻	1830	11/2⁻
1830	1830	11/2⁻	0	7/2⁻

^{27}Al(^{18}O,2nγ) 2008Fe02

Level Scheme



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

^{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-Compton shields. Measured Eγ, Iγ, γγ, γ(θ). 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, γγ, γ(θ), γ(lin pol). Deduced levels, $T_{1/2}$ by recoil distance method.

1981Da06: E=45.5 MeV. Measured γγ(θ,t), deduced Q of the 19/2$^-$ isomer at 3123.

1994Zh43: E=50.06 MeV. Measured isomer g factor by γ(θ,H,t) method.

^{43}Sc Levels

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

† From least-squares fit to Eγ data.
‡ From γ(θ) and γ(lin pol) of 2004Mo47 and 1976Po03.
\# From Adopted Levels.
@ From DSAM, values are from e-mail reply of Dec 9, 2004 to B. Singh from the first author of 2004Mo47.
& From γ(t) in 1981Da06.
a From Recoil-Distance-Method (RDM) in 1976Po03.
b Band(A): ΔJ=1 sequence.
c Band(B): γ sequence based on g.s..

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

γ(^{43}Sc)

A_2, A_4 and POL values are from 1976Po03. The ADO values are from priv. comm. (Dec. 9, 2004) from 2004Mo47.
ADO=angular distribution ratio (147°/90°), values are from e-mail reply of December 9, 2004 from the first author. Expected values are larger than ≈1.3 for stretched quadrupole and ≈0.6 for stretched dipole transitions.

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&@]	δ[&]	Comments
135.8[‡] *2*	40.6	3123.4	19/2$^-$	2987.5	15/2$^-$	E2		I_γ: 34.3 (1976Po03). ADO=2.18 *17*.
151.68[‡] *17*		151.65	3/2$^+$	0.0	7/2$^-$			
287.7 *5*	2.0	5517.9	(19/2$^+$)	5230.3	(17/2$^+$)	D+Q		ADO=0.83 *16*.
456.78[‡] *12*	19.0	1337.00	7/2$^+$	880.24	5/2$^+$	D+Q		A_2=−0.27 *10* I_γ: 5.29 (1976Po03). ADO=0.80 *6*.
472.50 *20*		472.50	3/2$^-$	0.0	7/2$^-$	E2		A_2=+0.09 *3*; A_4=−0.09 *3* E_γ: only seen in 1976Po03. I_γ: 6.35 (1976Po03). POL=+0.11 *19*.
588.4 *3*	13.0	3140.8	13/2$^+$	2552.6	11/2$^+$	D+Q		ADO=0.30 *13*.
594.6 *5*	86.0[§]	1931.8	9/2$^+$	1337.00	7/2$^+$	M1+E2		A_2=−0.41 *9* POL=−0.19 *12*. ADO=0.46 *4*.
614.75[‡] *25*	18.6	3755.4	15/2$^+$	3140.8	13/2$^+$	M1+E2	−0.11 *8*	A_2=−0.73 *10*; A_4=+0.28 *10* I_γ: 6.35 (1976Po03). POL=−0.23 *15*. ADO=0.47 *6*.
620.8[‡] *3*	9.0	2552.6	11/2$^+$	1931.8	9/2$^+$	D+Q		A_2=−0.51 *15* I_γ: 4.11 (1976Po03). ADO=0.49 *9*.
675.7 *5*	5.0	7105.1	(21/2$^+$,25/2$^+$)	6429.4	(23/2$^+$)	D+Q		ADO=0.82 *9*.
728.64[‡] *15*	35.6	880.24	5/2$^+$	151.65	3/2$^+$	M1+E2		A_2=−0.52 *2* I_γ: 31.7 (1976Po03). POL=+0.23 *6*. ADO=0.55 *5*.
764[#]	2.0	6281.4	(17/2,21/2)	5517.9	(19/2$^+$)			
823.7 *7*	8.6	7105.1	(21/2$^+$,25/2$^+$)	6281.4	(17/2,21/2)			
911.5 *6*	41.7	6429.4	(23/2$^+$)	5517.9	(19/2$^+$)	Q		ADO=1.32 *10*.
927.0 *10*	22.1	7356.4	(25/2$^+$)	6429.4	(23/2$^+$)	D+Q		ADO=0.83 *8*.
1051.7[‡] *4*	35.9[§]	1931.8	9/2$^+$	880.24	5/2$^+$	E2		A_2=+0.23 *3*; A_4=−0.05 *3* I_γ: 22.8 (1976Po03). POL=+0.16 *9*. ADO=1.23 *10*.
1157.55[‡] *15*	87.2	2987.5	15/2$^-$	1829.9	11/2$^-$	E2		A_2=+0.22 *4*; A_4=−0.18 *4* I_γ: 113.6 (1976Po03). POL=+0.26 *6*. ADO=1.41 *3*.
1185.0[‡] *5*	67.0	1337.00	7/2$^+$	151.65	3/2$^+$	Q		A_2=+0.10 *3* I_γ: 11.1 (1976Po03). Mult.: γ(lin pol) result disagrees with expected mult=E2 (1976Po03). POL=−0.21 *21*. ADO=1.33 *7*.
1202.7 *3*	21.0	3755.4	15/2$^+$	2552.6	11/2$^+$	Q		ADO=1.11 *14*.
1209.1[‡] *5*	19.1	3140.8	13/2$^+$	1931.8	9/2$^+$	E2		A_2=+0.29 *5*; A_4=−0.08 *5* I_γ: 13.5 (1976Po03). POL=+0.63 *28*. ADO=1.29 *6*.
1215.6[‡] *4*	14.0	2552.6	11/2$^+$	1337.00	7/2$^+$	Q		A_2=+0.37 *10* I_γ: 2.79 (1976Po03). ADO=1.17 *8*.

Continued on next page (footnotes at end of table)

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

γ(^{43}Sc) (continued)

E_γ [†]	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [&,@]	Comments
1258.8 *9*	29.0	4382.2	(17/2⁻)	3123.4	19/2⁻	D+Q	ADO=0.86 *10*.
1336.8 *15*	20.0	1337.00	7/2⁺	0.0	7/2⁻	D	ADO=1.060 *10*; ΔJ=0, dipole.
1394.6 *13*	7.0	4382.2	(17/2⁻)	2987.5	15/2⁻	D+Q	ADO=0.66 *17*.
1472.0 *10*	78.0	8828.4	(27/2⁺)	7356.4	(25/2⁺)	D+Q	ADO=0.66 *7*.
1474.9 *5*	6.0	5230.3	(17/2⁺)	3755.4	15/2⁺	D+Q	ADO=0.59 *16*.
1509.8 *19*	13.0	4633.2	(17/2⁻,21/2⁻)	3123.4	19/2⁻	D+Q	ADO=0.86 *11*.
1648 [#]	13.0	6281.4	(17/2,21/2)	4633.2	(17/2⁻,21/2⁻)		
1762.6 *3*	44.0	5517.9	(19/2⁺)	3755.4	15/2⁺	Q	ADO=1.30 *16*.
1829.8 [‡] *3*	100	1829.9	11/2⁻	0.0	7/2⁻	E2	A_2=+0.16 *1*; A_4=−0.06 *1* POL=+0.43 *9*. ADO=1.39 *3*.
2270.0 *10*	54.0	8699.5	(21/2⁺,25/2⁺)	6429.4	(23/2⁺)	D+Q	ADO=0.65 *12*.
2394.3 *5*	29.2	5517.9	(19/2⁺)	3123.4	19/2⁻	D	ADO=1.55 *15*; ΔJ=0, dipole.
3077.9 *15*	10.0	6065.5	(11/2,15/2,19/2)	2987.5	15/2⁻	D,Q	ADO=1.49 *18*; ΔJ=0, dipole or ΔJ=2, quadrupole.
3157.8 *20*	33.0	6281.4	(17/2,21/2)	3123.4	19/2⁻	D+Q	ADO=0.54 *8*.
3305.8 *7*	38.0	6429.4	(23/2⁺)	3123.4	19/2⁻	Q	Mult.: 2004Mo47 suggest octupole admixture. ADO=1.93 *22*.
3691.0 *18*	16.0	6814.5		3123.4	19/2⁻		ADO=0.90 *22*.

† 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.

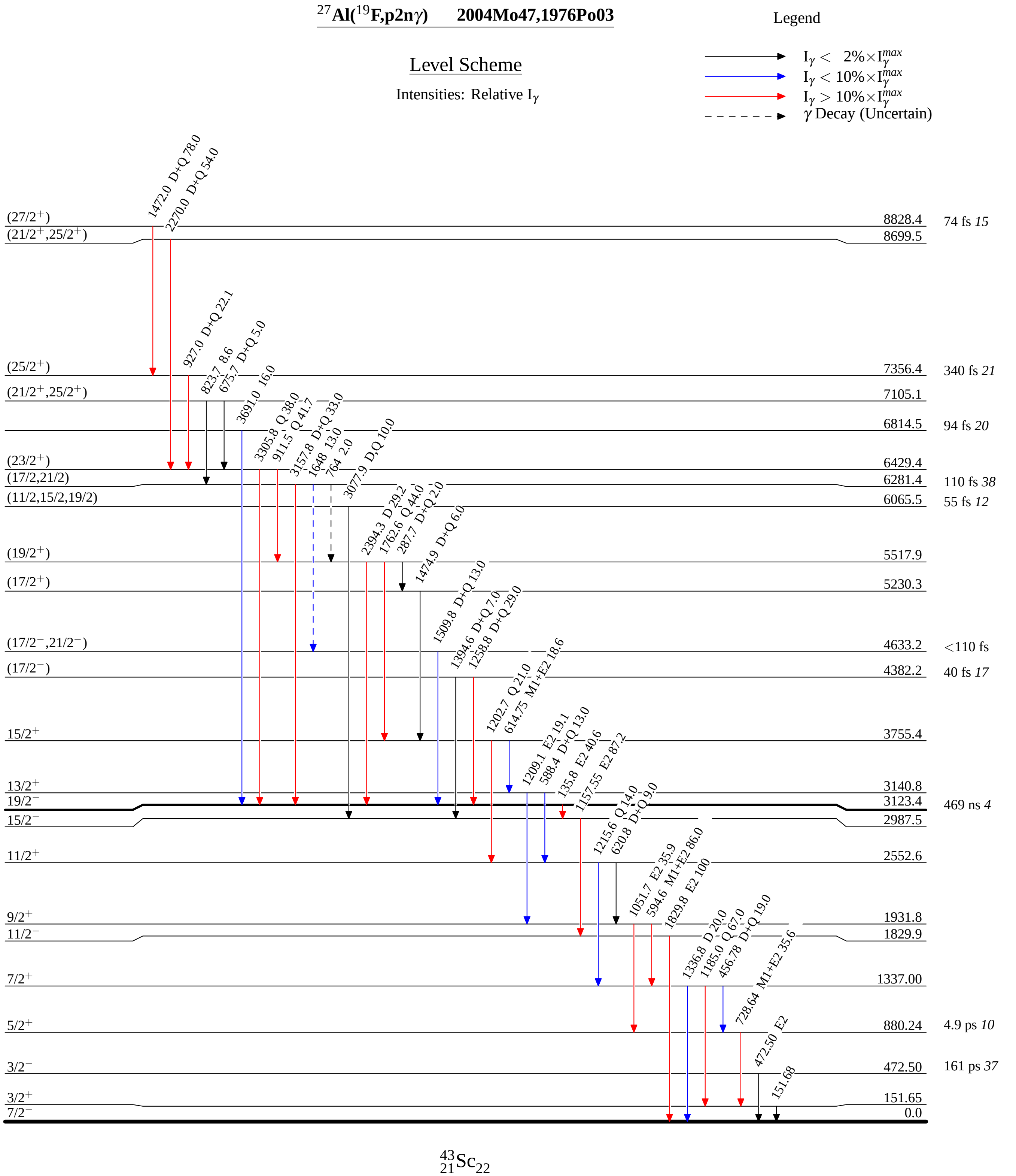
‡ Weighted average from 2004Mo47 and 1976Po03.

§ In comparison with branching ratio of 595γ and 1051γ in four reactions, it seems intensities listed in priv. comm. from 2004Mo47 are reversed.

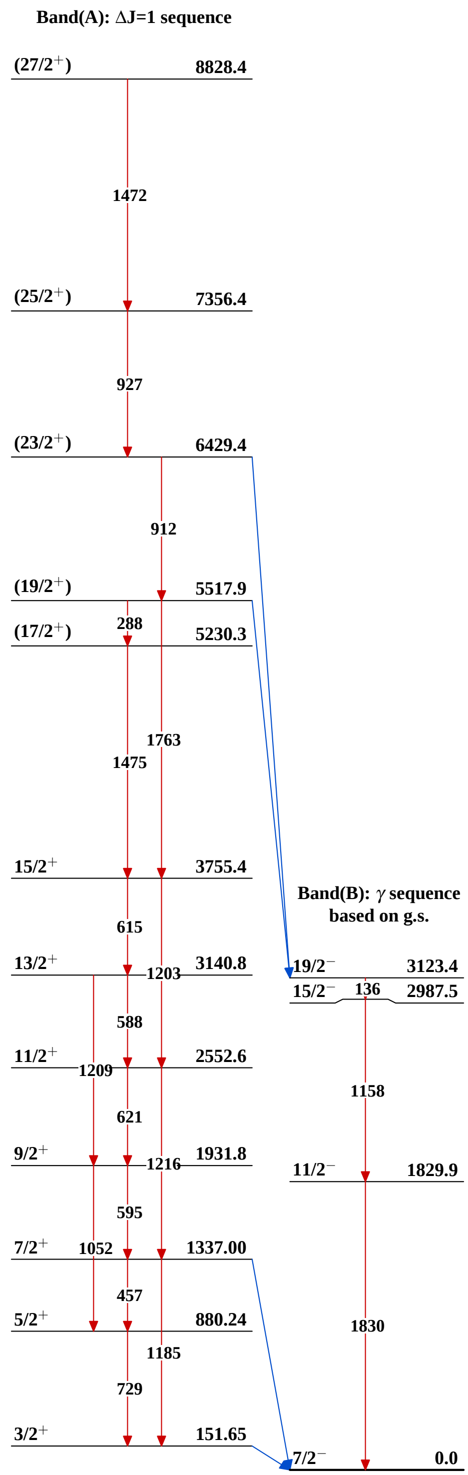
& From γ(θ) and γ(lin pol) of 2004Mo47 and 1976Po03.

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

Placement of transition in the level scheme is uncertain.


^{27}Al(^{19}F,p2nγ) 2004Mo47,1976Po03
Legend
Level Scheme
Intensities: Relative I_γ
I_γ < 2%×I_γ^{max}
I_γ < 10%×I_γ^{max}
I_γ > 10%×I_γ^{max}
γ Decay (Uncertain)
(27/2+) 8828.4 74 fs 15
(21/2+,25/2+) 8699.5
1472.0 D+Q 78.0
2270.0 D+Q 54.0
(25/2+) 7356.4 340 fs 21
927.0 D+Q 22.1
823.7 8.6
675.7 D+Q 5.0
(21/2+,25/2+) 7105.1
6814.5 94 fs 20
3691.0 16.0
3305.8 Q 38.0
911.5 Q 41.7
3157.8 D+Q 33.0
1648 13.0
764 2.0
3077.9 D,Q 10.0
(23/2+) 6429.4
(17/2,21/2) 6281.4 110 fs 38
(11/2,15/2,19/2) 6065.5 55 fs 12
2394.3 D 29.2
1762.6 Q 44.0
287.7 D+Q 2.0
1474.9 D+Q 6.0
(19/2+) 5517.9
(17/2+) 5230.3
1509.8 D+Q 13.0
1394.6 D+Q 7.0
1258.8 D+Q 29.0
(17/2−,21/2−) 4633.2 <110 fs
(17/2−) 4382.2 40 fs 17
1202.7 Q 21.0
614.75 M1+E2 18.6
15/2+ 3755.4
1209.1 E2 19.1
588.4 D+Q 13.0
135.8 E2 40.6
1157.55 E2 87.2
13/2+ 3140.8
19/2− 3123.4 469 ns 4
15/2− 2987.5
1215.6 Q 14.0
620.8 D+Q 9.0
11/2+ 2552.6
1051.7 E2 35.9
594.6 M1+E2 86.0
1829.8 E2 100
9/2+ 1931.8
11/2− 1829.9
1336.8 D 20.0
1185.0 Q 67.0
456.78 D+Q 19.0
728.64 M1+E2 35.6
7/2+ 1337.00
5/2+ 880.24 4.9 ps 10
472.50 E2
3/2− 472.50 161 ps 37
151.68
3/2+ 151.65
7/2− 0.0
$^{43}_{21}Sc_{22}$

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



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

^{28}Si(^{20}Ne,αpγ) 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. The coefficients from these measurements are listed in ^{24}Mg(^{24}Mg,αpγ) dataset.

^{43}Sc Levels

E(level)[†]	J^π	$T_{1/2}$[‡]	E(level)[†]	J^π	E(level)[†]	J^π
0.0[#]	$7/2^-$		6431.60[a] *13*	$23/2^+$	12053.72 *16*	$29/2^{(-)}$
152.25[a] *11*	$3/2^+$	438 μs *7*	6818.98 *15*	$(21/2^+)$	12073.76 *18*	$(29/2^-)$
845.42 *20*	$5/2^-$		7107.43[&] *13*	$23/2^+$	12615.45 *16*	$(31/2)^-$
880.97[b] *10*	$5/2^+$		7118.4 *10*		12704.2 *10*	
1337.85[a] *9*	$7/2^+$		7273.1 *10*		12804.7 *4*	
1408.38[@] *16*	$7/2^-$		7359.77[b] *14*	$25/2^+$	13045.3[&] *3*	$(29/2^+)$
1830.62[#] *9*	$11/2^-$		8010.6 *4*		13117.20 *18*	$(31/2^-)$
1932.83[b] *10*	$9/2^+$		8434.56 *17*	$23/2^-$	13123.1 *6*	
2554.07[a] *10*	$11/2^+$		8555.89[@] *14*	$23/2^-$	13584.6 *11*	$(29/2^+)$
2635.72[@] *12*	$11/2^-$		8703.53 *15*	$25/2^{(+)}$	14406.61 *17*	$(33/2^-)$
2988.74[#] *11*	$15/2^-$		8832.32[a] *16*	$27/2^+$	14452.1 *4*	$(29/2^+)$
3124.32[#] *13*	$19/2^-$	472 ns *4*	9219.2 *4*	$(21/2^-)$	14561.4[@] *3*	$31/2^-$
3142.46[b] *11*	$13/2^+$		9579.35 *18*	$(27/2^+)$	14916.7 *5*	31/2
3293.5 *5*	$7/2^-$		9995.34 *16*	$25/2^{(-)}$	15911.6[&] *3*	$(33/2^+)$
3756.04[a] *11*	$15/2^+$		10084.85 *14*	$27/2^-$	16704.3 *11*	
3960.31[@] *11*	$15/2^-$		10179.1 *6*		16708.9 *11*	
4301.5 *5*			10437.43[&] *22*	$(25/2^+)$	16711.5 *11*	
4383.67 *23*	$17/2^{(-)}$		10613.82 *17*	$(27/2^-)$	17769.8 *5*	(35/2)
5232.02[b] *13*	$17/2^+$		10856.86 *16*	$(27/2^-)$	17922.0 *5*	$(31/2^+)$
5519.53[a] *12*	$19/2^+$		11252.6 *10*	$25/2^+$	18197.0[@] *11*	$35/2^-$
5793.95 *23*			11355.67[@] *22*	$27/2^-$	18767.7 *5*	(37/2)
6067.70[@] *12*	$19/2^-$		11661.3 *5*		19210.5[&] *4*	$(37/2^+)$
6173.53[&] *14*	$19/2^+$		11807.67 *17*	$29/2^{(-)}$		
6284.04[b] *14*	$21/2^+$		11921.6 *5*	$25/2^{(+)}$		

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

[#] Band(A): γ sequence based on g.s.

[@] Band(B): γ sequence based on $7/2^-$.

[&] Band(C): γ sequence based on $19/2^+$.

[a] Band(D): γ sequence based on $3/2^+$.

[b] Band(E): γ sequence based on $5/2^+$.

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

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. See ^{24}Mg(^{24}Mg,αpγ) dataset for values of the coefficients from these measurements.

E_γ[†]	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]
135.5 *1*	3.19 *18*	3124.32	19/2⁻	2988.74	15/2⁻	
252.3 *1*	2.26 *8*	7359.77	25/2⁺	7107.43	23/2⁺	
287.9[§] *1*	1.96 *7*	5519.53	19/2⁺	5232.02	17/2⁺	D
288.4 *1*	0.58 *3*	7107.43	23/2⁺	6818.98	(21/2⁺)	
456.7 *1*	3.60 *14*	1337.85	7/2⁺	880.97	5/2⁺	
562.9 *2*	0.57 *4*	1408.38	7/2⁻	845.42	5/2⁻	
588.2 *1*	2.88 *10*	3142.46	13/2⁺	2554.07	11/2⁺	
595.1 *1*	10.8 *3*	1932.83	9/2⁺	1337.85	7/2⁺	
613.5 *1*	31.3 *9*	3756.04	15/2⁺	3142.46	13/2⁺	D
621.3 *1*	5.73 *19*	2554.07	11/2⁺	1932.83	9/2⁺	D
645.4 *1*	1.33 *7*	6818.98	(21/2⁺)	6173.53	19/2⁺	
653.9 *2*	0.66 *6*	6173.53	19/2⁺	5519.53	19/2⁺	
675.9 *1*	7.33 *24*	7107.43	23/2⁺	6431.60	23/2⁺	D
728.7 *1*	50.8 *19*	880.97	5/2⁺	152.25	3/2⁺	D
764.3 *1*	2.29 *12*	6284.04	21/2⁺	5519.53	19/2⁺	D
766.9 *2*	0.97 *5*	3756.04	15/2⁺	2988.74	15/2⁻	D
771.6 *4*	0.53 *6*	10856.86	(27/2⁻)	10084.85	27/2⁻	
804.4 *3*	0.90 *8*	2635.72	11/2⁻	1830.62	11/2⁻	D
823.3 *1*	5.24 *19*	7107.43	23/2⁺	6284.04	21/2⁺	
845.3 *3*	0.29 *4*	845.42	5/2⁻	0.0	7/2⁻	
860.4[&] *2*	0.51 *4*	10856.86	(27/2⁻)	9995.34	25/2⁽⁻⁾	D
880.5 *2*	1.65 *10*	880.97	5/2⁺	0.0	7/2⁻	
912.0 *1*	100 *3*	6431.60	23/2⁺	5519.53	19/2⁺	Q
928.2 *1*	75.4 *24*	7359.77	25/2⁺	6431.60	23/2⁺	D
933.0 *5*	0.93 *7*	7107.43	23/2⁺	6173.53	19/2⁺	
941.4 *1*	1.11 *5*	6173.53	19/2⁺	5232.02	17/2⁺	
951.0 *3*	1.23 *6*	11807.67	29/2⁽⁻⁾	10856.86	(27/2⁻)	D
971.5 *1*	2.18 *8*	3960.31	15/2⁻	2988.74	15/2⁻	D
997.9 *1*	0.87 *4*	18767.7	(37/2)	17769.8	(35/2)	D
1043.6 *1*	1.19 *6*	13117.20	(31/2⁻)	12073.76	(29/2⁻)	D
1051.9 *1*	28.5 *9*	1932.83	9/2⁺	880.97	5/2⁺	Q
1052.9 *4*	0.07 *4*	6284.04	21/2⁺	5232.02	17/2⁺	
1075.6 *3*	0.70 *7*	7359.77	25/2⁺	6284.04	21/2⁺	
1157.5[&] *1*	15.2 *6*	2988.74	15/2⁻	1830.62	11/2⁻	Q
1185.6 *1*	9.2 *4*	1337.85	7/2⁺	152.25	3/2⁺	Q
1202.1 *1*	5.76 *19*	3756.04	15/2⁺	2554.07	11/2⁺	
1209.7 *1*	30.9 *9*	3142.46	13/2⁺	1932.83	9/2⁺	Q
1216.1 *1*	4.45 *17*	2554.07	11/2⁺	1337.85	7/2⁺	
1227.1 *3*	2.37 *19*	2635.72	11/2⁻	1408.38	7/2⁻	
1289.2 *3*	0.46 *4*	14406.61	(33/2⁻)	13117.20	(31/2⁻)	
1324.5 *1*	2.57 *11*	3960.31	15/2⁻	2635.72	11/2⁻	Q
1338.0 *1*	2.51 *12*	1337.85	7/2⁺	0.0	7/2⁻	D
1360.6 *4*	0.65 *6*	3293.5	7/2⁻	1932.83	9/2⁺	
1381.2 *1*	3.52 *12*	10084.85	27/2⁻	8703.53	25/2⁽⁺⁾	D
1394.9 *2*	1.75 *8*	4383.67	17/2⁽⁻⁾	2988.74	15/2⁻	D

Continued on next page (footnotes at end of table)

^{28}Si(^{20}Ne,$\alpha p\gamma$) 2007Ch40 (continued)

γ(^{43}Sc) (continued)

E_γ[†]	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]
1408.3 *2*	3.3 *8*	1408.38	7/2$^-$	0.0	7/2$^-$	D
1439.5 *1*	2.66 *10*	9995.34	25/2$^{(-)}$	8555.89	23/2$^-$	D
1440.7 *2*	0.79 *4*	19210.5	(37/2$^+$)	17769.8	(35/2)	
1460.1 *1*	3.12 *13*	12073.76	(29/2$^-$)	10613.82	(27/2$^-$)	D[#]
1472.5 *1*	35.9 *11*	8832.32	27/2$^+$	7359.77	25/2$^+$	D
1476.0 *1*	5.49 *20*	5232.02	17/2$^+$	3756.04	15/2$^+$	
1529.0 *1*	4.63 *16*	10084.85	27/2$^-$	8555.89	23/2$^-$	Q
1586.9 *3*	0.39 *4*	6818.98	(21/2$^+$)	5232.02	17/2$^+$	
1595.2[§] *3*	1.09 *7*	8703.53	25/2$^{(+)}$	7107.43	23/2$^+$	
1650.3 *1*	10.7 *4*	10084.85	27/2$^-$	8434.56	23/2$^-$	Q
1724.8 *2*	2.10 *10*	8832.32	27/2$^+$	7107.43	23/2$^+$	
1757.9 *7*	1.71 *9*	12615.45	(31/2)$^-$	10856.86	(27/2$^-$)	
1763.3 *1*	22.0 *7*	5519.53	19/2$^+$	3756.04	15/2$^+$	Q
1791.2 *1*	6.06 *21*	14406.61	(33/2$^-$)	12615.45	(31/2)$^-$	D
1830.5 *1*	22.9 *14*	1830.62	11/2$^-$	0.0	7/2$^-$	Q
1833.6 *2*	2.85 *13*	5793.95		3960.31	15/2$^-$	
1968.8 *1*	6.30 *25*	12053.72	29/2$^{(-)}$	10084.85	27/2$^-$	D
2058.7 *2*	1.23 *7*	12053.72	29/2$^{(-)}$	9995.34	25/2$^{(-)}$	
2107.3 *1*	16.5 *5*	6067.70	19/2$^-$	3960.31	15/2$^-$	Q
2129.7 *1*	15.1 *5*	3960.31	15/2$^-$	1830.62	11/2$^-$	Q
2177.8[§] *6*	0.40 *5*	10613.82	(27/2$^-$)	8434.56	23/2$^-$	Q[@]
2190.8 *3*	1.19 *6*	12804.7		10613.82	(27/2$^-$)	
2219.2 *2*	2.43 *10*	9579.35	(27/2$^+$)	7359.77	25/2$^+$	
2228.0 *2*	1.76 *8*	11807.67	29/2$^{(-)}$	9579.35	(27/2$^+$)	
2271.8 *1*	9.9 *3*	8703.53	25/2$^{(+)}$	6431.60	23/2$^+$	D
2353.2 *3*	1.57 *8*	14406.61	(33/2$^-$)	12053.72	29/2$^{(-)}$	Q[@]
2368.6 *5*	0.99 *7*	4301.5		1932.83	9/2$^+$	
2369.6[&] *4*	1.26 *7*	8434.56	23/2$^-$	6067.70	19/2$^-$	
2394.9 *1*	82 *3*	5519.53	19/2$^+$	3124.32	19/2$^-$	D
2418.3[§] *2*	1.18 *6*	6173.53	19/2$^+$	3756.04	15/2$^+$	
2488.2 *1*	13.9 *4*	8555.89	23/2$^-$	6067.70	19/2$^-$	Q
2491.0 *3*	2.69 *16*	8010.6		5519.53	19/2$^+$	
2503.1 *1*	3.68 *14*	13117.20	(31/2$^-$)	10613.82	(27/2$^-$)	Q[#]
2508.0 *3*	1.67 *8*	14561.4	31/2$^-$	12053.72	29/2$^{(-)}$	
2530.4 *1*	3.02 *12*	14452.1	(29/2$^+$)	11921.6	25/2$^{(+)}$	
2530.6 *1*	12.7 *4*	12615.45	(31/2)$^-$	10084.85	27/2$^-$	Q
2598.0[&] *1*	2.91 *11*	14406.61	(33/2$^-$)	11807.67	29/2$^{(-)}$	(Q)
2607.8 *2*	1.12 *5*	13045.3	(29/2$^+$)	10437.43	(25/2$^+$)	
2636.0 *3*	2.6 *4*	2635.72	11/2$^-$	0.0	7/2$^-$	
2644.5 *5*	0.97 *6*	14452.1	(29/2$^+$)	11807.67	29/2$^{(-)}$	
2725.6[§] *1*	1.93 *10*	10084.85	27/2$^-$	7359.77	25/2$^+$	D
2799.5 *2*	2.70 *10*	11355.67	27/2$^-$	8555.89	23/2$^-$	Q
2852.9 *1*	3.06 *11*	17769.8	(35/2)	14916.7	31/2	(Q)
2866.3 *2*	3.50 *12*	15911.6	(33/2$^+$)	13045.3	(29/2$^+$)	
2887.4 *6*	0.90 *6*	9995.34	25/2$^{(-)}$	7107.43	23/2$^+$	
2920.2 *10*	0.39 *5*	11355.67	27/2$^-$	8434.56	23/2$^-$	
2975.2 *1*	6.45 *21*	11807.67	29/2$^{(-)}$	8832.32	27/2$^+$	D[@]
3038.1 *5*	1.27 *9*	13123.1		10084.85	27/2$^-$	
3048.6 *8*	0.38 *9*	6173.53	19/2$^+$	3124.32	19/2$^-$	
3071.6 *5*	0.90 *6*	10179.1		7107.43	23/2$^+$	
3079.0 *1*	4.92 *17*	6067.70	19/2$^-$	2988.74	15/2$^-$	Q

Continued on next page (footnotes at end of table)

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

γ(^{43}Sc) (continued)

E_γ †	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult. ‡
3105.3 *4*	0.70 *4*	11661.3		8555.89	23/2$^-$	
3124.2 *3*	1.03 *5*	16708.9		13584.6	(29/2$^+$)	
3147.7 *2*	2.80 *11*	9579.35	(27/2$^+$)	6431.60	23/2$^+$	
3151.4 *3*	1.53 *7*	9219.2	(21/2$^-$)	6067.70	19/2$^-$	(D)@
3159.8 *2*	10.0 *5*	6284.04	21/2$^+$	3124.32	19/2$^-$	D#
3205.3 *3*	2.09 *9*	14561.4	31/2$^-$	11355.67	27/2$^-$	Q@
3253.9 *1*	8.5 *3*	10613.82	(27/2$^-$)	7359.77	25/2$^+$	D
3296.0 *4*	1.24 *7*	15911.6	(33/2$^+$)	12615.45	(31/2)$^-$	
3298.8 *3*	1.58 *7*	19210.5	(37/2$^+$)	15911.6	(33/2$^+$)	
3307.6 *2*	8.9 *3*	6431.60	23/2$^+$	3124.32	19/2$^-$	[M2]
3329.9 *2*	2.04 *9*	10437.43	(25/2$^+$)	7107.43	23/2$^+$	
3362.2 *10*	0.40 *5*	7118.4		3756.04	15/2$^+$	
3469.8 *2*	1.74 *8*	17922.0	(31/2$^+$)	14452.1	(29/2$^+$)	(D)
3497.0 *1*	4.99 *18*	10856.86	(27/2$^-$)	7359.77	25/2$^+$	D
3516.9 *5*	0.55 *4*	7273.1		3756.04	15/2$^+$	
3586.9 *5*	0.47 *3*	16704.3		13117.20	(31/2$^-$)	
3635.4 *3*	1.31 *6*	18197.0	35/2$^-$	14561.4	31/2$^-$	Q@
3892.6 *3*	2.96 *12*	11252.6	25/2$^+$	7359.77	25/2$^+$	
3906.6 *5*	0.58 *5*	16711.5		12804.7		
3972.5 *2*	1.75 *7*	12804.7		8832.32	27/2$^+$	
3997.1 *3*	1.23 *7*	11355.67	27/2$^-$	7359.77	25/2$^+$	
4148.1 *8*	0.32 *3*	12704.2		8555.89	23/2$^-$	
4213.0 *3*	1.88 *7*	13045.3	(29/2$^+$)	8832.32	27/2$^+$	D@
4341.7 *3*	1.66 *7*	13045.3	(29/2$^+$)	8703.53	25/2$^{(+)}$	
4560.5 *3*	1.89 *8*	11921.6	25/2$^{(+)}$	7359.77	25/2$^+$	D
4752.0 *3*	1.33 *6*	13584.6	(29/2$^+$)	8832.32	27/2$^+$	D@
5310.5 *1*	13.8 *10*	8434.56	23/2$^-$	3124.32	19/2$^-$	Q@
5489.0 *3*	3.19 *12*	11921.6	25/2$^{(+)}$	6431.60	23/2$^+$	D
5620.1 *5*	1.45 *7*	14452.1	(29/2$^+$)	8832.32	27/2$^+$	
5684.9 *4*	1.52 *7*	13045.3	(29/2$^+$)	7359.77	25/2$^+$	
6081.0§ *3*	4.69 *16*	14916.7	31/2	8832.32	27/2$^+$	Q

† The quoted uncertainties are statistical only. Above 3.5 MeV (maximum range of calibration curve), systematic uncertainties can be 1-2 keV.

‡ 2007Ch40 assign multipolarities for most of the transitions, many based only on Jπ assignments. The evaluators assign mult=D for ΔJ=0,1 M1 or E1 and Q for ΔJ=2, Q transitions for which supporting angular distribution/correlation data are available. Dipole transitions with expected M1 character may include E2 component.

§ Poor fit in the level scheme. The uncertainty is increased by a factor of 2 for fitting purposes.

& Poor fit in the level scheme. The uncertainty is increased by a factor of 3 for fitting purposes.

@ DCO value corresponds to an alternative DCO-like analysis.

DCO value corresponds to gate on ΔJ=2, quadrupole transition.

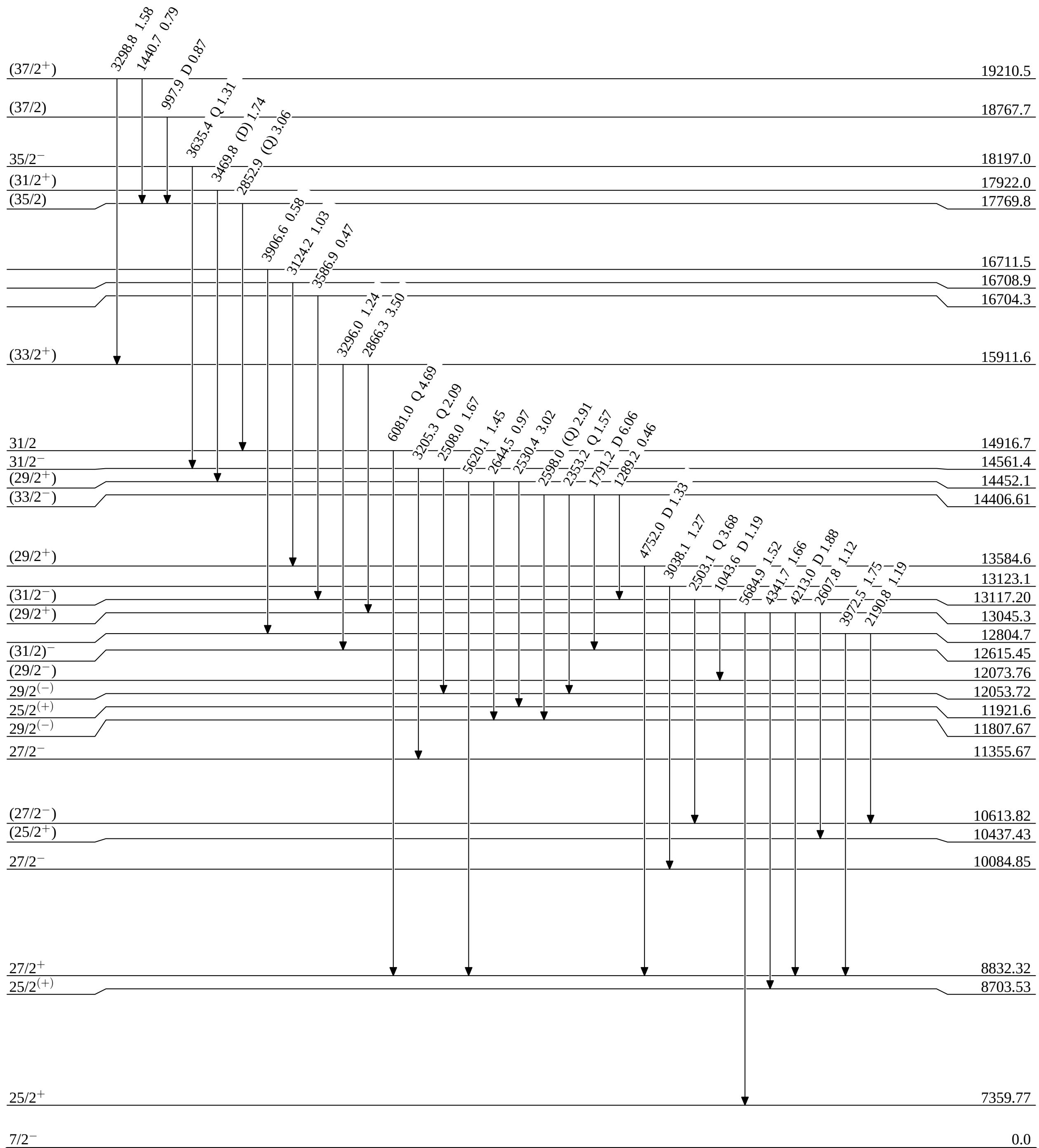
^{28}Si(^{20}Ne,αpγ) 2007Ch40

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$

Level Scheme

Intensities: Relative I_γ



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

^{28}Si(^{20}Ne,αpγ) 2007Ch40

Level Scheme (continued)

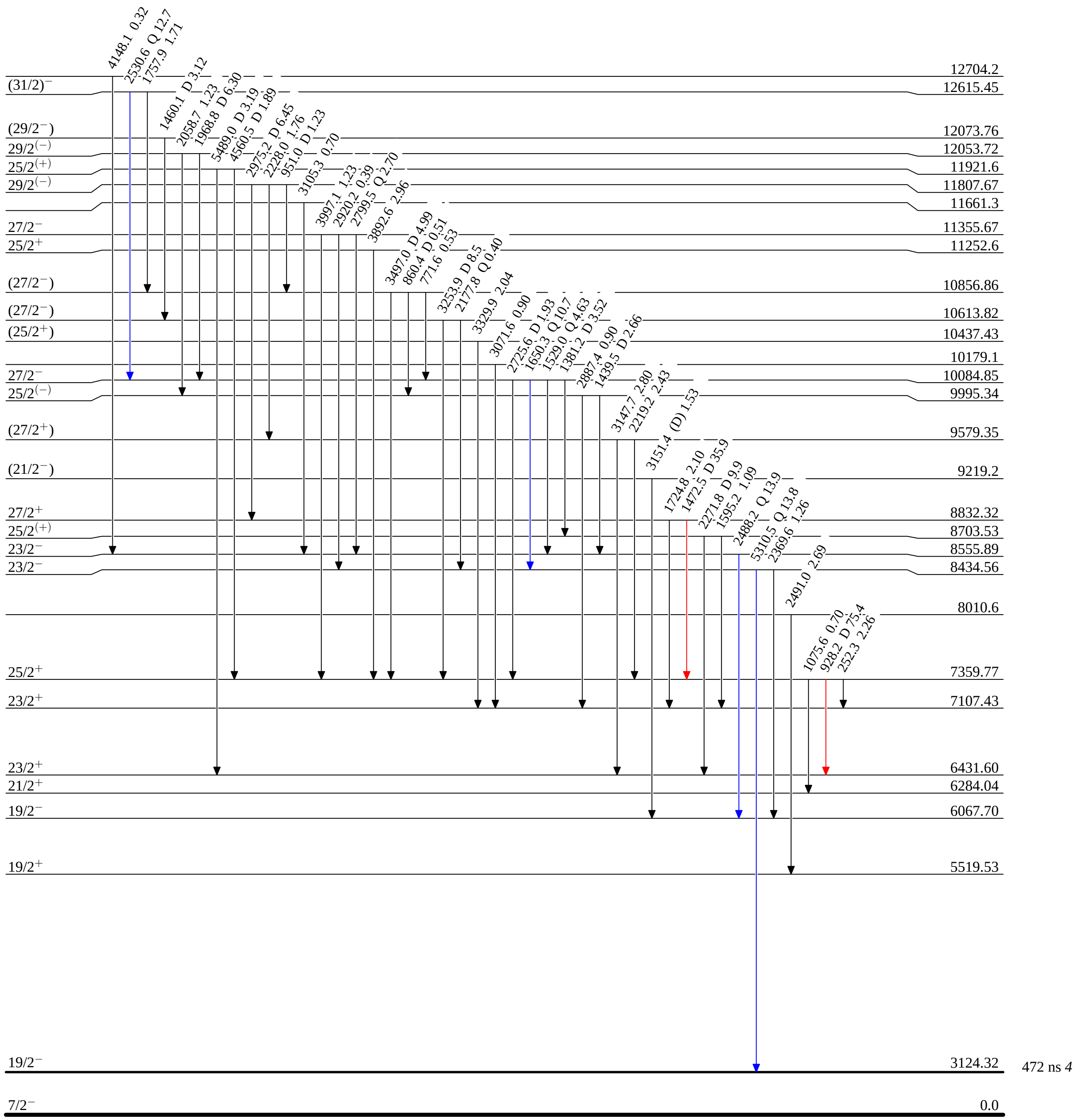
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

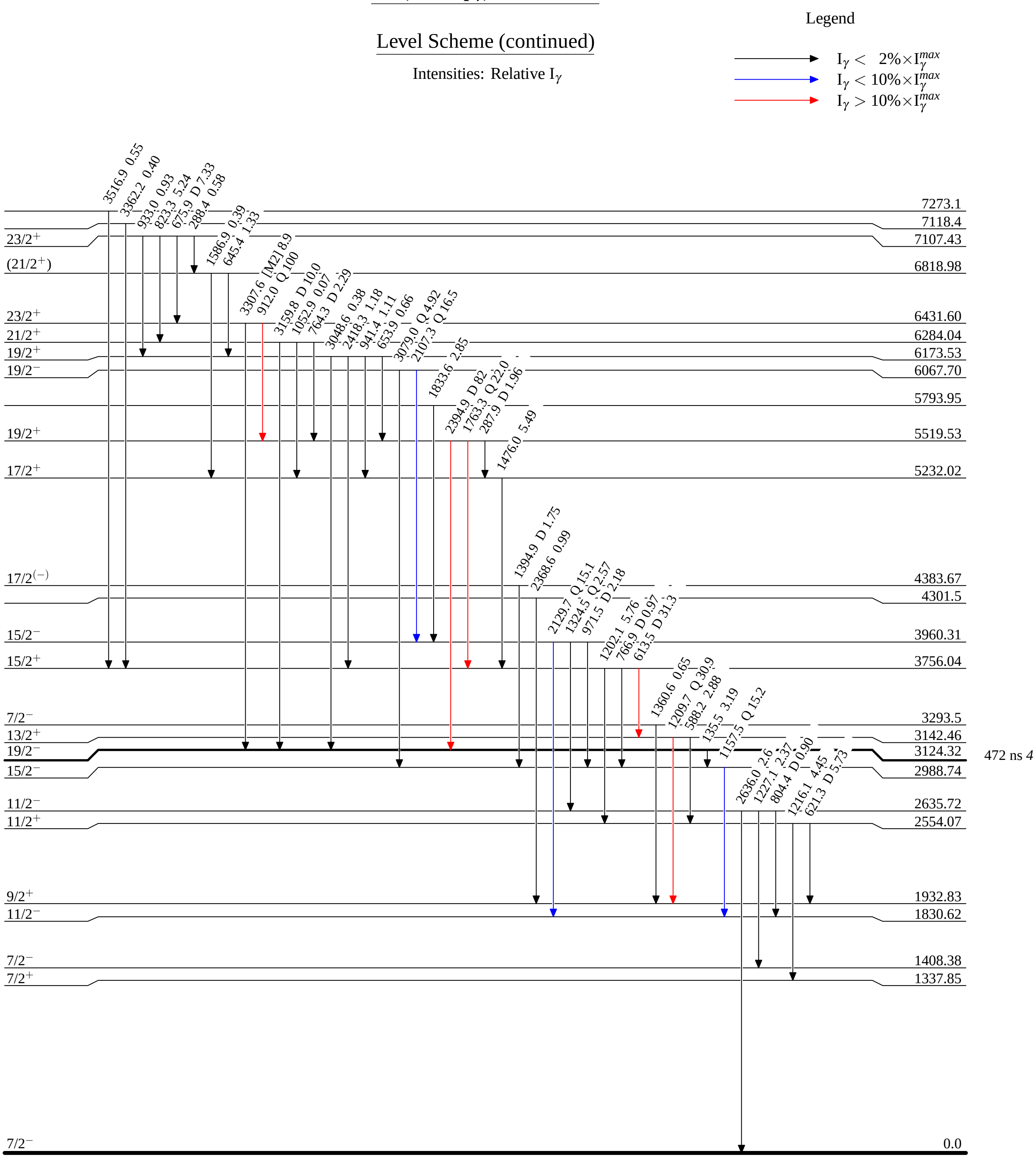


$^{43}_{21}Sc_{22}$

$^{28}Si(^{20}Ne,\alpha p\gamma)$ 2007Ch40

Level Scheme (continued)

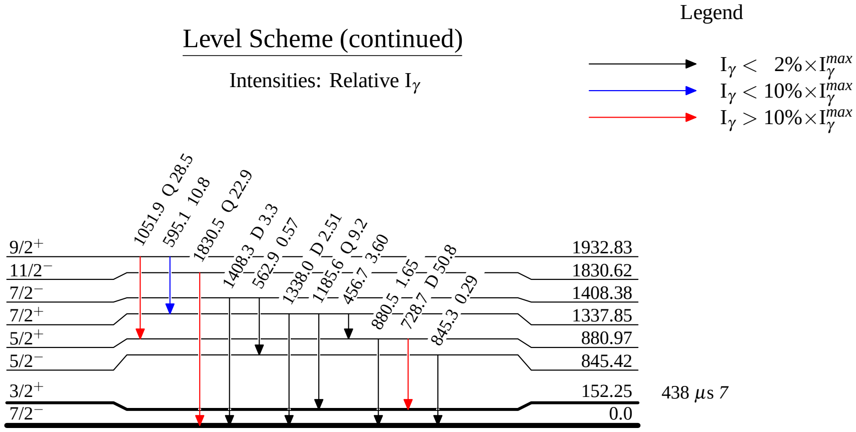
Intensities: Relative I_γ



^{28}Si(^{20}Ne,αpγ) 2007Ch40

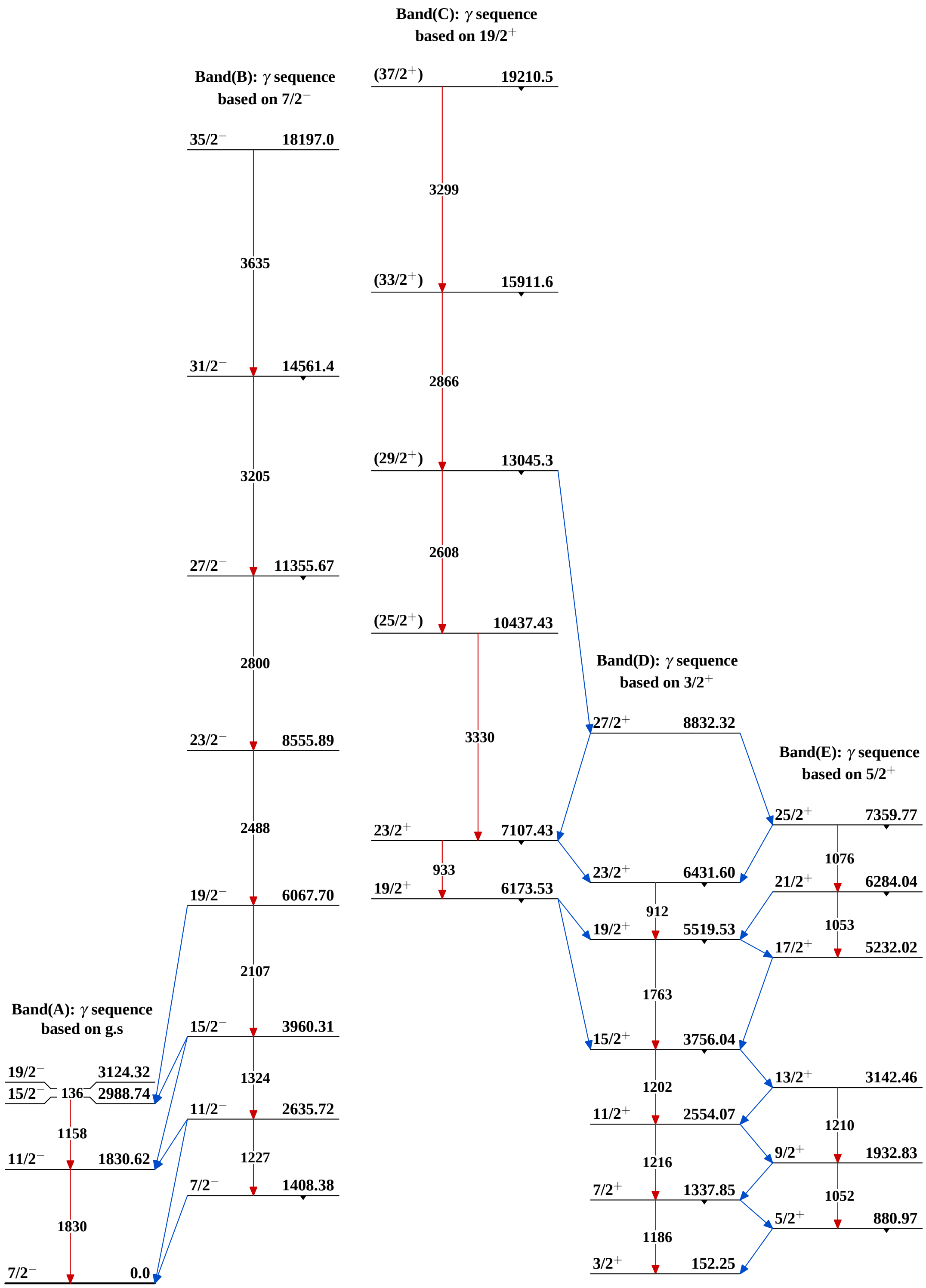
Level Scheme (continued)

Intensities: Relative I_γ



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

^{28}Si(^{20}Ne,αpγ) 2007Ch40



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

^{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^π[‡]	$T_{1/2}$
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
6428.6 *9*	23/2$^+$	16.3[@] ps *15*
7354.8 *11*	25/2$^+$	0.42[#] ps *11*

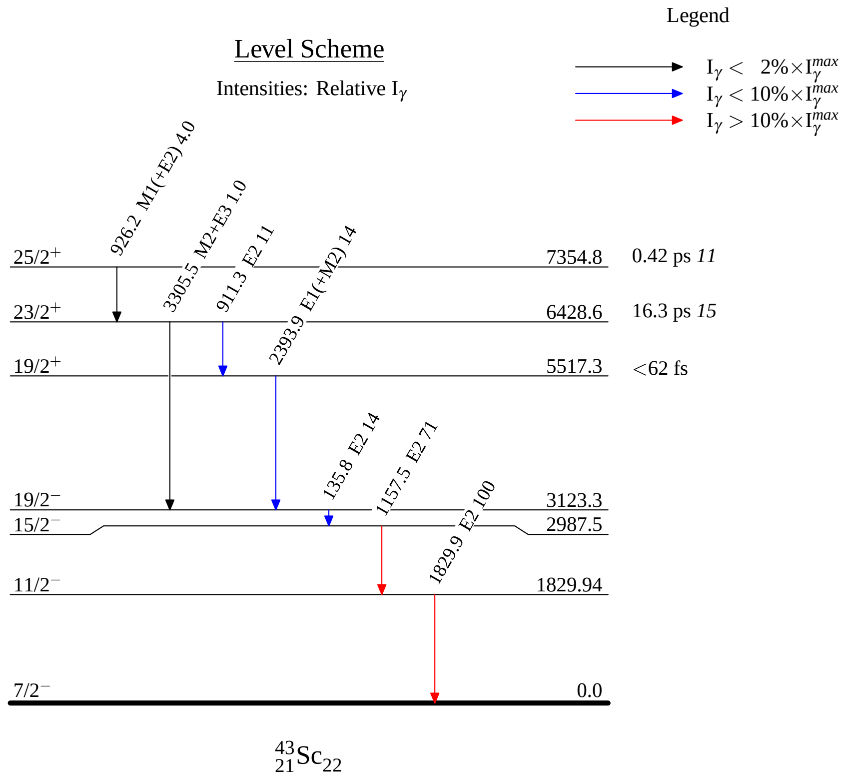
† From least-squares fit to Eγ data.
‡ From Adopted Levels.
# DSAM (1980Sh09).
@ RDM (1980Sh09).

γ(^{43}Sc)

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

† From 1980Sh09.
‡ From $\gamma(\theta)$ and γ(lin pol) of 1980Sh09.

$^{29}Si(^{16}O,pn\gamma)$ 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 σ(E_p,θ). 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 σ(E_p,θ). 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 10 μg/cm^2 carbon backing. Protons were momentum analyzed with a 75 cm broad-range magnetic spectrograph and detected in nuclear emulsions. Measured σ(E_p,θ). 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 σ(E_p,θ). 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 σ(θ), 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 σ(θ). DWBA calculations.
1974Ho39: E-4-10 MeV. Measured cross section.
1972Fi20: E=28.5 MeV. Measured σ(θ). DWBA calculations.
1971Po03: E=9.5, 11 MeV. Measured proton spectrum FWHM≈150 keV. DWBA calculations.
1966Cu01: E=9, 10 MeV. Measured σ(θ). FWHM≈25 keV. DWBA calculations.
1963La04: E=20 MeV or less. Measured σ(θ) for selected groups. A total of 14 groups reported.
1961Ma03: E=21 MeV. Measured Q(β^-)value.

Relative total cross sections (1987Fr09)

Level	cross section
1811	3.9 *5*
1829	9.6 *11*
1963	4.5 *5*
2094	3.6 *5*
2106	5.4 *8*
2141	4.9 *6*
2243	5.9 *6*
2289	4.1 *5*
2335	4.0 *5*
2382	3.1 *4*
2459	6.5 *7*
2551	6.7 *7*
2580	4.4 *5*
2669	2.9 *4*
2762	5.6 *7*

^{43}Sc Levels

E(level)[‡]	Jπ[†]	L[d]	σ(DWBA)/σ(exp)[c]	Comments
0	7/2−	3	0.258	
151[b] *2*				
473[a] *2*	3/2−	1	0.358	S-factor=0.267, 0.280 (relative to 1 for g.s.) (1985Ba77).

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

^{43}Sc Levels (continued)

E(level)[‡]	Jπ[†]	L[d]	σ(DWBA)/σ(exp)[c]	Comments
844[a] 2	5/2−		0.265	
855[&]				
882[b] 2				
1156[a] 2				
1178[a] 2	3/2−	1		S-factor=1.22, 1.28 (relative to 1 for g.s.) (1985Ba77), 1.39 (1981Sm03).
1335[b] 2				
1418[a] 2	7/2−	3	0.024	
1646[b] 2				
1810[a] 2			0.394	Jπ: 1981Sm03 assign 1/2−, but adopted Jπ=3/2−. Also σ(θ) fitted well to 3/2− by 1979Th03.
1827[a] 2	11/2−	5	0.168	
1877[b] 2				
1912[#] 6				
1928[a] 2				
1963[@]				
2094[@]				
2106[@]				
2141[@]				
2243[@]				
2289	5/2−	3		
2335[@]				
2382[@]				
2459[@]				
2551[@]				
2580[@]				
2634	(9/2−)		0.110	Jπ: adopted Jπ=(9/2,11/2)−.
2669[@]				
2762[@]				
2810[&]				
2839[&]				
2987	15/2−	7[e]	0.379	Jπ: 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				

Continued on next page (footnotes at end of table)

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

^{43}Sc Levels (continued)

E(level)[‡]
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 3123, (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 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. Deduced levels.
1966WaZW: measured ce, deduced α(K)(expt) and K/L ratios for 152γ and 472γ.
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 1971Ba92 by RDM. Others: >0.43 ps (1971Po03), >4.2 ps (1972Ba04).
879.9 *4*	5/2$^+$	4.2 ps *10*	$T_{1/2}$: from 1971Ba92 by RDM. 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 1971Ba92 by RDM. 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).
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). J$^\pi$: 7/2 choice does not seem allowed from p$\gamma(\theta)$ (1970Ba51).

Continued on next page (footnotes at end of table)

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

^{43}Sc Levels (continued)

E(level)†	J$^{\pi}$‡	T$_{1/2}$#	Comments
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. J$^{\pi}$: 5/2 is preferred in pγ(θ) (1970Ba51).
2093.9 *12*	3/2^{-}	0.33 ps *9*	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 to 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*	9/2^{-},11/2^{-}	0.21 ps *7*	T$_{1/2}$: from 1972Ba04. Other: 520 fs *+1143−243* (1987Fr09).
2650.5 *16*			
2669 *2*	3/2^{-}		
2762.2 *4*	(5/2 to 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) T$_{1/2}$: from 1978Ha07. Others: 450 ns *14* (1971Na10), 0.5 μs *1* (1970Sa24). g: 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 *1*		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_γ [†]	I_γ [§]	E_f	J_f^π	Mult. [&]	δ [&]	α [@]	Comments
151.6	3/2$^+$	151.6	100	0.0	7/2$^-$	M2		0.0406	Mult.: from α(K)(expt)=0.031 *2*, K/L(expt)=9.0 *7* (1966WaZW).
471.9	3/2$^-$	320.3	4 *2*	151.6	3/2$^+$				
		471.9	96	0.0	7/2$^-$	E2			Mult.: from α(K)(expt)=7.7×10^{-4} *19* (1966WaZW). A$_2$=+0.075 *34* (1967Ph01).
843.9	5/2$^-$	692.3	<4	151.6	3/2$^+$				
		843.9	100	0.0	7/2$^-$	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$^+$	381.5	30 *6*	471.9	3/2$^-$				Iγ(383)/Iγ(703)=25/75 (1987Fr09).
		701.8	70 *6*	151.6	3/2$^+$				
879.9	5/2$^+$	728.3	100	151.6	3/2$^+$	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).
		879.9	2 *1*	0.0	7/2$^-$				
1158.0	3/2$^+$	278.1	19 *4*	879.9	5/2$^+$				Iγ(278)/Iγ(1006)=17/55 (1987Fr09).
		304.6	33 *5*	853.4	1/2$^+$				Iγ(303)/Iγ(1006)=28/55 (1987Fr09).
		314.1	<3	843.9	5/2$^-$				
		1006.4	48 *6*	151.6	3/2$^+$	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$^-$	333.1	19 *6*	843.9	5/2$^-$				Iγ(334)/Iγ(707)=8/68 (1987Fr09).
		705.1	68 *4*	471.9	3/2$^-$	M1+E2	−0.18 *13*		δ: −0.18 *13* or <−22 or >+4.9 (1970Ba51).
		1177.0	13 *4*	0.0	7/2$^-$				Iγ(1179)/Iγ(707)=19/73 (1987Fr09).
1336.8	7/2$^+$	456.9	19 *3*	879.9	5/2$^+$	M1+E2	−0.23 *4*		Iγ(457)/Iγ(1185)=23/64 (1987Fr09). δ: from 1970Fo06. Others: −0.28 *10* or −1.20 *18* (1970Ba51).
		1185.2	61 *3*	151.6	3/2$^+$	E2			δ: +0.02 *3* (1987Fr09) for 7/2 to 3/2. A$_2$=+0.48 *6*, A$_4$=−0.27 *7* (1967Ph01).
		1336.8	20 *3*	0.0	7/2$^-$	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$^-$	562.2	10 *2*	843.9	5/2$^-$				Iγ(563)/Iγ(1406)=10/82 (1987Fr09).
		934.2	3 *1*	471.9	3/2$^-$				Iγ(936)/Iγ(1406)=9/82 (1987Fr09).
		1406.1	90 *2*	0.0	7/2$^-$	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$^+$	492.3	22 *3*	1158.0	3/2$^+$				Iγ(492)/Iγ(1499)=21/58 (1987Fr09). Iγ=12 (1967Ph01).
		770.4	7	879.9	5/2$^+$				Iγ(771)/Iγ(1499)=7/58 (1987Fr09).
		796.9	4 *2*	853.4	1/2$^+$				
		1178.4		471.9	3/2$^-$				E$_\gamma$,I$_\gamma$: unresolved from 1179γ from 1179 level. Iγ=12 (1967Ph01).
		1498.7	57 *5*	151.6	3/2$^+$	M1(+E2)	0.06		δ: from 1967Ph01. A$_2$=+0.55 *4* (1967Ph01).
		1650.3	17 *3*	0.0	7/2$^-$				δ: 0.0 (1967Ph01). Iγ(1651)/Iγ(1499)=14/58 (1987Fr09). A$_2$=+0.19 *5* (1967Ph01).
1810.7	3/2$^-$	633.7	55 *4*	1177.0	3/2$^-$	M1+E2	−0.22 *7*		δ: from 1970Ba51. Other: >+8 or <−19 (1970Ba51).

$^{43}_{21}$Sc$_{22}$-81

γ(^{43}Sc) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[§]	E_f	J^π_f	Mult.[&]	δ[&]	Comments
1810.7	3/2⁻	1338.8	45 4	471.9	3/2⁻	M1+E2	−0.22 7	δ: from 1970Ba51. Other: >+8 or <−19 (1970Ba51). Iγ(1339)/Iγ(632)=43/42 (1987Fr09).
		1659.1	16	151.6	3/2⁺			
		1810[‡#]		0.0	7/2⁻			
1829.3	11/2⁻	949[‡#]		879.9	5/2⁺			E_γ,Mult.: this γ is suspect since implied E3 multipolarity is inconsistent with RUL.
		1677[‡#]		151.6	3/2⁺			E_γ,Mult.: this γ is suspect since implied M4 multipolarity is inconsistent with RUL.
		1830.1 5	100	0.0	7/2⁻			E_γ: from 1970Sa24.
1882.3	(5/2,9/2)⁻	1038.4[#]	<5	843.9	5/2⁻			
		1730[‡#]		151.6	3/2⁺			
		1882.3	100	0.0	7/2⁻	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⁺	593.8	31 3	1336.8	7/2⁺	M1+E2	−0.21 4	Iγ(595)/Iγ(1051)=25/75 (1987Fr09). δ: weighted average of −0.14 6 (1970Ba51), −0.24 4 (1970Fo06).
		1050.7	69 3	879.9	5/2⁺	E2		δ: −0.02 2 (1987Fr09) for 9/2 to 5/2.
		1779[‡#]		151.6	3/2⁺			E_γ,Mult.: this γ is suspect since implied M3 multipolarity is inconsistent with RUL.
1962.5	(3/2,5/2)⁻	785.5	20	1177.0	3/2⁻			
		1490.6	80	471.9	3/2⁻	M1+E2	+0.21 6	δ: from 1970Ba51. Other: >+9 or <−17 (1970Ba51).
2093.9	3/2⁻	916.9	58 7	1177.0	3/2⁻			
		1250.0[#]	7 7	843.9	5/2⁻			
		1622.0	31	471.9	3/2⁻			
		1942.3	35 6	151.6	3/2⁺			Iγ(1942)/Iγ(915)=16/52 (1987Fr09).
2105.7	(3/2,5/2)	455.4[#]	10 5	1650.3	5/2⁺			
		947.7	32 5	1158.0	3/2⁺			Iγ(948)/Iγ(1226)=19/73 (1987Fr09).
		1225.8	58 6	879.9	5/2⁺			
		1954.1[#]	6	151.6	3/2⁺			
2141.2	(3/2⁻,5/2⁺)	983.2	21	1158.0	3/2⁺			
		1261.3	55 5	879.9	5/2⁺			
		1669.3	19 3	471.9	3/2⁻			
		1989.6	16 3	151.6	3/2⁺			Iγ(1990)/Iγ(1261)=26/53 (1987Fr09).
		2141.1	10 4	0.0	7/2⁻			
2242.6	(3/2,5/2,7/2)⁻	1398.7	25	843.9	5/2⁻			
		1770.7	57	471.9	3/2⁻			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).
		2242.5	18	0.0	7/2⁻			
2288.8	5/2⁻	2288.7	100.0 7	0.0	7/2⁻	M1+E2	+0.08 5	δ: from 1970Ba51. Others: +0.35 4 (1987Fr09), −12 +4−12 (1970Ba51).
2335.4	5/2⁻	2335.3	100	0.0	7/2⁻	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⁽⁺⁾	731.8	69	1650.3	5/2⁺			

γ(^{43}Sc) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[§]	E_f	J^π_f	Mult.[&]	δ[&]	Comments
2382.1	$3/2^{(+)}$	1528.7	31	853.4	$1/2^+$	M1+E2	+0.49 *7*	δ: from 1987Fr09.
2458.6	$(5/2\text{ to }9/2)^-$	2458.5	100	0.0	$7/2^-$	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	$11/2^+$	620.1	61 *4*	1930.6	$9/2^+$			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).
		1213.9	39 *4*	1336.8	$7/2^+$			δ: 0.00 *4* (1987Fr09) for 11/2 to 7/2. Iγ(1215)/Iγ(621)=46/54 (1987Fr09).
2579.9	(5/2)	1421.9	36	1158.0	$3/2^+$			
		1700.0	16	879.9	$5/2^+$			
		2428.2	48	151.6	$3/2^+$			
2635.5	$9/2^-,11/2^-$	806.2	17	1829.3	$11/2^-$			
		1229.4	23	1406.1	$7/2^-$			
		2635.4	60	0.0	$7/2^-$			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		1806.6		843.9	$5/2^-$			
2669	$3/2^-$	1816	56	853.4	$1/2^+$			
		2197.0	44	471.9	$3/2^-$			
2762.2	$(5/2\text{ to }9/2)^-$	2762.1	100	0.0	$7/2^-$			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		1389.1	16	1406.1	$7/2^-$			
		1951.3	39	843.9	$5/2^-$			
		2795.1	45	0.0	$7/2^-$			
2810.7	(5/2,7/2,9/2)	705.0	35 *4*	2105.7	(3/2,5/2)			Iγ(705)/Iγ(1474)=37/46 (1987Fr09).
		1473.9	46 *5*	1336.8	$7/2^+$			δ: +0.02 *4* for 9/2 (1987Fr09).
		2810.6	19 *5*	0.0	$7/2^-$			Iγ(2811)/Iγ(1474)=17/46 (1987Fr09).
2840.0	$(5/2,7/2)^+$	457.9	18	2382.1	$3/2^{(+)}$			
		1503.2	44	1336.8	$7/2^+$			
		2839.9	38	0.0	$7/2^-$			
2846		2846	100	0.0	$7/2^-$			
2862.7	$(1/2,3/2,5/2)^+$	1212.4	21	1650.3	$5/2^+$			
		1982.8	29	879.9	$5/2^+$			
		2711.0	50	151.6	$3/2^+$			
2984.1	(3/2,5/2)	1053.5[#]		1930.6	$9/2^+$			Iγ(1052)/Iγ(2104)=22 *3*/34 *5* (1970Ba51).
		1647.3	27	1336.8	$7/2^+$			Iγ(1647)/Iγ(2104)=35 *5*/34 *5* (1970Ba51).
		2104.1	28	879.9	$5/2^+$			
		2140.1	13	843.9	$5/2^-$			
		2832.4	32	151.6	$3/2^+$			I_γ: 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	$15/2^-$	1157.1 *2*	100	1829.3	$11/2^-$			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). E_γ: from 1970Sa24.

γ(^{43}Sc) (continued)

E$_i$(level)	J$^\pi_i$	E$_\gamma$[†]	I$_\gamma$[§]	E$_f$	J$^\pi_f$	Comments
3123.2	19/2$^-$	135.8 *2*	100	2987.6	15/2$^-$	E$_\gamma$: from 1970Sa24.
3139.9	13/2$^+$	1209.3	100	1930.6	9/2$^+$	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$^+$)	2278.8	21	879.9	5/2$^+$	
		3007.1	37	151.6	3/2$^+$	
		3158.7	42	0.0	7/2$^-$	
3197.6		2725.6	100	471.9	3/2$^-$	
3264.0	(7/2,9/2)$^-$	1434.7	4	1829.3	11/2$^-$	
		3263.9	96	0.0	7/2$^-$	
3293.7	7/2$^-$	1363.1	32	1930.6	9/2$^+$	
		2116.6	26	1177.0	3/2$^-$	
		2413.7	10	879.9	5/2$^+$	
		2449.7	32	843.9	5/2$^-$	
3334		2157	22	1177.0	3/2$^-$	
		2490	21	843.9	5/2$^-$	
		2862	26	471.9	3/2$^-$	
		3334	31	0.0	7/2$^-$	
3375.2	(7/2,9/2)$^-$	1492.9	16	1882.3	(5/2,9/2)$^-$	
		1545.9	19	1829.3	11/2$^-$	
		1969.1	30	1406.1	7/2$^-$	
		2038.3	12	1336.8	7/2$^+$	
		3375.1	23	0.0	7/2$^-$	
3451.2	5/2$^+$	1640.5	73	1810.7	3/2$^-$	
		2571.2	27	879.9	5/2$^+$	
3463.3	5/2$^-$	3311.6	100	151.6	3/2$^+$	
4157		1606	100	2550.7	11/2$^+$	

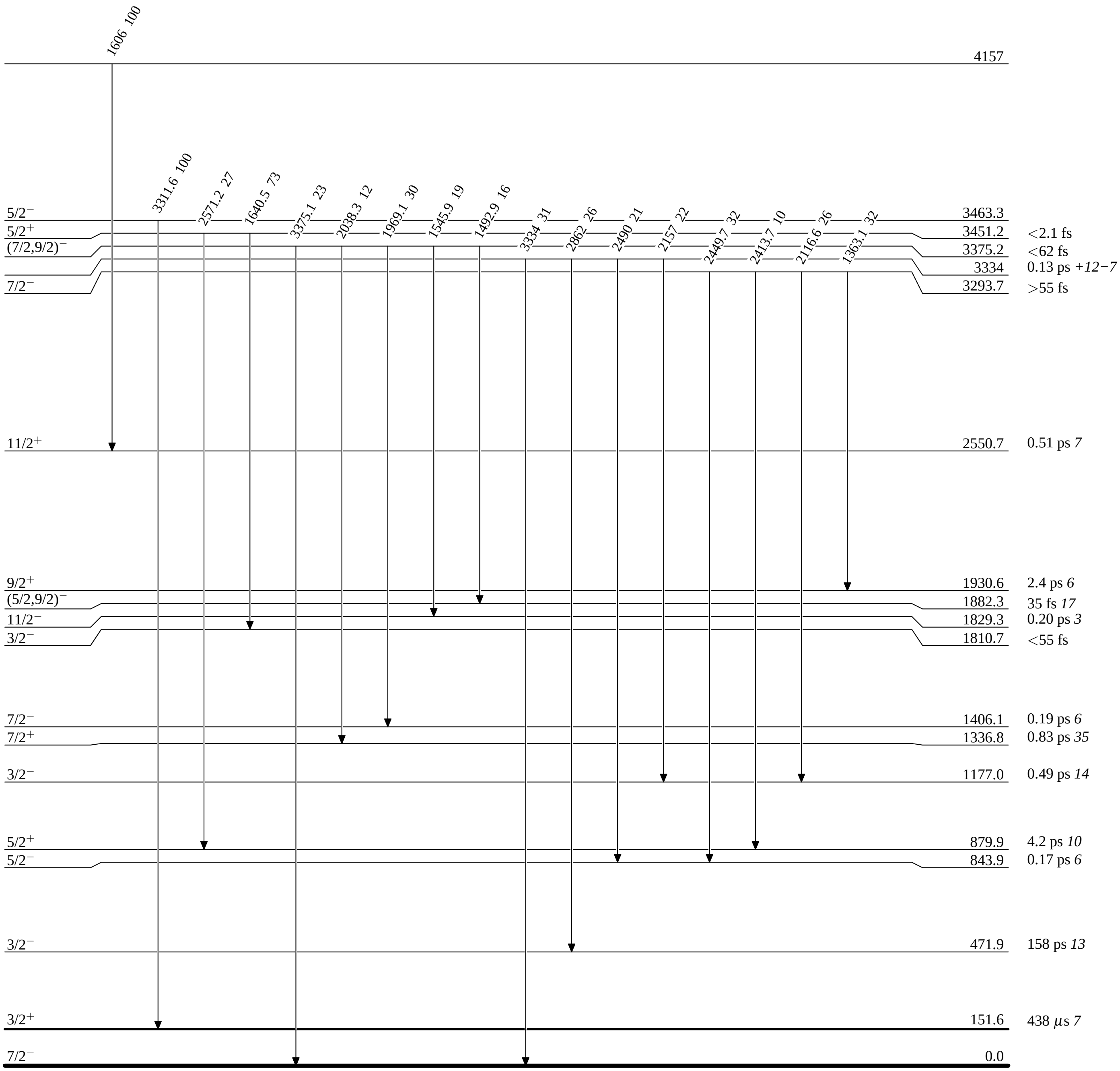
[†] Level-energy differences.
[‡] Reported only by 1967Sc08.
[§] Values quoted with uncertainties are from 1970Ba51 and/or 1972Ba04, others are from 1987Fr09.
[&] From $\gamma(\theta)$ and RUL (for E2 and M2).
[@] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
[#] Placement of transition in the level scheme is uncertain.

$^{43}_{21}$Sc$_{22}$-84

$^{40}Ca(\alpha,p\gamma)$ 1987Fr09,1972Ba04,1971Po03

Level Scheme

Intensities: % photon branching from each level

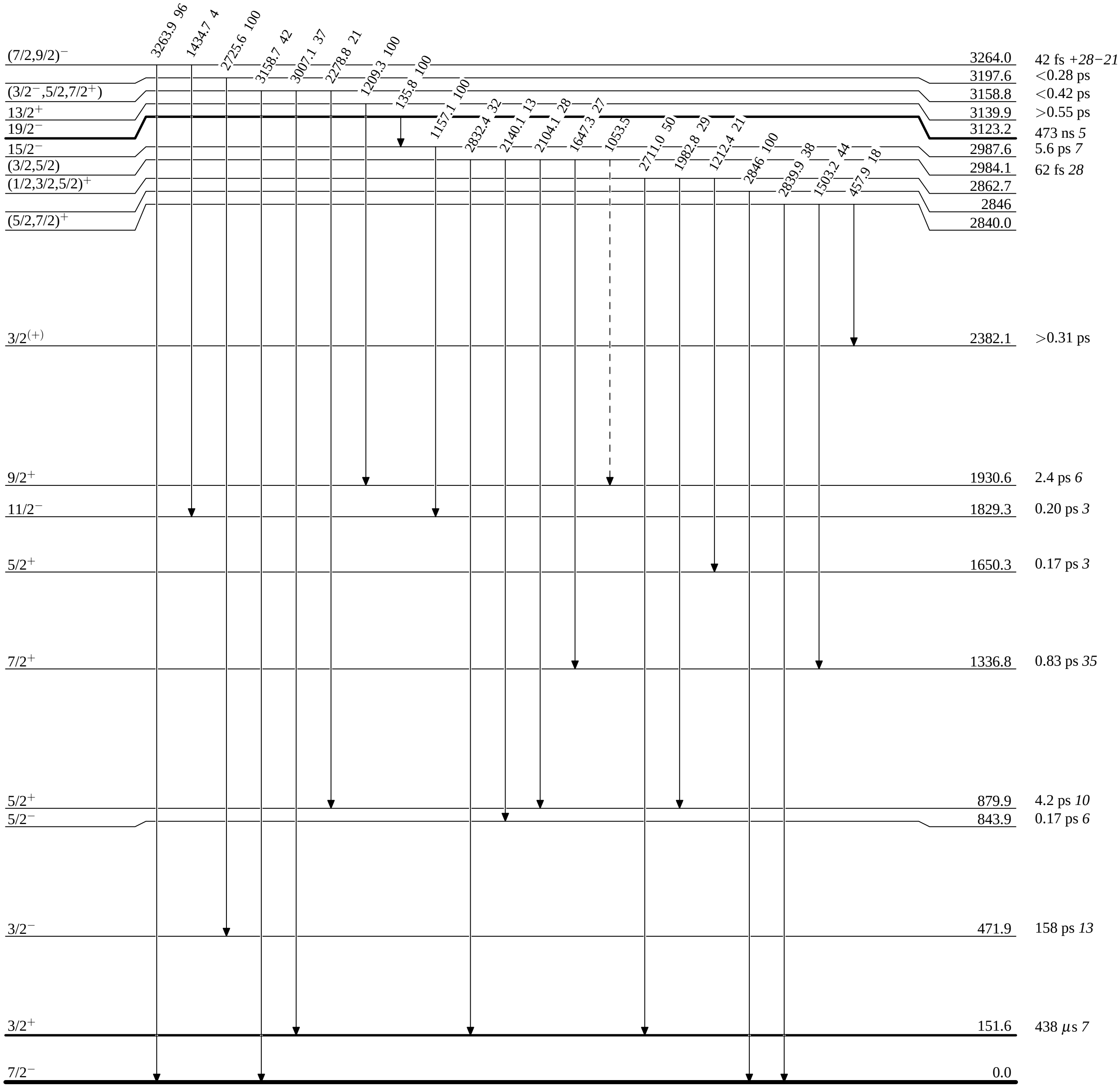


$^{43}_{21}Sc_{22}$

$^{40}Ca(\alpha,p\gamma)$ 1987Fr09,1972Ba04,1971Po03

Level Scheme (continued)

Intensities: % photon branching from each level

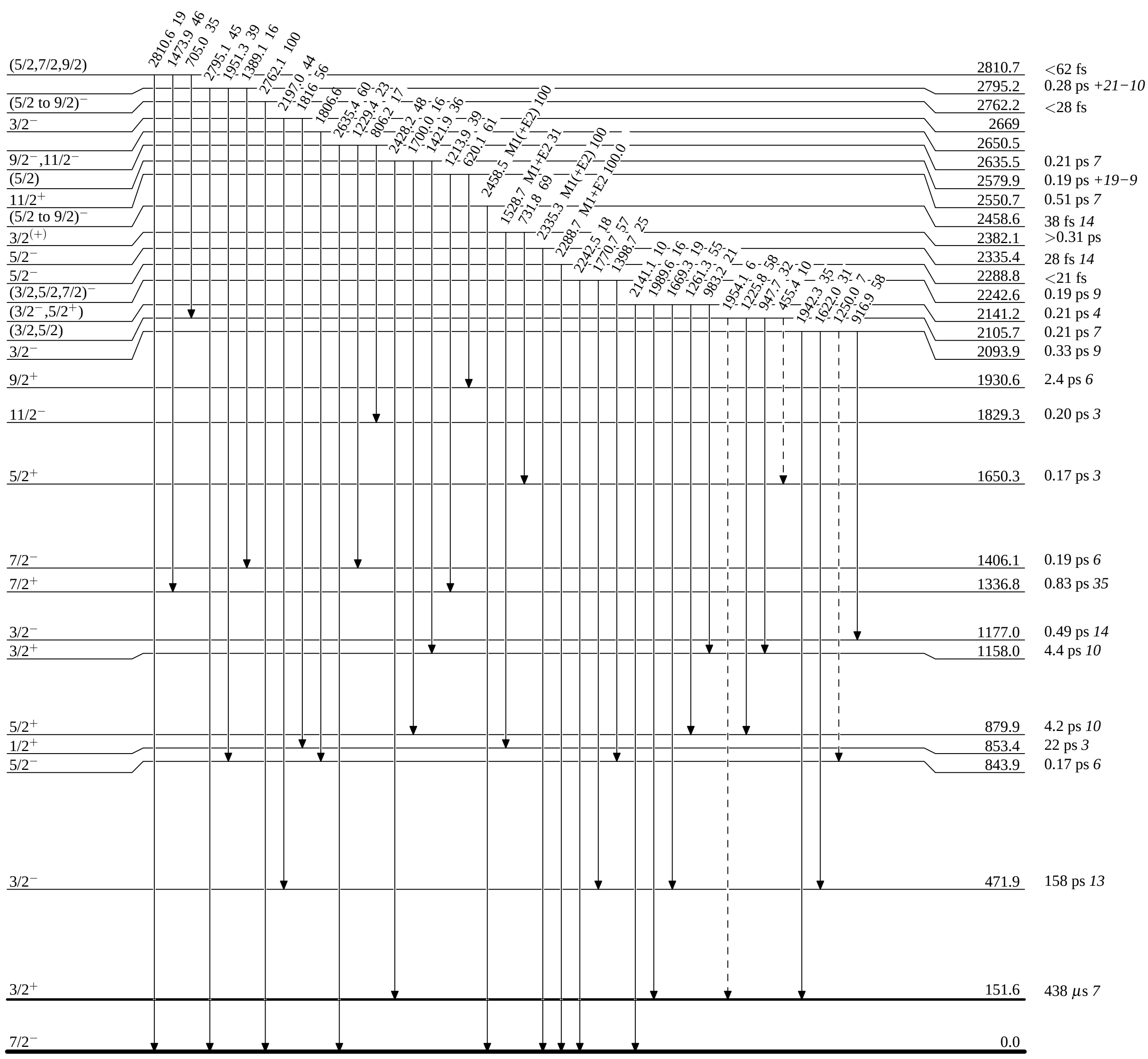


$^{43}_{21}Sc_{22}$

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

Level Scheme (continued)

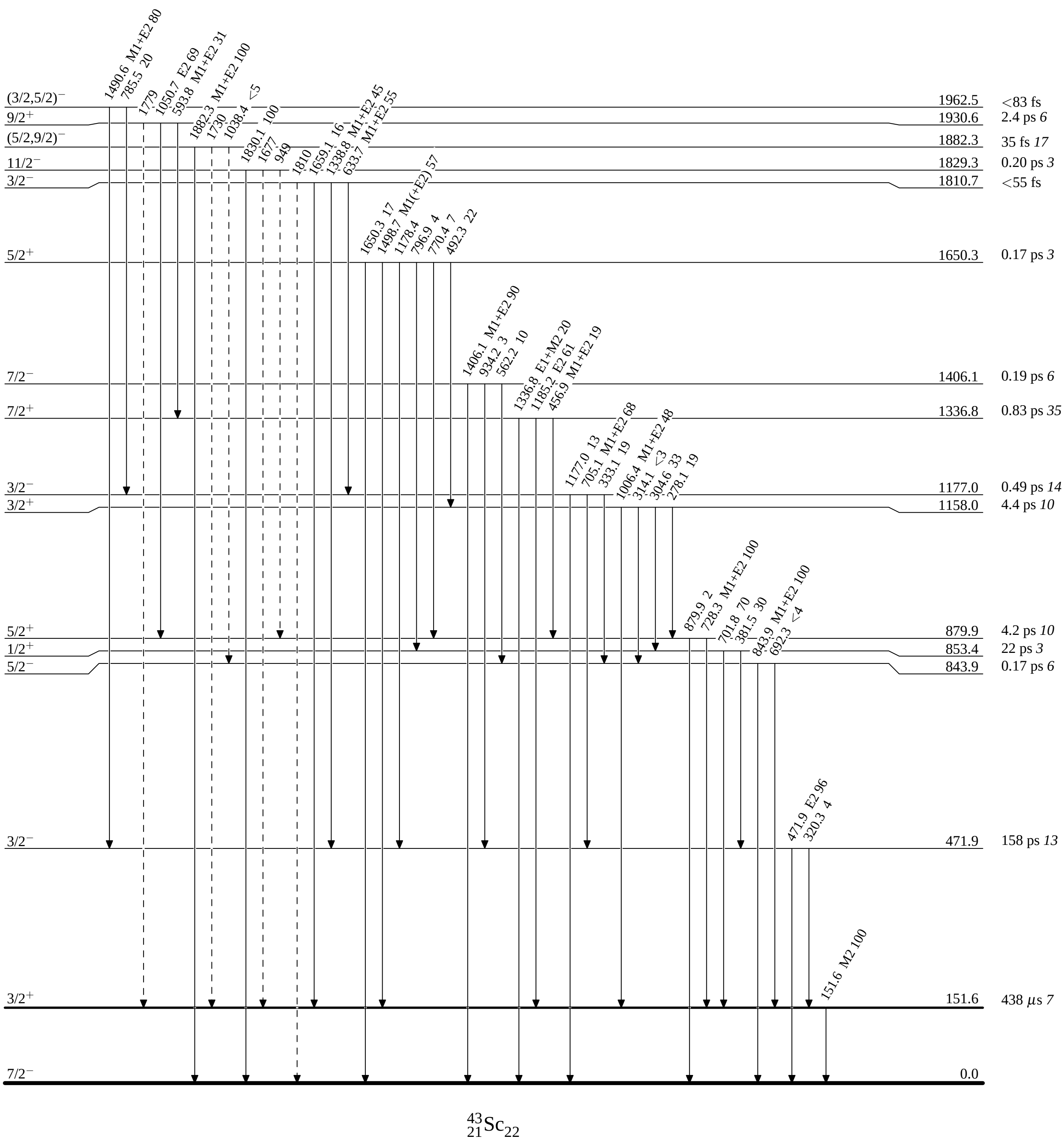
Intensities: % photon branching from each level



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

Level Scheme (continued)

Intensities: % photon branching from each level



$^{40}Ca(^{6}Li,^{3}He)$ 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 ≈75 μg/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≈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 are from 1974Li01.

^{43}Sc Levels

E(level)	J^{π}@	L	Σ (σ(exp))/Σ (σ(DWBA))#
0	7/2$^-$	3	0.36
470‡ *30*	3/2$^-$		
1180 *30*	3/2$^-$	1	1.5
1410‡	7/2$^-$		
1810† *30*	3/2$^-$	1	0.67
1830† *30*	11/2$^-$	(5)	0.38
2290 *30*	5/2$^-$	3	0.85
2620 *30*	9/2$^-$,11/2$^-$	5	0.25
2990 *30*	15/2$^-$	7	0.16
3120 *30*	(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):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)[†]	J^{π}[&]	E(p)(LAB)[@]	Relative intensity[#]	Comments
5919[‡]	3/2	1013		E(level): S(p)=4929.8 *19* (2012Wa38). E(p)(LAB): from 1965Br31.
5950[‡]	(3/2,5/2)	1044		E(p)(LAB): from 1977Di17. Absolute strength=0.67 (1977Di17).
6060[‡]	(5/2)	1157		E(p)(LAB): 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	

Continued on next page (footnotes at end of table)

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

^{43}Sc Levels (continued)

E(level)[†]	Jπ[&]	E(p)(LAB)[@]	Relative intensity[#]	Comments
6403		1509	53	
6410		1515	15	
6416		1521	50	
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	

Continued on next page (footnotes at end of table)

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

^{43}Sc Levels (continued)

E(level)[†]	Jπ[&]	E(p)(LAB)[@]	Relative intensity[#]	Comments
6877		1993	183	
6881		1997	52	
6889		2006	4	
6901		2018	37	
6906		2023	37	
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		

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

^{43}Sc Levels (continued)

E(level)[†]	Jπ[&]	E(p)(LAB)[@]	Comments
7275		2401	
7280		2406	
7285		2411	
7288		2414	
7295		2421	
7302		2428	
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 2012Wa38 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.

Continued on next page (footnotes at end of table)

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

^{43}Sc Levels (continued)

[@] Proton energies are from 1969Wa19 from 1201 to ≈2000 and from 1977Di17 above 2 MeV. 2 keV uncertainty for energies from 1969Wa19. Uncertainty in proton energies given by 1977Di17 is estimated (by the evaluators) to be about 1 keV, whereas the uncertainty in excitation energies is 2 keV, essentially due to ΔS(p).

[&] 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* (1971Po03).
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 *1*	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* (1971Po03).
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* (1971Po03).
2094.3 *3*	3/2$^-$	0.23 ps *+14−7*	
2106.4 *7*	(3/2,5/2)		
2114.3 *9*			
2141.9 *13*	(3/2,5/2$^+$)	0.17 ps *+6−4*	J$^\pi$: (7/2) from $\gamma\gamma(\theta)$ (1970Ma13), but γ to 1/2$^+$ excludes 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 *2*			
2811.2 *10*			
2840.5 *15*	(5/2,7/2)$^+$		
2846.2 *15*			
2859.7 *16*			
2875 *2*	(5/2)$^+$		

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)[†]	Jπ[‡]	$T_{1/2}$[#]	Comments
2986.7 *12*	(3/2,5/2)	53 fs *11*	
3160 *2*			
3261 *2*	$(7/2,9/2)^-$		
3290.2 *16*	$7/2^-$	<3.5 fs	
3327 *2*			
3331.4 *17*			
3374 *2*	$(7/2,9/2)^-$		
3451.7 *10*	$5/2^+$	7 fs *+7−6*	
3463 *2*	$5/2^-$		
3503 *2*	$7/2^-$		
3645.4 *18*			
3683 *2*			
3733.8 *18*			
3757 *2*			
3807 *1*	$7/2^-$	<3.5 fs	
3843 *2*			
3860 *2*			
4007 *2*	$(3/2,5/2)^+$		
4038 *2*	$7/2^-$		
4272			E(level): from 1969Wa19.
4371 *2*	$5/2^-,7/2^-$		Jπ: $7/2^+$ preferred in p$\gamma(\theta)$.
4430 *2*			
4454.7	(5/2 to 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. Jπ: from 1970Ma13.
6143	$3/2^-$		E(level): E(p)(lab)=1241.9. Jπ: 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. Jπ: 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). Jπ: from 1974Ma39.
6777	$5/2^+$		E(level): E(p)(lab)=1891.
6919	7/2		E(level): E(p)(lab)=2036.6. Jπ: 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	$(7/2^+)$		E(level): E(p)(lab)=2643. Jπ: from Adopted Levels. $9/2^+$ proposed only by 1977Di17, but γ to $3/2^+$ rules out this assignment.
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)(c.m.), where S(p)=4929.8 *19* (2012Wa38). Values of E(p)(lab) are given under comments.

‡ From Adopted Levels up to 5919 keV. For resonances, Jπ assignments are from 1977Di17, unless otherwise stated.

\# From Doppler-shift method (1971Po03).

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

γ(^{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 1970Ma13,1974Ma39) 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^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[§]	δ[§]	Comments
151.9	3/2$^+$	151.9	100	0.0	7/2$^-$			
472.3	3/2$^-$	320.3	4 *1*	151.9	3/2$^+$			
		472.3	100 *2*	0.0	7/2$^-$			
845.0	5/2$^-$	845.0	100	0.0	7/2$^-$	M1+E2	+0.18 *2*	
855.3	1/2$^+$	383.0	25 *2*	472.3	3/2$^-$			
		703.3	100 *4*	151.9	3/2$^+$			
880.5	5/2$^+$	728.5	100 *2*	151.9	3/2$^+$	M1+E2	−0.51 *7*	δ: weighted average of −0.49 *8* and −0.64 *18* (1970Ma13).
		880.5	2 *1*	0.0	7/2$^-$			
1158.3	3/2$^+$	277.8	35 *5*	880.5	5/2$^+$			δ(Q/D)=+0.23 *20*, +23 *+19−∞* or <−5.7.
		303.0	37 *5*	855.3	1/2$^+$			δ(Q/D)=+0.19 *20* or −2.9 *+13−85*.
		686.0	4 *2*	472.3	3/2$^-$			
		1006.3	100 *4*	151.9	3/2$^+$			δ(Q/D)=−1.3 *5* or +1.5 *15*.
1179.0	3/2$^-$	298.5	1	880.5	5/2$^+$			
		334.0	17 *3*	845.0	5/2$^-$			
		706.7	100 *8*	472.3	3/2$^-$			
		1027.0[&]		151.9	3/2$^+$			
		1179.0	23 *3*	0.0	7/2$^-$			
1336.3	7/2$^+$	455.8	26 *2*	880.5	5/2$^+$			
		1184.3	100 *2*	151.9	3/2$^+$			
		1336.3	20 *5*	0.0	7/2$^-$			
1408	7/2$^-$	563	16 *3*	845.0	5/2$^-$			
		936	9 *3*	472.3	3/2$^-$			
		1408	100 *4*	0.0	7/2$^-$			
1651.2	5/2$^+$	492.9	30 *3*	1158.3	3/2$^+$			δ(Q/D)=0.00 *20* or −2.4 *+12−50*.
		770.7	12 *3*	880.5	5/2$^+$			
		795.9	5 *2*	855.3	1/2$^+$			
		1499.2	100 *5*	151.9	3/2$^+$	M1(+E2)	−0.05 *18*	
		1651.2	20 *3*	0.0	7/2$^-$			
1810.3	3/2$^-$	631.3	100 *13*	1179.0	3/2$^-$			
		955.0	41 *10*	855.3	1/2$^+$			
		1338.0	90 *10*	472.3	3/2$^-$			
		1658.3	26 *8*	151.9	3/2$^+$			
1884.6	(5/2,9/2)$^-$	1004.1	21	880.5	5/2$^+$			
		1039.6	16	845.0	5/2$^-$			
		1884.6	100	0.0	7/2$^-$	D+Q		δ(Q/D)=−0.4 *+2−11* for 9/2; +(1.1 *+13−6*) for 5/2.
1931.2	9/2$^+$	594.9	19 *2*	1336.3	7/2$^+$	D+Q	−0.14 *6*	A_2=+0.63 *11*, A_4=+0.01 *12* (1977Di17).
		1050.7	100 *4*	880.5	5/2$^+$	Q		A_2=−0.38 *6*, A_4=+0.30 *6* (1977Di17).
		1931.2	1	0.0	7/2$^-$			
1962.5	(3/2,5/2)$^-$	783.5	15 *2*	1179.0	3/2$^-$			δ(Q/D)=−0.04 *25* or +(1.5 *+∞−10*).
		804.2	4 *1*	1158.3	3/2$^+$			
		1490.2	100 *2*	472.3	3/2$^-$			
		1962.5		0.0	7/2$^-$			
2094.3	3/2$^-$	915.3	100 *9*	1179.0	3/2$^-$			δ(Q/D)=0.00 *10*, +(3.7 *+25−10*) or −10 *+4−48*.
		1213.8	30 *6*	880.5	5/2$^+$			
		1239.0	55 *6*	855.3	1/2$^+$			
		1249.3	33 *6*	845.0	5/2$^-$			

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

γ(^{43}Sc) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[§]	δ[§]	Comments
2094.3	3/2$^-$	1622.0	33 *9*	472.3	3/2$^-$			
		1942.3	52 *9*	151.9	3/2$^+$			
2106.4	(3/2,5/2)	948.1	30 *4*	1158.3	3/2$^+$			
		1225.9	100 *6*	880.5	5/2$^+$			
2114.3		956.0	79 *9*	1158.3	3/2$^+$			
		1962.3	100 *13*	151.9	3/2$^+$			
2141.9	(3/2,5/2$^+$)	490.7	38	1651.2	5/2$^+$			I_γ: from Fig. 1 of 1977Di17.
		962.9	6 *3*	1179.0	3/2$^-$			
		983.6	15 *6*	1158.3	3/2$^+$			
		1261.4	100 *9*	880.5	5/2$^+$			δ(Q/D)=+0.27 *10* or −23 *+12−∞*.
		1286.6	12 *6*	855.3	1/2$^+$			
		1669.6	50 *6*	472.3	3/2$^-$			
		1989.9	74 *6*	151.9	3/2$^+$			
		2141.8[&]		0.0	7/2$^-$	D(+Q)	0.00 *4*	I_γ: 102 (1969Wa19). γ not reported by 1977Di17.
2200?		2200[&]		0.0	7/2$^-$			
2289.3	5/2$^-$	2289.2	100	0.0	7/2$^-$			
2335.8	5/2$^-$	2335.7	100	0.0	7/2$^-$			
2382.9	3/2$^{(+)}$	731.7	100	1651.2	5/2$^+$			
2552.0	11/2$^+$	620.8	100 *8*	1931.2	9/2$^+$			
		1215.7	67 *7*	1336.3	7/2$^+$			
2580.4	(5/2)	617.9[&]		1962.5	(3/2,5/2)$^-$			I_γ: 1969Wa19 report only the 617 and 1401 γs from 2580 level, with $I\gamma(617)/I\gamma(1401)$=0.33.
		1401.4[&]		1179.0	3/2$^-$			δ(Q/D)=+0.11 *10* or −5.7 *+20−80*.
		1422.1	52 *10*	1158.3	3/2$^+$			
		1699.9	40 *8*	880.5	5/2$^+$			
		2428.3	100 *13*	151.9	3/2$^+$			
2670.3	3/2$^-$	1262.3[&]		1408	7/2$^-$			I_γ: 1969Wa19 report 1260 and 1492 γs from 2670 level, with $I\gamma(1260)/I\gamma(1492)$=0.33.
		1491.3	16 *4*	1179.0	3/2$^-$			I_γ: other: 100 (1969Wa19).
		1789.8	43 *8*	880.5	5/2$^+$			
		1815.0	100 *4*	855.3	1/2$^+$			
		2197.9	45 *6*	472.3	3/2$^-$			
2796		1951	100 *9*	845.0	5/2$^-$			
		2644	33 *5*	151.9	3/2$^+$			
2811.2		1474.9	100 *10*	1336.3	7/2$^+$			
		2811.1	100 *10*	0.0	7/2$^-$			
2840.5	(5/2,7/2)$^+$	1960.0	43 *9*	880.5	5/2$^+$			
		2840.4	100 *7*	0.0	7/2$^-$			
2846.2		2846.1	100	0.0	7/2$^-$			
2859.7		1208.5	14 *5*	1651.2	5/2$^+$			
		1680.7	16 *5*	1179.0	3/2$^-$			
		1701.4	23 *7*	1158.3	3/2$^+$			
		1979.2	100 *5*	880.5	5/2$^+$			
		2707.6	75 *7*	151.9	3/2$^+$			
2875	(5/2)$^+$	2723		151.9	3/2$^+$			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)	1650.4	16	1336.3	7/2$^+$			
		1807.7	34 *8*	1179.0	3/2$^-$			
		2106.1	71 *5*	880.5	5/2$^+$			δ(Q/D)=−0.95 *50* for 5/2; +0.13 *11* or −11 *+7−∞* for 3/2.

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

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

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Comments
2986.7	(3/2,5/2)	2141.6	58 *8*	845.0	5/2⁻	
		2834.6	100 *8*	151.9	3/2⁺	δ(Q/D)=+(0.66 *+60−30*) for 5/2; 0.00 *9* or +(4.5 *+30−13*) for 3/2.
3160		2279		880.5	5/2⁺	From intensity balance, this γ-ray accounts for 25% of the total intensity, other 75% intensity is unaccounted for.
3261	(7/2,9/2)⁻	3261		0.0	7/2⁻	From intensity balance, this γ-ray accounts for 60% of the total intensity, other 40% intensity is unaccounted for.
3290.2	7/2⁻	1479.9	21 *5*	1810.3	3/2⁻	
		2111.1	100 *12*	1179.0	3/2⁻	
		2409.6	21 *7*	880.5	5/2⁺	
		2445.1	91 *9*	845.0	5/2⁻	
		3290[&]		0.0	7/2⁻	This is the only γ reported from 3290 level by 1969Wa19.
3327		3327		0.0	7/2⁻	From intensity balance, this γ-ray accounts for 70% of the total intensity, other 30% intensity is unaccounted for.
3331.4		1368.9	4 *2*	1962.5	(3/2,5/2)⁻	
		1521.1	13 *4*	1810.3	3/2⁻	
		2152.3	100 *4*	1179.0	3/2⁻	
		2173.0	44 *4*	1158.3	3/2⁺	
		2486.3	29 *6*	845.0	5/2⁻	
		2859.0	19 *4*	472.3	3/2⁻	
3374	(7/2,9/2)⁻	3374		0.0	7/2⁻	From intensity balance, this γ-ray accounts for 50% of the total intensity, other 50% intensity is unaccounted for.
3451.7	5/2⁺	2571.1	100 *7*	880.5	5/2⁺	
		2606.6	45 *7*	845.0	5/2⁻	
		3299.6	55 *7*	151.9	3/2⁺	
		3451.6	27 *9*	0.0	7/2⁻	I_γ: 1969Wa19 report this as the only γ from 3452 level.
3463	5/2⁻	2582	37 *4*	880.5	5/2⁺	
		3311	100 *7*	151.9	3/2⁺	
3503	7/2⁻	2658	100 *10*	845.0	5/2⁻	
		3503	100 *10*	0.0	7/2⁻	
3645.4		1682.9	34 *11*	1962.5	(3/2,5/2)⁻	
		1994.2	66 *13*	1651.2	5/2⁺	
		2466.3	100 *16*	1179.0	3/2⁻	
		2764.8	63 *13*	880.5	5/2⁺	
3683		2803	25 *4*	880.5	5/2⁺	
		2838	56 *5*	845.0	5/2⁻	
		3531	100 *11*	151.9	3/2⁺	
3733.8		1444.5	31	2289.3	5/2⁻	
		2325.7	83	1408	7/2⁻	
		2888.7	100	845.0	5/2⁻	
3757		3605	100 *10*	151.9	3/2⁺	
		3757	43 *7*	0.0	7/2⁻	
3807	7/2⁻	2471	24 *6*	1336.3	7/2⁺	
		2926	100 *5*	880.5	5/2⁺	A_2=−0.36 *9*, A_4=+0.11 *10* (1977Di17). δ(Q/D)=0.00 *10* for 7/2 to 5/2 transition.
		3335	35 *8*	472.3	3/2⁻	
		3807		0.0	7/2⁻	This is the only γ reported by 1969Wa19 from the 3807 level.
3843		2998		845.0	5/2⁻	From intensity balance, this γ-ray accounts for 40% of the total intensity, other 60% intensity is unaccounted for.
3860		3708		151.9	3/2⁺	From intensity balance, this γ-ray accounts for 80% of the total intensity, other 20% intensity is unaccounted for.
4007	(3/2,5/2)⁺	3126	83 *20*	880.5	5/2⁺	
		3152	100 *20*	855.3	1/2⁺	
		3535	50 *13*	472.3	3/2⁻	
		3855	100 *17*	151.9	3/2⁺	

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

γ(^{43}Sc) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Comments
4038	7/2$^-$	2107	100 *13*	1931.2	9/2$^+$	
		3566	67 *15*	472.3	3/2$^-$	
4371	5/2$^-$,7/2$^-$	2265	37 *7*	2106.4	(3/2,5/2)	
		2720	32 *10*	1651.2	5/2$^+$	
		2963	49 *12*	1408	7/2$^-$	
		3035	100 *10*	1336.3	7/2$^+$	
		3490	27 *7*	880.5	5/2$^+$	
4430		3251	100 *15*	1179.0	3/2$^-$	
		3272	75 *13*	1158.3	3/2$^+$	
		3549	75 *10*	880.5	5/2$^+$	
4454.7	(5/2 to 9/2)	4454.5	100	0.0	7/2$^-$	δ(Q/D)=+0.13 *5* for 9/2; −0.05 *5* or −5.7 *+14−35* for 5/2.
5919	3/2	2629	33	3290.2	7/2$^-$	
		3249	33	2670.3	3/2$^-$	
		3338	33	2580.4	(5/2)	
		3536	67	2382.9	3/2$^{(+)}$	
		3719[&]		2200?		
		4268	67	1651.2	5/2$^+$	A_2=−0.25 (1966Br21).
		4740	33	1179.0	3/2$^-$	A_2=−0.43 (1966Br21).
		4760	67	1158.3	3/2$^+$	A_2=−0.33 (1966Br21).
		5038	67	880.5	5/2$^+$	A_2=−0.43 (1966Br21).
		5074	100	845.0	5/2$^-$	A_2=−0.77 (1966Br21).
		5446	67	472.3	3/2$^-$	A_2=−0.15 (1966Br21).
		5767	100	151.9	3/2$^+$	A_2=−0.28 (1966Br21).
5950	(3/2,5/2)	2143[&]		3807	7/2$^-$	
		2619	62	3331.4		
		2660	19	3290.2	7/2$^-$	I_γ: 1965Br31 report this as the strongest γ-ray from this level.
		2964[&]		2986.7	(3/2,5/2)	
		3369	14	2580.4	(5/2)	
		3615	5	2335.8	5/2$^-$	
		3661	5	2289.3	5/2$^-$	
		3808	10	2141.9	(3/2,5/2$^+$)	
		3836	5	2114.3		
		3856	10	2094.3	3/2$^-$	
		3987	33	1962.5	(3/2,5/2)$^-$	
		4139	5	1810.3	3/2$^-$	
		4299	67	1651.2	5/2$^+$	
		4771	100	1179.0	3/2$^-$	
		4791	14	1158.3	3/2$^+$	
		5094	43	855.3	1/2$^+$	E_γ: 5105 from level difference in 1965Br31. I(5105γ)/I(4771γ)=0.33.
		5477	43	472.3	3/2$^-$	
		5798	43	151.9	3/2$^+$	E_γ: 5805 from level difference in 1965Br31. I(5805γ)/I(4771γ)=1.
6060	(5/2)	6060		0.0	7/2$^-$	
6103	(3/2$^-$,5/2$^+$)	2260	1.6	3843		
		2651	10	3451.7	5/2$^+$	
		2943	1.6	3160		
		3116	1.6	2986.7	(3/2,5/2)	
		3257	1.6	2846.2		
		3262	<1.6	2840.5	(5/2,7/2)$^+$	
		3961	13	2141.9	(3/2,5/2$^+$)	
		3996	5	2106.4	(3/2,5/2)	
		4695	5	1408	7/2$^-$	
		4766	8	1336.3	7/2$^+$	

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

γ(^{43}Sc) (continued)

E_i(level)	J^{π}_i	Eγ[†]	Iγ[‡]	E_f	J^{π}_f	Comments
6103	(3/2⁻,5/2⁺)	4924	3	1179.0	3/2⁻	
		5247	1.6	855.3	1/2⁺	
		5258	3	845.0	5/2⁻	
		5630	1.6	472.3	3/2⁻	
		5951	100	151.9	3/2⁺	
		6103	5	0.0	7/2⁻	
6136	3/2	2329[&]		3807	7/2⁻	
		2846[&]		3290.2	7/2⁻	
		3150[&]	30	2986.7	(3/2,5/2)	
		3466[&]	15	2670.3	3/2⁻	
		3555	35	2580.4	(5/2)	δ(Q/D)=−0.14 *7* or −2.6 *+5−7* for Jπ(res)=3/2 (1970Ma13).
		3994	24	2141.9	(3/2,5/2⁺)	
		4041	71	2094.3	3/2⁻	δ(Q/D)=+0.07 *5* or +2.7 *+6−10* for Jπ(res)=3/2 (1970Ma13).
		4173	100	1962.5	(3/2,5/2)⁻	δ(Q/D)=+0.14 *10* or −19 *+13−∞* for Jπ(res)=3/2 (1970Ma13).
		4485	35	1651.2	5/2⁺	δ(Q/D)=+0.36 *2* or +7.6 *+48−∞* for Jπ(res)=3/2 (1970Ma13).
		4957	65	1179.0	3/2⁻	δ(Q/D)=−0.36 *6* or −9.5 *+30−70* for Jπ(res)=3/2 (1970Ma13).
		4977	53	1158.3	3/2⁺	δ(Q/D)=−0.05 *3* or +4.7 *+7−20* for Jπ(res)=3/2 (1970Ma13).
		5255	41	880.5	5/2⁺	δ(Q/D)=−0.05 *3* for Jπ(res)=3/2 (1970Ma13).
		5280	18	855.3	1/2⁺	
		5291	24	845.0	5/2⁻	
		5663	24	472.3	3/2⁻	δ(Q/D)=−0.36 *2* or −7.6 *+20−38* for Jπ(res)=3/2 (1970Ma13).
		5984	100	151.9	3/2⁺	δ(Q/D)=0.00 *2* or +3.7 *5* for Jπ(res)=3/2 (1970Ma13).
6143	3/2⁻	2336	21	3807	7/2⁻	
		2853	21	3290.2	7/2⁻	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).
		3156	37	2986.7	(3/2,5/2)	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).
		3473	32	2670.3	3/2⁻	
		4048	32	2094.3	3/2⁻	δ(Q/D)=+0.13 *7* or +2.4 *5* for Jπ(res)=3/2 (1970Ma13).
		4180	26	1962.5	(3/2,5/2)⁻	δ(Q/D)=+0.06 *5* for Jπ(res)=3/2 (1970Ma13).
		4332	11	1810.3	3/2⁻	
		4964	68	1179.0	3/2⁻	δ(Q/D)=−0.17 *4* or +19 *+8−28* for Jπ(res)=3/2 (1970Ma13).
		4984	16	1158.3	3/2⁺	
		5262	11	880.5	5/2⁺	
		5287	100	855.3	1/2⁺	
		5298	53	845.0	5/2⁻	
		5670	16	472.3	3/2⁻	δ(Q/D)=0.00 *3* or +3.7 *+5−8* for Jπ(res)=3/2 (1970Ma13).
		5991	74	151.9	3/2⁺	δ(Q/D)=−0.10 *3* or +8.8 *+25−65* for Jπ(res)=3/2 (1970Ma13).
		6143	11	0.0	7/2⁻	
6182	5/2	6032		151.9	3/2⁺	
6198	(3/2,5/2⁺)	2464	16	3733.8		
		3862	20	2335.8	5/2⁻	
		4056	16	2141.9	(3/2,5/2⁺)	
		4103	52	2094.3	3/2⁻	
		4235	12	1962.5	(3/2,5/2)⁻	
		4547	48	1651.2	5/2⁺	
		5317	100	880.5	5/2⁺	
		5342	60	855.3	1/2⁺	
		5353	12	845.0	5/2⁻	
		6046	64	151.9	3/2⁺	
6217	(3/2⁻,5/2⁺)	2357	2	3860		
		2572	6	3645.4		
		2765	6	3451.7	5/2⁺	

Continued on next page (footnotes at end of table)

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

γ(^{43}Sc) (continued)

E_i(level)	J_i^π	E_γ [†]	I_γ [‡]	E_f	J_f^π	Mult. [§]	δ [§]	Comments
6217	(3/2$^-$,5/2$^+$)	3230	8	2986.7	(3/2,5/2)			
		3357	12	2859.7				
		3547	10	2670.3	3/2$^-$			
		4075	4	2141.9	(3/2,5/2$^+$)			
		4110	2	2106.4	(3/2,5/2)			
		4122	4	2094.3	3/2$^-$			
		4406	6	1810.3	3/2$^-$			
		4809	2	1408	7/2$^-$			
		4880	<2	1336.3	7/2$^+$			
		5336	6	880.5	5/2$^+$			
		5361	100	855.3	1/2$^+$			
		5744	16	472.3	3/2$^-$			
		6065	8	151.9	3/2$^+$			
		6217	8	0.0	7/2$^-$			
6247	(3/2,5/2)	2957[&]		3290.2	7/2$^-$			
		4047[&]		2200?				
		4105	50	2141.9	(3/2,5/2$^+$)			
		4152	17	2094.3	3/2$^-$			
		4284	33	1962.5	(3/2,5/2)$^-$			
		4596[&]		1651.2	5/2$^+$			
		5068	17	1179.0	3/2$^-$			
		5366	33	880.5	5/2$^+$			
		5402	83	845.0	5/2$^-$			
		6095	100	151.9	3/2$^+$			
6320	5/2$^+$	2513	11	3807	7/2$^-$			
		2868	5	3451.7	5/2$^+$			
		3333	11	2986.7	(3/2,5/2)			δ(Q/D)=−0.02 *4* for Jπ(2987)=3/2 and −0.81 *12* for Jπ(2987)=5/2 (1970Ma13).
		3739	3	2580.4	(5/2)			
		3937	2	2382.9	3/2$^{(+)}$			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).
		4178	10	2141.9	(3/2,5/2$^+$)	D+Q	+0.07 *6*	
		4669	2	1651.2	5/2$^+$			
		4983	3	1336.3	7/2$^+$			
		5141	6	1179.0	3/2$^-$	D+Q	0.00 *3*	
		5439	10	880.5	5/2$^+$	D+Q	+0.14 *5*	
		5464	10	855.3	1/2$^+$			δ(Q/D)=+0.01 *3* or −3.1 *5*.
		5475	8	845.0	5/2$^-$			
		6168	100	151.9	3/2$^+$	D+Q	+0.03 *3*	
6685	1/2$^-$	4104	13	2580.4	(5/2)			
		4590	79	2094.3	3/2$^-$			
		4722	42	1962.5	(3/2,5/2)$^-$			
		5506	38	1179.0	3/2$^-$			
		5804	33	880.5	5/2$^+$			
		5829	25	855.3	1/2$^+$			
		6212	29	472.3	3/2$^-$			
		6533	100	151.9	3/2$^+$			
6696	5/2	3013	5	3683				
		3369[&]	5	3327				
		4313	9	2382.9	3/2$^{(+)}$			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.
		4733	5	1962.5	(3/2,5/2)$^-$	D+Q	−0.47 *8*	
		5044	11	1651.2	5/2$^+$	D+Q	−0.07 *7*	

Continued on next page (footnotes at end of table)

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

γ(^{43}Sc) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[§]	δ[§]	Comments
6696	5/2	5359	11	1336.3	7/2$^+$			δ(Q/D)=−0.14 *6* or −23 +∞−12.
		5517	7	1179.0	3/2$^-$			
		5537	7	1158.3	3/2$^+$			
		5815	32	880.5	5/2$^+$	D+Q	+0.03 *3*	
		5851	7	845.0	5/2$^-$	D+Q	−0.27 *10*	
		6223	2	472.3	3/2$^-$	D+Q	+0.22 *5*	
		6544	100	151.9	3/2$^+$	D+Q	−0.14 *4*	
		6695	27	0.0	7/2$^-$	D+Q	+0.02 *4*	
6709	1/2$^-$	3722[&]	25	2986.7	(3/2,5/2)			
		4614[&]	100	2094.3	3/2$^-$			
		4747[&]	19	1962.5	(3/2,5/2)$^-$			
		6236[&]	8	472.3	3/2$^-$			
		6557[&]	17	151.9	3/2$^+$			
6777	5/2$^+$	2322	64	4454.7	(5/2 to 9/2)			
		3790	45	2986.7	(3/2,5/2)			
		4196	55	2580.4	(5/2)			
		4394	36	2382.9	3/2$^{(+)}$			
		4635	82	2141.9	(3/2,5/2$^+$)			
		5125	91	1651.2	5/2$^+$			
		5369	18	1408	7/2$^-$			
		5440	27	1336.3	7/2$^+$			
		5598	100	1179.0	3/2$^-$			
		5896	91	880.5	5/2$^+$			
		5921	45	855.3	1/2$^+$			
		5932	82	845.0	5/2$^-$			
		6304	91	472.3	3/2$^-$			
		6625	82	151.9	3/2$^+$			
6919	7/2	2464	13	4454.7	(5/2 to 9/2)			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).
		2647[&]	5	4272				γ from 1969Wa19 only.
		3076	3	3843				
		3592	6	3327				
		3658	6	3261	(7/2,9/2)$^-$			
		4044	3	2875	(5/2)$^+$			
		4123	3	2796				
		4338[&]	3	2580.4	(5/2)			δ(Q/D)=+0.32 *10* for Jπ(res)=7/2 (1970Ma13).
		5034	5	1884.6	(5/2,9/2)$^-$			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).
		5511	5	1408	7/2$^-$			δ(Q/D)=−0.04 *4* for Jπ(res)=7/2 (1970Ma13).
		6037	3	880.5	5/2$^+$			
		6074	100	845.0	5/2$^-$			δ(Q/D)=0.00 *2* for Jπ(res)=7/2 (1970Ma13).
		6446[&]	3	472.3	3/2$^-$			δ(Q/D)=+0.04 *4* for Jπ(res)=7/2 (1970Ma13).
		6917	11	0.0	7/2$^-$			δ(Q/D)=−0.29 *8* for Jπ(res)=7/2 (1970Ma13).
7344	(3/2$^-$,5/2)	3484	13	3860				
		3537	39	3807	7/2$^-$			
		3661	10	3683				
		3698	10	3645.4				
		4184	19	3160				
		5229	6	2114.3				
		5692	19	1651.2	5/2$^+$			

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

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

E_i(level)	J^π_i	E_γ†	I_γ‡	E_f	J^π_f	Comments
7344	(3/2⁻,5/2)	6007	6	1336.3	7/2⁺	
		6165	6	1179.0	3/2⁻	
		6185	6	1158.3	3/2⁺	
		6463	100	880.5	5/2⁺	
		7191	55	151.9	3/2⁺	
		7343	32	0.0	7/2⁻	
7394	(3/2⁻,5/2⁺)	2964	20	4430		
		3387	28	4007	(3/2,5/2)⁺	
		3637	8	3757		
		3931	12	3463	5/2⁻	
		3942	12	3451.7	5/2⁺	
		4519	8	2875	(5/2)⁺	
		4534	8	2859.7		
		4598	4	2796		
		4813	4	2580.4	(5/2)	
		5011	4	2382.9	3/2⁽⁺⁾	
		5252	4	2141.9	(3/2,5/2⁺)	
		5279	28	2114.3		
		5583	8	1810.3	3/2⁻	
		5742	8	1651.2	5/2⁺	
		5986	4	1408	7/2⁻	
		6057	4	1336.3	7/2⁺	
		6215	16	1179.0	3/2⁻	
		6235	40	1158.3	3/2⁺	
		6513	32	880.5	5/2⁺	
		6538	20	855.3	1/2⁺	
		6548	16	845.0	5/2⁻	
		6921	8	472.3	3/2⁻	
		7241	100	151.9	3/2⁺	
		7393	4	0.0	7/2⁻	
7512	(7/2⁺)	3141	12	4371	5/2⁻,7/2⁻	A_2=+0.28 *5*, A_4=−0.02 *5* (1977Di17). δ(Q/D)=+0.31 *6* for 9/2 to 7/2 transition.
		3474	3	4038	7/2⁻	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.
		3705	10	3807	7/2⁻	A_2=−0.31 *10*, A_4=−0.18 *10* (1977Di17). δ(Q/D)=−0.05 *6* for 9/2 to 7/2 transition.
		4671	3	2840.5	(5/2,7/2)⁺	
		4701	3	2811.2		
		4960	3	2552.0	11/2⁺	
		5580	100	1931.2	9/2⁺	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.
		5627	3	1884.6	(5/2,9/2)⁻	
		6353	5	1158.3	3/2⁺	
		6666	3	845.0	5/2⁻	
		7511	22	0.0	7/2⁻	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⁺)	3151	3	4430		
		3898	18	3683		
		4078	5	3503	7/2⁻	
		4129	8	3451.7	5/2⁺	
		4207	5	3374	(7/2,9/2)⁻	
		4721	3	2859.7		
		5439	13	2141.9	(3/2,5/2⁺)	

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

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

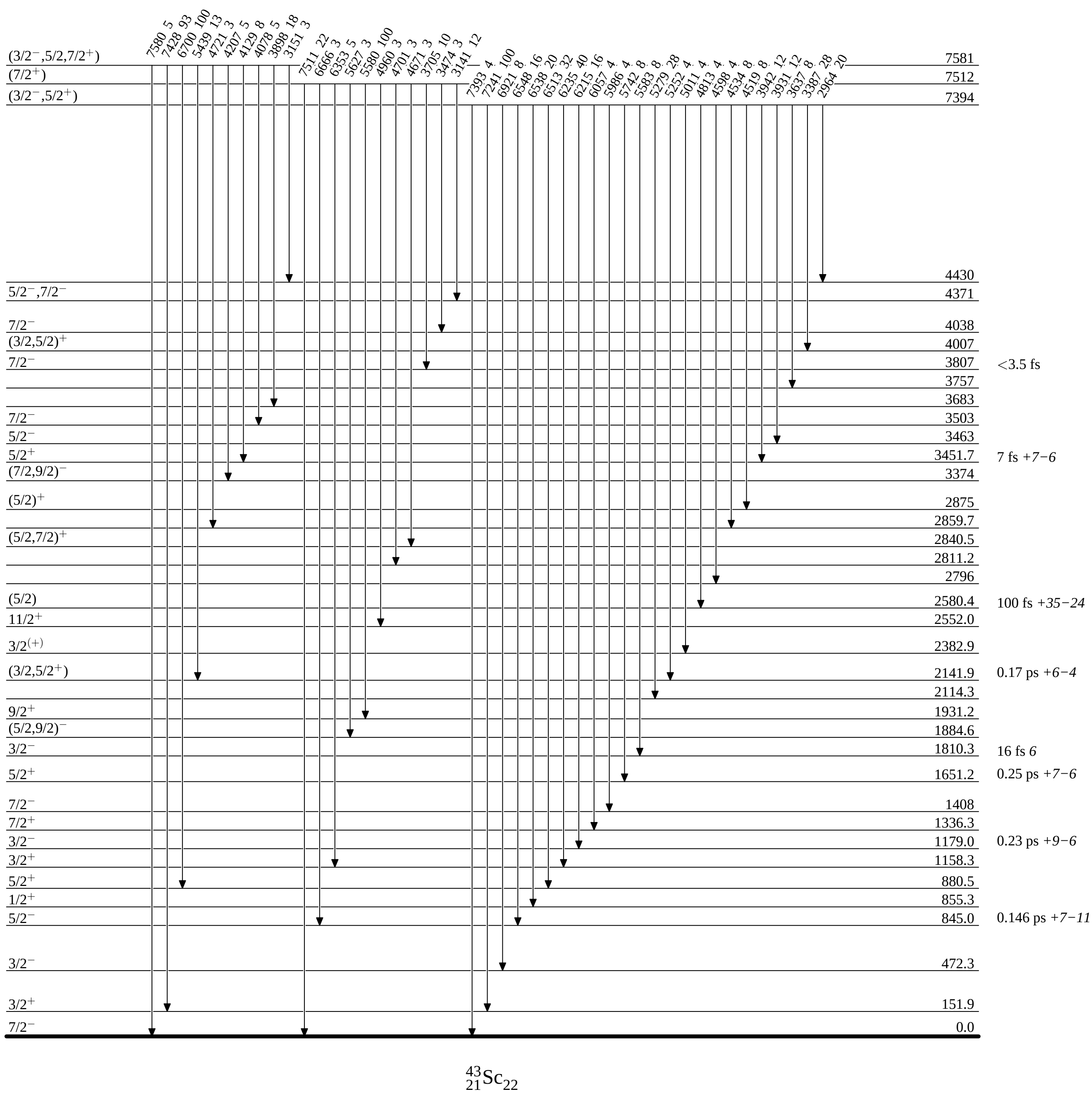
E_i(level)	J_i^π	E_γ †	I_γ ‡	E_f	J_f^π
7581	$(3/2^-,5/2,7/2^+)$	6700	100	880.5	$5/2^+$
		7428	93	151.9	$3/2^+$
		7580	5	0.0	$7/2^-$

† 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.
& Placement of transition in the level scheme is uncertain.

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

Level Scheme

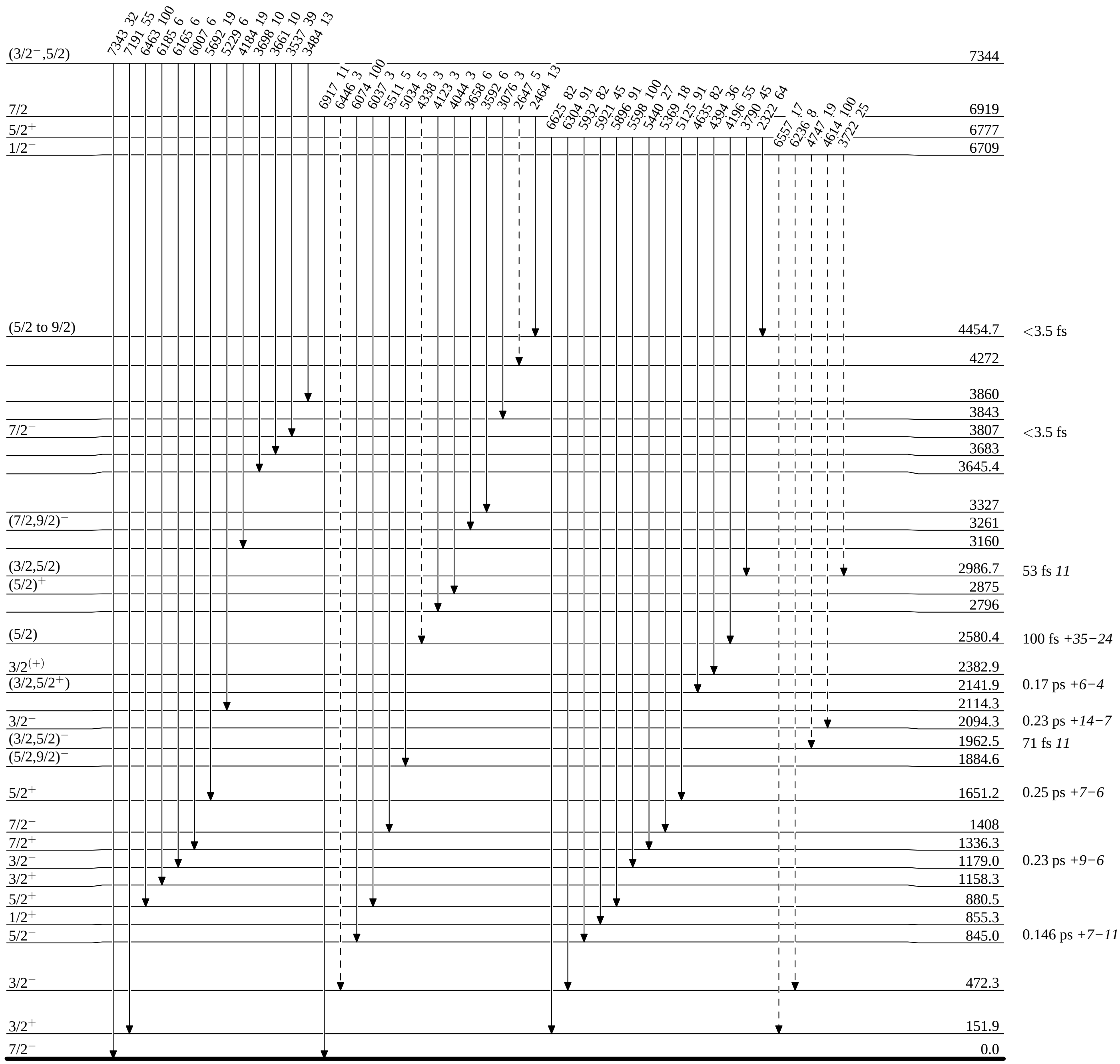
Intensities: Relative photon branching from each level



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

Level Scheme (continued)

Intensities: Relative photon branching from each level

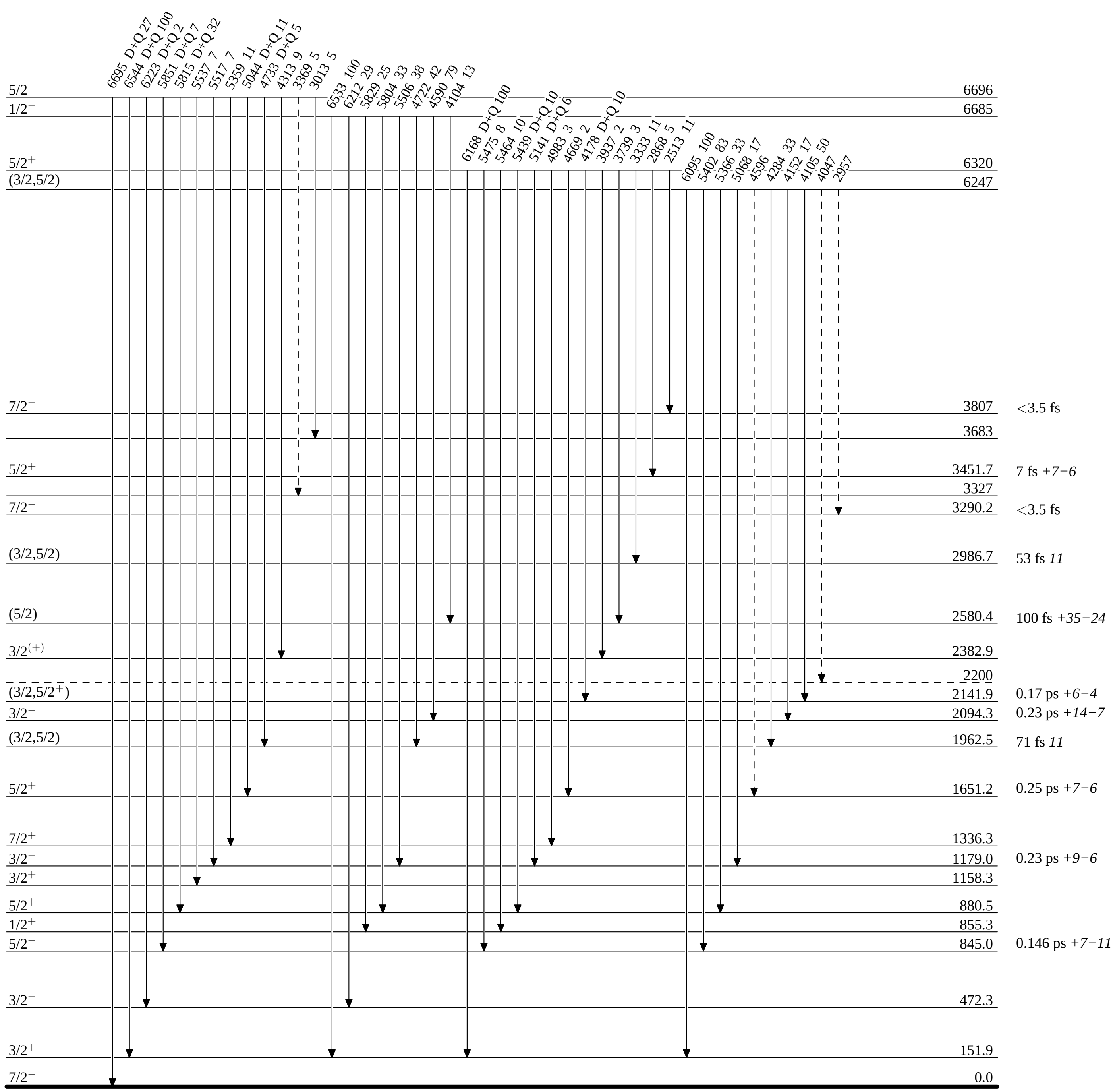


$^{43}_{21}Sc_{22}$

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

Level Scheme (continued)

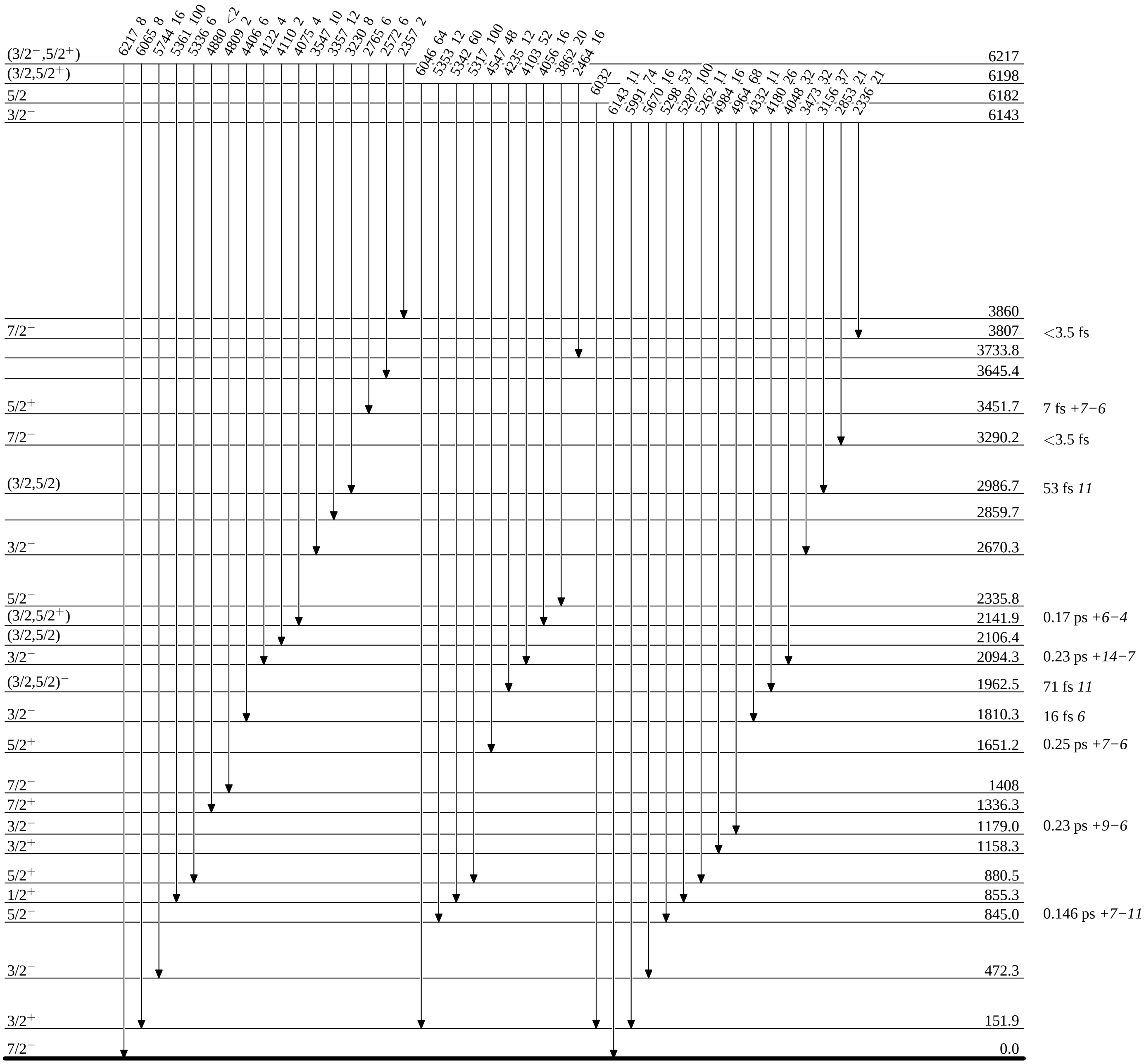
Intensities: Relative photon branching from each level



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

Level Scheme (continued)

Intensities: Relative photon branching from each level

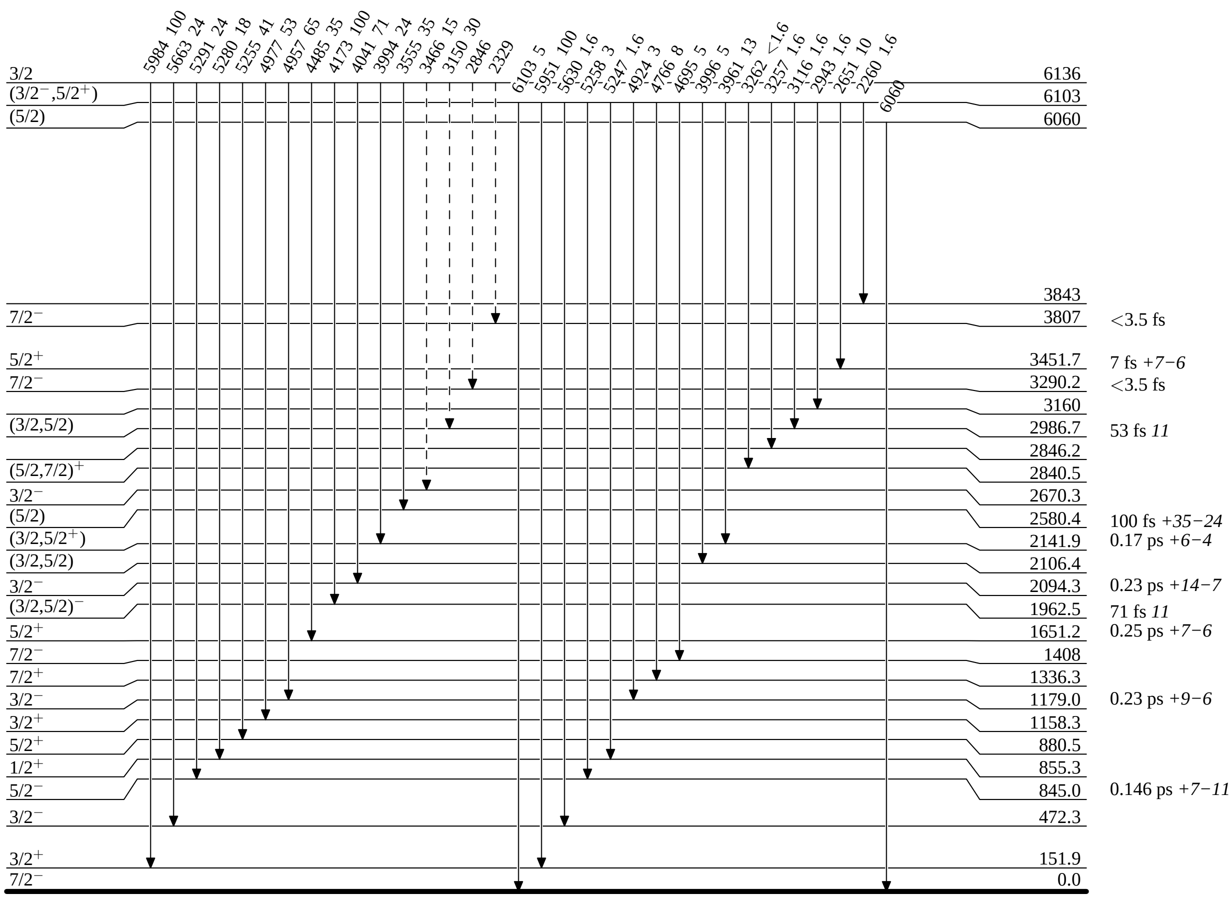


$^{43}_{21}Sc_{22}$

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

Level Scheme (continued)

Intensities: Relative photon branching from each level

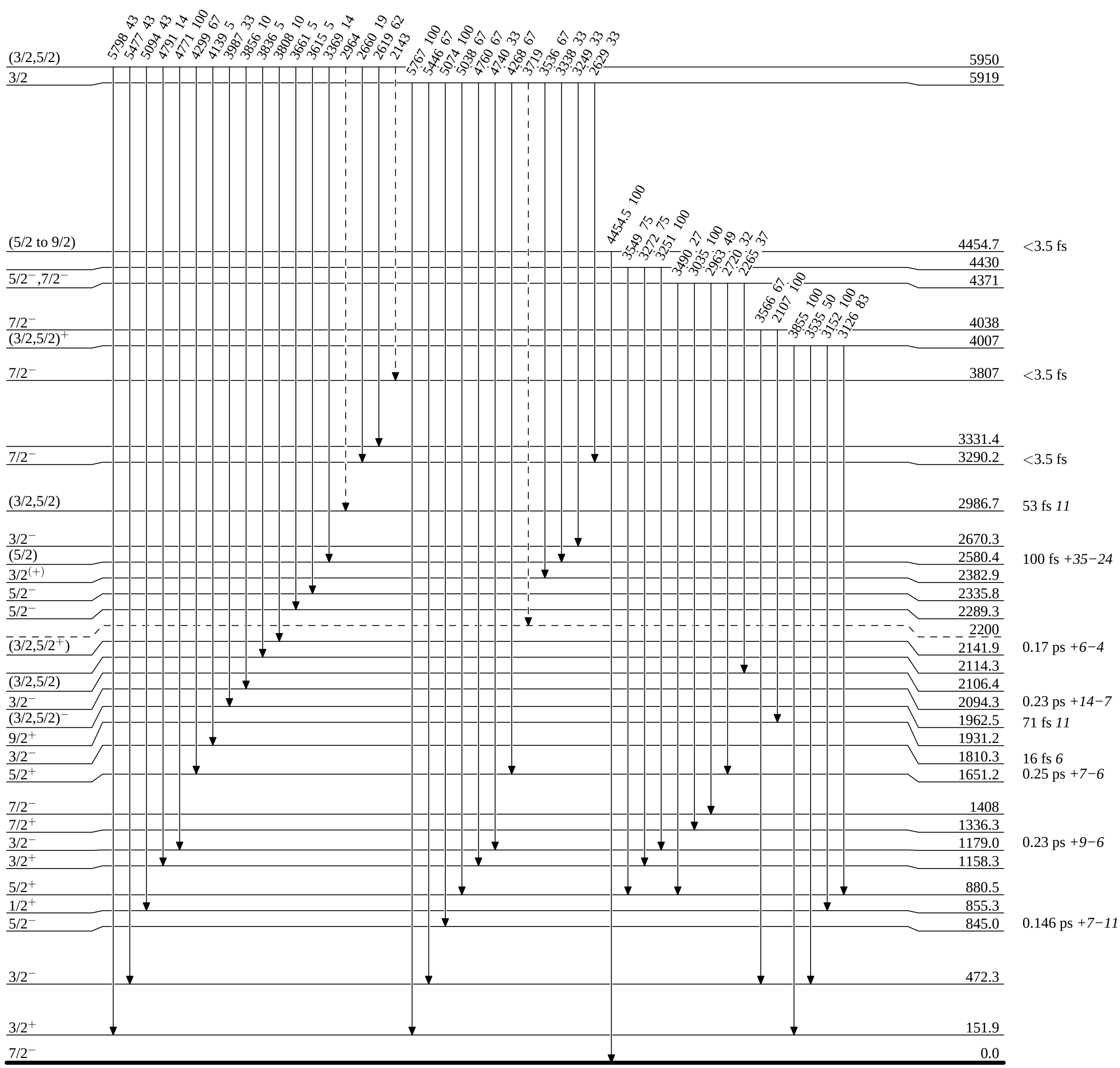


$^{43}_{21}Sc_{22}$

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

Level Scheme (continued)

Intensities: Relative photon branching from each level

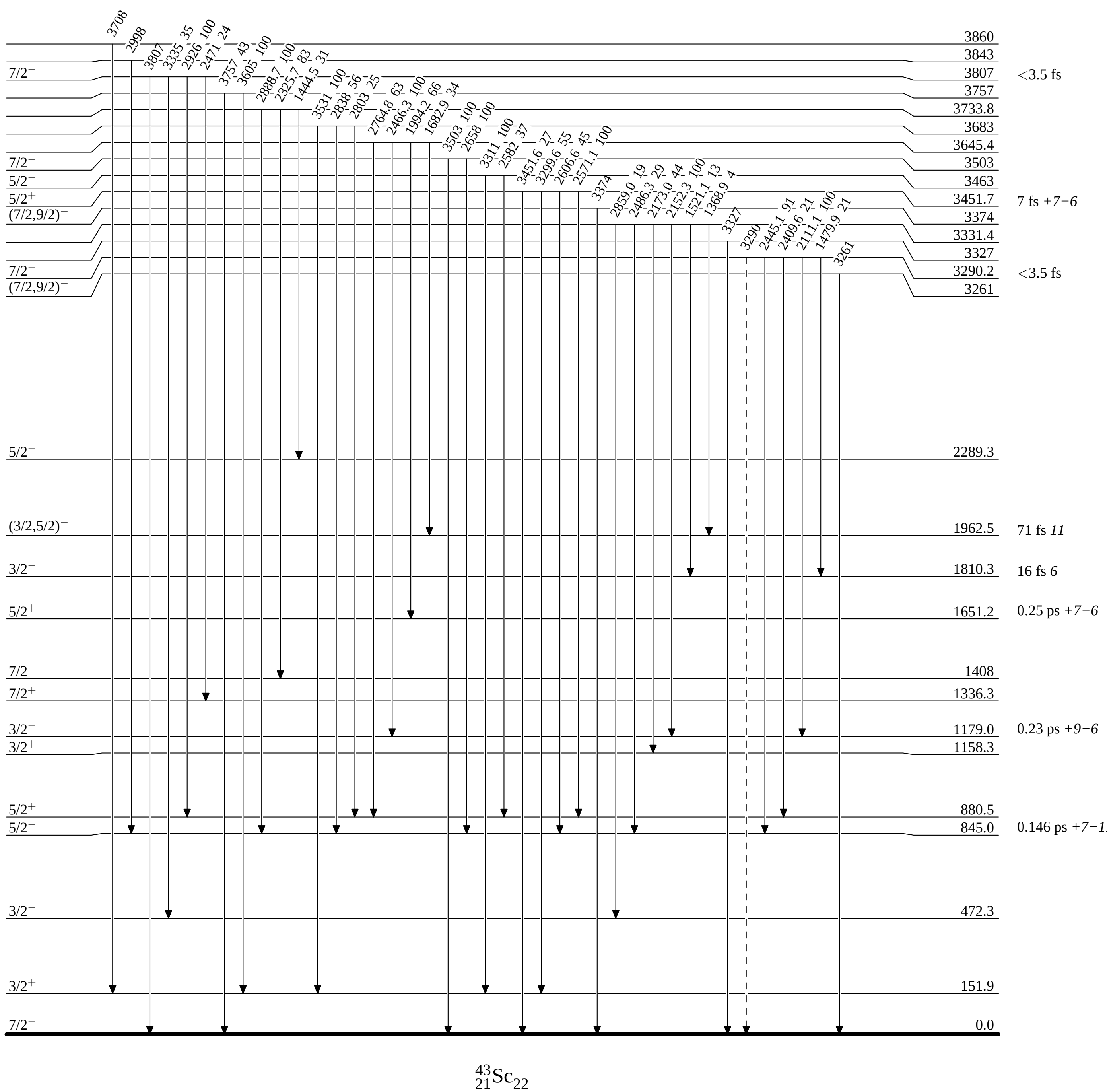


$^{43}_{21}Sc_{22}$

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

Level Scheme (continued)

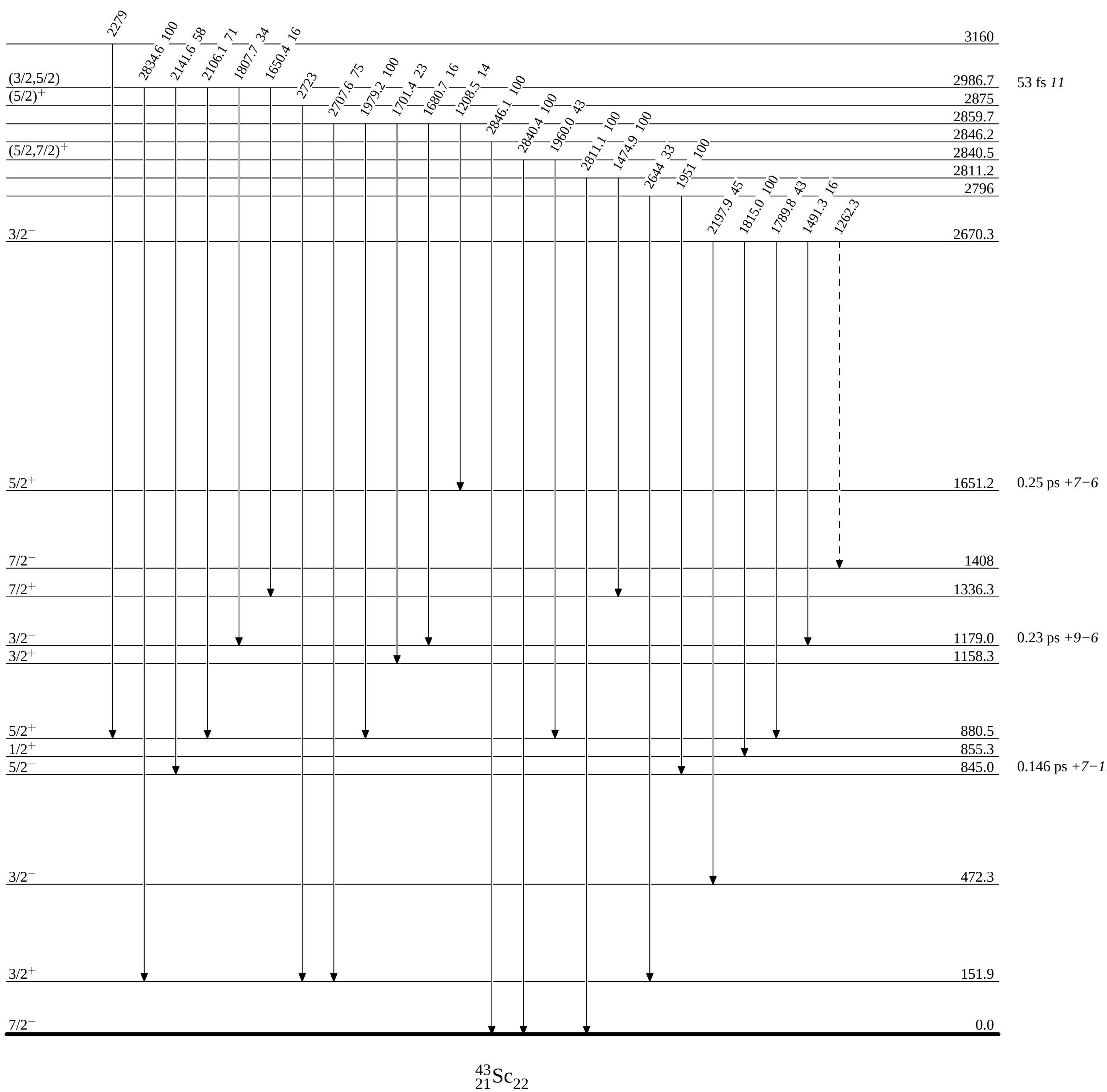
Intensities: Relative photon branching from each level



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

Level Scheme (continued)

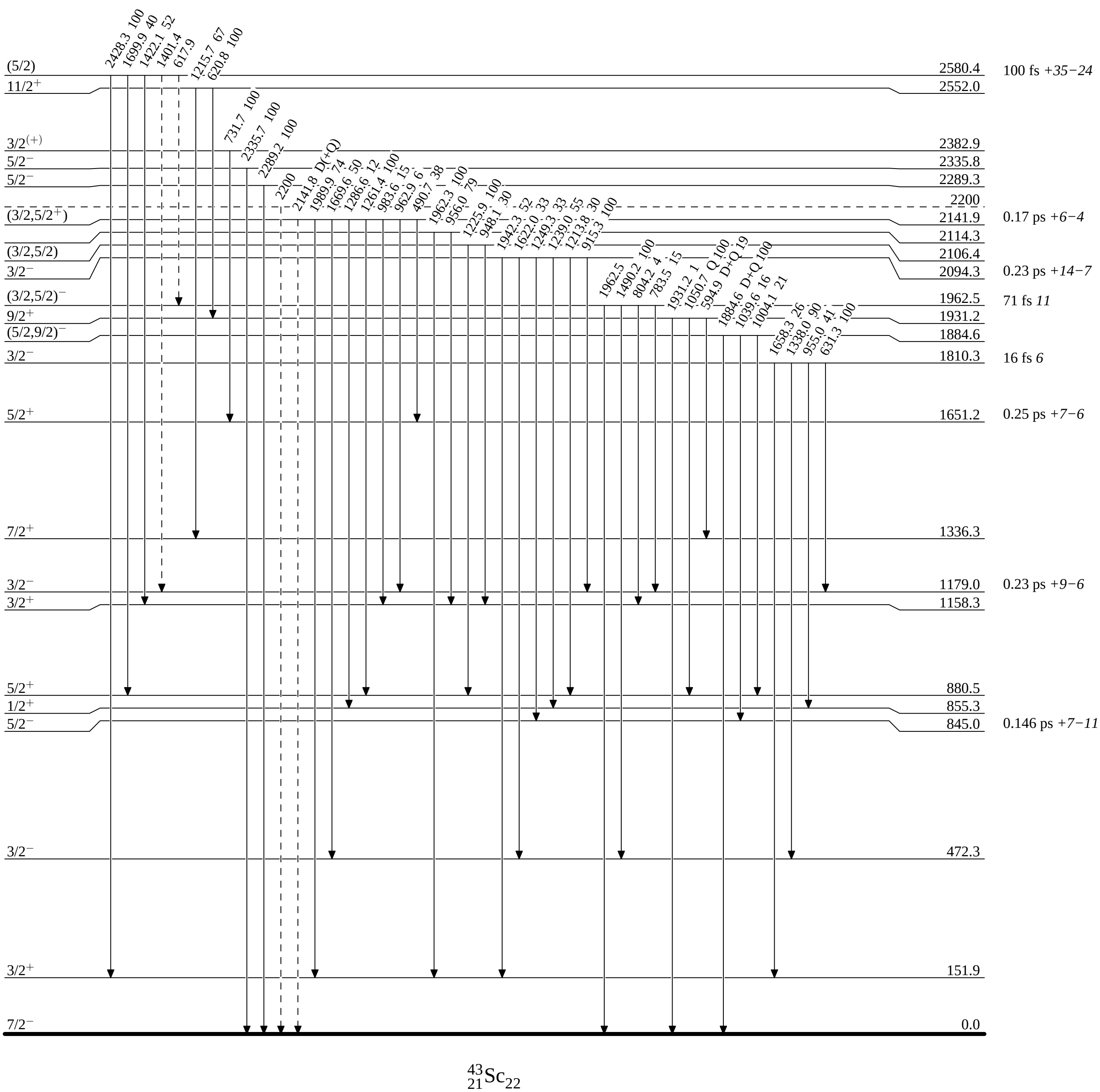
Intensities: Relative photon branching from each level



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

Level Scheme (continued)

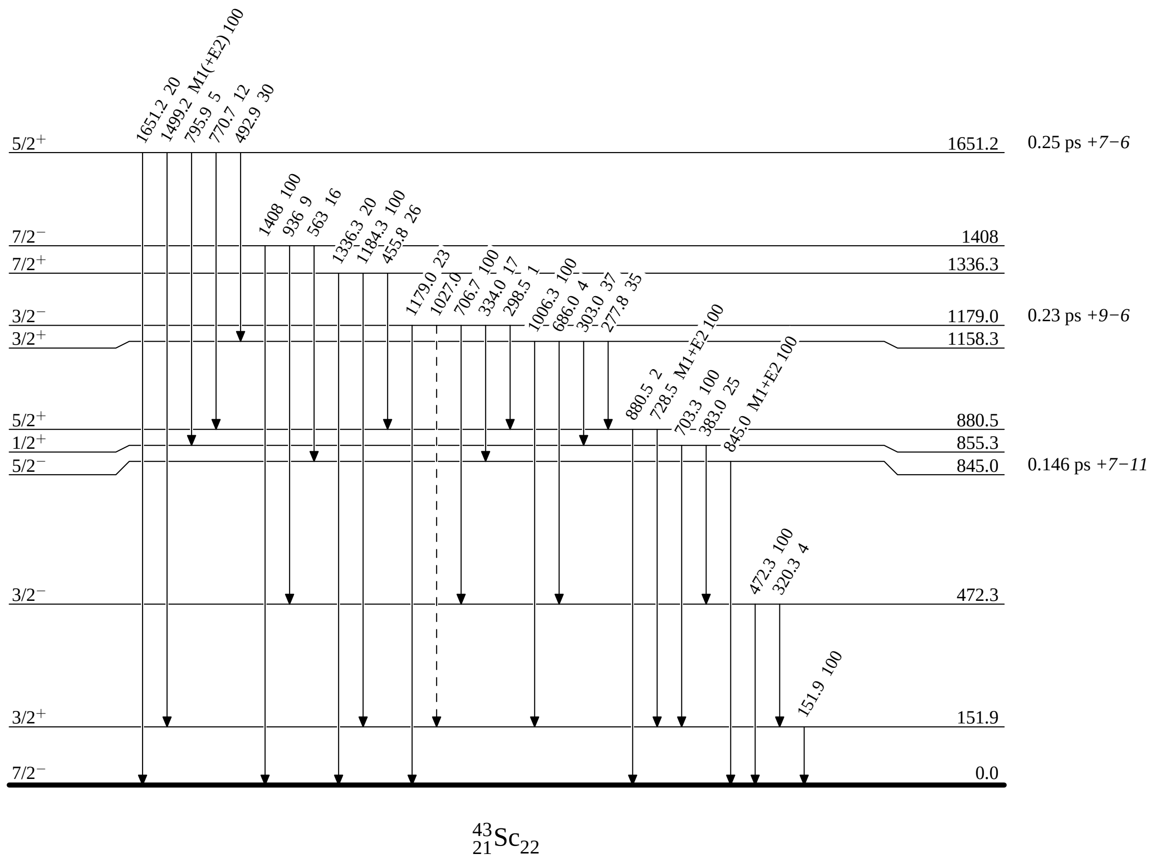
Intensities: Relative photon branching from each level



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

Level Scheme (continued)

Intensities: Relative photon branching from each level



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

S(p)=4929.8 *19* (2012Wa38).

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 σ(E,θ). 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 σ(E,θ). 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)[†]	Jπ[†#]	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).
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	

Continued on next page (footnotes at end of table)

^{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
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	
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	

Continued on next page (footnotes at end of table)

^{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
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	
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	

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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†
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. Uncertainty in proton energies is estimated to be 0.1 keV (as specified in a previous paper by 1976Wi16), whereas the uncertainty in the excitation energy is 2 keV, essentially due to ΔS(p).
‡ From 1974Ma39.
# From theoretical fits to the experimental data.

^{42}Ca(p,p′γ):resonances 1984Ka27

1984Ka27: E=3.00-3.35 MeV. Measured (inelastically) scattered protons and γ-rays, $\sigma(\theta)$. For proton spectrum, FWHM=6 keV.

^{43}Sc Levels

E(level)[†]	J$^{\pi}$[&]	E(p)(lab)[@]	Cross section (MB)[@]
8021[‡]		3165	11
8027[#]		3171	0.3
8054[#]		3198	0.4
8063[‡]		3208	37
8068[‡]	3/2$^-$	3212	27
8074[‡#]	3/2$^-$	3220[a]	51
8093[‡#]		3237[b]	20
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 2012Wa38 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 $\sigma(\theta)$.
a σ=2.9 mb for scattering from 1837, 0$^+$.
b σ=1.1 mb for scattering from 1837, 0$^+$.

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

Target ^{42}Ca Jπ=0$^+$.

1971Bo04: E=5.0-6.05 MeV deuteron beam was produced from the εN 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 $\sigma(E_n,\theta)$. 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 $\sigma(E_n,\theta)$. Deduced levels, spectroscopic factors from DWBA analysis.

1992NaZN: E=25 MeV. Measured $\sigma(\theta)$, 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 $\sigma(\theta)$.

^{43}Sc Levels

E(level)[†]	L[#]	(2J+1)C^{2}S[‡]	Comments
0	3	4.0	(2J+1)C^{2}S: other: 4.1 (1992NaZN).
152 *12*	2	1.1	(2J+1)C^{2}S: other: 0.91 (1992NaZN).
475 *11*	1	0.31	(2J+1)C^{2}S: other: 0.30 (1992NaZN).
860 *10*	0	0.14	(2J+1)C^{2}S: other: 0.64 (1992NaZN).
1177 *9*	1	0.72	(2J+1)C^{2}S: other: 0.69 (1992NaZN).
1395 *13*			
1817 *9*	1	0.40	(2J+1)C^{2}S: other: 0.35 (1992NaZN).
1947 *13*	1	0.04	L,(2J+1)C^{2}S: L=0, S=0.03 (1968Gr06).
2117 *9*	(1)	0.08	(2J+1)C^{2}S: other: 0.085 (1992NaZN).
2310 *10*	3	1.3	(2J+1)C^{2}S: other: 1.1 (1992NaZN).
2657 *10*	(0)	0.05	E(level): from 1971Bo04 and 1992NaZN. (2J+1)C^{2}S: other: 0.18 (1992NaZN).
2830[@]	1+3[@]	0.020,0.11[@]	(2J+1)C^{2}S: for p3/2 and f5/2.
2930[@]	2[@]	0.070,.054[@]	
2977 *11*			
3330[@]	3[@]	0.34,0.28[@]	
3460	2	0.25,0.20	E(level): from 1971Bo04 and 1992NaZN. L,(2J+1)C^{2}S: from 1992NaZN.
3630 *9*			
3683 *9*	3	0.90	(2J+1)C^{2}S: other: 0.84,0.61 (1992NaZN).
3940	3	0.80,0.60	E(level): from 1971Bo04 and 1992NaZN. L,(2J+1)C^{2}S: from 1992NaZN.
4011 *12*			
4243 *9*	3	2.2	(2J+1)C^{2}S: 1978En02 give (2J+1)S=6.5 with C^2=2 for T=3/2. Other: 1.5 (1992NaZN).
4379 *9*	3	0.8	(2J+1)C^{2}S: other: 0.50,0.37 (1992NaZN).
4580 *15*			
4670 *9*	1	0.13	
4725 *9*	1	0.13	(2J+1)C^{2}S: 1978En02 give (2J+1)S=0.38 with C^2=2 for T=3/2. Other: 0.33,0.34 (1992NaZN).
4898 *9*	(1)	0.21	E(level),L,(2J+1)C^{2}S: 1992NaZN give L=2, S=0.33,0.27 for a 4910 group.
5026 *9*	1	0.47	(2J+1)C^{2}S: other: 0.56,0.56 (1992NaZN).
5260[@]	1[@]	0.13,0.13[@]	
5511 *9*	1	0.37,0.38	L,(2J+1)C^{2}S: from 1992NaZN for a 5540 group.
5647 *9*	1	0.11	
5715 *9*	1	0.16	(2J+1)C^{2}S: other: 0.37,0.38 (1992NaZN).
5826 *9*			
5988 *9*			
6041 *9*	1	0.08	(2J+1)C^{2}S: other: 0.26,0.27 (1992NaZN).
6155 *9*	1	1.15	(2J+1)C^{2}S: 1978En02 give (2J+1)S=3.4 with C^2=2 for T=3/2. Other: S=1.7 (1992NaZN).

Continued on next page (footnotes at end of table)

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

^{43}Sc Levels (continued)

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

† 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 E(n) 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 1972BrXX): no details are available.

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

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

dσ/dΩ (max) mb/sr (1971Bo04)

E(level)	cross section	E(level)	cross section
0	4.13	4662	1.84
154	1.28	4712	1.77
470	5.35	4765	0.22
851	2.07	4810	0.76
1179	14.2	4887	2.25
1809	6.70	5007	4.86
1958	0.71	5187	0.76
2097	1.10	5258	1.07
2291	1.41	5317	0.25
2657	0.69	5490	0.62
2681	0.53	5530	0.47
2978	0.08	5633	1.58
3330	1.24	5724	3.12
3474	0.27	5819	0.52
3613	0.59	5871	0.64
3673	1.77	5921	1.52
3786	0.11	5964	0.75
3939	0.30	6024	1.35
3956	0.15	6079	1.40
3985	0.29	6145	10.3
4234	5.49	6384	0.50
4363	0.62	6444	0.81
4388	0.65	6704	5.54
4555	0.61	6811	1.20
4584	0.21	6917	0.33

^{43}Sc Levels

E(level)[†]	L[‡]	(2J+1)C^{2}S[#]	Comments
0.0	3	4.4	(2J+1)C^{2}S: 6.4 (1966Sc17).
154 *10*	2	0.95	(2J+1)C^{2}S: 1.05 (1966Sc17).
470 *10*	1	0.30	(2J+1)C^{2}S: 0.57 (1966Sc17).
846[@] *8*			
851 *10*	0	0.11	E(level): 856 (1966Sc17), 857 (1968Br08). (2J+1)C^{2}S: 0.38 (1966Sc17).
876[@] *8*			
1179 *10*	1	0.81	(2J+1)C^{2}S: 1.4 (1966Sc17).
1647 *10*			E(level): from 1966Sc17. Not reported by 1971Bo04.

Continued on next page (footnotes at end of table)

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

^{43}Sc Levels (continued)

E(level)[†]	L[‡]	(2J+1)C^{2}S[#]	Comments
1809 *10*	1	0.45	(2J+1)C^{2}S: 0.57 (1966Sc17).
1958 *10*	1	0.04	
2097 *10*	1	0.07	(2J+1)C^{2}S: 0.10 (1966Sc17).
2120?[@] *10*			
2291 *10*	3	1.6	(2J+1)C^{2}S: 1.3 (1966Sc17).
2339[@] *10*			
2395[@] *10*			
2606[@] *10*			
2657 *10*	0	0.06	
2681 *10*			
2875[@] *10*			
2978 *10*			
3191[@] *10*			
3258[@] *10*			
3330 *10*	3	0.25	
3452[@] *10*			
3474 *10*	3	0.13	
3500[@] *10*			
3613 *10*			
3673 *10*	3	0.85	(2J+1)C^{2}S: 0.67 (1966Sc17).
3786 *10*			
3939 *10*	3	0.11	
3956 *10*			
3985 *10*			
4234 *10*	3	2.2	(2J+1)C^{2}S: 2.1 (1966Sc17) 1978En02 quote (2J+1)S=5.5 for T=3/2.
4363 *10*	3	0.17	
4388 *10*	3	0.24	
4555 *10*			
4584 *10*			
4662 *10*	1	0.15	
4712 *10*	1	0.13	(2J+1)C^{2}S: 1978En02 quote (2J+1)S=0.32 for T=3/2.
4765 *10*	1	0.02	
4810 *10*	1	0.07	
4876[@] *10*			
4887 *10*	1	0.21	
4927[@] *10*			
5007 *10*	1	0.35	
5187 *10*			
5258 *10*	1	0.14	
5317 *10*			
5446[@] *10*			
5490 *10*	1	0.07	
5530 *10*	1	0.05	
5633 *10*	1	0.16	
5724 *10*	1	0.31	
5819 *10*			
5871 *10*			
5921 *10*			
5964 *10*			
6024 *10*	1	0.16	
6079 *10*			
6105[@] *10*			

Continued on next page (footnotes at end of table)

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

^{43}Sc Levels (continued)

E(level)†	L‡	(2J+1)C^2S#	Comments
6145 *10*	1	1.4	(2J+1)C^2S: 1978En02 quote (2J+1)S=3.5 for T=3/2.
6282 *10*			E(level): from 1966Sc17, not reported by 1971Bo04.
6384 *10*			
6444 *10*			
6704 *10*	(1)		
6811 *10*			
6917 *10*			

† 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 $\approx$15$-\mu$m and $\approx$100$-\mu$m silicon surface barrier detectors, FWHM$\approx$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^{π} †	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 Levels.

^{43}Ca(p,n),(p,nγ) 1967Mc07

1967Mc07: (p,n): 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: (p,n): E<4.9 MeV. Measured σ(E). Deduced levels.

1971De17: (p,n): E<5.6 MeV. Measured σ(E).

1972Bi13: (p,nγ): measured ce, deduced α(expt) for 152γ.

^{43}Sc Levels

E(level)[†]
0
152[‡] *5*
476[#] *5*
855[@] *5*
881 *5*
1175 *10*
1347 *10*
1424 *10*
1677 *15*

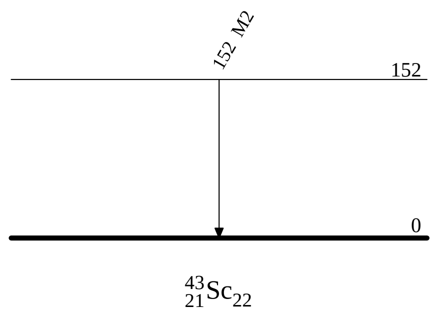
[†] From 1967Mc07.
[‡] 138 *8* (1960Mc12).
[#] 456 *10* (1960Mc12).
[@] 874 *10* (1960Mc12).

γ(^{43}Sc)

E_γ	E_i(level)	E_f	Mult.	Comments
152	152	0	M2	Mult.: from α(expt)=0.041 *4* (1972Bi13).

^{43}Ca(p,n),(p,nγ) 1967Mc07

Level Scheme



^{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 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 are from 1971Al19 unless otherwise noted.

^{43}Sc Levels

E(level)	dσ/dΩ (30°) (μb/sr)	E(level)	L	dσ/dΩ (30°) (μb/sr)
0[@]	28.9	2983 *4*		16.3
152[†]	1.7	3120 *4*		15.4
473[†]	0.8	3254 *4*		9.9
846[†]	<1.1[#]	3324 *4*		9.6
856[†]	<1.1[#]	3464[‡] *8*		7.7
880[†]	<1.1[#]	3667 *8*		
1178 *4*	3.9	3843 *8*		7.4
1402 *4*	1.5	3894 *8*		13.9
1810[†]	0.8	3931 *8*		7.1
1826 *4*	9.2	4128?[&] *8*		3.2
1881 *4*	6.5	4230[a] *8*	0	46.8
2244[†]	0.6	4276 *8*		3.5
2284[@] *4*	11.6	4343 *8*		3.0
2333[†]	0.7	4371[‡] *8*		18.9
2455[‡] *4*	16.7	4511 *8*		8.8
2620?[†]	<0.5	4658[‡] *8*		
2630 *4*	6.3	4766 *8*		8.8
2670[†]	1.2	4821[b] *8*	2	4.4
2756[@] *4*	4.7	4871 *8*		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.
& Possible contaminant.
a 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).
b Probable IAS of 593, 3/2^{-} in ^{43}Ca.

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

Jπ(^{45}Sc g.s.)=7/2^{-}.
1977SaZF: E=40 MeV. Measured $\sigma(\theta)$, 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 $\sigma(E_t,\theta)$.Deduced levels, L from DWBA analysis.
1972KrZD: E=27 MeV. Measured $\sigma(\theta)$.

^{43}Sc Levels

E(level)[†]	L[‡]	E(level)[†]	L[‡]	E(level)[†]	L[‡]	E(level)[†]	L[‡]
0	0[c]	2337 *10*	2[c]	3257 *10*	4	3949 *10*	3
470[#] *10*	2	2460 *10*	2[c]	3290 *10*	2	4015 *10*	5
850[#] *10*	2	2549 *10*	(5,6)	3328 *10*	2	4049 *10*	4
1180[#] *10*	2	2633 *10*	2	3373 *10*	2	4138 *10*	5
1410[#] *10*	0[c]	2670 *10*	2	3448 *10*	5	4169 *10*	4
1811[@]	2	2760[b] *10*	4[b]	3480 *10*	3	4211 *10*	3
1830[#] *10*	2[c]	2793 *10*	2	3509 *10*	0	4239 *10*	0[c]
1880[#] *10*	2[c]	2838 *10*	5	3676 *10*	3	4650[#] *10*	
1933[@]	5	2859 *10*	3	3700 *10*	6	5236[a] *10*	
2110[&] *10*	(3+5)	2984 *10*	4	3771 *10*	5		
2246 *10*	2	3123 *10*	6	3807 *10*	5		
2291 *10*	4	3205 *10*	(4)	3848 *10*	5		

† 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.
& Doublet.
a 5250 (1973Se01).
b L=3 for a 2780 group (1973Se01).
c 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 $\sigma(\alpha,\theta)$ and $A_y(\theta)$. 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×σ(DWBA), where N=47.2×10^6 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*	3/2$^+$ [a]		σ(exp)/σ(theory)=0.75.
479 *5*			
840[‡]	5/2$^-$ [&]		
856 *8*	1/2$^+$ [a]		σ(exp)/σ(theory)=2.5.
884 *8*			
1188 *8*			
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$^-$	≤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.

Continued on next page (footnotes at end of table)

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

^{43}Sc Levels (continued)

[&] $\sigma(\theta)$ 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.

Adopted Levels, Gammas

$Q(\beta^-)=-11400$ *40*; S(n)=12288 *7*; S(p)=4489 *7*; $Q(\alpha)=-4463$ *7* 2012Wa38
S(2n)=29766 *29*, S(2p)=8761 *7*, $Q(\varepsilon p)=1937$ *7* (2012Wa38).
1988Kr11: $^{40}Ca(^{12}C,^{9}Be)$, E=480 MeV ^{12}C beam at GANIL populated only the $19/2^-$ 3066 keV level.
1987Th02: $^{42}Ca(\text{pol p},\pi^-)$, measured cross section and analyzing power.
1983Wa05: $^{40}Ca(^{3}He,\gamma)$, E=3.19 MeV, measured $\sigma(E,\theta)$, deduced a broad resonance at level of 18.7 MeV *2* with Γ=3.1 MeV *3*.
1982Vi05: $^{42}Ca(p,\pi^-)$, 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	$Be(^{58}Ni,X\gamma)$	E	$^{46}Ti(^{3}He,^{6}He)$
C	$^{40}Ca(\alpha,n\gamma)$		

E(level)†	Jπ	T1/2	XREF	Comments
0	7/2⁻	509 ms *5*	ABCDE	%ε+%β⁺=100; %εp=? μ=0.85 *2* (1993Ma67,2014StZZ) μ: β-NMR in Pt (1993Ma67,1993Ma72,1992Ma63). Jπ: log *ft*=3.56 to 7/2⁻ g.s. of ^{43}Sc (super-allowed 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	Jπ: (3/2⁺) proposed in (^{3}He,^{6}He) from similarity of σ(θ) pattern of 3/2⁺ states, all believed to be from $d_{3/2}$ 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 *10*	(3/2⁻)		DE	XREF: D(520). Jπ: possible mirror state of 3/2⁻, 472 level in ^{43}Sc.
998 *10*	(1/2⁺)		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. Jπ: (1/2⁺) proposed in (^{3}He,^{6}He) from similarity of σ(θ) 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*	(5/2⁺)		A	Jπ: possible mirror state of 5/2⁺, 880 level in ^{43}Sc.
1160 *10*	(1/2 to 5/2)⁻		DE	Jπ: L(^{6}Li,t)=1 suggests 1/2⁻,3/2⁻,5/2⁻.
1483.5 *10*	(7/2⁺)		C E	Jπ: possible mirror state of 7/2⁺, 1337 level in ^{43}Sc.
1760 *30*	(1/2 to 5/2)⁻		De	Jπ: L(^{6}Li,t)=1 suggests 1/2⁻,3/2⁻,5/2⁻.
1857.7 *10*	(11/2⁻)		BCDe	Jπ: 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*	(9/2⁺)		C	Jπ: possible mirror state of 9/2⁺, 1931 level in ^{43}Sc.
2250 *10*			DE	Jπ: L(^{6}Li,t)=3 suggests 3/2⁻ to 9/2⁻.
2438 *9*			E	
2640 *30*			D	Jπ: L(^{6}Li,t)=5 suggests 7/2⁻ to 13/2⁻.
2951.7 *10*	(15/2⁻)		BCDE	XREF: E(2990).

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Adopted Levels, Gammas (continued)

^{43}Ti Levels (continued)

E(level)†	J^π	$T_{1/2}$	XREF	Comments
				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.
3066.4 *10*	(19/2$^-$)	556 ns *6*	BC	μ=+7.22 *1* (1978Ha07,2014StZZ) Q=0.33 *8* (1981Da06,2014StZZ,2013StZZ) μ: TDPAD (1978Ha07). Q: TDPAD (1981Da06; original value of 0.30 *7* re-evaluated to 0.33 *8* by 2013StZZ. J^π: from agreement of experimental μ with that calculated from shell-model with configuration=$\nu(f^3_{7/2}+f^2_{7/2}f_{5/2})$. Probable mirror state of (19/2$^-$), 3123 level in ^{43}Sc with $T_{1/2}$=472 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 *30*			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)

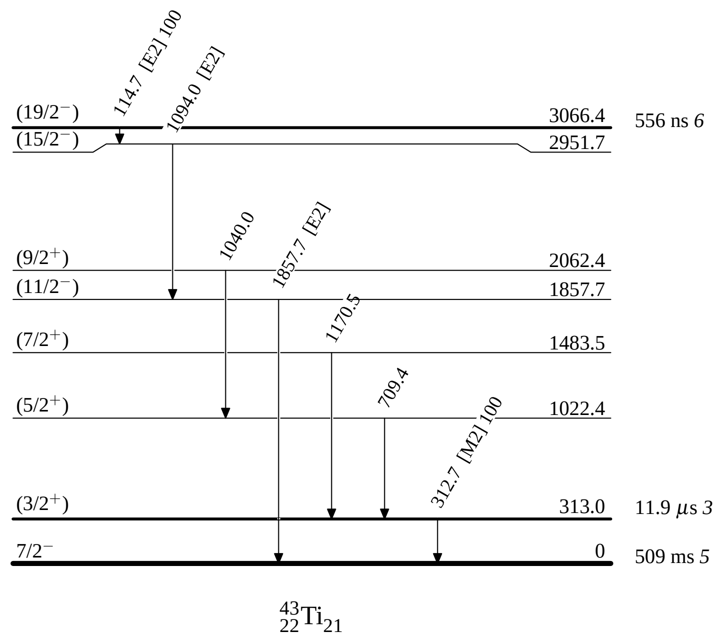
E_i(level)	J^π_i	E_γ†	I_γ	E_f	J^π_f	Mult.	Comments
313.0	(3/2$^+$)	312.7 *2*	100	0	7/2$^-$	[M2]	B(M2)(W.u.)=0.0710 *18* E_γ: from Be(^{58}Ni,Xγ).
1022.4	(5/2$^+$)	709.4		313.0	(3/2$^+$)		
1483.5	(7/2$^+$)	1170.5		313.0	(3/2$^+$)		
1857.7	(11/2$^-$)	1857.7		0	7/2$^-$	[E2]	
2062.4	(9/2$^+$)	1040.0		1022.4	(5/2$^+$)		
2951.7	(15/2$^-$)	1094.0		1857.7	(11/2$^-$)	[E2]	
3066.4	(19/2$^-$)	114.7	100	2951.7	(15/2$^-$)	[E2]	B(E2)(W.u.)=5.7 *3*

† From (α,nγ) unless otherwise noted.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



^{44}Cr εp decay (42.8 ms) 2007Do17,2014Po05

Parent: ^{44}Cr: E=0; $J^{\pi}=0^{+}$; $T_{1/2}$=42.8 ms *6*; Q(εp)=8400 *SY*; %εp decay=12.0 *20*

^{44}Cr-$T_{1/2}$: From ^{44}Cr Adopted Levels in ENSDF database, taken from 2007Do17. Others: 25 ms *+6−4* from 2014Po05 (time correlation of implantation events due to ^{44}Cr and subsequent emission of protons, and using the maximum likelihood method); 53 ms *+4−3* (1992Bo37). All the three values are in disagreement. Unweighted average of three values is 40.3 ms *82*, much nearer to the 2007Do17 value.

^{44}Cr-Q(εp): 8400 *300* (syst,2012Wa38).

^{44}Cr-%εp decay: %εp=10 *1* (2014Po05), 14.0 *9* (2007Do17). 2014Po05 discuss accuracy of results in the two measurements.

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=α−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.

2014Po05: ^{44}Cr isotope produced in fragmentation of Ni target with a ^{58}Ni beam at 160 MeV/nucleon from the NSCL, MSU facility. Fragments separated with the A1900 fragment separator and identified using time-of-flight and energy-loss techniques. The optical time projection chamber (OTPC) was used to detect fragments and the decay of heavy particles such as protons or α particles. Measured half-life of ^{44}Cr g.s. from time correlation of implantation events and subsequent emission of protons. Total proton branching ratio was measured based on incoming ions and decay events.

^{43}Ti Levels

E(level)
0

Delayed Protons (^{43}Ti)

E(p)†	E(^{43}Ti)	I(p)	Comments
742 *26*		0.6 *2*	E(p): reported by 2014Po05 only; uncertainty of 24 keV from minimization procedure and 10 keV from drift velocity added in quadrature.
1384 *12*		1.1 *3*	E(p)=1340 *62*, I(p)=1.4% *3* (2014Po05).
1741 *15*		0.6 *3*	E(p)=1680 *44*, I(p)=0.5% *2* (2014Po05).
908 *11*	0	1.7 *3*	E(p)=896 *53*, I(p)=2.7% *5* (2014Po05).

† The proton energies are in the center-of-mass system.

^{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 ≈10 mg/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 are 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*	μ=+7.22 *1* (1978Ha07); Q=0.30 *7* (1981Da06) μ,Q: DPAD method. $T_{1/2}$: from γ(t) (1978Ha07). 553 ns *21* from 1981Da06.

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

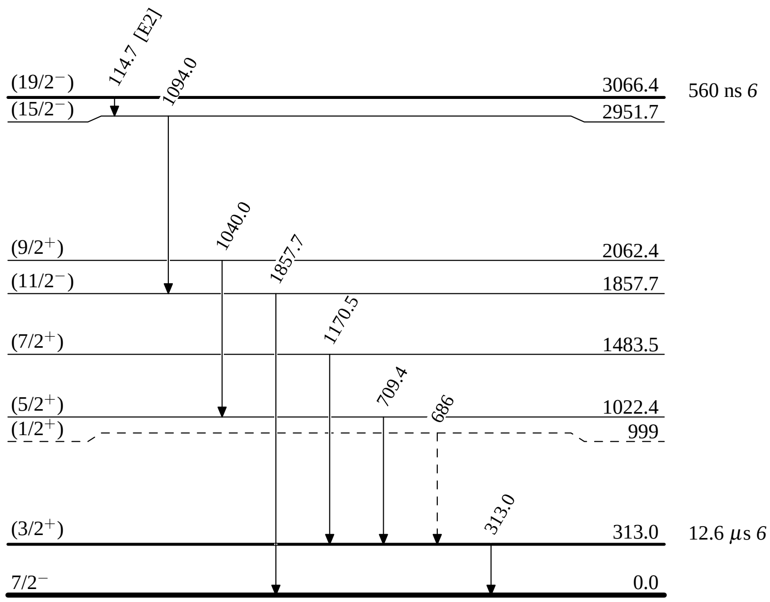
γ(^{43}Ti)

E$_\gamma$	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.
114.7	3066.4	(19/2$^-$)	2951.7	(15/2$^-$)	[E2]
313.0	313.0	(3/2$^+$)	0.0	7/2$^-$	
686†	999?	(1/2$^+$)	313.0	(3/2$^+$)	
709.4	1022.4	(5/2$^+$)	313.0	(3/2$^+$)	
1040.0	2062.4	(9/2$^+$)	1022.4	(5/2$^+$)	
1094.0	2951.7	(15/2$^-$)	1857.7	(11/2$^-$)	
1170.5	1483.5	(7/2$^+$)	313.0	(3/2$^+$)	
1857.7	1857.7	(11/2$^-$)	0.0	7/2$^-$	

† Placement of transition in the level scheme is uncertain.

$^{40}Ca(\alpha,n\gamma)$ 1978Me15

Level Scheme



$^{43}_{22}Ti_{21}$

^{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, $\sigma(\theta)$.
1982Ne02: E=156 MeV, measured $\sigma(\theta)$.
All data are from 1974Li01 unless otherwise noted.

^{43}Ti Levels

E(level)	L†	S
0	3	1.0
520 *30*		
1150 *30*	1	2.5
1760 *30*	1	1.5
1860 *30*	(5)	0.63
2230 *30*	3	1.8
2640 *30*	5	0.35
2950 *30*	7	0.24
3220 *30*	(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 by the MSU 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 MSU sector-focused cyclotron. ^{6}He particles were analyzed and detected in the focal plane of an Enge split-pole magnetic spectrograph. Measured $\sigma(E(^{6}He))$. Deduced mass.

Others: 1975Mu09.

^{43}Ti Levels

E(level)†	J^{π}‡
0	$(7/2^-)$
319 *6*	$(3/2^+)$
475 *10*	
998 *10*	$(1/2^+)$
1160 *10*	
1470 *10*	
1800 *15*	
2250 *10*	
2438 *9*	
2990 *15*	

† From 1977Mu03.

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

Be(^{58}Ni,Xγ) 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-resolution and high-efficiency CLUSTER germanium detectors. Measured Eγ, Iγ. Deduced levels, $T_{1/2}$.

^{43}Ti Levels

E(level)	J^{π}†	$T_{1/2}$	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.

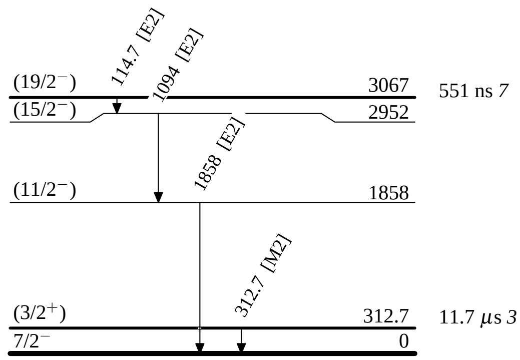
γ(^{43}Ti)

Eγ	E_i(level)	J^{π}_i	E_f	J^{π}_f	Mult.	α†	Comments
114.7 *2*	3067	(19/2$^-$)	2952	(15/2$^-$)	[E2]	0.201 *4*	B(E2)(W.u.)=4.82 *8*
312.7 *2*	312.7	(3/2$^+$)	0	7/2$^-$	[M2]	0.0048	B(M2)(W.u.)=0.072 *2*
1094	2952	(15/2$^-$)	1858	(11/2$^-$)	[E2]		
1858	1858	(11/2$^-$)	0	7/2$^-$	[E2]		

† Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

Be(^{58}Ni,Xγ) 2011Ho02

Level Scheme



$^{43}_{22}Ti_{21}$

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-resolution and high-efficiency CLUSTER germanium detectors. Measured Eγ, Iγ. Deduced levels, $T_{1/2}$.

^{43}Ti Levels

E(level)	J^{π}†	$T_{1/2}$	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.

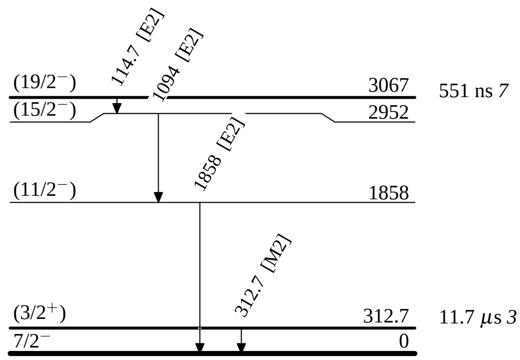
γ(^{43}Ti)

E_γ	E_i(level)	J^{π}_i	E_f	J^{π}_f	Mult.	α†‡	Comments
114.7 *2*	3067	(19/2$^-$)	2952	(15/2$^-$)	[E2]	0.200	B(E2)(W.u.)=4.82 *8*
312.7 *2*	312.7	(3/2$^+$)	0	7/2$^-$	[M2]	0.0048	B(M2)(W.u.)=0.072 *2*
1094	2952	(15/2$^-$)	1858	(11/2$^-$)	[E2]		
1858	1858	(11/2$^-$)	0	7/2$^-$	[E2]		

† Calculated values from 2008Ki07.
‡ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

Be(^{58}Ni,Xγ):isomers 2011Ho02

Level Scheme



$^{43}_{22}Ti_{21}$

Adopted Levels

Q(β^-)=−15620 *SY*; S(n)=18370 *SY*; S(p)=100 *40*; Q(α)=−6170 *50* 2012Wa38
Estimated uncertainties: ΔQ(β^-)=400, ΔS(n)=300 (2012Wa38). S(p)=84 *43* (2013Ya03, mass measurement using the cooler storage ring CSRe at Lanzhou).
S(2n)=34260 *300* (syst), S(2p)=3850 *40*, Q(εp)=6920 *40* (2012Wa38).
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: 2013Ya03 by storage ring and 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; %εp=? T$_{1/2}$: from 2007Do17. J$^\pi$: 7/2$^-$ proposed from syst (2012Au07). Shell-model calculations by 2010Pe15 predict magnetic dipole moment μ=+5.106 *49*.
8.25×10^3? *23*	(3/2$^+$)		A	E(level),J$^\pi$: probable IAS of ^{43}Cr g.s. (2001Gi01).

^{43}Cr ε decay (21.2 ms) 2001Gi01

Parent: ^{43}Cr: E=0.0; J^{π}=(3/2^{+}); $T_{1/2}$=21.2 ms *7*; Q(ε)=15620 *SY*; %ε+%β^{+} decay=100.0
^{43}Cr-J^{π},$T_{1/2}$: From Adopted Levels of ^{43}Cr.
^{43}Cr-Q(ε): 15620 *400* (syst,2012Wa38).
^{43}Cr decays also by β^{+}p to ^{42}Ti and by β^{+}2p to ^{41}Sc; by β^{+}3p to ^{40}Ca (2011Po01,2012Au08).
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^{π}	Comments
8.25×10^{3} *23*	(3/2^{+})	Main β^{+} decay may be to IAS state of ^{43}Cr g.s. at 8255 *230* (2001Gi01).

ε,β^{+} radiations

E(decay)	E(level)
(7370 *SY*)	8250

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 α-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)	$T_{1/2}$[†]	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 $\beta^{+}+\varepsilon$ decay to ^{43}Ti (2007Do17).

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

Adopted Levels

S(n)=16610 *SY*; S(p)=1970 *SY*; Q(α)=−6920 *SY* 2012Wa38
Estimated uncertainties (2012Wa38): ΔS(n)=570, ΔS(p)=500, ΔQ(α)=450.
S(2n)=37330 (calculated,1997Mo25). S(2p)=1180 *413*, Q(εp)=15520 *400* (syst,2012Wa38).
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 α-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 NSCL, MSU, 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 detecte using the Optical Time Projection Chamber (OTPC). Measured Ep, Ip, branching ratios for difference decay modes. Deduced half-life.
2012Au08 (also 2012As02): ^{43}Cr nuclei produced in the reaction Ni(^{58}Ni,X), E(^{58}Ni)=75 MeV/nucleon using LISE3 separator at GANIL ^{43}Cr ions were separated, identified and then implanted onto the time projection chamber (TPC). Decays were detected in a time-projection chamber (TPC), where signals from four gas electron multipliers (GEM) detected in a two-dimensional strip detector combined with drift-time analysis were used to reconstruct the tracks of the particles in three dimensions. Characterization of the TCP was done with the β^+p decay of ^{52}Ni with reference to proton energies and branching ratios. Measured energy loss, decay events, angular correlation between two protons. Deduced delayed one-, two-, and three-proton decay branching ratio. Implantation and decay events were time correlated. Recorded events in this study: 180 events for β^+2p emission, and three events for β^+3p emission from decay of ^{43}Cr.
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^+=100; %εp=79.3 *30* (2012Au08); %ε2p=11.6 *10* (2012Au08) %ε3p=0.13 *+18−8* (2012Au08) Other: %ε+%β^+=12 *4*, %εp=81 *4*, %ε2P=7.1 *4*, %ε3p=0.08 *3* (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. 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). Relative branching ratios of delayed protons: 87.1% *25* for one-proton, 12.7% *10* for two-proton and 0.14% *+19−9* for three-proton emissions (2012Au08). Absolute branches were deduced using total delayed proton emission branch of 91.0% *23* from 2007Do17 and 2011Po01. Measured E(p)=4363 keV *9* (2007Do17) assigned to β^+2p mode. From simulations studies and in comparison with the experimental results, 2012Au08 show that the two protons do not share equally the delayed-2p decay energy and are emitted sequentially. A ratio of 34%−66% between the two protons is in good agreement with experimental data. In addition, an isotropic distribution of the relative angle angle between the two protons is a signature of sequential emission which is supported by measured angular correlation between two protons emitted by the decay of ^{43}Cr (2012Au08). J$^\pi$: proposed by 2001Gi01 from the β^+ decay to the (3/2$^+$) IAS state in ^{43}V. $T_{1/2}$: 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) 2012Au08,2009Mi29,2007Gi10

Parent: ^{45}Fe: E=0; J^π=(3/2$^+$); $T_{1/2}$=2.4 ms *3*; Q(2p)=1210 *50*; %2p decay=70 *4*
^{45}Fe-Q(2p): From 2012Au08: Other: 1154 keV *16* (2012Wa38).
^{45}Fe-J^π: From systematics (2012Au07: NUBASE-2012).
^{45}Fe-$T_{1/2}$: Weighted average of 2.6 ms *2* (2007Mi36,2007Mi40, from decay time), 3.6 ms *+16−8* (2012Au08,2007Gi10, 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).
^{45}Fe-%2p decay: %2p=70 *4*, %ε+%β^+=30 *4* (2007Mi36,2007Mi40) Others: %2p=57 *10* (2005Do20), 65% *5* (2008Bl03), 78 *+14−22* (2012Au08).

2012Au08: visualization of two individual protons from a 2p decay mode. This study was a new analysis of data from the first observation of two proton decay data in ^{45}Fe that has already been presented in 2007Gi10. ^{45}Fe nuclei were produced in the reaction Ni(^{58}Ni,X) using the LISE3 separator at GANIL. ^{45}Fe ions were separated, identified and then implanted onto the time projection chamber (TPC). The identification was done by measuring energy loss in the first Si detector and tof between the micro-channel plate and the Si detector. Decays were detected in a time-projection chamber (TPC), where signals from four gas electron multipliers (GEM) detected in a two-dimensional strip detector combined with drift-time analysis were used to reconstruct the tracks of the particles in three dimensions. Characterization of the TCP was done with the β^+p decay of ^{52}Ni with reference to proton energies and branching ratios. Measured energy loss, decay event counts, angular correlation between two protons. Deduced $T_{1/2}$ of ^{45}Fe, branching ratio. Experimental $T_{1/2}$ of ^{45}Fe was compared with predictions from three-body model. Implantation and decay events were time correlated with ten events were recorded for ^{45}Fe implantations and seven events recorded for the 2p decay of ^{45}Fe. Other recorded events in this study: β^+ delayed one-proton decay (one event) and β^+ delayed two-proton decay (two events). This study was a new analysis of data from the first observation of two proton decay data in ^{45}Fe that has already been presented in 2007Gi10.

2007Mi36, 2007Mi40, 2009Mi29: E=161 MeV/nucleon provided by the K500-K1200 coupled cyclotrons at the NSCL, MSU. ^{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 photo-multiplier signal which are used to reconstruct the particle 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-α-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.

Others: 2011Bl01, 2009Bl06, 2008Mi03, 2007Gr12, 2007Gr13, 2006Ro09, 2005Pf01, 2005Pf02, 2004Bl05, 2004Bl19, 2004Pf02, 2003Bl21, 2003Gi13, 2003Pf01, 2002Gi09, 2002Pf02, 2002Pf03, 2001Gi01, 2001Gi02, 1992Bo37.

^{43}Cr Levels

E(level)	J^π	$T_{1/2}$	Comments
0	(3/2$^+$)	21.2 ms *7*	J^π,$T_{1/2}$: from Adopted Levels. From two-proton emission from ^{45}Fe, total decay energy=1.21 MeV *5* (2012Au08), in agreement with previous measurement of 1.151 MeV *15* (2008Bl03). The protons share equally the decay energy, and are emitted simultaneously (2012Au08).

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