Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen# and Balraj Singh	NDS 135, 1 (2016)	31-May-2016

Q(β^-)=−17490 *SY*; S(n)=17478 *28*; S(p)=3751.22 *27*; Q(α)=−5471.1 *3* 2012Wa38
Estimated uncertainty for Q(β^-)=300 (syst,2012Wa38).
S(2n)=32400 *160*, S(2p)=4836.20 *28*, Q(εp)=2744.25 *24* (2012Wa38).
Identification and production of ^{42}TI nuclide by 1962Ob03 using ^{40}Ca(^{3}He,n) which measured a half-life of 0.25 s *4*.
2009Ku19: ^{42}Ti produced in ^{40}Ca(^{3}He,nγ) E=17 MeV, beam from the Ion Guide Isotope Separator On-Line (IGISOL) facility at the Accelerator Laboratory of the University of Jyvaskyla. Target of a 1.5 mg/cm^2 natural Ca. Measured Eγ, $\beta\gamma$-coin, $T_{1/2}$, mass differences using JYFLTRAP Penning-trap spectrometer.

^{42}Ti Levels

Cross Reference (XREF) Flags

A	^{43}Cr εp decay (21.2 ms)	D	^{40}Ca(^{3}He,nγ)
B	^{45}Fe ε3p decay (2.45 ms)	E	^{40}Ca(^{12}C,^{10}Be)
C	^{40}Ca(^{3}He,n)	F	^{42}Ca(π^+,π^-)

E(level)†	J$^\pi$	$T_{1/2}$#	XREF	Comments
0	0$^+$	208.65 ms *80*	ABCD F	%ε+%β^+=100 $T_{1/2}$: weighted average of 211.7 ms *19* (2015Mo01, from analysis of β-decay and correlated implantations), 209.5 ms *52* (2015Mo01, from the analysis of γ-ray data), 208.14 ms *45* (2009Ku19, also 2011KuZY, from decay timing of positrons emitted by a pure ^{42}Ti source deposited on a mylar tape and counted by a 4π cylindrical plastic scintillator, source production used Penning-trap system; uncertainty increased by evaluators by a factor of 2), 230 ms *50* (1972Zi02, β counting), 202 ms *5* (1969Ga27, γ counting), and 200 ms *20* (1969Ni03, γ counting), 250 ms *40* (1962Ob03). Other: 173 ms *14* (1969Al12, β counting) seems discrepant as compared to all the other values. 2015Ha07 review gives $T_{1/2}$=208.09 ms *55*.
1554.6‡ *3*	2$^+$	0.44 ps *11*	A CD F	J$^\pi$: L(^{3}He,n)=2.
1854.2 *12*	0$^+$	>0.14 ps	CD	J$^\pi$: L(^{3}He,n)=0.
2396.1‡ *10*	(2$^+$)	0.22 ps *13*	A CD	J$^\pi$: γ to 0$^+$; RUL; systematics.
2676.6 *8*	4$^+$	>1.4 ps	CD	J$^\pi$: L(^{3}He,n)=4.
2730? *35*			C	
2945? *25*			C	
3043.0 *15*	6$^+$	3.12 ns *21*	CDE	J$^\pi$: L(^{3}He,n)=6.
3130? *45*			C	
3280 *40*			C	
3335?			D	
3440 *30*	1$^-$		C	J$^\pi$: L(^{3}He,n)=1.
3540 *30*			C	
3660 *25*			C	
3744 *3*	2$^+$	<0.17 ps	CD	J$^\pi$: L(^{3}He,n)=2.
3850 *25*			C	
3990 *25*			C	
4130 *25*			C	
4245 *25*	0$^+$		C	J$^\pi$: L(^{3}He,n)=0.
4375 *20*	3$^-$		C	J$^\pi$: L(^{3}He,n)=3.
4.40×10^3 *20*			E	
4440 *20*	2$^+$		C	J$^\pi$: L(^{3}He,n)=2.
4665 *20*	2$^+$		C	J$^\pi$: L(^{3}He,n)=2.
4730 *30*			C	

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Adopted Levels, Gammas (continued)

^{42}Ti Levels (continued)

E(level)†	J^π	XREF	Comments
4890? *45*		C	
4950 *25*	4^+	C	J^π: L(^{3}He,n)=4.
5160? *50*		C	
5220 *30*	4^+	C	J^π: L(^{3}He,n)=4.
5555 *20*	0^+	C	J^π: L(^{3}He,n)=0.
6370 *30*	(0^+)	C	J^π: L(^{3}He,n)=(0).
6445 *40*		C	
7.50×10^3 *20*		E	

† From (^{3}He,nγ) and (^{3}He,n).
‡ From Eγ in ^{43}Cr εcp decay.
# From DSAM in (^{3}He,nγ), unless otherwise noted.

γ(^{42}Ti)

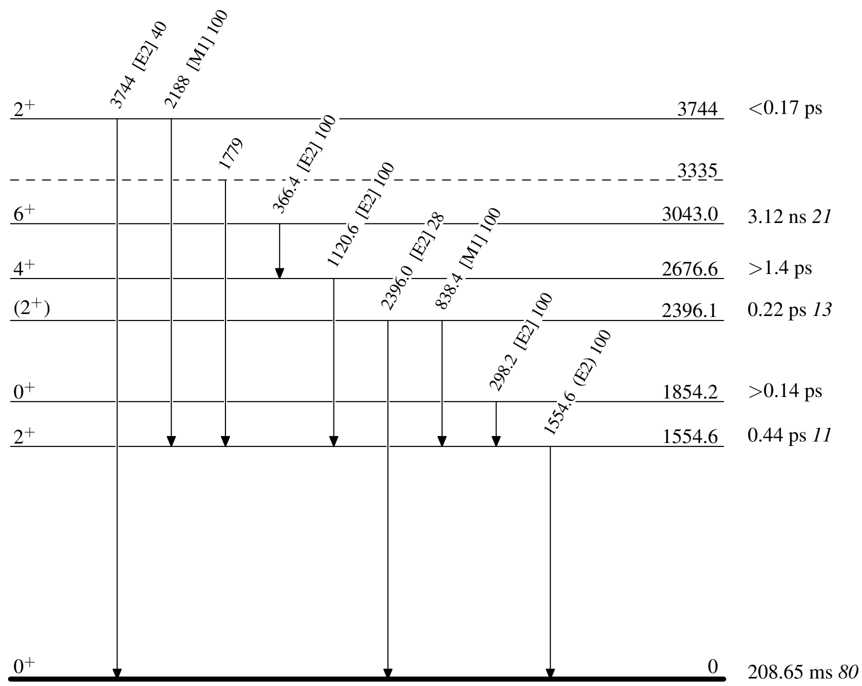
E_i(level)	J^π_i	E_γ†	I_γ#	E_f	J^π_f	Mult.	Comments
1554.6	2^+	1554.6‡ *3*	100	0	0^+	(E2)	B(E2)(W.u.)=16 *4*
1854.2	0^+	298.2	100	1554.6	2^+	[E2]	
2396.1	(2^+)	838.4‡ *10*	100	1554.6	2^+	[M1]	B(M1)(W.u.)=0.13 *8*
		2396.0	28 *10*	0	0^+	[E2]	B(E2)(W.u.)=0.8 *6*
2676.6	4^+	1120.6	100	1554.6	2^+	[E2]	
3043.0	6^+	366.4	100	2676.6	4^+	[E2]	B(E2)(W.u.)=3.2 *2*
3335?		1779		1554.6	2^+		
3744	2^+	2188	100 *9*	1554.6	2^+	[M1]	
		3744	40 *9*	0	0^+	[E2]	

† From level-energy differences, recoil correction removed, unless otherwise noted.
‡ From ^{43}Cr εcp decay.
# From (^{3}He,nγ).

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{42}_{22}Ti_{20}$

Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 190,1 (2023)	20-Jun-2023

Q(β^-)=−13749 *7*; S(n)=16318 *4*; S(p)=8649.4 *20*; Q(α)=−5127.1 *7* 2021Wa16

Q(β^-),S(n): Deduced by the evaluators from newly measured mass of ^{44}V (M.E.=−23800.4 *71*) and ^{43}Ti (M.E.=−29302.2 *42*), respectively, by 2022Wa39. Others: Q$^-$=−13741 *7* from evaluated M.E.(^{44}V)=23808 *7* and S(n)=16304 *6* from evaluated M.E.(^{43}Ti)=−29316 *6* in 2021Wa16.

Q(ε)=267.4 *19*, S(2n)=28586.9 *7*, S(2p)=13579.2 *7* (2021Wa16).

Other measurements:

Additional information 1.

^{12}C(^{32}S,F),(^{32}S,X)E=140 MeV: fission of ^{44}Ti: 1986Pl02 (E=140 MeV), 1979Os01 (E(c.m.)=20-35 MeV).

^{16}O(^{28}Si,^{28}Si): resonances: 1979Ba49 (E(c.m.)=30.0-32.7 MeV).

^{24}Mg(^{32}S,^{12}C) E=140 MeV: fission fragments: 1990Sa14; E=164 MeV: γ-ray spectroscopy: 2000Th16.

^{40}Ca(α,α): resonances: 1984Ch15, 1976Fr08. See ^{40}Ca(α,α) dataset.

^{40}Ca(^{16}O,^{16}O): resonances: 1984Me01 (E=18.67-22.29 MeV).

^{40}Ca(^{32}S,^{28}Si): α-particle transfer: 1989Di06 (E=90, 100, 110 MeV).

^{44}Ca(π^+,π^-): double-charge exchange reaction: 1979Da16 (E=290 MeV), 1987Gi04 (E=163,210 MeV), 1987Zu03 (E≈292 MeV), 1988We02 (E=35 MeV), 1990Se11 (E=100-300 MeV), 1990We05 (E=35 MeV), 1991Ba05 (E=50 MeV), 1991Wi03 (E=300-550 MeV), 1992Le16 (E=25-65 MeV), 1993Wa02 and 1993Wa30 (E=50 MeV), 1995Si01 (E=32-79 MeV).

See 1998Ya21 and 1998Mi33 for a very detailed review of α-cluster structure as deduced from ^{40}Ca(α,α) and (^{6}Li,d) reactions.

Theoretical structure calculations:

2022Ho15: calculated point-proton and neutron density distributions, point-proton and point-neutron rms radii using antisymmetrized quasi-cluster model (AQCM).

2022Is04: calculated energy curves and rms matter radius for the 0$^+$ state as a function of the distance between ^{4}He and ^{40}Ca using antisymmetrized quasicluster model (AQCM) and iSMT model, with tensor interaction.

2022Ko04: calculated ground state energy, charge rms radius using Coupled cluster (CC) and ab initio density functional theory.

2022Yu04: calculated levels, J^π, yrast states, B(E2) using particle-number conserved Bardeen-Cooper-Schrieffer (NBCS) approximation in the frame of shell-model.

2021Ar13: calculated average neutron-proton interactions, neutron skin thickness, bubble structure, single-particle energy levels, charge form factor using the Skyrme-Hartree-Fock approach.

2021Cs02: calculated levels, J^π, B(E2) using multiconfigurational dynamical symmetry (MUSY) mode.

2018Ar03: calculated levels, J^π, null point-matter radius, γ-decay widths, B(E2), B(E4) using α-cluster model.

2014Ro02, 2010Ro30: calculated levels, J^π, B(E2), static quadrupole moments, g factors using large-scale shell model calculations.

2010Zh48: calculated levels, band structure, J^π, B(E2) of the low-lying states using IBM-3 model.

2009Ma37: calculated levels, J^π, quadrupole moments, magnetic moments, B(E2), yrast bands and polarization effects using microscopic particle-vibration model.

2007Za10, 2007Zd02: calculated levels, J^π, quadrupole deformation parameters for high-spin states using density functional theory and full *sdfp* shell model.

2006Ki03: calculated levels, J^π, B(E2), superdeformation and cluster features using antisymmetrized molecular dynamics model.

2004Al24: calculated levels, J^π, B(M1), B(E2), mixed-symmetry states using interacting boson model.

2004Zh34: calculated levels, J^π, B(E2), symmetry features using interacting boson model.

1998Oh03: calculated levels, J^π, rotational bands using α-cluster model.

1996Zh01, 1994Zh16: calculated intraband B(λ) using Bloch-Brink microscopic α-cluster model.

1995Bu25: calculated levels, B(λ), α-emission widths using universal α-core interaction.

1994Va09: calculated levels, B(λ) using Core-excited α-cluster model.

1989Fa03: calculated levels, B(M1), transition densities using deformed Woods-Saxon potential, quasiparticle RPA.

1989Me05: calculated levels widths using α-cluster model.

1988Hu12: calculated levels. Folded diagram, pairs model space.

1988Mi01, 1988Oh06: calculated levels, B(E2), α-spectroscopic factors, rms radii, widths. Local potential model, α+^{40}Ca cluster structure.

1988Wa23: calculated levels, B(E2), band structure, rms radius using Resonating group method.

1986Mi20, 1986Mi21: calculated levels, B(E2), intercluster rms radii, α-clustering effects.

Adopted Levels, Gammas (continued)

1981It03: calculated levels, B(E2), Sα using shell model and α-cluster models.
1980Pa20: calculated levels, rotational bands, B(E2) using local potential, and α-cluster model.
1980Ru02: calculated binding energy, symmetric shape preference using oscillator basis, and Wigner, Majorana forces.
1978Pi04: calculated cluster levels.
1975Si11: calculated levels, B(E2) using asymmetric rotor model with vibrations.
1974Ba84, 1969Kh03: calculated levels, B(E2).
1972Sh29: calculated levels, quadrupole moment, B(E2) using variation after projection method.
1971Bh02: calculated levels, B(E2) using shell model.
1968Na20: calculated levels using Harmonic-oscillator shell model with ^{40}Ca core.
Other theoretical calculations: 248 references for structure and six for radioactive decays retrieved from the NSR database (www.nndc.bnl.gov/nsr/) are listed in document records which can be accessed via web-based ENSDF database.

^{44}Ti Levels

Cross Reference (XREF) Flags

A	^{44}V ε decay (111 ms)	I	^{28}Si(^{24}Mg,2$\alpha\gamma$)	Q	^{40}Ca(^{12}C,^{8}Be)
B	^{44}V ε decay (150 ms)	J	^{32}S(^{14}N,pnγ),^{42}Ca(α,2nγ)	R	^{40}Ca(^{13}C,^{9}Be),(^{14}N,^{10}B)
C	^{45}Cr εp decay (60.9 ms)	K	^{40}Ca(α,γ) E=res	S	^{40}Ca(^{16}O,^{12}C)
D	^{4}He(^{40}Ca,α'):resonances	L	^{40}Ca(α,γ):resonances	T	^{40}Ca(^{20}Ne,^{16}O)
E	^{12}C(^{40}Ca,^{8}Be)	M	^{40}Ca(α,α):resonances	U	^{40}Ca(^{32}S,^{28}Si)
F	^{24}Mg(^{23}Na,2npγ)	N	^{40}Ca(^{6}Li,d)	V	^{42}Ca(^{3}He,n)
G	^{24}Mg(^{28}Si,2$\alpha\gamma$)	O	^{40}Ca(^{6}Li,pnγ)	W	^{42}Ca(^{16}O,^{14}C)
H	^{28}Si(^{19}F,2npγ)	P	^{40}Ca(^{7}Li,t)	X	^{46}Ti(p,t),(P,tγ)

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[#]	XREF	Comments
0.0[&]	0$^+$	59.1 y *3*	ABC EFGHIJK NOPQRSTUVWX	%ε=100 Evaluated (<r^2>)$^{1/2}$=3.6115 fm *51* (2013An02 evaluation). Evaluated change in charge radius δ<r^2>(^{44}Ti,^{48}Ti)=+0.143 fm^2 *37* (2013An02). T$_{1/2}$: weighted average of 58.9 y *3* (2006Ah10,timing distribution of ratio of 1157γ from ^{44}Ti decay and 1173γ from ^{60}Co decay, weighted average of 8 measurements at Argonne and two at Hebrew university; earlier value from the same group is 59.0 y *6* (1998Ah03)), 59 y *2* (2001Ha21, specific activity method by counting implanted ^{44}Ti fragments and γ counting of individual and sum peaks), 60.7 y *12* (1999Wi01, time distribution of γ activity), 60.3 y *13* (1998Go05, specific activity method with γ counting), 62 y *2* (1998No06, time distribution of γ activity, preliminary value from the same group is 63 y *3* (1997No06)). Reduced χ^2=1.3. Following result have not been included in the averaging procedure either due to their being outliers or imprecise: 39.0 y *18* and 58 y *10* (1996Me22,specific activity and γ counting), 66.6 y *16* (1990Al11,timing distribution of ratio of β activities from ^{44}Ti, ^{36}Cl and ^{207}Bi), and 54.2 y *21* (1983Fr27, specific activity with accelerator mass spectroscopy) 48.2 y 9 (1965Mo07, specific activity method) and 46.4 y 17 (1965Wi05, specific activity method). Inclusion of results from 1990Al11 and 1983Fr27 gives 59.3 y *7* with reduced χ^2=2.7 and increased uncertainties (0.5 for 2006Ah10, and 3.0 for 1990Al11). 2020Br05 measured decay rate of ^{44}Ti during 5-hour interval following the detection of the first gravitational wave signal from binary neutron star inspiral (GW170817) detected by Advanced LIGO and Advanced VIRGO in 2017, and found no correlation, contradicting previous claims of detection of a 2.5σ

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Adopted Levels, Gammas (continued)

^{44}Ti Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	XREF	Comments
				correlation. 2018An10 measured decay rate of ^{44}Ti over 84 h around the two correlated solar flares in September 2017, and within 2σ found no correlation. 2020TuZW described a generalized gamma simulator built from the GEANT4 toolkit in connection with $T_{1/2}$ of ^{44}Ti decay. Measured charge radius $(<r^2>)^{1/2}$=3.6185 fm *38* (2004Ga34, 2002Ca47, collinear laser spectroscopy).
1083.10[&] *9*	2^+	2.57 ps *37*	ABC EFGHIJK NOPQ ST VWX	T=0 Jπ: 1083.08γ E2 to 0^+. $T_{1/2}$: unweighted average of 1.86 ps *17* from (^{23}Na,2npγ) by RDDS; 3.1 ps *8* from (α,γ) E=res by DSAM; 2.75 ps *20* from DSAM in ^{12}C(^{40}Ca,^{8}Be). Weighted average is 2.58 ps *27* with large reduced χ^2 of 6.3.
1904.4[a] *8*	0^+	>0.5 ps	G K N X	Jπ: L(p,t)=0 from 0^+.
2454.32[&] *13*	4^+	0.433 ps *35*	BC EFGHIJK NO Q ST wX	T=0 XREF: N(2440)T(2470)w(2500). Jπ: L(^{6}Li,d)=4 from 0^+; 1371.2γ E2, ΔJ=2 to 2^+. $T_{1/2}$: weighted average of 0.423 ps *35* from DSAM in (^{6}Li,pnγ); 0.42 ps *7* from DSAM (α,γ) E=res; 0.451 ps *42* from DSAM in ^{12}C(^{40}Ca,^{8}Be).
2530.90[a] *13*	2^+	1.02 ps *14*	A E G K N S wX	μ=+1.04 *30* (2003Sc19,2020StZV) T=0 XREF: N(2520)w(2500). Jπ: L(^{6}Li,d)=2 from 0^+; 2530.86γ E2, ΔJ=2 to 0^+. $T_{1/2}$: weighted average of 0.97 ps *14* from DSAM (α,γ) E=res; 1.14 ps *21* from DSAM in ^{12}C(^{40}Ca,^{8}Be). μ: transient-magnetic field method (2003Sc19).
2886.2[d] *6*	2^+	0.35 ps *7*	G K N X	Jπ: L(p,t)=2 from 0^+; 2886.1γ E2, ΔJ=2 to 0^+.
3176.12[b] *29*	3^-	15.6 ps *13*	E GHIJK NO X	Jπ: L(^{6}Li,d)=3 from 0^+; ΔJ=3 to 0^+ in (α,γ). Other: L(p,t)=(2) for a group at 3175 is inconsistent. $T_{1/2}$: from RDDS in (^{6}Li,pnγ).
3364.88[a] *34*	4^+	0.36 ps *7*	G I K N Q ST WX	XREF: N(3350)Q(3340)T(3310). Jπ: L(^{6}Li,d)=L(p,t)=4 from 0^+.
3415.3[d] *3*	(3^+)	0.49 ps *7*	G K	Additional information 2. Jπ: (2,3) from $\gamma(\theta)$ in (α,γ); 3^+ from assignment as an unnatural-parity state by 1977Di07 in (α,γ); 565γ from 3980, 4^+.
3645.89[c] *30*	4^-	76.3 ps *56*	GHIJK NO	XREF: N(3630). Jπ: spin=4 from $\gamma(\theta)$ in (α,γ) E=res; 469.73γ M1+E2 to 3^-. Other: L(^{6}Li,d)=2 from 0^+ for a 3630 group disagrees with 4^-, which could indicate existence of a different level. $T_{1/2}$: from RDDS in (^{6}Li,pnγ) (2020Ar16). Other: 2.7 ps *9* from RDM in (^{19}F,2npγ) (1974Ko22), which however results in a very large B(E2)(W.u.) exceeding RUL=100 for 469.7γ. 1977Di07 (also 1981Di09 and subsequent private communication to P.M. Endt from W.R. Dixon) 3646 level must be much longer than the reported value of 3.9 ps discussed that lifetime of the by 1974Ko22, based on recommended upper limit (RUL) for E1 transitions.
3755.9 *4*	2^+	0.17 ps *4*	K N S X	XREF: N(3740)S(3780)X(3730). Additional information 3.

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Adopted Levels, Gammas (continued)

^{44}Ti Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$[#]	XREF	Comments
				J^{π}: spin=2 from $\gamma(\theta)$ of 3756γ to g.s. and primary 5957γ from 4^+ resonance at 9713 in (α,γ) E=res; 3756γ to g.s. is E2 not M2 based on RUL. 1973Ba13 suggest L(p,t)=(2,3) for a group at 3730 *20*, giving (2^+,3^-). However, L(^{6}Li,d)=1 from 0^+ giving 1^- for a group at 3740 *20* disagrees, which could indicate existence of a different level populated in (^{6}Li,d).
3942.7 *3*	3^-	0.8 ps *2*	K N S VWX	XREF: N(3920)S(3990)W(3980). Additional information 4. J^{π}: L(p,t)=L(^{6}Li,d)=3 from 0^+. But L(^{3}He,n)=(2) for a 3940 group is inconsistent with 3^-.
3980[d] *1*	4^+	0.35 ps *14*	K st vwX	XREF: t(4010)v(4010). Additional information 5. J^{π}: L(p,t)=4 from 0^+.
4015.30 *16*	6^+	0.42 ps *6*	B GHIJK NO st vwX	T=0 XREF: N(4000)s(3990)t(4010)v(4010)w(3980). J^{π}: L(^{6}Li,d)=6 from 0^+; spin=6 from $\gamma(\theta)$ in (α,γ) E=res. $T_{1/2}$: weighted average of 0.39 ps *6* from (α,γ) E=res and 0.45 ps *7* from (^{6}Li,pnγ), both by DSAM.
4061.47[b] *31*	(5^-)	1.5 ps *+13−5*	GHIJK NO q X	XREF: q(4100). J^{π}: spin=(3,5) from $\gamma(\theta)$ in (α,γ) E=res with spin=5 preferred in 1977Di07; spin=(5) from $\gamma(\theta)$ in (^{19}F,2npγ); parity from 885.6γ (E2) to 3^-. But L(^{6}Li,d)=3 for a 4060 group favors 3^- and L(p,t)=4 for a 4060 group favors 4^+.
4115.3 *6*	2^+	111 fs *49*	A K N q S	T=0 XREF: N(4100)q(4100). J^{π}: L(^{6}Li,d)=2 from 0^+; spin=2 also from $\gamma(\theta)$ of ΔJ=2 to 0^+ from primary 5582$\gamma(\theta)$ in (α,γ) E=res.
4227 *1*	(3^-)		K	Additional information 6. J^{π}: 581γ to 4^-, 1340γ to 2^+; primary 4727γ from 1^-, 5957γ from 4^+.
4499.94[&] *33*	(6^+)		G I X	J^{π}: 2045.4γ to 4^+; band assignment.
4605 *5*	0^+		X	J^{π}: L(p,t)=0.
4792.2 *5*	(2^+)	0.35 ps *14*	K X	Additional information 7. J^{π}: L(p,t)=(2) from 0^+.
4803.02 *32*	(6^+)		B	T=0 J^{π}: proposed in β^+ decay (150 ms). Unrealistic intensity balance at 4803 level in ^{44}V β^+ decay (150 ms) suggests that other γ transitions, yet unseen, de-excite this level.
4860 *30*	0^+		n S V	XREF: S(4870)V(4860). E(level): weighted average of 4870 *30* from (^{16}O,^{12}C), 4860 *60* from (^{3}He,n), and 4840 *30* from (^{6}Li,d). J^{π}: L(^{6}Li,d)=L(^{3}He,n)=0 from 0^+.
5055 *5*	3^-		N X	XREF: N(5080). J^{π}: L(^{6}Li,d)=3 from 0^+. But L(^{6}Li,d)=(4) favors (4^+) for a group at 5080 *30*.
5151.7[c] *4*	(6^-)		G I O	J^{π}: 1505.5γ to 4^-; band assignment.
5240 *30*	5^-		N S	XREF: N(5230). E(level): weighted average of 5230 *30* from (^{6}Li,d) and 5250 *30* from (^{16}O,^{12}C).

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Adopted Levels, Gammas (continued)

^{44}Ti Levels (continued)

E(level)†	Jπ‡	$T_{1/2}$#	XREF	Comments
				Jπ: L(^{6}Li,d)=5 from 0^+.
5305 *2*		0.35 ps *14*	K q x	Additional information 8.
5330 *30*	5^-		N q x	E(level): the level in ^{40}Ca(^{6}Li,d) with $J^\pi=5^-$ is considered different from the 5305 level in ^{40}Ca(α,γ), as otherwise, E3 required for 4222γ gives unrealistically large B(E3)(W.u.)=1300 *+800−400*. Jπ: L(^{6}Li,d)=5.
5421 *5*	3^-		K N S X	XREF: N(5410)S(5380). Additional information 9. Jπ: L(^{6}Li,d)=3 from 0^+ for a 5410 group. But L(p,t)=(2) for a a 5415 *10* group is inconsistent.
5671.5[b] *5*	(7^-)		G I O	Jπ:)609.6γ to (5^-); band assignment.
6032 *10*	2^+		N S V X	XREF: S(6050)V(6060). E(level): weighted average of 6030 *30* from (^{6}Li,d), 6050 *30* from (^{16}O,^{12}C), 6060 *60* from (^{3}He,n), and 6030 *10* from (p,t). Jπ: L(^{6}Li,d)=2 from 0^+. But L(p,t)=(4) is inconsistent.
6245 *30*	1^-		N S	XREF: S(6270). E(level): weighted average of 6220 *30* from (^{6}Li,d) and 6270 *30* from (^{16}O,^{12}C). Jπ: L(^{6}Li,d)=1 from 0^+.
6508.36 *26*	8^+	<0.5 ps	GHIJ N	XREF: N(6470). Jπ: L(^{6}Li,d)=8; 2493.16γ E2 to 6^+. $T_{1/2}$: from DSAM in ^{32}S(^{14}N,pnγ) (1975Si19).
6535 *10*			S V X	XREF: S(6540)V(6560).
6572.4[&] *5*	(8^+)		G I s	XREF: s(6540). Jπ: 2072.2γ to (6^+); band assignment.
6606.3 *5*	2^+		A k n V x	T=1 Jπ: L(p,t)=L(^{3}He,n)=L(^{6}Li,d)=2 from 0^+.
6810 *60*	$(0,2)^+$		N V	XREF: N(6800). Jπ: L(^{3}He,n)=0 but L(^{6}Li,d)=2 for a 6800 group.
6848.80 *21*	$(6)^+$		B	T=1 Jπ: superallowed β transition (log *ft*=3.44 *5*) from $(6)^+$ parent.
6924.2[c] *5*	(8^-)		G I	Jπ: 1772.8γ to (6^-); band assignment.
6959 *7*	(4^+)		N S X	T=1 E(level): from (p,t). Jπ: L(^{6}Li,d)=L(p,t)=(4) from 0^+.
7010			P	
7140 *30*			S	
7216 *2*	1^+		K X	T=1 Additional information 10. Jπ: $\gamma(\theta)$ of 7216γ to 0^+ is isotropic; primary γ from 0^+ resonances at 9298 and 9338; possible analog of (1^+; 1) state at 669 keV in ^{44}Sc (1972Si34).
7340	3^-		N s	XREF: s(7360). Jπ: L(^{6}Li,d)=3 from 0^+.
7409.0[b] *5*	(9^-)		G I s	XREF: s(7360). Jπ: 1737.3γ to (7^-); band assignment.
7458	(8^+)		G	Additional information 11. Jπ: from 3444γ asymmetry in (^{28}Si,2$\alpha\gamma$).
7500 *40*	1^-		V	Jπ: L(^{3}He,n)=1 from 0^+.
7570 *30*	3^-		N P S	E(level): weighted average of 7560 *30* from (^{6}Li,d) and

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Adopted Levels, Gammas (continued)

^{44}Ti Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$[#]	XREF	Comments
				7580 *30* from (^{16}O,^{12}C). J^{π}: L(^{6}Li,d)=3 from 0^+.
7634 *20*	(1,2$^+$)		K	Additional information 12. J^{π}: γ rays to 0^+.
7670 *10*	6^+		n s V X	XREF: n(7670)s(7690)V(7700). E(level): from (p,t). J^{π}: L(^{6}Li,d)=6 from 0^+.
7670.87 *29*	(10$^+$)	1.87 ps *35*	GHIJ n s	XREF: n(7670)s(7690). J^{π}: 1162.55 E2, ΔJ=2 to (8$^+$); band assignment. $T_{1/2}$: from DSAM in (^{14}N,pnγ).
7780 *30*			S	
8036.0 *27*	3^-		L N s	XREF: N(8040)s(8050). E(level): from (α,γ) E=res. J^{π}: L(^{6}Li,d)=3 from 0^+.
8039.70 *30*	(12$^+$)	2.1 ns *4*	GHIJ s	XREF: s(8050). J^{π}: 368.85γ E2, ΔJ=2 to (10$^+$); band assignment. $T_{1/2}$: pulsed beam in (α,2nγ) (1976Br15). Other: >1.4 ns from RDM in (^{19}F,2npγ).
8072.0 *23*	(1$^-$,2$^+$)		KL s	XREF: K(8067)s(8050). Additional information 13. E(level): from (α,γ): resonances. J^{π}: 8067γ to 0^+; π=natural for (α,γ) resonance.
8123 *7*			L	
8134.0 *23*			a L	XREF: a(8180).
8170	1^-		a N p	XREF: a(8180)p(8200). J^{π}: L(^{6}Li,d)=1; L(^{7}Li,t)=(1,2) for a 8200 group.
8195 *3*			a L p	XREF: a(8180)p(8200). J^{π}: L(^{7}Li,t)=(1,2) for a 8200 group.
8237 *4*			L p	XREF: p(8200). J^{π}: L(^{7}Li,t)=(1,2) for a 8200 group.
8254.0 *18*			L	
8320.0 *20*			KL	Additional information 14. E(level): from (α,γ):resonances. Other: 8318 *5* from (α,γ) E=res.
8382 *3*	2^+		KL N s	XREF: N(8380)s(8390). Additional information 15. E(level): from (α,γ):resonances. Other: 8385 *5* from (α,γ) E=res. J^{π}: spin=2 from $\gamma(\theta)$ in (α,γ) E=res; π=natural.
8419.0 *25*	(0$^+$,1$^-$)		KL	Additional information 16. E(level): from (α,γ):resonances. Other: 8416 *5* from (α,γ) E=res. J^{π}: spin=(0,1) from $\gamma(\theta)$ in (α,γ) E=res; π=natural.
8449 *5*	2^+		K n p	XREF: n(8450)p(8450). Additional information 17. J^{π}: spin=2 from $\gamma(\theta)$ in (α,γ) E=res and π=natural. L(^{6}Li,d)=2+3 for a 8450 group which could be a doublet of the 8449 level in (α,γ) E=res and the 8465 level in (α,γ):resonances. The evaluators therefore assign J(8465)=(3$^-$).
8465.0 *23*	(3$^-$)		L n p	XREF: n(8450)p(8450). J^{π}: see comments for J(8449). L(^{7}Li,t)=3 for a 8450 group.
8511 *5*	2^+		K n	XREF: n(8540). Additional information 18. J^{π}: spin=2 from $\gamma(\theta)$ in (α,γ) E=res and π=natural.

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Adopted Levels, Gammas (continued)

^{44}Ti Levels (continued)

E(level)[†]	J^{π}[‡]	XREF	Comments
8524 *3*		L n	XREF: n(8540). J^{π}: L(^{6}Li,d)=2+3 for a 8540 group could suggest a doublet of 2^+ and 3^- around this energy.
8534 *5*	$(2^+,3^-)$	K n	XREF: n(8540). Additional information 19. J^{π}: spin=(2,3) from $\gamma(\theta)$ in (α,γ) E=res; π=natural.
8568 *3*	2^+	KL n q S	XREF: n(8540)q(8600). Additional information 20. E(level): weighted average of 8565 *5* from (α,γ) E=res and 8569 *3* from (α,γ):resonances. J^{π}: spin=2 from $\gamma(\theta)$ in (α,γ) E=res; π=natural.
8627 *6*	2^+	K q	XREF: q(8600). Additional information 21. J^{π}: spin=3 from $\gamma(\theta)$ in (α,γ) E=res; π=natural.
8639.0 *17*	2^+	KL q	XREF: q(8600). Additional information 22. E(level): from (α,γ):resonances. J^{π}: spin=2 from $\gamma(\theta)$ in (α,γ) E=res; π=natural.
8695 *3*		L	
8728 *4*		L n	XREF: n(8750).
8754 *3*	2^+	K N	XREF: N(8750). Additional information 23. J^{π}: spin=2 from $\gamma(\theta)$ in (α,γ) E=res; π=natural. But L(^{6}Li,d)=6 for 8750 group suggests 6^+.
8763.0 *13*		L	
8838.0 *19*		L	
8861.9[c] *5*	(10^-)	G I	J^{π}: 1937.3γ to (8^-); band assignment.
8895.0 *26*		L	
8946 *3*	(4^+)	K P s	XREF: P(8950)s(8950). Additional information 24. J^{π}: L(^{7}Li,t)=4 for a 8950 group.
8954 *3*	1^-	K s	XREF: s(8950). Additional information 25. J^{π}: spin=1 from $\gamma(\theta)$ in (α,γ) E=res; π=natural.
8962.7 *21*	$(3^-,4^+)$	KL N s	XREF: s(8950). Additional information 26. E(level): from weighted average of 8964.0 *21* in ^{40}Ca(α,α):resonances, 8960 *3* in ^{40}Ca(α,γ) E=res. J^{π}: from $\gamma(\theta)$ in (α,γ) E=res; π=natural, with 2^+ rejected. L(^{6}Li,d)=2 in one of the studies from 0^+ suggests 2^+, but L=4 in this reaction is also proposed in another experiment. As the uncertainty in the level energy in (^{6}Li,d) is not given, it could possible be a different level from that in (α,γ) E=res.
8984[&]	(10^+)	G	Additional information 27. J^{π}: 2413γ to (8^+); band assignment.
8987 *2*	2^+	K N	Additional information 28. J^{π}: spin=2 from $\gamma(\theta)$ in (α,γ) E=res; π=natural.
8992 *2*	4^+	K n	XREF: n(9000). Additional information 29. J^{π}: spin=4 from $\gamma(\theta)$ in (α,γ) E=res; L(^{6}Li,d)=4 for a 9000 group.
8999.0 *14*	(4^+)	L n	XREF: n(9000). J^{π}: π=natural; L(^{6}Li,d)=4 for a 9000 group.
9046 *6*		L S	XREF: S(9030).
9076.0 *25*	(2^+)[@]	KLM	E(level): from (α,γ):resonances. Other: 9077 *5* from (α,α):resonances,

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Adopted Levels, Gammas (continued)

^{44}Ti Levels (continued)

E(level)†	Jπ‡	XREF	Comments
			9073 *5* from (α,γ) E=res.
9105 *5*	$4^{+@}$	K M	E(level): weighted average of 9100 *5* from (α,γ) E=res and 9109 *5* from (α,α):resonances.
9119 *5*		KL	E(level): weighted average of 9120 *5* from (α,γ) E=res and 9118 *5* from (α,γ):resonances.
9132 *5*	$2^{+@}$	M	
9140 *5*		K M	Additional information 30. E(level): other: 9145 *5* from (α,α):resonances. Jπ: (0^+) from R-Matrix analysis in (α,γ):resonances for a resonance at 9145 *5* is inconsistent with the primary γ to 0^+ g.s. in (α,γ) E=res, which could imply a different resonance.
9155.0 *17*		L	
9180 *5*		K N	XREF: N(9190). Additional information 31. Jπ: L(^{6}Li,d)=6 for a group at 9190 suggests 6^+.
9191 *5*	$4^{+@}$	Mn	XREF: n(9190). Jπ: other: L(^{6}Li,d)=6 for a group at 9190 suggests 6^+.
9215 *2*	2^+	K	T=0 Additional information 32. Jπ: spin=2 from γ(θ) in (α,γ) E=res; π=natural. T: from 1980Di14 in (α,γ) E=res.
9227 *2*	$2^{+@}$	K M	T=1 Additional information 33. Jπ: spin=2 also from γ(θ) in (α,γ) E=res. T: from 1980Di14 in (α,γ) E=res.
9239 *2*	2^+	K	T=0 Additional information 34. Jπ: spin=2 from γ(θ) in (α,γ) E=res; π=natural. T: from 1980Di14 in (α,γ) E=res.
9243.0 *14*		L	
9290 *5*		K s	XREF: s(9310).
9294 *2*		K s	XREF: s(9310).
9299 *2*	0^+	K n s X	%α=87 *20* (1978Fr10); %p<6 (1978Fr10) T=1+2 XREF: n(9320)s(9310)X(9304). Additional information 35. Jπ: L(p,t)=0; L(^{6}Li,d)=(0). T: from 1978Di11 in (α,γ) E=res. Isospin-mixed doublet with the 9338 keV level. Possible isospin mixture of T=0 and 1.
9304 *5*	$2^{+@}$	M	
9338 *2*	0^+	K n s V X	T=1+2 XREF: n(9320)s(9310)V(9370). Additional information 36. E(level): other: 9336 *8* from (p,t). Jπ: L(^{3}He,n)=L(p,t)=0. T: from 1972Si34 in (α,γ) E=res. Possible isospin mixture of T=0 and 1. $\Gamma_{\alpha0}/\Gamma$=0.32 *5*, Γ_p/Γ<0.04, Γ_γ/Γ=0.54 *11* (1978Fr10).
9350 *5*	$4^{+@}$	M	
9361 *3*	(2^+,3^-)	K	Additional information 37. Jπ: spin=(2,3) from γ(θ) in (α,γ) E=res; π=natural.
9385 *5*	$3^{-@}$	K M	E(level): weighted average of 9382 *5* from (α,α):resonances and 9388 *5* from (α,γ) E=res.
9400	5^-	N P	XREF: N(9430). Jπ: L(^{6}Li,d)=L(^{7}Li,t)=5.

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Adopted Levels, Gammas (continued)

^{44}Ti Levels (continued)

E(level)[†]	J^{π}[‡]	XREF	Comments
9432 *5*	4^+[@]	K M	E(level): weighted average of 9427 *5* from (α,γ) E=res and 9436 *5* from (α,α):resonances.
9478 *5*		K	
9491 *5*	3^-[@]	K M	XREF: K(9500).
9503	(10^+)	G	Additional information 38. J^{π}: from $\gamma\gamma$(DCO) in (^{28}Si,2$\alpha\gamma$).
9522 *5*	2^+[@]	M	
9542 *5*		K	
9563 *5*	0^+[@]	M	
9589 *5*	5^-	K N P	XREF: N(9580)P(9580). J^{π}: L(^{6}Li,d)=L(^{7}Li,t)=5.
9642 *5*	2^+[@]	K M	E(level): weighted average of 9632 *10* from (α,γ) E=res and 9645 *5* from (α,α):resonances.
9679 *6*	0^+[@]	K M	E(level): weighted average of 9668 *10* from (α,γ) E=res and 9682 *5* from (α,α):resonances.
9698 *5*	2^+	K	Additional information 39. J^{π}: spin=2 from $\gamma(\theta)$ in (α,γ) E=res; π=natural.
9713 *3*	4^+	K	Additional information 40. J^{π}: spin=4 from $\gamma(\theta)$ in (α,γ) E=res; π=natural.
9724.2[b] *6*	(11^-)	G I	J^{π}: 2315.0γ to (9^-); band assignment.
9741 *5*	(2^+)[@]	K M	E(level): weighted average of 9737 *5* from (α,γ) E=res and 9745 *5* from (α,α):resonances.
9780 *5*	0^+[@]	M	
9845 *5*	3^-[@]	M	
9880 *5*	3^-[@]	K M	E(level): weighted average of 9873 *10* from (α,γ) E=res and 9882 *5* from (α,α):resonances.
9895 *5*		K	E(level): this resonance in (α,γ) E=res is probably the same level as the 9909 level in (α,α):resonances, since the same E(α) energy is reported in both datasets.
9908 *3*	$(3^-,5^-)$	K	Additional information 41. E(level): this level is considered as a different level from the 9909,(0^+) level in (α,α):resonances due to the contradicting J^{π} assignments, despite close energies. J^{π}: spin=(3,5) from $\gamma(\theta)$ in (α,γ) E=res; π=natural.
9909 *5*	(0^+)[@]	M	E(level): see comments for 9895, 9908 and 9918 levels.
9918 *5*	(0^+)[@]	M	E(level): the same E(α) is reported for this resonance in (α,α):resonances and the 9908 resonance in (α,γ):E=res, but they are considered as different levels due to contradicting J^{π} assignments and discrepant level energies.
9950 *5*	0^+[@]	M	
9977 *5*	0^+[@]	M	
10009 *5*	2^+[@]	K M	XREF: K(10014).
10027 *5*	2^+[@]	M	
10046 *10*		K	
10072 *5*	0^+[@]	M	
10113 *5*	(3^-)[@]	M	
10129 *10*	$(1^-,2^+)$	K	J^{π}: spin=(1,2) from $\gamma(\theta)$ in (α,γ) E=res; π=natural.
10166 *10*		K	
10182 *5*	(0^+)[@]	M	
10209 *5*	$(0^+,1^-,2^+)$	K	J^{π}: spin=(0,1,2) from $\gamma(\theta)$ in (α,γ) E=res; π=natural.

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Adopted Levels, Gammas (continued)

^{44}Ti Levels (continued)

E(level)[†]	J^π[‡]	XREF	Comments
10227 5	(2^+)[@]	M	
10258 10		K	
10280	(0^+)	V	J^π: L(^{3}He,n)=0.
10303 5		K	
10327 5		K	
10386 6	$(2^+,3^-)$	K Q	XREF: Q(10400). Additional information 42. J^π: spin=(2,3) from $\gamma(\theta)$ in (α,γ):E=res; π=natural.
10461 30	(0^+)	K V	J^π: L(^{3}He,n)=0.
10464.8[c] 5	(12^-)	G I	XREF: G(10454). J^π: 1602.6γ to (10^-); band assignment.
10520 10		K	
10590 30	(0^+)	V	J^π: L(^{3}He,n)=0.
10700	4^+	P	J^π: L(^{7}Li,t)=4.
10860	0^+	N	J^π: L(^{6}Li,d)=0.
11040	4^+	N P	XREF: N(11000?). J^π: L(^{7}Li,t)=4.
11072	0^+	M	J^π: L(α,α)=0.
11087.2 5		G I	J^π: 12^+ proposed in (^{28}Si,2$\alpha\gamma$), but 13^- in (^{24}Mg,2$\alpha\gamma$).
11110	$(5^-,6^+)$	P	J^π: L(^{7}Li,t)=(5,6).
11191	0^+[@]	D M	
11496	(12^+)	G	Additional information 43. J^π: from $\gamma\gamma$(DCO) in (^{28}Si,2$\alpha\gamma$); 2513γ to (10^+).
11537.6[b] 5	(13^-)	I	J^π: 1072.6γ to (12^-); band assignment.
11547.8 6	(13^-)	G I	XREF: G(11537). J^π: proposed in (^{28}Si,2$\alpha\gamma$).
11660	3^-	PQ	XREF: Q(11600). J^π: L(^{7}Li,t)=3.
11691	1^-[@]	M	
11727	1^-	D M	XREF: D(11750). J^π: L(α,α)=1.
11810	$(4^+,5^-)$	P	J^π: L(^{7}Li,t)=(4,5).
11835[&]	(12^+)	G	Additional information 44. J^π: proposed in (^{28}Si,2$\alpha\gamma$).
11950	7^-	P	J^π: L(^{7}Li,t)=7.
12110	4^+	P	J^π: L(^{7}Li,t)=4.
12118	2^+	M	J^π: L(α,α)=2.
12172	2^+[@]	M	
12.20×10^3 20	(1^-)	D K q	XREF: q(12400). Additional information 45. J^π: proposed by 1974Pe13 in (α,γ):E=res.
12563	(3^-)	M q	XREF: q(12400). J^π: L(α,α)=(3).
12580	4^+	Pq	XREF: q(12400). J^π: L(^{7}Li,t)=4.
12772	3^-[@]	M	
12854	(4^+)	M P	XREF: P(12860). J^π: L(^{7}Li,t)=(3,4); L(α,α)=(4).
13.00×10^3 19	(1^-)	D K	XREF: D(12940). Additional information 46. J^π: proposed by 1974Pe13 in (α,γ):E=res. Other: 3^- proposed in (^{40}Ca,α').

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Adopted Levels, Gammas (continued)

^{44}Ti Levels (continued)

E(level)†	Jπ‡	XREF	Comments
13240	(3⁻,4⁺)	P	Jπ: L(^{7}Li,t)=(3,4).
13370.6[b] 8	(15⁻)	D G I	Jπ: from γγ(DCO) in (^{28}Si,2αγ) and band assignment.
13440	5⁻	P	Jπ: L(^{7}Li,t)=5.
13782[c]	(14⁻)	G	Additional information 47. Jπ: from γγ(DCO) in (^{28}Si,2αγ) and band assignment.
13970	3⁻	P	Jπ: L(^{7}Li,t)=3.
14.10×10^3 18	(3⁻)	K	Additional information 48. Jπ: proposed by 1974Pe13 in (α,γ):E=res.
14270	(4⁺,5⁻)	P	Jπ: L(^{7}Li,t)=(4,5).
≈14330	(0⁺)	D	Jπ: 0⁺ proposed in (^{40}Ca,α′).
14.55×10^3 17	(1⁻)	K	Additional information 49. Jπ: proposed by 1974Pe13 in (α,γ):E=res.
14710	(5⁻,6⁺)	D P	XREF: D(14800). Jπ: L(^{7}Li,t)=(5,6).
14830	(3⁻,4⁺)	P	Jπ: L(^{7}Li,t)=(3,4).
15.45×10^3 16		K P	Additional information 50.
15.95×10^3 16	(3⁻)	D K	XREF: D(15810). Additional information 51. Jπ: proposed by 1974Pe13 in (α,γ):E=res, but 6⁺ proposed in (^{40}Ca,α′) for a group at 15810.
16020		P	
≈16570	(2⁺)	D	Jπ: proposed in (^{40}Ca,α′) (2019Ba45).

† For levels connected with γ rays, values are from a least-square fit to γ-ray energies with ΔEγ or without ΔEγ (for which 0.5 keV is assumed) where measured Eγ is available, or taken from (α,γ) E=res where measured Eγ value is not available but E(level) has been deduced by authors from precise Eγ data which however are not listed in the references; for other levels with no γ, E(level) values are from various reactions as indicated, unless otherwise noted.

‡ When assigning J^π to a level based on γ transitions from this level to a level of known J^π, 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. For α resonances populated in (α,γ) and (α,α) reactions, π=natural.

From (α,γ) E=res using DSAM, unless otherwise noted.

@ From R-Matrix analysis in (α,α):resonances.

& Band(A): Ground-state band.

a Band(B): Band based on 1904.3, 0⁺.

b Band(C): Band based on 3175.8, 3⁻.

c Band(D): Band based on 3645.8, 4⁻.

d Seq.(E): γ cascade based on 2886, 2⁺.

$\gamma(^{44}Ti)$

E_i(level)	J^{π}_i	E_{γ}[†]	I_{γ}[†]	E_f	J^{π}_f	Mult.[‡]	δ[‡]	Comments
1083.10	2^+	1083.08 *10*	100	0.0	0^+	E2		B(E2)(W.u.)=16.0 *+27−20* E_{γ}: from ^{44}V β^+ decay (111 ms). Mult.: from $\gamma(\theta$,pol) in (^{19}F,2npγ) and $\gamma(\theta)$ in (α,γ) E=res.
1904.4	0^+	821.3 *8*	100	1083.10	2^+	[E2]		B(E2)(W.u.)<330 upper limit exceeds RUL=100, which would require a $T_{1/2}$>1.6 ps.
2454.32	4^+	1371.20 *10*	100	1083.10	2^+	E2		B(E2)(W.u.)=29.2 *24* E_{γ}: weighted average of 1371.22 *8* from ^{44}V β^+ decay (150 ms), 1370.0 *5* from ^{45}Cr εp decay, 1371.21 *15* from (^{19}F,2npγ), and 1371.4 *5* from (^{14}N,pnγ). Mult.: Q with ΔJ=2 from $\gamma(\theta)$ in (^{28}Si,2$\alpha\gamma$) and (α,γ) E=res and M2 ruled out by RUL.
2530.90	2^+	626	5 *1*	1904.4	0^+	E2		B(E2)(W.u.)=22 *6* E_{γ}: γ reported in (α,γ) only; not in ^{44}V ε decay.
		1447.77 *12*	100 *10*	1083.10	2^+	E2+M1	−7.5 *+25−80*	B(M1)(W.u.)=0.00009 *+11−6*; B(E2)(W.u.)=6.5 *+10−9* E_{γ}: weighted average of 1447.88 *13* from ^{44}V β^+ decay (111 ms) and 1447.68 *12* from (α,γ) E=res. I_{γ}: from ^{44}V β^+ decay (111 ms).
		2530.86 *25*	39 *7*	0.0	0^+	E2		B(E2)(W.u.)=0.157 *36* E_{γ}: from ^{44}V β^+ decay (111 ms). I_{γ}: weighted average of 42 *7* from ^{44}V β^+ decay (111 ms) and 35 *7* from (α,γ) E=res.
2886.2	2^+	982	5 *3*	1904.4	0^+	[E2]		B(E2)(W.u.)=6.5 *+47−33*
		1803	43 *14*	1083.10	2^+	[M1,E2]		B(M1)(W.u.)=0.0031 *+11−10* if pure M1, B(E2)(W.u.)=2.7 *+10−8* if pure E2.
		2886.1 *6*	100 *14*	0.0	0^+	E2		B(E2)(W.u.)=0.59 *+17−12*
3176.12	3^-	645	<1.00	2530.90	2^+	[E1]		B(E1)(W.u.)<1.4×10^{-6}
		721.3[@]	2 *1*	2454.32	4^+	[E1]		B(E1)(W.u.)=1.8×10^{-6} *+9−8*
		2093.0 *8*	100 *2*	1083.10	2^+	E1(+M2)	−0.01 *4*	B(E1)(W.u.)=3.6×10^{-6} *3* E_{γ}: weighted average of 2093.2 *8* from (^{19}F,2npγ), 2092.9 *8* from (^{14}N,pnγ), and 2092.9 *8* from (α,γ) E=res. δ: from $\gamma\gamma(\theta)$ data in $^{40}Ca(\alpha,\gamma)$ (1981Di09).
		3175.9[@]	1.0 *5*	0.0	0^+	[E3]		B(E3)(W.u.)=2.0 *+11−9* I_{γ}: other: 2011Mi02 in (^{6}Li,pnγ) quote 2.0 *3* as from 2000UrZX.
3364.88	4^+	833	5 *2*	2530.90	2^+	[E2]		B(E2)(W.u.)=20 *+10−8*
		2281.8[@]	100 *2*	1083.10	2^+	[E2]		B(E2)(W.u.)=2.6 *+6−4*
3415.3	(3^+)	529	2.2 *5*	2886.2	2^+			
		885	<1.5	2530.90	2^+			
		2332	100.0 *5*	1083.10	2^+	D+Q		δ: δ=+1.6 *+12−6* for J=2; >+6 or +0.4 *+10−9* for J=3 (1971Si13) in (α,γ) E=res.
3645.89	4^-	230[#]	5.9[&]	3415.3	(3^+)			

Adopted Levels, Gammas (continued)

$\gamma(^{44}Ti)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡]	α[a]	Comments
3645.89	4^-	469.73 *13*	100	3176.12	3^-	E2+M1		E_γ: weighted average of 469.86 *10* from (^{19}F,2npγ) and 469.6 *1* from (^{14}N,pnγ). Mult.,δ: D+Q from $\gamma(\theta)$ in ^{40}Ca(α,γ) E=res (1981Di09); δ=−4.2 *8* for J(8963)=3 or −5.7 *14* for J(8963)=4.
		1191	4.2 *21*	2454.32	4^+	[E1]		B(E1)(W.u.)=1.6×10^{-7} *+8−7*
		2563	<1.0	1083.10	2^+	[M2]		B(M2)(W.u.)<0.003
3755.9	2^+	1852	<6	1904.4	0^+	[E2]		B(E2)(W.u.)<0.99
		2673	39 *7*	1083.10	2^+	[M1,E2]		B(M1)(W.u.)=0.0019 *+6−4* if pure M1, B(E2)(W.u.)=0.73 *+25−17* if pure E2.
		3756	100 *7*	0.0	0^+	E2	1.10×10^{-3} *2*	B(E2)(W.u.)=0.34 *+11−7* Mult.: ΔJ=2 from $\gamma(\theta)$ in (α,γ) E=res; M2 ruled out by RUL.
3942.7	3^-	767	<2	3176.12	3^-	[M1,E2]		B(M1)(W.u.)<0.0016 if pure M1, B(E2)(W.u.)<7.6 if pure E2.
		1412	<2	2530.90	2^+	[E1]		B(E1)(W.u.)<6.3×10^{-6}
		1489	5 *2*	2454.32	4^+	[E1]		B(E1)(W.u.)=1.0×10^{-5} *+5−4*
		2859	100 *3*	1083.10	2^+	[E1]	1.18×10^{-3} *2*	B(E1)(W.u.)=2.7×10^{-5} *+9−6*
3980	4^+	565	8 *4*	3415.3	(3^+)			
		804	8 *6*	3176.12	3^-	[E1]		B(E1)(W.u.)=0.00012 *+14−7*
		1094	48 *10*	2886.2	2^+	[E2]		B(E2)(W.u.)=28 *+18−9*
		1526	29 *10*	2454.32	4^+	[M1,E2]		B(M1)(W.u.)=0.0027 *+19−11* if pure M1, B(E2)(W.u.)=3.2 *+22−13* if pure E2.
		2897	100 *15*	1083.10	2^+	[E2]		B(E2)(W.u.)=0.45 *+28−14*
4015.30	6^+	1560.97 *8*	100	2454.32	4^+	E2		B(E2)(W.u.)=15.8 *+27−20* E_γ: weighted average of 1561.00 *8* from ^{44}V β^+ decay (150 ms), 1560.90 *15* from (^{19}F,2npγ), and 1560.7 *4* from (^{14}N,pnγ). Mult.: Q with ΔJ=2 from $\gamma(\theta)$ in (^{19}F,2npγ) and γ asymmetry in (α,γ) E=res; M2 ruled out by RUL.
4061.47	(5^-)	415.2[@]	8.0[&]	3645.89	4^-	[M1,E2]	0.0011 *5*	B(M1)(W.u.)=0.009 *+5−4* if pure M1. B(E2)(W.u.)=1.5×10^{2} *+9−7* exceeds RUL=100 if pure E2.
		696.7[@]		3364.88	4^+	[E1]		
		885.6 *9*	68[&]	3176.12	3^-	(E2)		B(E2)(W.u.)=29 *+15−13* E_γ: unweighted average of 886.4 *5* from (^{19}F,2npγ) and 884.7 *3* from (^{14}N,pnγ). Mult.,δ: −2<δ(Q/D)<2 for J^π= 3^-, 0 for J^π=5^- from $\gamma(\theta)$ with Q preferred in (α,γ) E=res (1977Di07); (Q) from $\gamma(\theta)$ in (^{19}F,2npγ); (M2) ruled out by RUL.
		1607.1 *5*	100[&]	2454.32	4^+	(E1)		B(E1)(W.u.)=4.9×10^{-5} *+26−20* E_γ: weighted average of 1607.2 *5* from (^{19}F,2npγ) and 1607.0 *5* from (^{14}N,pnγ).

$^{44}_{22}Ti_{22}$-13

$^{44}_{22}Ti_{22}$-14

$\gamma(^{44}$Ti) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡]	α[a]	Comments
								B(E1)(W.u.)=4.9×10^{-5} *+26−20* E_γ: weighted average of 1607.2 *5* from (^{19}F,2npγ) and 1607.0 *5* from (^{14}N,pnγ). δ: δ(Q/D)=+0.15 *10* for J^π= 3$^-$, $-0.1<\delta<0.1$ for J^π=5$^-$ in (α,γ) E=res (1977Di07); (D) from $\gamma(\theta)$ in (^{19}F,2npγ); (E1) from $\Delta\pi$=(yes).
4061.47	(5$^-$)	2978[b]	<4	1083.10	2$^+$	[E3]		E_γ,I_γ: γ from (α,γ) only. B(E3)(W.u.)<124 upper limit exceeds RUL=100.
4115.3	2$^+$	1230	11 *11*	2886.2	2$^+$	[M1,E2]		E_γ: γ reported in (α,γ) only; not in ^{44}V ε decay. B(M1)(W.u.)<0.022 if pure M1, B(E2)(W.u.)<40 if pure E2.
		1585	47 *11*	2530.90	2$^+$	[M1,E2]		E_γ: γ reported in (α,γ) only; not in ^{44}V ε decay. If M1, B(M1)(W.u.)=0.010 *+8−4*. If E2, B(E2)(W.u.)=11 *+9−4*.
		2212	<11	1904.4	0$^+$	[E2]		B(E2)(W.u.)<1.1 E_γ: γ reported in (α,γ) only; not in ^{44}V ε decay.
		3032.1 *6*	100 *16*	1083.10	2$^+$	[M1,E2]		E_γ: from ^{44}V β^+ decay (111 ms). If M1, B(M1)(W.u.)=0.0031 *+24−10*. If E2, B(E2)(W.u.)=1.0 *+7−3*.
		4117	64 *11*	0.0	0$^+$	[E2]	1.22×10^{-3} *2*	B(E2)(W.u.)=0.13 *+10−5* E_γ: γ reported in (α,γ) only; not in ^{44}V ε decay.
4227	(3$^-$)	581	26 *12*	3645.89	4$^-$			
		812	15 *9*	3415.3	(3$^+$)			
		1051	100 *12*	3176.12	3$^-$			
		1341	85 *12*	2886.2	2$^+$			
		1696	50 *12*	2530.90	2$^+$			
		3144	18 *9*	1083.10	2$^+$			
4499.94	(6$^+$)	1135.0[@]		3364.88	4$^+$			
		2045.4[@]	100[&]	2454.32	4$^+$			
4792.2	(2$^+$)	1036	4 *2*	3755.9	2$^+$	[M1,E2]		If M1, B(M1)(W.u.)=0.0020 *+18−10*. If E2, B(E2)(W.u.)=5.2 *+47−26*.
		1617	6 *2*	3176.12	3$^-$	[E1]		B(E1)(W.u.)=2.0×10^{-5} *+15−8*
		1906	3 *2*	2886.2	2$^+$	[M1,E2]		If M1, B(M1)(W.u.)=0.00024 *+26−13*. If E2, B(E2)(W.u.)=0.19 *+20−10*.
		3709	100 *3*	1083.10	2$^+$	[M1,E2]	0.00101 *7*	If M1, B(M1)(W.u.)=0.0011 *+7−3*. If E2, B(E2)(W.u.)=0.22 *+14−7*.
4803.02	(6$^+$)	2348.5 *4*	100	2454.32	4$^+$			E_γ: from ^{44}V β^+ decay (150 ms).
5151.7	(6$^-$)	1090.4[@]	10[&]	4061.47	(5$^-$)			
		1505.5[@]	100[&]	3645.89	4$^-$			
5305		4222	100	1083.10	2$^+$			
5421	3$^-$	4340	100	1083.10	2$^+$			
5671.5	(7$^-$)	513[#]		5151.7	(6$^-$)			E_γ: level-energy difference=519.8.
		1609.6[@]	100[&]	4061.47	(5$^-$)			
6508.36	8$^+$	2008.4[@]	10.5[&]	4499.94	(6$^+$)	[E2]		B(E2)(W.u.)>0.29
		2493.16 *25*	100[&]	4015.30	6$^+$	E2		B(E2)(W.u.)>1.1

$^{44}_{22}Ti_{22}$-14

$\gamma(^{44}Ti)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡]	α[a]	Comments
								E_γ: from (^{19}F,2npγ). Other: 2492.6 *14* from (^{14}N,pnγ). Mult.: Q with ΔJ=2 from $\gamma(\theta)$ in (^{19}F,2npγ); M2 ruled out by RUL.
6572.4	(8$^+$)	2072.2[@]	100	4499.94	(6$^+$)			
6606.3	2$^+$	4075.2 *5*	35 *7*	2530.90	2$^+$			E_γ,I_γ: from ^{44}V β^+ decay (111 ms).
		5523.1 *12*	100 *23*	1083.10	2$^+$			E_γ,I_γ: from ^{44}V β^+ decay (111 ms).
6848.80	(6)$^+$	2045.6 *4*	24.6 *18*	4803.02	(6$^+$)			
		2833.42 *14*	100 *7*	4015.30	6$^+$			
6924.2	(8$^-$)	1252.5[@]		5671.5	(7$^-$)			
		1772.4[@]	100[&]	5151.7	(6$^-$)			
7216	1$^+$	5312	3 *1*	1904.4	0$^+$			
		6133	1.0 *5*	1083.10	2$^+$			
		7216	100 *1*	0.0	0$^+$			
7409.0	(9$^-$)	1737.3[@]	100	5671.5	(7$^-$)			
7458	(8$^+$)	3444	100	4015.30	6$^+$			
7634	(1,2$^+$)	5730	61 *32*	1904.4	0$^+$			
		7634	100 *32*	0.0	0$^+$			
7670.87	(10$^+$)	1098.2		6572.4	(8$^+$)			E_γ: from (^{24}Mg,2$\alpha\gamma$).
		1162.55 *15*	100[&]	6508.36	8$^+$	E2		B(E2)(W.u.)=15.4 *+36−24* E_γ: weighted average of 1162.49 *15* from (^{19}F,2npγ) and 1162.8 *3* from (^{14}N,pnγ). Mult.: Q with ΔJ=2 from $\gamma(\theta)$ in (^{19}F,2npγ) and (^{14}N,pnγ); M2 ruled out by RUL.
8039.70	(12$^+$)	368.85 *10*	100	7670.87	(10$^+$)	E2	2.42×10^{-3} *3*	B(E2)(W.u.)=4.3 *+10−7* E_γ: weighted average of 368.80 *10* from (^{19}F,2npγ) and 368.9 *1* from (^{14}N,pnγ). Mult.: Q with ΔJ=2 from $\gamma(\theta)$ in (^{19}F,2npγ) and (^{14}N,pnγ).
8072.0	(1$^-$,2$^+$)	8067	100	0.0	0$^+$			
8320.0		5432	85 *19*	2886.2	2$^+$			
		7235	100 *19*	1083.10	2$^+$			
8382	2$^+$	5499	100 *20*	2886.2	2$^+$			
		7302	40 *20*	1083.10	2$^+$			
		8385	60 *20*	0.0	0$^+$			
8419.0	(0$^+$,1$^-$)	7333	100	1083.10	2$^+$			
8449	2$^+$	5995	27 *13*	2454.32	4$^+$			
		7366	100 *13*	1083.10	2$^+$			
8511	2$^+$	7428	100	1083.10	2$^+$			
8534	(2$^+$,3$^-$)	7451	100	1083.10	2$^+$			
8568	2$^+$	5200	32 *16*	3364.88	4$^+$			
		6034	29 *16*	2530.90	2$^+$			

From ENSDF

$^{44}_{22}Ti_{22}$-15

$\gamma(^{44}Ti)$ (continued)

E_i(level)	J_i^π	E_γ†	I_γ†	E_f	J_f^π	Mult.‡	δ‡	Comments
8568	2^+	7482	100 *16*	1083.10	2^+			
8627	2^+	7544	100	1083.10	2^+			
8639.0	2^+	7556	100 *13*	1083.10	2^+			
		8639	33 *13*	0.0	0^+			
8754	2^+	6223	18	2530.90	2^+			
		7671	64	1083.10	2^+			
		8754	100	0.0	0^+			
8861.9	(10^-)	1452.9@		7409.0	(9^-)			
		1937.3@	100&	6924.2	(8^-)			
8946	(4^+)	6415	82 *13*	2530.90	2^+	[E2]		
		7863	100 *13*	1083.10	2^+	[E2]		
8954	1^-	4727	20 *5*	4227	(3^-)			
		6068	24 *3*	2886.2	2^+			
		7049	100 *5*	1904.4	0^+			
		8954	8 *2*	0.0	0^+			
8962.7	$(3^-,4^+)$	4902	9 *4*	4061.47	(5^-)			
		5020	19 *4*	3942.7	3^-			
		5207	7 *4*	3755.9	2^+			
		5317	100 *4*	3645.89	4^-	D+Q		δ: −0.475 *52* for J(8963)=4 or −0.091 *23* for J(8963)=3 from $\gamma(\theta)$ data (1981Di09).
		5599	12 *2*	3364.88	4^+			
		5787	58 *4*	3176.12	3^-	D+Q		δ: +0.041 *57* for J(8963)=3 or +0.44 *5* for J(8963)=4 from $\gamma(\theta)$ data (1981Di09).
		6509	22 *2*	2454.32	4^+			
8984	(10^+)	2413	100	6572.4	(8^+)			E_γ: from (^{28}Si,2$\alpha\gamma$).
8987	2^+	6456	60 *3*	2530.90	2^+	D+Q		δ: 0.29 *11* or +4.0 *+30−4* from $\gamma(\theta)$ (1971Si13) in (α,γ) E=res.
		6533	<16	2454.32	4^+			
		7904	<16	1083.10	2^+			
		8987	100 *3*	0.0	0^+			
8992	4^+	6461	<9	2530.90	2^+	[E2]		
		6538	100 *6*	2454.32	4^+	D+Q	−0.64 *11*	
		7909	90 *6*	1083.10	2^+	Q(+O)	+0.02 *3*	
		8992b	<9	0.0	0^+			
9140		6609		2530.90	2^+			
		9140		0.0	0^+			
9180		5238		3942.7	3^-			
		5535		3645.89	4^-			
		6005		3176.12	3^-			
		6726		2454.32	4^+			
9215	2^+	5800	54 *7*	3415.3	(3^+)	D+Q		δ: 0.09 *17* for J(3415)=3 (1980Di14) from $\gamma(\theta)$ in (α,γ) E=res.
		6329	28 *5*	2886.2	2^+	D+Q		δ: 0.3 *2* or +3.7 *13* (1980Di14) from $\gamma(\theta)$ in (α,γ) E=res.
		6684	100 *5*	2530.90	2^+	D+Q		δ: 0.07 *8* (1980Di14) from $\gamma(\theta)$ in (α,γ) E=res.
		7311	2.4 *12*	1904.4	0^+			

$^{44}_{22}Ti_{22}$-16

$\gamma(^{44}Ti)$ (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡	δ‡	Comments
9215	2^+	8132	49 *10*	1083.10	2^+	D+Q		δ: 0.84 *25* or 11 *7* (1980Di14) from $\gamma(\theta)$ in (α,γ) E=res.
		9215	31 *7*	0.0	0^+			
9227	2^+	5812	51.1 *13*	3415.3	(3^+)	D+Q		δ: −0.32 *+10−5* when J=2 for 3415 level, −0.09 *7* when J=3 for 3415 level (1971Si13); +0.01 *4* for J(3415)=3 (1980Di14).
		6341	16.8 *7*	2886.2	2^+	D+Q	−0.08	δ: other: 0<δ<+1 (1980Di14).
		6696	100.0 *15*	2530.90	2^+	D+Q	+0.03 *4*	δ: weighted average of +0.02 *4* (1971Si13) and +0.03 *4* (1980Di14).
		7323	<2	1904.4	0^+			
		8144	46.9 *11*	1083.10	2^+	D+Q	+0.06 *5*	
		9227	1.50 *18*	0.0	0^+			
9239	2^+	5824	84 *4*	3415.3	(3^+)	D+Q		δ: 0.11 *7* for J(3415)=3 (1980Di14).
		6353	39 *33*	2886.2	2^+	D+Q	+0.06 *12*	
		6708	100 *6*	2530.90	2^+	D+Q	+0.14 *8*	
		7335	23 *5*	1904.4	0^+			
		8156	90 *7*	1083.10	2^+	D+Q	−0.45 *6*	
		9239	18 *4*	0.0	0^+			
9299	0^+	2082	69 *14*	7216	1^+			
		5542	100 *14*	3755.9	2^+			
9338	0^+	2122	100 *6*	7216	1^+			
		5582	2.5 *6*	3755.9	2^+			
		6452	<0.5	2886.2	2^+			
		6807	<0.5	2530.90	2^+			
		8256	<0.2	1083.10	2^+			
9361	$(2^+,3^-)$	3938	16 *5*	5421	3^-			
		4056	32 *11*	5305				
		4569	63 *11*	4792.2	(2^+)			
		5134	21 *5*	4227	(3^-)			
		5245	21 *5*	4115.3	2^+			
		5381	32 *5*	3980	4^+			
		5418	26 *5*	3942.7	3^-			
		5715	21 *5*	3645.89	4^-			
		5946	11 *5*	3415.3	(3^+)			
		6185	100 *11*	3176.12	3^-			
		6475	21 *5*	2886.2	2^+			
		6830	21 *5*	2530.90	2^+			
		6907	16 *5*	2454.32	4^+			
		8278	95 *11*	1083.10	2^+			
		9361	32 *11*	0.0	0^+			
9503	(10^+)	2932	100	6572.4	(8^+)			
9698	2^+	5582	18 *4*	4115.3	2^+			
		6283	100 *4*	3415.3	(3^+)			
		6522	6 *2*	3176.12	3^-			
		6812	57 *4*	2886.2	2^+			

From ENSDF

γ(^{44}Ti) (continued)

E_i(level)	J^{π}_i	E_{γ}†	I_{γ}†	E_f	J^{π}_f
9698	2^+	7167	12 *4*	2530.90	2^+
		7244	6 *2*	2454.32	4^+
		8615	2.7 *6*	1083.10	2^+
		9698	2.7 *6*	0.0	0^+
9713	4^+	4921	26 *7*	4792.2	(2^+)
		5486	7 *2*	4227	(3^-)
		5957	100 *7*	3755.9	2^+
		6298	41 *7*	3415.3	(3^+)
		6827	26 *7*	2886.2	2^+
		8630	17 *4*	1083.10	2^+
9724.2	(11^-)	2054#		7670.87	(10^+)
		2315.0@	100	7409.0	(9^-)
9908	$(3^-,5^-)$	5847	100 *9*	4061.47	(5^-)
		6152	23 *6*	3755.9	2^+
		6262	66 *6*	3645.89	4^-
		6732	17 *6*	3176.12	3^-
		8825	6 *3*	1083.10	2^+
10386	$(2^+,3^-)$	6159	17 *9*	4227	(3^-)
		6443	87 *13*	3942.7	3^-
		6740	57 *9*	3645.89	4^-
		7210	100 *13*	3176.12	3^-
		7500	70 *9*	2886.2	2^+
		9303	91 *9*	1083.10	2^+
		10386	9 *4*	0.0	0^+
10464.8	(12^-)	1602.6@	100&	8861.9	(10^-)
		2425.3@		8039.70	(12^+)
11087.2		1362.8@		9724.2	(11^-)
		3047.5@	100&	8039.70	(12^+)
11496	(12^+)	2513	100	8984	(10^+)
11537.6	(13^-)	1072.6@		10464.8	(12^-)
		3497.8@		8039.70	(12^+)
11547.8	(13^-)	1824@	100&	9724.2	(11^-)
		3507.9@	50&	8039.70	(12^+)
11835	(12^+)	2852	100	8984	(10^+)
12.20×10^3	(1^-)	11120		1083.10	2^+
		12200		0.0	0^+
13.00×10^3	(1^-)	11900		1083.10	2^+
		13000		0.0	0^+

$^{44}_{22}Ti_{22}$-18

$\gamma(^{44}Ti)$ (continued)

E_i(level)	J^{π}_i	E_γ[†]	I_γ[†]	E_f	J^{π}_f	Comments
13370.6	(15⁻)	1822.8[@]	100[&]	11547.8	(13⁻)	
		2906[b]	100[&]	10464.8	(12⁻)	E_γ,I_γ: from (^{28}Si,2$\alpha\gamma$). Mult=M3 implied by ΔJ^π makes this transition unlikely in view of competing 1815 (implied mult=E2) transition (evaluators).
13782	(14⁻)	3325	100	10464.8	(12⁻)	
14.10×10^3	(3⁻)	13020		1083.10	2⁺	
14.55×10^3	(1⁻)	13470		1083.10	2⁺	
		14550		0.0	0⁺	
15.45×10^3		12960		2454.32	4⁺	Final states: 2454+2531.
15.95×10^3	(3⁻)	13460		2454.32	4⁺	Final states: 2454+2531.
		14870		1083.10	2⁺	

† From (α,γ) E=res, unless otherwise noted. For Eγ data from (α,γ) E=res, values with ΔE from 1973Di04 and others from level-energy differences rounded off to nearest keV with E(level) values from 1977Di07 based on their measured Eγ values which however are not listed in 1977Di07.

‡ From $\gamma(\theta)$ in (α,γ) E=res with electric and magnetic natures determined based on recommended upper limit (RUL) of transition strength and measured level $T_{1/2}$ where available, unless otherwise noted. If $T_{1/2}$ is unknown and parity (E or M) is determined not by polarization measurements or ce data, evaluators use D instead of M1 and E1, and Q instead of E2.

\# Reported in (^{28}Si,2$\alpha\gamma$), but not in (^{24}Mg,2$\alpha\gamma$).

@ From (^{24}Mg,2$\alpha\gamma$).

& From (^{28}Si,2$\alpha\gamma$).

a 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.

b Placement of transition in the level scheme is uncertain.

$^{44}_{22}Ti_{22}$-19

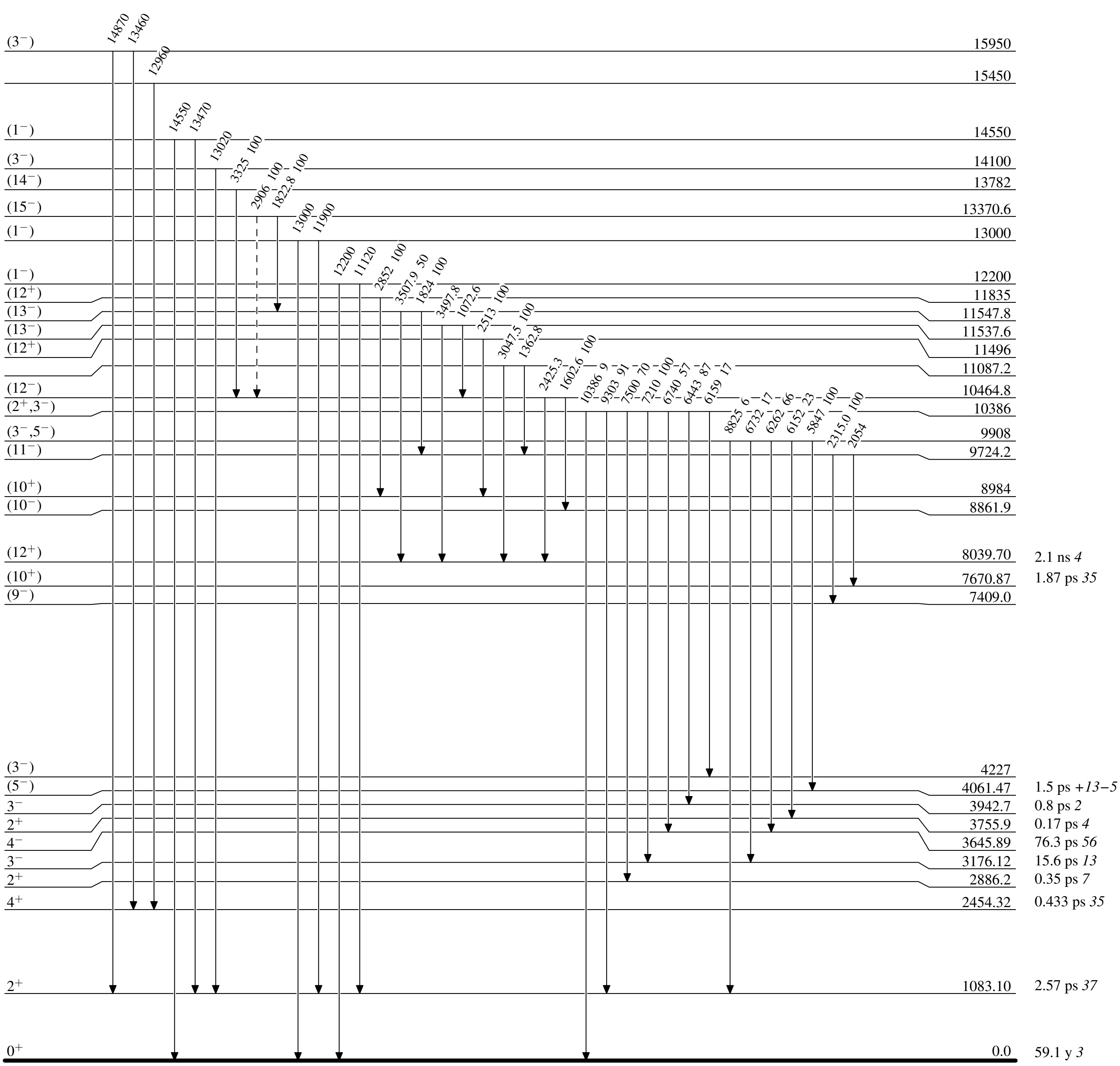
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

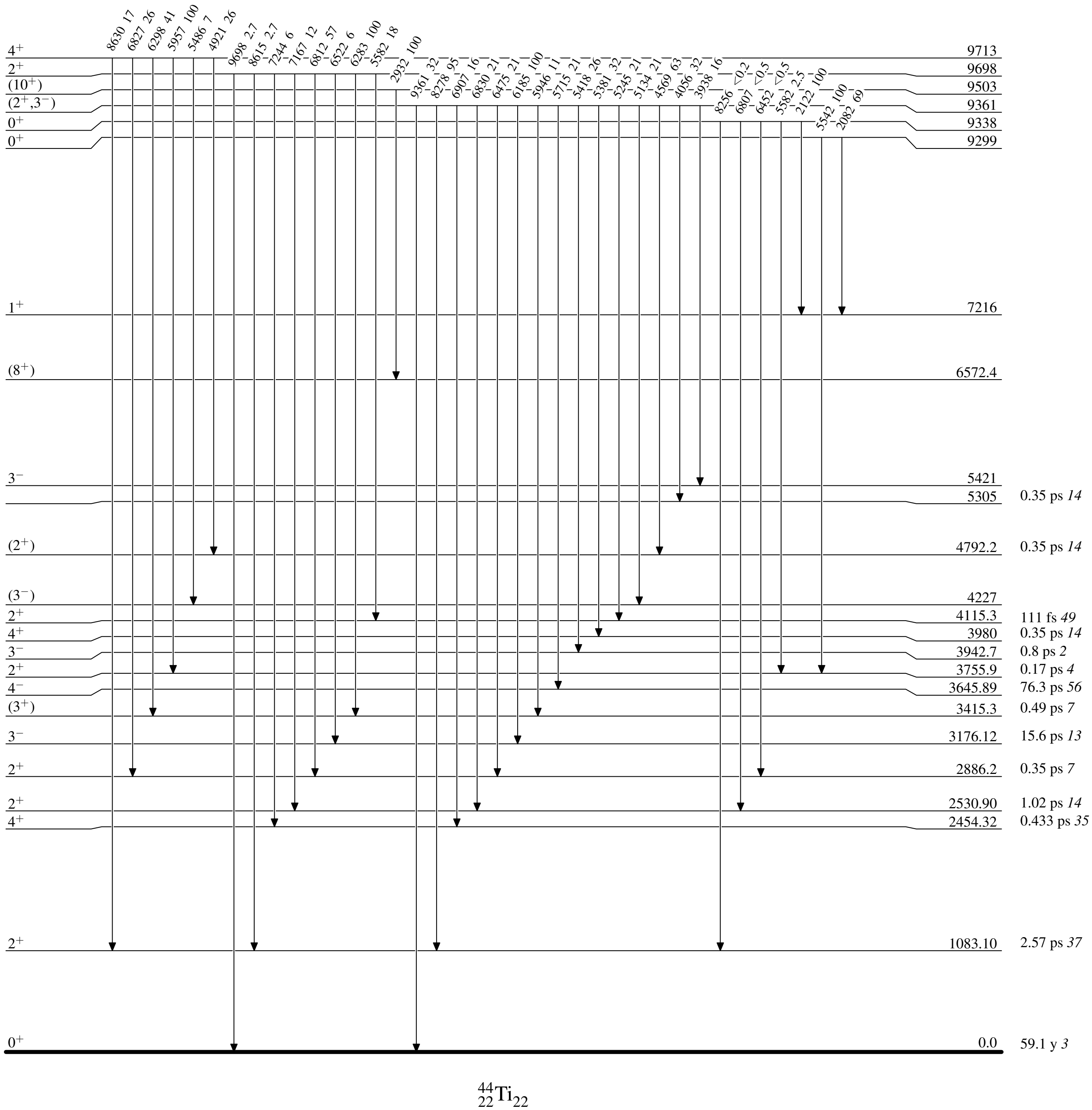


$^{44}_{22}Ti_{22}$

Adopted Levels, Gammas

Level Scheme (continued)

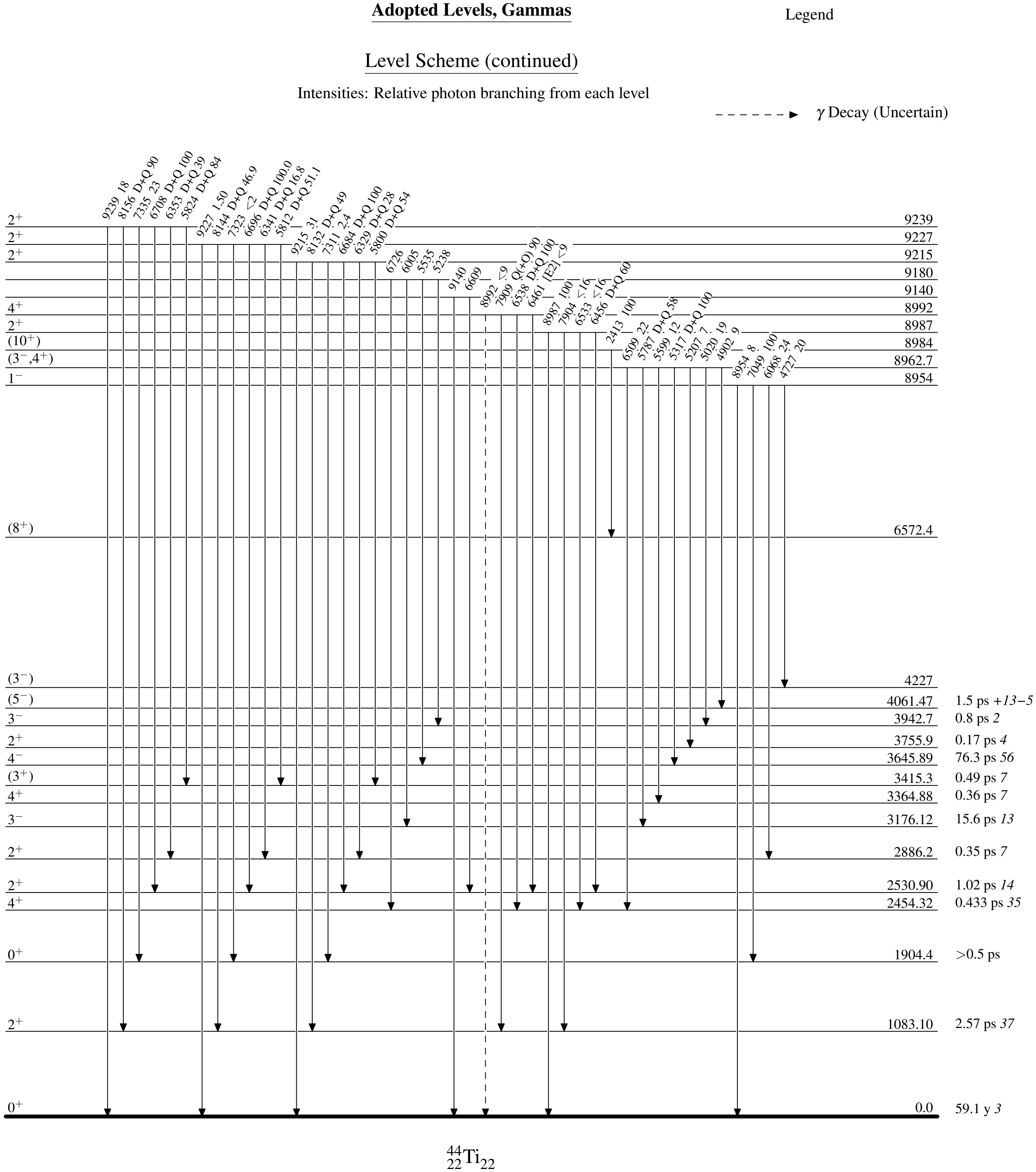
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

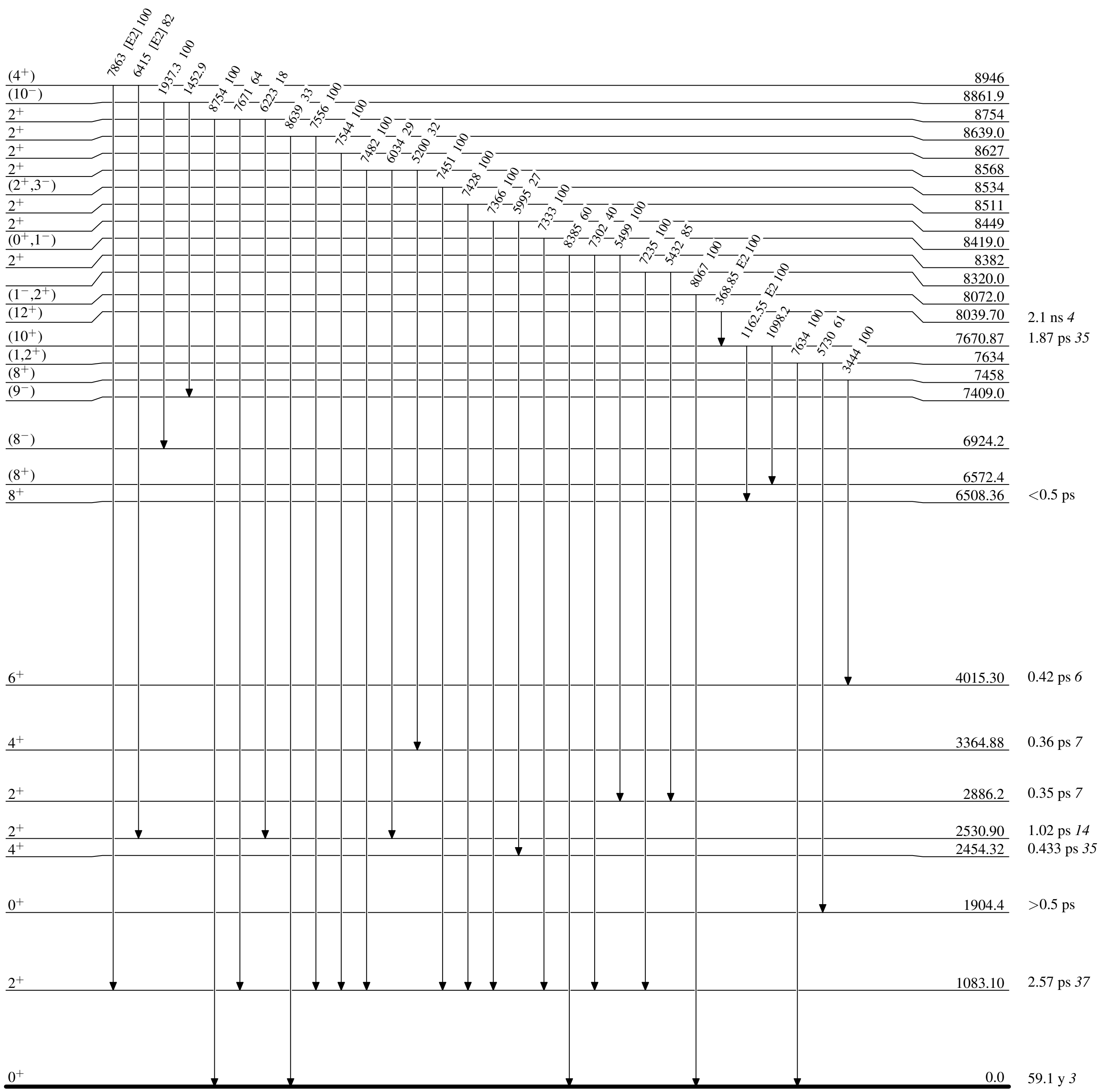
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{44}_{22}Ti_{22}$

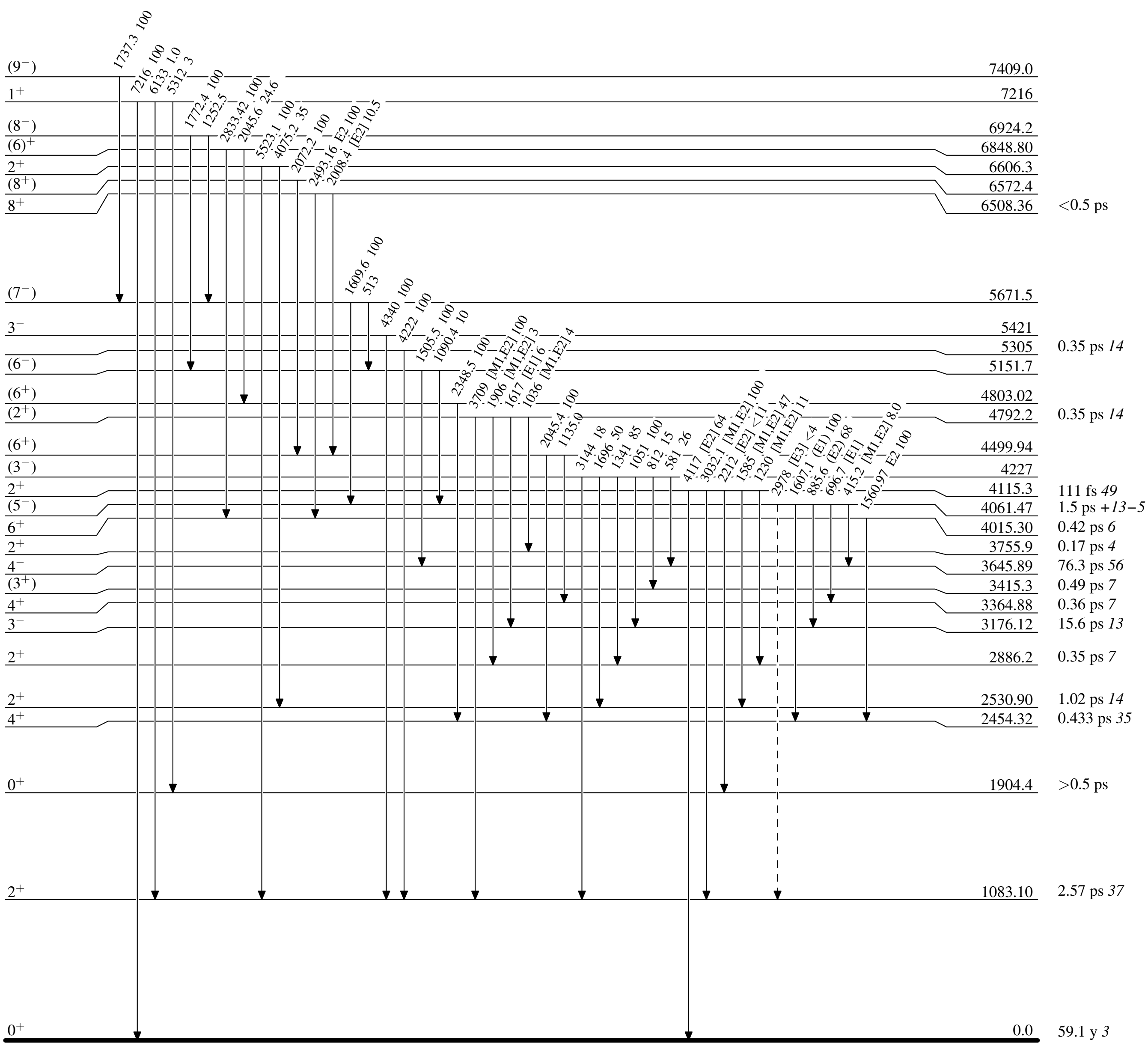
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

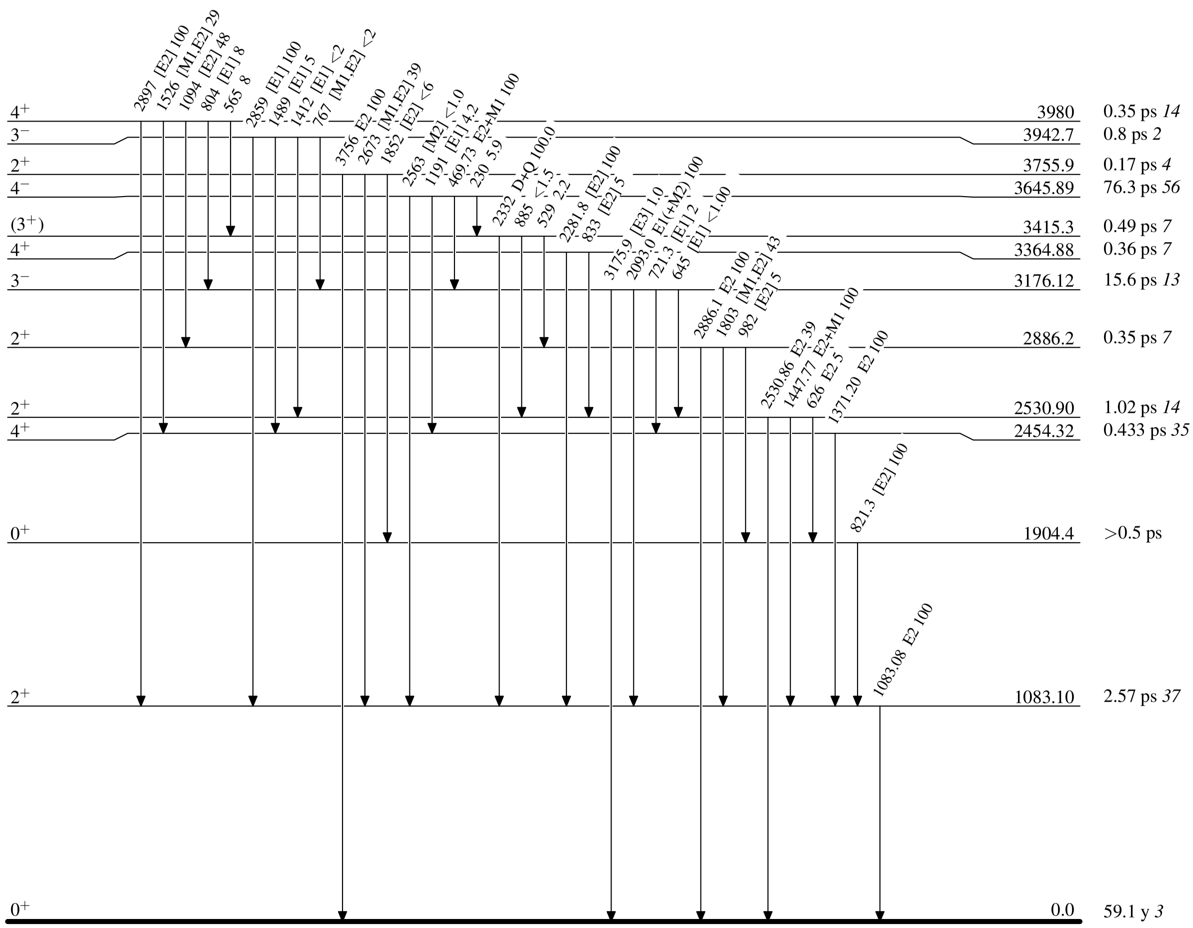


$^{44}_{22}Ti_{22}$

Adopted Levels, Gammas

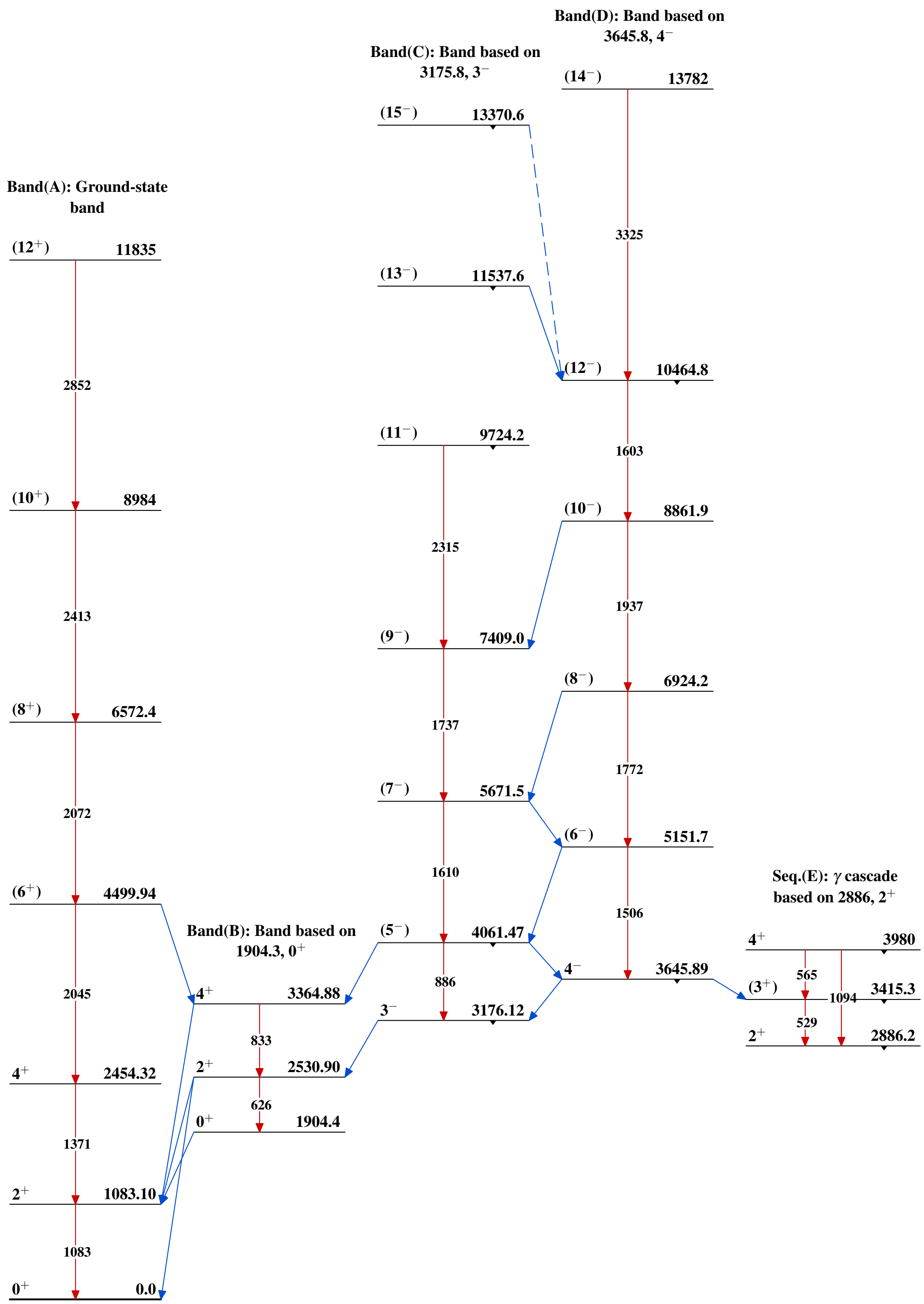
Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{44}_{22}Ti_{22}$

Adopted Levels, Gammas



$^{44}_{22}Ti_{22}$

Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	S. -c. Wu	NDS 91,1 (2000)	15-Jul-2000

Q(β^-)=−7052.39 *10*; S(n)=13189.2 *9*; S(p)=10344.8 *7*; Q(α)=−8004.7 *4* 2012Wa38
Note: Current evaluation has used the following Q record \$ −7051.4 *10* 13189.8 *8* 10345.0 *7* 1995Au04.
Data from (p,γ) are often inconsistent with data from other experiments. The evaluator has excluded part of the (p,γ) data from the Adopted Levels, gammas file.
Isotope shifts: 1996Lu12, 1996Fu23, 1995Ga44, 1992Az03.
Other reactions:
^{27}Al(^{19}F,γ): 1993Fe01.
^{46}Ti(t,t′): 1994So26.
^{46}Ti(^{58}Ni,^{58}Ni): 1997Ku25, 1994Ab33.

^{46}Ti Levels

Band(α,t) K$^\pi$=0$^+$ g.s. band. See (^{28}Si,2α2pγ), (^{9}Be,3nγ), (^{9}Be,2pnγ) or (^{12}C,α2pγ).
Band(O,S) K$^\pi$=3$^-$ band. See (^{28}Si,2α2pγ), (^{9}Be,3nγ), (^{9}Be,2pnγ) or (^{12}C,α2pγ).

Cross Reference (XREF) Flags

A	^{46}Sc β^- decay	L	^{44}Ca(^{16}O,^{14}C)	W	^{46}Ti(p,p′), (pol p,p′)
B	^{46}V β^+ decay	M	^{45}Sc(p,γ): primary γ′s	X	^{46}Ti(p,p′γ),(pol P,p′γ)
C	^{12}C(^{40}Ca,α2pγ)	N	^{45}Sc(p,γ): secondary γ′s	Y	^{46}Ti(d,d′)
D	^{28}Si(^{28}Si,2α2pγ)	O	^{45}Sc(^{3}He,d)	Z	^{46}Ti(^{3}He,^{3}He′)
E	^{32}S(^{16}O,2pγ)	P	^{45}Sc(α,t)	Others:	
F	^{39}K(^{12}C,αpγ)	Q	^{45}Sc(^{16}O,^{15}N)	AA	^{46}Ti(α,α′),(α,α′γ)
G	^{40}Ar(^{9}Be,3nγ)	R	^{46}Ti(γ,γ′)	AB	Coulomb excitation
H	^{40}Ca(^{9}Be,2pnγ)	S	^{46}Ti(e,e′p)	AC	^{47}Ti(p,d)
I	^{42}Ca(^{6}Li,d)	T	^{46}Ti(e,e′)	AD	^{47}Ti(d,t)
J	^{43}Ca(α,nγ)	U	^{46}Ti(n,n′)	AE	^{47}Ti(^{3}He,α)
K	^{44}Ca(^{3}He,n)	V	^{46}Ti(n,n′γ)	AF	^{48}Ti(p,t)

E(level)	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0	0$^+$	stable	ABCDEFGHIJKLMNOPQR TUVWXYZ	XREF: Others: AA, AB, AC, AD, AE, AF
889.286 *3*	2$^{+\#}$	5.32 ps *15*	ABCDEFGHIJKLMNOPQR TUVWXYZ	XREF: Others: AA, AB, AC, AD, AE, AF μ=+0.98 *24* (1981Sh19,1989Ra17) Q=−0.21 *6* (1989Ra17) J$^\pi$: E2 γ to 0$^+$. T$_{1/2}$: weighted average of 4.69 ps *34* (^{46}Sc β^- decay), 4.5 ps *5* (^{16}O,2pγ), 5.6 ps *2* (Coulomb excitation, B(E2)=0.090 *4*), 7.5 ps *14* (γ,γ′) and 1.4 ps *+35−7* (p,γ) (1987Mo17).
2009.846 *5*	4$^{+\#}$	1.62 ps *10*	A CDEFGHIJ LMNOPQ T VWXYZ	XREF: Others: AA, AB, AC, AD, AE, AF J$^\pi$: L=4 in (p,p′) and (p,t). T$_{1/2}$: weighted average of 1.6 ps *1* (coulomb excitation), 1.8 ps *2* (^{16}O,2pγ), 1.5 ps *3* (^{9}Be,3nγ), 1.3 ps *6* (α,nγ) and 1.5 ps *3* (p,γ); other: 3.2 ps *+12−6* (α,α′γ).
2611.0 *2*	0$^+$	76$^\&$ fs *21*	B J VWXYZ	XREF: Others: AF E(level): from (p,p′γ). J$^\pi$: L=0 in (p,t).
2961.8 *2*	2$^{+@}$	166 fs *7*	J MNOP T VWXY	J$^\pi$: L=2 in (p,p′). T$_{1/2}$: from (p,γ). Others: 150 fs *40* (α,nγ) and 49 fs *8*

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{46}Ti Levels (continued)

E(level)	J$^\pi$	T$_{1/2}$	XREF	Comments
				(p,p′γ).
3058.46 *12*	3$^-$	7[&] ps *2*	CDEFGH J MNO VWXY	XREF: Others: AA J$^\pi$: L=3 in (p,p′) and (p,t). T$_{1/2}$: from (α,nγ); other: 2 ps *+2−1* (p,γ).
3168.00 *10*	1$^-$[@]	176 fs *24*	C J MN R VWX	J$^\pi$: from L=1 in (p,p′). T$_{1/2}$: weighted average of 150 fs *40* (α,nγ) and 191 fs *30* (p,γ); 28 fs *8* from (γ,γ′) and 49 fs *9* from (p,p′γ) not used.
3213			J	
3217.3			V	E(level): from (n,n′γ).
3235.7 *2*	2$^+$[@]	29 fs *6*	J MNO Q T VWXY	XREF: Others: AA, AC, AE, AF J$^\pi$: L=2 in (p,p′) and (p,t). However, L=5 in (α,α′). T$_{1/2}$: weighted average of 28 fs *10* (α,nγ) and 29 fs *+7−3* (p,γ); 13 fs *2* from (p,p′γ) not used.
3298.86 *16*	6$^+$[#]	0.99 ps *9*	CDEFGH J MNOPQ VW	XREF: Others: AD, AE, AF J$^\pi$: L=6 in (p,p′). T$_{1/2}$: weighted average of 1.0 ps *5* (^{16}O,2pγ), 1.0 ps *2* (^{9}Be,3nγ), 1.1 ps *3* (α,nγ), and 0.97 ps *11* (p,γ).
3338 *18*			W	E(level): from (p,p′).
3441.39 *17*	4$^-$[#]	66 ps *4*	CDE GH J MNO VWX	J$^\pi$: γ from 6$^-$, γ to 3$^-$ is ΔJ=1, D. T$_{1/2}$: weighted average of 58 ps *7* (^{16}O,2pγ) and 68 ps *4* (^{9}Be,2pnγ); 10 ps *+7−4* from (α,nγ) not used.
3553.1			V	E(level): from (n,n′γ).
3569.3 *3*	3$^-$[‡]	50 fs *+19−16*	C MN VWX	XREF: Others: AA, AC, AF J$^\pi$: L=3 in (p,p′). T$_{1/2}$: from (p,p′γ); 211 fs *24* from (p,γ) was not used.
3571.7 *2*	0$^+$[‡]	192 fs *+16−13*	J MNOP V XY	XREF: Others: AF J$^\pi$: L=0 in (p,t). T$_{1/2}$: weighted average of 180 fs *40* (α,nγ) and 194 fs *+17−14* (p,γ).
3579.8		70 fs *30*	J MN V	XREF: Others: AE E(level): from (n,n′γ). E(level)=3582 from (α,nγ); 3583 *3* from weighted average of values from (p,γ) and (^{3}He,α).
3610.2			J VW	E(level): from (n,n′γ). E(level)=3608 from (α,nγ).
3677	2$^-$		T W	Observed in (e,e′) and (p,p′). J$^\pi$: from σ(θ) in (e,e′).
3696	2$^+$		T	J$^\pi$: from σ(θ) in (e,e′).
3723.8 *4*	(2)$^+$[‡]	57 fs *4*	C J MNO VWX	XREF: Others: AF J$^\pi$: L=1 in (^{3}He,d); L=(2) in (p,t). However, L=(4) in (p,p′). T$_{1/2}$: weighted average of 59 fs *4* (p,γ), 52 fs *14* (α,nγ); 33 fs *+16−11* from (p,p′γ) not included.
3731	1$^+$		T	J$^\pi$: from σ(θ) in (e,e′).
3737.9 *3*	(1,2$^+$)		X	E(level): from (p,p′γ). J$^\pi$: γ to 0$^+$.
3771.5	+		V	XREF: Others: AC E(level): from (n,n′γ). E(level)=3780 *15* from (p,d). J$^\pi$: L=1+3 in (p,d).
3826.43 *18*	5$^-$	3.7[&] ps *21*	C H J MN V	XREF: Others: AA J$^\pi$: γ(θ) in (^{12}C,α2pγ); γ to 3$^-$, 6$^+$.
3845.0 *5*	2$^+$[‡]	8.9 fs *21*	J MNO V X	XREF: Others: AE, AF J$^\pi$: L=2 in (p,t).

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Adopted Levels, Gammas (continued)

^{46}Ti Levels (continued)

E(level)	J^π	$T_{1/2}$	XREF	Comments
				$T_{1/2}$: weighted average of 10 fs *4* (p,γ) and 8.5 fs *25* (p,p′γ); other: <0.024 ps from (α,nγ).
3848 *5*	(4$^+$)		W	J^π: L=(4) in (p,p′).
3852.44 *16*	5$^-$[#]	4.8 ps *8*	CD GH J V	J^π: γ to 3$^-$, 6$^+$; $\gamma(\theta)$ in (^{12}C,α2pγ). $T_{1/2}$: weighted average of 3.8 ps *17* (^{9}Be,3nγ), 4.9 ps *10* (^{9}Be,2pnγ), and 12 ps *5* (α,nγ).
3856 *4*			MN Q	XREF: Others: AC
3872	1$^+$		T	J^π: from $\sigma(\theta)$ in (e,e′).
3889.3 *14*	2$^+$	0.38[&] ps *7*	JKL VWX	J^π: L=2 in (p,p′).
3905.6 *3*	(1,2$^+$)	22 fs *4*	J MN V X	J^π: γ to 0$^+$. $T_{1/2}$: from (p,p′γ); other: 38 ps +*14*−*9* (p,γ).
3926 *8*	(2$^+$)[‡]		OP	XREF: Others: AE, AF E(level): weighted average of values from (α,t), (^{3}He,α), and (p,t). J^π: L=(2)in (p,t).
3941.9	4$^+$	<0.02 ps	J MN Q VW	XREF: Others: AC, AD, AE E(level): from (n,n′γ). E(level)=3941 from (α,nγ); 3941 *3* from weighted average of values from (p,γ), (p,p′), (p,d) and (^{3}He,α). J^π: L=4 in (p,p′).
4003.1			J VW	XREF: Others: AC E(level): from (n,n′γ). E(level)=4003 from (α,nγ).
4025.3	2$^+$		O T VWX	XREF: Others: AE E(level): from (n,n′γ). E(level)=4029 *5* from weighted average of values from (p,p′) and (^{3}He,α). J^π: from $\sigma(\theta)$ in (e,e′); γ′s to 4$^+$ and 0$^+$ levels.
4038.8			J MN V	E(level): from (n,n′γ). E(level)=4040 from (α,nγ); 4040 *4* from (p,γ).
4130.1	2$^+$[‡]		MNOP VW	XREF: Others: AA, AF E(level): from (n,n′γ). E(level)=4140 *4* from weighted average of values from (p,γ), (α,t), (p,p′) and (p,t). J^π: L=2 in (p,p′). However, L=3 in (α,α′).
4178.7	3$^-$[‡]		J V	XREF: Others: AF J^π: L=3 in (p,t).
4191.5	3$^-$		J MNO VW	J^π: L=3 in (p,p′).
4315.8 *10*	1$^+$	2.7 fs *4*	B R T VWX	XREF: Others: AC, AE J^π: from (γ,γ′) and $\sigma(\theta)$ in (e,e′). $\Gamma(0)^2/\Gamma$=0.172 eV *26* (1976Ra03). $T_{1/2}$: from $\Gamma(0)^2/\Gamma$ in (γ,γ′) and $\Gamma(0)/\Gamma$=1.
4322.6 *13*			C V	
4372.0	3$^-$		J VW	XREF: Others: AE J^π: L=3 in (p,p′).
4398 *8*	(5$^-$,6$^+$)[‡]		O	XREF: Others: AD, AF J^π: L=5,6 in (p,t).
4417.1 *5*	6$^-$	0.45[&] ps *17*	C H J MN VW	J^π: from $\gamma(\theta)$ in (^{12}C,α2pγ). However, L=(5) in (p,p′).
4437 *15*				XREF: Others: AE E(level): from (^{3}He,α).
4500 *10*				XREF: Others: AF E(level): from (p,t).
4523.4 *10*	4$^+$	0.07[&] ps *3*	C G J MN V	J^π: γ′s to 6$^+$,2$^+$ levels.

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Adopted Levels, Gammas (continued)

^{46}Ti Levels (continued)

E(level)	J^π	$T_{1/2}$	XREF	Comments
4527 *5*	(6$^+$)		MNOPQ W	XREF: Others: AE J^π: L=(6) in (p,p′).
4573 *20*				XREF: Others: AE E(level): from (^{3}He,α).
4617			O	
4662.30 *18*	6$^{-\#}$	1.4 ps *4*	CD GH J V	J^π: γ to 4$^-$ is ΔJ=2, E2; γ to 5$^-$ is ΔJ=1, D. $T_{1/2}$: from (^{9}Be,3nγ).
4675 *10*	0$^{+\ddagger}$			XREF: Others: AF J^π: L=0 in (p,t).
4697	(2$^+$)		J MN W	XREF: Others: AE J^π: L=(2) in (p,p′).
4726.4 *10*	(5$^-$,6$^+$)		C J OP	XREF: Others: AA J^π: from $\gamma(\theta)$ in (^{12}C,α2pγ).
4791 *4*	(3$^-$)‡		W	XREF: Others: AE, AF E(level): weighted average of values from (p,p′), (3He,a) and (p,t). J^π: L=(3) in (p,t).
4827.2 *22*	3$^-$		MN W	J^π: L=3 in (p,p′).
4845	+		O	J^π: L=1+3 in (^{3}He,d).
4896.9 *3*	8$^{+\#}$	0.49 ps *6*	CD FGH J W	J^π: γ to 6$^+$ is ΔJ=2, Q; RUL. $T_{1/2}$: weighted average of 0.45 ps *9* (^{9}Be,3nγ), 0.6 ps *2* (^{9}Be,2pnγ), 0.39 ps *12* (α,nγ) and 0.92 ps *23* (^{28}Si,2α2pγ).
4950 *10*	2$^{+\ddagger}$		O	XREF: Others: AF E(level): from (p,t). J^π: L=2 in (p,t).
5000 *10*				XREF: Others: AF E(level): from (p,t).
5023.7 *12*	3$^-$		C G J MNO W	XREF: Others: AA, AE J^π: L=3 in (p,p′); L=0 in (^{3}He,d). However, L=4 in (α,α′).
5079 *4*	(4$^+$)		MN W	J^π: L=(4) in (p,p′).
5094	+		O	J^π: L=1 in (^{3}He,d).
5117 *20*				XREF: Others: AE E(level): from (^{3}He,α).
5154 *10*			W	E(level): from (p,p′).
5180	+		MNO Q	J^π: L=3 in (^{16}O,^{15}N).
5197.60 *18*	7$^{-\#}$	0.83 ps *3*	CD GH J	J^π: γ to 5$^-$ is ΔJ=2, Q; RUL. $T_{1/2}$: from (α,nγ). Other: 0.6 ps *2* (^{9}Be,3nγ).
5206 *9*	3$^-$		W	XREF: Others: AE, AF E(level): weighted average of values from (p,p′) (^{3}He,α) and (p,t). J^π: L=3 in (p,p′); L=(4) in (p,t).
5230 *10*	2$^+$		T W	E(level): from (p,p′). J^π: from $\sigma(\theta)$ in (e,e′).
5280	6$^+$		J	XREF: Others: AA J^π: L=6 from (α,α′).
5321	2$^+$		O T	XREF: Others: AE E(level): from (e,e′). J^π: from $\sigma(\theta)$ in (e,e′).
5361 *9*	(5$^-$,6$^+$)		P W	J^π: L=(5,6) in (p,p′).
5363	2$^+$		O T	E(level): from (e,e′). J^π: from $\sigma(\theta)$ in (e,e′).
5409 *10*	3$^-$		W	J^π: L=3 in (p,p′).

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Adopted Levels, Gammas (continued)

^{46}Ti Levels (continued)

E(level)	J^π	$T_{1/2}$	XREF	Comments
5515 *10*	2^+		W	J^π: L=2 in (p,p′).
5530 *4*	3^-		MNOP	XREF: Others: AE, AF J^π: L=3 in (p,t).
5604 *10*	(2^+)		W	J^π: L=(2) in (p,p′).
5610 *30*	0^+		K O	J^π: L=0 in (^{3}He,n).
5700 *9*	(2^+)		W	XREF: Others: AE J^π: L=(2) in (p,p′).
5794 *4*	4^+		MN W	J^π: L=4 in (p,p′).
5811	+		O	J^π: L=0 in (^{3}He,d).
5828 *10*	3^-		W	J^π: L=3 in (p,p′).
5840	+			XREF: Others: AD J^π: L=3 in (d,t).
5872 *10*	(2^+)		W	XREF: Others: AA J^π: L=(2) in (p,p′).
5903 *20*	+		O	XREF: Others: AE E(level): from (^{3}He,α). J^π: L=1+3 in (^{3}He,d).
5950 *4*	3^-		MN W	J^π: L=3 in (p,p′).
5965 *26*	(6^+)‡		OP	XREF: Others: AF J^π: L=(6) in (p,t).
5992 *10*	(4^+)		W	J^π: L=(4) in (p,p′).
6021	+		O	J^π: L=1 in (^{3}He,d).
6025			J	
6094	$3^-,4^-$		O	J^π: L=0 in (^{3}He,d).
6118 *10*	2^+		W	XREF: Others: AF E(level): from (p,p′). J^π: L=2 in (p,p′).
6134	2^+		O T	J^π: from $\sigma(\theta)$ in (e,e′).
6150.5 *4*	8^-#	0.31 ps *3*	CD GH J	J^π: γ to 6^- is ΔJ=2, Q; RUL. $T_{1/2}$: weighted average of 0.46 ps *12* (^{9}Be,3nγ) and 0.30 ps *3* (^{28}Si,2α2pγ).
6200.4 *9*	8^+	<0.19 ps	CD G J	J^π: from (^{28}Si,2α2pγ); however, J=(7) from (^{12}C,α2pγ). $T_{1/2}$: from (^{28}Si,2α2pγ).
6217 *10*	3^-		O W	J^π: L=3 in (p,p′).
6241.9 *3*	10^+#	0.84 ps *4*	CD FGH J	J^π: γ to 8^+ is ΔJ=2, E2; no γ to J<8. $T_{1/2}$: weighted averaged of 0.83 ps *4* (α,nγ), 1.0 ps *3* (^{9}Be,3nγ), 0.9 ps *2* (^{9}Be,2pnγ) and 1.7 ps *4* (^{28}Si,2α2pγ).
6251			O	
6266 *6*			MN W	
6305 *20*				XREF: Others: AE E(level): from (^{3}He,α).
6338 *10*	4^+		O W	J^π: L=4 in (p,p′).
6360	1^+		W	J^π: L=0 in (p,p′).
6395 *6*	4^+		K MN W	XREF: Others: AA E(level): weighted average of values from (^{3}He,n), (p,γ) and (p,p′). J^π: L=4 in (p,p′).
6398	1^+		T	J^π: from $\sigma(\theta)$ in (e,e′).
6424	+		O	J^π: L=1 in (^{3}He,d).
6458 *10*	3^-		W	J^π: L=3 in (p,p′).
6513 *10*			W	E(level): from (p,p′).
6550	+		O	J^π: L=1 in (^{3}He,d).

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Adopted Levels, Gammas (continued)

^{46}Ti Levels (continued)

E(level)	J^π	$T_{1/2}$	XREF	Comments
6574 *10*			W	E(level): from (p,p′).
6616	+		O	J^π: L=1 in (^{3}He,d).
6685 *10*	4^+		W	J^π: L=4 in (p,p′).
6739 *10*	$(4)^+$		O W	J^π: L=(4) in (p,p′); L=1+3 in (^{3}He,d).
6794 *10*			W	E(level): from (p,p′).
6830.3 *5*	9^-#	0.52 ps *6*	CD GH	J^π: γ to 7^- is ΔJ=2, Q; γ to 8^+ is ΔJ=1, D; RUL. $T_{1/2}$: weighted average of 0.52 ps *8* from (^{9}Be,3nγ) and 0.53 ps *10* (^{28}Si,2α2pγ).
6851	+		O W	J^π: L=1+3 in (^{3}He,d).
6890 *10*	4^+		O W	XREF: Others: AF J^π: L=(3,4) in (p,p′); L=1 in (^{3}He,d).
6958 *10*	(3^-)		W	J^π: L=(3) in (p,p′).
6974	+		O	J^π: L=1+3 in (^{3}He,d).
7019 *10*	$(3^-,4^+)$		W	J^π: L=(3,4) in (p,p′).
7041	+		O	J^π: L=1+3 in (^{3}He,d).
7101	+		O	J^π: L=1 in (^{3}He,d).
7120 *10*	(3^-)		W	J^π: L=(3) in (p,p′).
7147	+		O	XREF: Others: AF E(level): from (^{3}He,d). J^π: L=1 in (^{3}He,d).
7172 *10*			W	E(level): from (p,p′).
7180	1^+		W	J^π: L=0 in (p,p′).
7201	+		O	J^π: L=1 in (^{3}He,d).
7238 *10*			W	E(level): from (p,p′).
7288	+		O	J^π: L=1+3 in (^{3}He,d).
7312 *10*	3^-		W	J^π: L=3 in (p,p′).
7350 *30*	+		K O	E(level): from (^{3}He,n). J^π: L=1 in (^{3}He,d).
7392 *10*	(3^-)		W	J^π: L=(3) in (p,p′).
7410	1^+		W	J^π: L=0 in (p,p′).
7429	+		O	J^π: L=1 in (^{3}He,d).
7472 *10*			W	E(level): from (p,p′).
7534 *10*	(3^-)		W	XREF: Others: AF J^π: L=(3) in (p,p′).
7558	+		O	J^π: L=1 in (^{3}He,d).
7584	+		O	J^π: L=1 in (^{3}He,d).
7608 *10*	+		O W	E(level): from (p,p′). J^π: L=1 in (^{3}He,d).
7630	1^+		W	J^π: L=0 in (p,p′).
7660 *10*			W	E(level): from (p,p′).
7710 *10*	+		O W	E(level): from (p,p′). J^π: L=1 in (^{3}He,d).
7730	1^+		W	J^π: L=0 in (p,p′).
7735 *10*			W	E(level): from (p,p′).
7788 *10*	+		O W	E(level): from (p,p′). J^π: L=1 in (^{3}He,d).
7849	+		O	J^π: L=1 in (^{3}He,d).
7874 *10*			W	E(level): from (p,p′).
7917	+		O	J^π: L=1 in (^{3}He,d).
7937 *10*			W	E(level): from (p,p′).
7941.8 *4*	11^+#	0.31 ps *8*	CD GH	J^π: γ to 10^+ is ΔJ=1, M1; no γ to J<10. $T_{1/2}$: from (^{9}Be,3nγ); <0.07 ps from (^{9}Be,2pnγ) and <0.07 ps from (^{28}Si,2α2pγ).

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Adopted Levels, Gammas (continued)

^{46}Ti Levels (continued)

E(level)	J^π	$T_{1/2}$	XREF	Comments
7960.8 *8*	$10^{-\#}$	<0.30 ps	CD H	J^π: γ to 8^- is $\Delta J=2$, Q; no γ to J<8. $T_{1/2}$: from (^{28}Si,2α2pγ).
7979	+		O	J^π: L=1 in (^{3}He,d).
8013 *10*			W	E(level): from (p,p′).
8020 *30*	(0^+)		K	J^π: L=(0) in (^{3}He,n).
8040 *10*			O W	E(level): from (p,p′).
8088	+		O	J^π: L=1 in (^{3}He,d).
8134 *10*			W	E(level): from (p,p′).
8182	+		O	J^π: L=1 in (^{3}He,d).
8217.5 *3*	$12^{+\#}$	0.51 ps *5*	CD GH	J^π: γ to 11^+ is $\Delta J=1$, M1; γ to 10^+ is $\Delta J=2$, E2. $T_{1/2}$: weighted average of 0.57 ps *6* (^{9}Be,3nγ), 0.35 ps *9* (^{9}Be,2pnγ) and 0.58 ps *6* (^{28}Si,2α2pγ).
8230 *10*	+		O W	E(level): from (p,p′). J^π: L=1 in (^{3}He,d).
8283.9 *13*	10,11,12^+	<0.17 ps	CD	J^π: from (^{28}Si,2α2pγ) and (^{12}C,α2pγ). $T_{1/2}$: from (^{28}Si,2α2pγ).
8293	+		O	J^π: L=1 in (^{3}He,d).
8346	+		O	J^π: L=1 in (^{3}He,d).
8384	+		O	J^π: L=1+3 in (^{3}He,d).
8460	1^+		W	J^π: L=0 in (p,p′).
8467	+		O	J^π: L=1+3 in (^{3}He,d).
8530	+		O	J^π: L=1 in (^{3}He,d).
8574	+		O	J^π: L=1+3 in (^{3}He,d).
8621	+		O	J^π: L=1 in (^{3}He,d).
8662	+		O	J^π: L=1 in (^{3}He,d).
8701	+		O	J^π: L=1 in (^{3}He,d).
8716.2 *12*	$11^{-\#}$	<0.29 ps	CD	J^π: γ only to 9^-. $T_{1/2}$: from (^{28}Si,2α2pγ).
8761	+		O	J^π: L=1 in (^{3}He,d).
8808	+		O	J^π: L=1 in (^{3}He,d).
8860	+		O	J^π: L=1 in (^{3}He,d).
8940	+		O	J^π: L=1 in (^{3}He,d).
8984	+		O	J^π: L=1 in (^{3}He,d).
9000	1^+		W	J^π: L=0 in (p,p′).
9070	+		O	J^π: L=1 in (^{3}He,d).
9111	+		O	J^π: L=1+3 in (^{3}He,d).
9141			O	
9168 *7*	$4^{+\ddagger}$		O	XREF: Others: AF E(level): from (p,t). J^π: L=4 in (p,t).
9170	1^+		W	J^π: L=0 in (p,p′).
9205 *9*	$6^{+\ddagger}$		O	XREF: Others: AE, AF J^π: L=6 in (p,t).
9253	+		O	J^π: L=1 in (^{3}He,d).
9304	+		O	J^π: L=1 in (^{3}He,d).
9345	+		O	J^π: L=1 in (^{3}He,d).
9399 *30*	+		O	XREF: Others: AE E(level): from (^{3}He,α). J^π: L=1 in (^{3}He,d).
9420	1^+		W	J^π: L=0 in (p,p′).
9426	+		O	J^π: L=3 in (^{3}He,d).

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Adopted Levels, Gammas (continued)

^{46}Ti Levels (continued)

E(level)	J^π	$T_{1/2}$	XREF	Comments
9474	+		O	XREF: Others: AE E(level): from (^{3}He,d). J^π: L=1 in (^{3}He,d).
9519	−		O	J^π: L=2 in (^{3}He,d).
9550	1^+		W	J^π: L=0 in (p,p′).
9572	+		O	J^π: L=3 in (^{3}He,d).
9615 *6*	$2^{+‡}$		O	XREF: Others: AF J^π: L=2 in (p,t).
9649	+		O	J^π: L=1 in (^{3}He,d).
9670	1^+		W	J^π: L=0 in (p,p′).
9682			O	
9718	−		O	J^π: L=2 in (^{3}He,d).
9761			O	
9770	1^+		W	J^π: L=0 in (p,p′).
9790			O	
9852† *19*			O	XREF: Others: AE
9864			O	
9870	1^+		W	J^π: L=0 in (p,p′).
9973† *19*	+		O	XREF: Others: AE J^π: L=3 in (^{3}He,d).
10000	1^+		W	J^π: L=0 in (p,p′).
10038† *19*			O	XREF: Others: AE
10041.6 *8*	$12^+,14^{+\#}$	0.6 ps *2*	CD GH	$T_{1/2}$: from (^{9}Be,3nγ); <0.6 ps from (^{28}Si, 2α2pγ). J^π: γ to 11^+ is ΔJ=1; γ to 12^+ is ΔJ=0, D+Q.
10180	1^+		W	J^π: L=0 in (p,p′).
10212 *25*			O	
10256 *25*			O	
10321 *25*			O	
10347 *30*				XREF: Others: AE Observed in (^{3}He,α).
10350	1^+		W	J^π: L=0 in (p,p′).
10374 *25*			O	
10380 *3*			D	
10441 *25*			O	
10523† *19*	+		O	XREF: Others: AE J^π: L=3 in (^{3}He,d).
10602 *25*			O	
10661† *19*			O	XREF: Others: AE
10730 *25*			O	
10782 *25*	+		O	J^π: L=3 in (p,p′).
10866 *22*			O	XREF: Others: AF E(level): weighted average of values from (^{3}He,d) and (p,t).
10938 *19*	+		O	XREF: Others: AE E(level): weighted average of values from (^{3}He,d) and (^{3}He,α). J^π: L=1 in (^{3}He,d).
10980 *25*			O	
11050	1^+		W	J^π: L=0 in (p,p′).
11051 *25*			O	
11110 *25*			O	
11167 *25*			O	
11299 *25*			O	

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Adopted Levels, Gammas (continued)

^{46}Ti Levels (continued)

E(level)	J$^{\pi}$	XREF	Comments
11354 *3*	3	M	J$^{\pi}$: from $\gamma(\theta)$ in (p,γ).
11374.2 *23*		M	
11426 *19*		K O	E(level): weighted average of values from (^{3}He,n) and (^{3}He,d).
11450	1^{+}	W	J$^{\pi}$: L=0 in (p,p′).
11570	1^{+}	W	J$^{\pi}$: L=0 in (p,p′).
11698 *3*	(2,3)	M	J$^{\pi}$: from $\gamma(\theta)$ in (p,γ).
11840	1^{+}	W	J$^{\pi}$: L=0 in (p,p′).
12200	1^{+}	W	J$^{\pi}$: L=0 in (p,p′).
12460 *30*	0^{+}	K	J$^{\pi}$: L=0 in (^{3}He,n).
12650	1^{+}	W	J$^{\pi}$: L=0 in (p,p′).
12974 *4*		D	
13070	1^{+}	W	J$^{\pi}$: L=0 in (p,p′).
13169 *4*		D	
13310	1^{+}	W	J$^{\pi}$: L=0 in (p,p′).
14153 *6*	0^{+}		XREF: Others: AF J$^{\pi}$: from L=0 in (p,t).
14300 *60*	(0^{+})	K	J$^{\pi}$: from L=(0) in (^{3}He,n).

† Weighted average of values from (^{3}He,d) and (^{3}He,α).
‡ From L(p,t).
# Based on analysis of $\gamma(\theta)$ from (^{28}Si,2α2pγ), (^{9}Be,2pnγ) or (^{12}C,α2pγ).
@ From $\gamma(\theta)$ and γ linear polarization in (p,p′γ).
& From (α,nγ).

$\gamma(^{46}Ti)$

γ's from capture states in (p,γ) not included; see (p,γ).

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.	δ	α[a]	Comments
889.286	2^+	889.277 *3*	100	0.0	0^+	E2		0.00017	E_γ,Mult.,α: from ^{46}Sc β^- decay. B(E2)(W.u.)=19.5 *6*.
2009.846	4^+	1120.545 *4*	100	889.286	2^+	E2			E_γ,Mult.: from ^{46}Sc β^- decay. B(E2)(W.u.)=20.2 *13*.
		2010	1.3×10^{-5} *10*	0.0	0^+	[E4]			B(E4)(W.u.)=4.E+2 *3* E_γ: assumed from ^{46}Sc β^- decay scheme and photoneutrons from Be. I_γ: from ^{46}Sc β^- decay.
2611.0	0^+	1721.81 *12*	100	889.286	2^+				B(E2)(W.u.)=50 *14*
2961.8	2^+	2072.6[&] *2*	100.0[&] *6*	889.286	2^+	E2+M1	−1.21 *14*		B(M1)(W.u.)=0.0058 *9*; B(E2)(W.u.)=5.2 *6* Mult.,δ: from (p,p$'\gamma$),(pol p,p$'\gamma$).
		2962.3[&] *7*	4.4[&] *6*	0.0	0^+				B(E2)(W.u.)=0.064 *16*
3058.46	3^-	96.5	11 *3*	2961.8	2^+	[E1]		0.0324	α(K)=0.0289; α(L)=0.00261 B(E1)(W.u.)=0.008 *4* E_γ,I_γ: from (p,p$'\gamma$) based on coincidence data.
		1048.76 *7*	100 *3*	2009.846	4^+	E1+M2	0.11 *3*		B(E1)(W.u.)=5.7×10^{-5} *17*; B(M2)(W.u.)=2.9 *18* E_γ: weighted average of values from (^{28}Si,2α2pγ), (^{16}O,2pγ), (^{9}Be,2pnγ), and (p,p$'\gamma$). I_γ,Mult.,δ: from (p,p$'\gamma$). Large B(M2)(W.u.) suggests that δ is too large.
		2169[b]	<3.3	889.286	2^+				
3168.00	1^-	2278.8 *2*	100 *2*	889.286	2^+				
		3168.1 *1*	83 *2*	0.0	0^+	[E1]			B(E1)(W.u.)=4.3×10^{-5} *6*
3213		2324[@]	100[@]	889.286	2^+				
3235.7	2^+	2346.5 *2*	100.0 *13*	889.286	2^+				
		3235.7 *7*	18.8 *13*	0.0	0^+	[E2]			B(E2)(W.u.)=0.89 *20*
3298.86	6^+	1289.1 *1*	100	2009.846	4^+	E2[†]			B(E2)(W.u.)=16.4 *15* E_γ: weighted average of values from (^{28}Si,2α2pγ), (^{16}O,2pγ), (^{9}Be,3nγ), (^{9}Be,2pnγ) and (^{12}C,α2pγ).
3441.39	4^-	382.95 *7*	100 *3*	3058.46	3^-				E_γ: weighted average of values from (^{28}Si,2α2pγ), (^{9}Be,2pnγ), (α,nγ), and (p,p$'\gamma$). I_γ: weighted average of values from (^{16}O,2pγ), (α,nγ), and (p,p$'\gamma$).
		1431.79 *17*	35 *3*	2009.846	4^+				E_γ: weighted average of values from (^{28}Si,2α2pγ), (^{9}Be,2pnγ), (α,nγ), and (p,p$'\gamma$). I_γ: weighted average of values from (^{16}O,2pγ), (α,nγ), and (p,p$'\gamma$).

$^{46}_{22}Ti_{24}$-10

$\gamma(^{46}Ti)$ (continued)

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.	Comments
3569.3	3^-	1559.6[&] *2*	100	2009.846	4^+	[E1]	B(E1)(W.u.)=0.0022 *8* I_γ: from (^{12}C,α2pγ).
		2680[‡]	27[‡]	889.286	2^+	[E1]	B(E1)(W.u.)=0.00012 *4*
3571.7	0^+	2682.5[&] *2*	100[&]	889.286	2^+	[E2]	B(E2)(W.u.)=2.17 *18*
3579.8		1573[@] *1*	100[@]	2009.846	4^+		
		2691[#]	<2	889.286	2^+		I_γ: from (p,γ).
3610.2		2719[@] *1*	100[@]	889.286	2^+		
3723.8	$(2)^+$	1713.0[@] *10*	32[@] *9*	2009.846	4^+		
		2834.6 *3*	100[@] *9*	889.286	2^+		E_γ: weighted average of values from (α,nγ) and (p,p′γ).
3737.9	$(1,2^+)$	3737.9[&] *3*	100[&]	0.0	0^+		
3826.43	5^-	529[‡]	30[‡]	3298.86	6^+		
		768.0 *1*	70[‡]	3058.46	3^-		E_γ: from (^{9}Be,2pnγ).
		1818[‡]	100[‡]	2009.846	4^+		
3845.0	2^+	2955.8[&] *4*	100[&]	889.286	2^+		
3852.44	5^-	411.1[@] *2*	5[@] *4*	3441.39	4^-		I_γ: =10 from (^{12}C,α2pγ).
		553 *1*		3298.86	6^+		E_γ: from (^{28}Si,2α2pγ); Iγ=10 from (^{12}C,α2pγ).
		794.2 *1*	14[@] *6*	3058.46	3^-		E_γ: weighted average of values from (^{28}Si,2α2pγ), (^{9}Be,2pnγ) and (α,nγ).
		1842.65 *8*	100[@] *6*	2009.846	4^+		E_γ: weighted average of values from (^{28}Si,2α2pγ), (^{9}Be,3nγ), (^{9}Be,2pnγ), and (α,nγ).
3856		1847	100	2009.846	4^+		E_γ,I_γ: from (p,γ).
3889.3	2^+	720[&]	100[&] *9*	3168.00	1^-		
		2990[&]	25[&] *9*	889.286	2^+		
3905.6	$(1,2^+)$	1290[&]	43[&]	2611.0	0^+		Not observed in (p,γ).
		1890[&]	<30[&]	2009.846	4^+		I_γ: =24 from (p,γ).
		3016.3[&] *4*	43[&]	889.286	2^+		I_γ: =73 from (p,γ).
		3905.7[&] *4*	100[&]	0.0	0^+		
3941.9	4^+	1932	100	2009.846	4^+		E_γ: from (α,nγ) and (p,γ); ΔE not given.
4003.1		944.1[@]	100[@]	3058.46	3^-		
4025.3	2^+	860[&]	100[&] *8*	3168.00	1^-		
		2030[&]	49[&] *8*				
		3140[&]	100[&] *8*	889.286	2^+		
		4020[&]	22[&] *8*	0.0	0^+		
4038.8		985[#]		3058.46	3^-		
		3151[@]	100[@]	889.286	2^+		
4130.1	2^+	2128[#b]	100	2009.846	4^+		

$^{46}_{22}Ti_{24}$-11

Adopted Levels, Gammas (continued)

$\gamma(^{46}Ti)$ (continued)

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.	Comments
4178.7	3^-	2168.0[@] 10	100[@] 9	2009.846	4^+		
		3290.3[@] 15	35[@] 9	889.286	2^+		
4191.5	3^-	2182.0[@] 10	19[@] 10	2009.846	4^+		
		3301.8[@] 15	100[@] 10	889.286	2^+		
4315.8	1^+	4316[&] 1	100[&]	0.0	0^+		
4322.6		1024[‡]	100[‡]	3298.86	6^+		
4372.0	3^-	2362[@]	100[@]	2009.846	4^+		
4417.1	6^-	588.3[@] 9	<5.3[@]	3826.43	5^-		
		974.2 2	100[@]	3441.39	4^-		E_γ: weighted average of values from (^{9}Be,2pnγ) and (α,nγ).
4523.4	4^+	1082		3441.39	4^-		E_γ: from (^{12}C,α2pγ).
		1225[#]	100 15	3298.86	6^+		I_γ: from (p,γ).
		1273[#]	54 15				I_γ: from (p,γ).
4662.30	6^-	810.0 2	19[@] 6	3852.44	5^-		E_γ: weighted average of values from (^{28}Si,α2pγ),(^{9}Be,2pnγ) and (α,nγ).
		1220.8 1	100[@] 9	3441.39	4^-		E_γ: weighted average of values from (^{28}Si,α2pγ),(^{9}Be,3nγ), (^{9}Be,2pnγ) and (α,nγ).
		1364.0[@] 8	38[@] 9	3298.86	6^+		
4697	(2^+)	2687[@]	100[@]	2009.846	4^+		
4726.4	$(5^-,6^+)$	2715[@]	100[@]	2009.846	4^+		
4827.2	3^-	1592[#]	100	3235.7	2^+		E_γ,I_γ: from (p,γ).
		1659[#]	27	3168.00	1^-		E_γ,I_γ: from (p,γ).
		2818[#]	10	2009.846	4^+		E_γ,I_γ: from (p,γ).
4896.9	8^+	1597.9 2	100	3298.86	6^+	E2[†]	B(E2)(W.u.)=11.3 14 E_γ: weighted average of values from (^{28}Si,2α2pγ), (^{9}Be,3nγ), (^{9}Be,2pnγ) and (^{12}C,α2pγ).
5023.7	3^-	1725	100	3298.86	6^+		
5079	(4^+)	1843[#]	100	3235.7	2^+		
5180	$^+$	2128[#b]	100	3058.46	3^-		
5197.60	7^-	471[‡]	8[‡]	4726.4	$(5^-,6^+)$		
		535		4662.30	6^-		E_γ: from (^{28}Si,2α2pγ) and (α,nγ).
		1345.1 1	100[‡]	3852.44	5^-	[E2]	B(E2)(W.u.)=11.2 4 E_γ: weighted average of values from (^{28}Si,2α2pγ), (^{9}Be,3nγ) and (^{9}Be,2pnγ). Separated by 0.8 8 from γ in decay of 6242 level according to (^{9}Be,2pnγ).
		1370[‡]	33[‡]	3826.43	5^-		
5280	6^+	1427[@]	100[@]	3852.44	5^-		
5530	3^-	2230[#]	100	3298.86	6^+		E_γ,I_γ: from (p,γ).

$^{46}_{22}Ti_{24}$-12

Adopted Levels, Gammas (continued)

$\gamma(^{46}Ti)$ (continued)

E_i(level)	J_i^{π}	E_{γ}	I_{γ}	E_f	J_f^{π}	Mult.	α[a]	Comments
5530	3^-	2361[#]	67	3168.00	1^-			E_{γ},I_{γ}: from (p,γ).
5794	4^+	2224[#]	100	3571.7	0^+			
5950	3^-	2715[#]	100	3235.7	2^+			
6025		1363[@]	100[@]	4662.30	6^-			
6150.5	8^-	1488.2 *3*	100	4662.30	6^-	E2[†]		B(E2)(W.u.)=22 *2* E_{γ}: weighted average of values from (^{28}Si,2α2pγ), (^{9}Be,3nγ) and (^{9}Be,2pnγ). I_{γ}: from (^{28}Si,2α2pγ) and (^{12}C,α2pγ).
		1734 *1*	16.5	4417.1	6^-	E2[†]		E_{γ}: from (^{28}Si,2α2pγ). I_{γ}: from (^{28}Si,2α2pγ) and (^{12}C,α2pγ). B(E2)(W.u.)=1.7 *2*.
6200.4	8^+	1304 *1*	65	4896.9	8^+	M1[†]		E_{γ},I_{γ}: from (^{28}Si,2α2pγ).
		2902	100	3298.86	6^+	E2[†]		E_{γ},I_{γ}: from (^{28}Si,2α2pγ).
6241.9	10^+	1345.1 *1*	100	4896.9	8^+	E2[†]		B(E2)(W.u.)=15.6 *7* E_{γ}: weighted average of values from (^{28}Si,2α2pγ), (^{9}Be,3nγ), (^{9}Be,2pnγ) and (^{12}C,α2pγ). Separated by 0.8 *8* from γ in decay of 5197 level according to (^{9}Be,2pnγ).
6266		2679[#]	100	3579.8				
6395	4^+	2203[#]	100	4191.5	3^-			
6830.3	9^-	1632.6 *5*	100	5197.60	7^-	E2[†]		E_{γ}: weighted average of values from (^{28}Si,2α2pγ), (^{9}Be,3nγ) and (^{9}Be,2pnγ). I_{γ}: from (^{28}Si,2α2pγ) and (^{12}C,α2pγ). B(E2)(W.u.)=8.2 *9*.
		1933 *1*	16.5	4896.9	8^+	E1[†]		B(E1)(W.u.)=2.0×10^{-5} *2* E_{γ}: from (^{28}Si,2α2pγ). I_{γ}: from (^{28}Si,2α2pγ) and (^{12}C,α2pγ).
7941.8	11^+	1699.8 *4*	100	6241.9	10^+	M1[†]		B(M1)(W.u.)=0.014 *4* E_{γ}: weighted average of values from (^{28}Si,2α2pγ), (^{9}Be,3nγ) and (^{9}Be,2pnγ).
7960.8	10^-	1810.7 *7*	100	6150.5	8^-	E2[†]		E_{γ}: weighted average of values from (^{28}Si,2α2pγ) and (^{9}Be,2pnγ).
8217.5	12^+	275.3 *1*	45	7941.8	11^+	M1[†]	0.00154	B(M1)(W.u.)=0.64 *6* E_{γ}: weighted average of values from (^{28}Si,2α2pγ), (^{9}Be,3nγ) and (^{9}Be,2pnγ). I_{γ}: from (^{28}Si,2α2pγ) and (^{12}C,α2pγ).
		1976.2 *9*	100	6241.9	10^+	E2[†]		E_{γ}: weighted average of values from (^{28}Si,2α2pγ), (^{9}Be,3nγ) and (^{9}Be,2pnγ). I_{γ}: from (^{28}Si,2α2pγ) and (^{12}C,α2pγ). B(E2)(W.u.)=3.8 *4*.
8283.9	10,11,12^+	2041	100	6241.9	10^+	(E2+M1)		E_{γ},I_{γ}: from (^{28}Si,2α2pγ) and (^{12}C,α2pγ).
8716.2	11^-	1887 *1*	100	6830.3	9^-	E2[†]		E_{γ},I_{γ}: from (^{28}Si,2α2pγ) and (^{12}C,α2pγ).

$^{46}_{22}Ti_{24}$-13

Adopted Levels, Gammas (continued)

$\gamma(^{46}Ti)$ (continued)

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.	Comments
10041.6	$12^+,14^+$	1823.1 *5*	100	8217.5	12^+	E2[†]	B(E2)(W.u.)=5 *2* E_γ: weighted average of values from (^{28}Si,2α2pγ), (^{9}Be,3nγ) and (^{9}Be,2pnγ).
		2100		7941.8	11^+		E_γ: from (^{12}C,α2pγ).
10380		2163		8217.5	12^+		E_γ: from (^{28}Si,2α2pγ).
12974		2594		10380			E_γ: from (^{28}Si,2α2pγ).
13169		195 *1*		12974			E_γ: from (^{28}Si,2α2pγ).

[†] From (^{28}Si,2α2pγ) and/or (^{9}Be,2pnγ).
[‡] From (^{12}C,α2pγ).
[#] From (p,γ); ΔE not given.
[@] From (α,nγ).
[&] From (p,p$'\gamma$).
[a] 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.
[b] Placement of transition in the level scheme is uncertain.

$^{46}_{22}Ti_{24}$-14

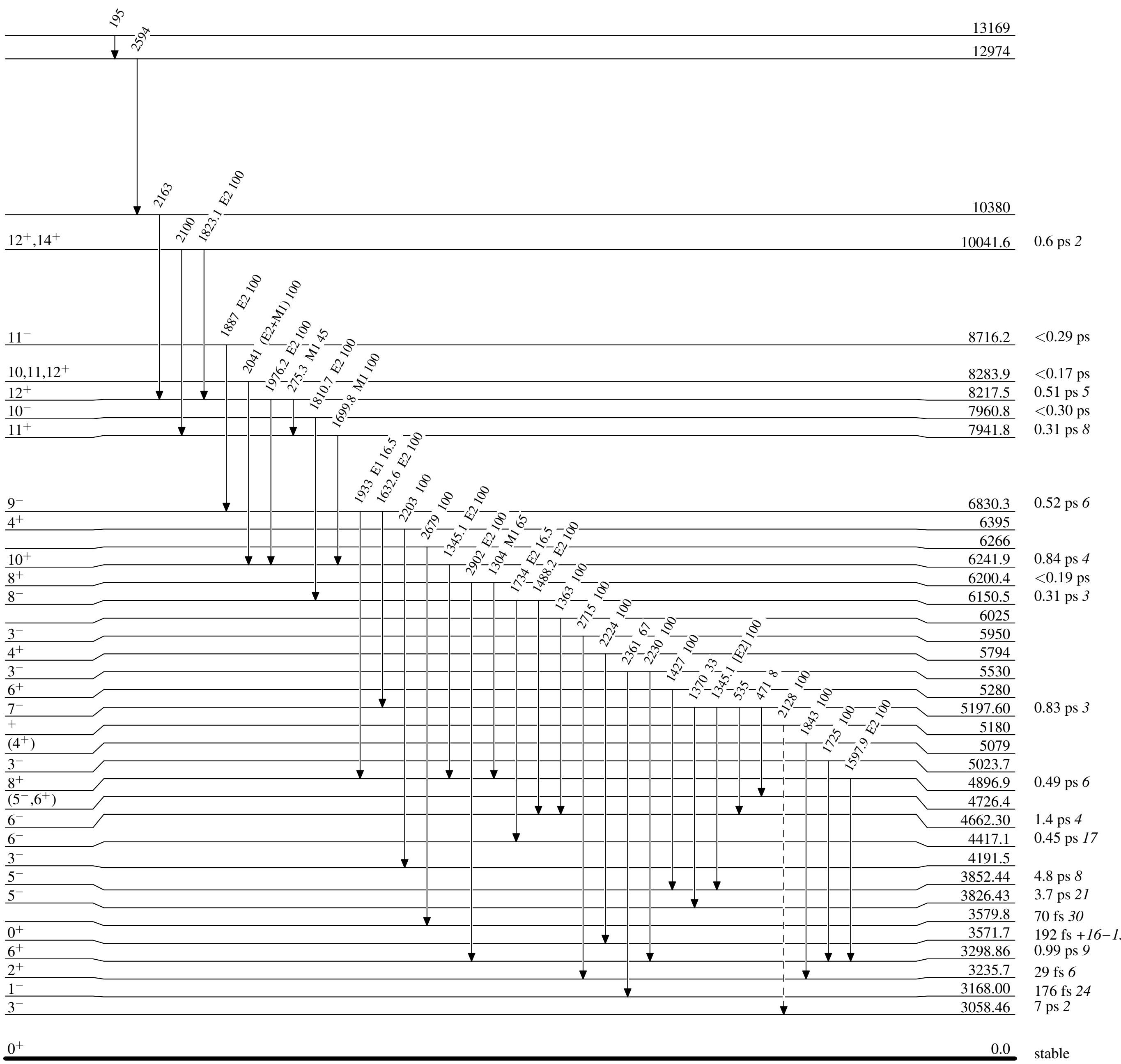
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

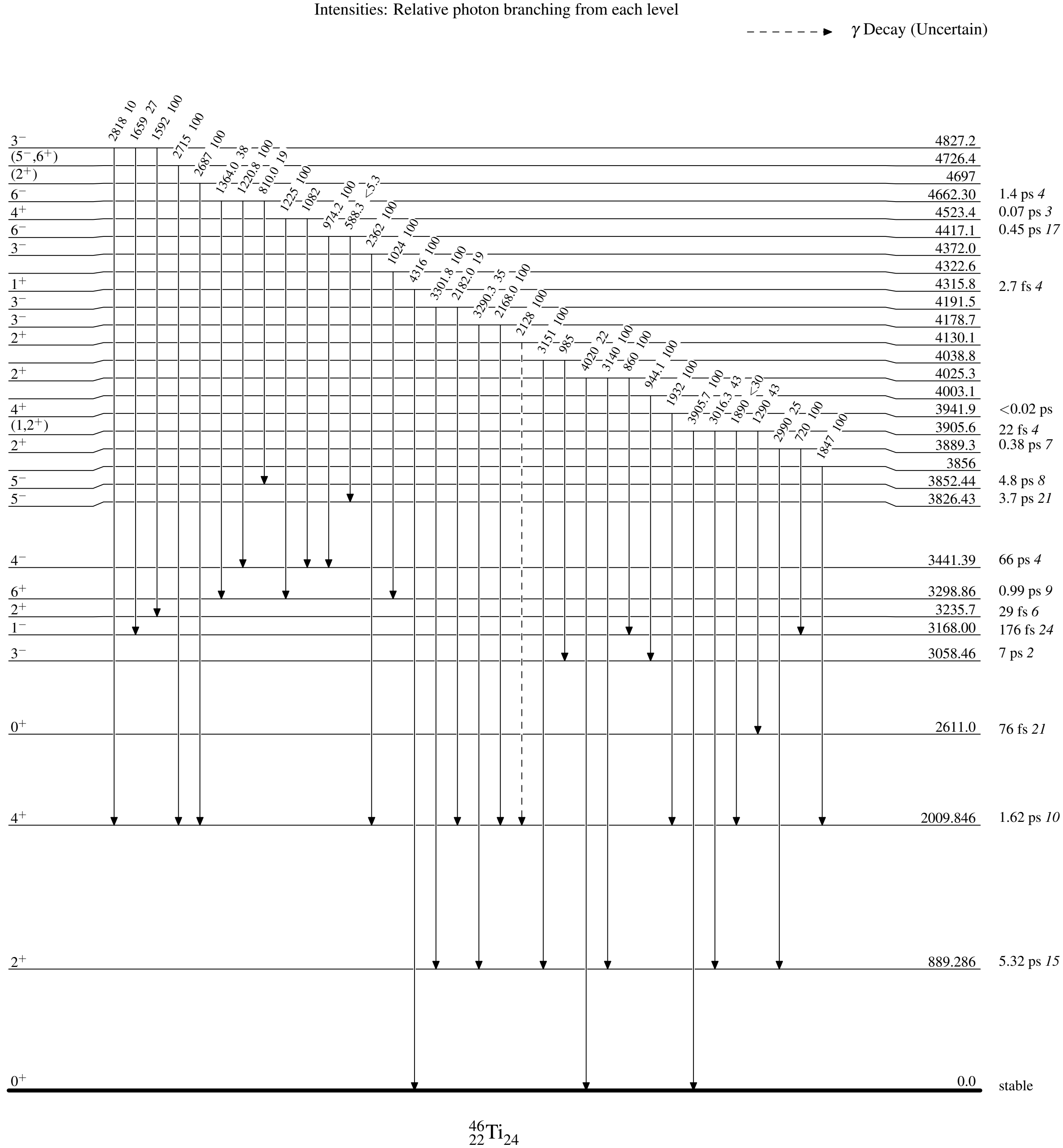


$^{46}_{22}Ti_{24}$

Adopted Levels, Gammas

Level Scheme (continued)

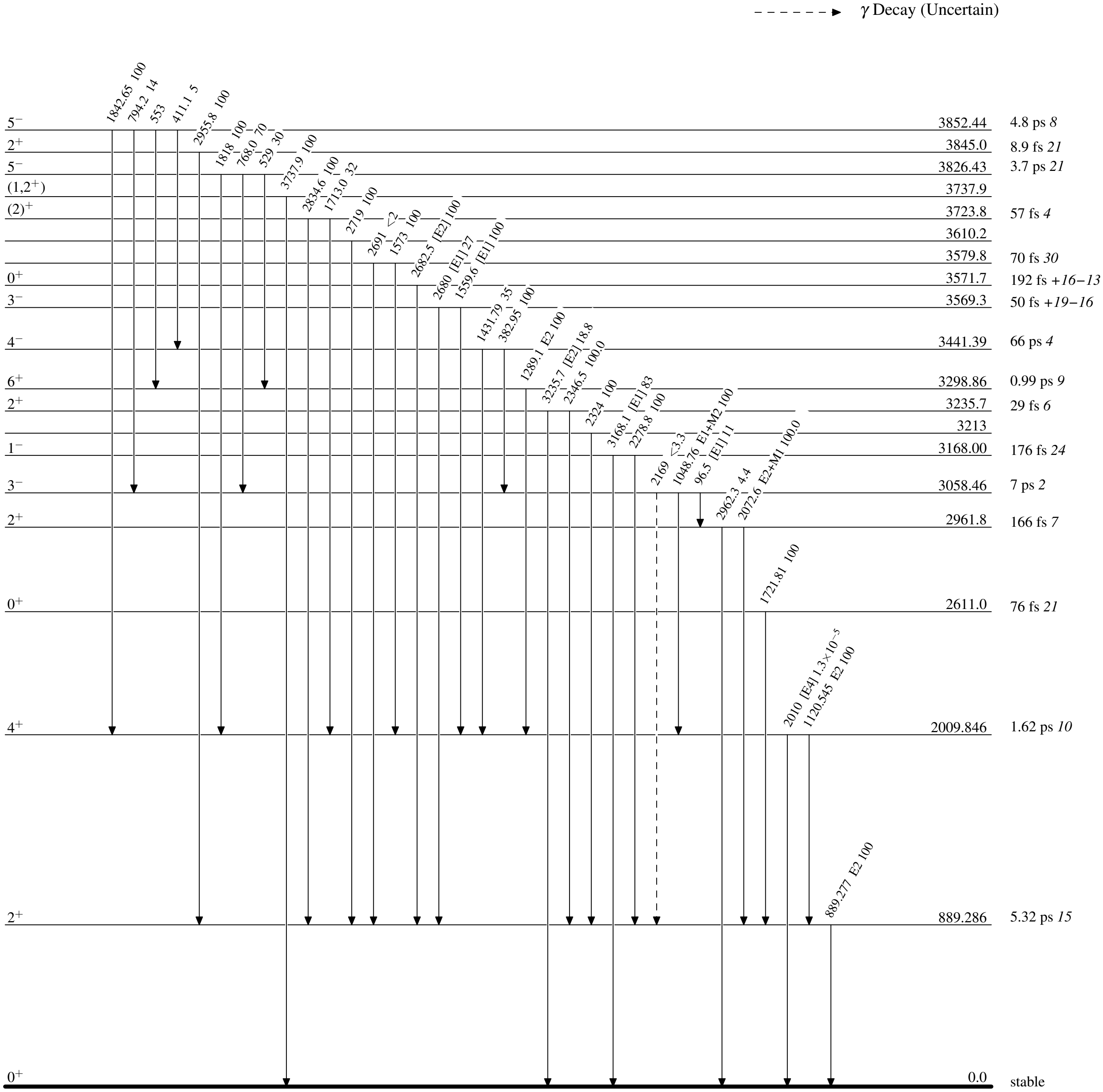
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{46}_{22}Ti_{24}$

Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 179, 1 (2022)	30-Nov-2021

Q(β^-)=−4014.9 *10*; S(n)=11626.66 *3*; S(p)=11445.1 *19*; Q(α)=−9449.1 *3* 2021Wa16
S(2n)=20507.32 *6*, S(2p)=19931.3 *22* (2021Wa16).
Mass measurements: 2017Ka53, 2014Kw04, 2013Bu12, 2012Na15, 1979Ko10, 1972De39.
Measurements of hyperfine structure: 2004Ga34, 2002Ca47, 1996Fu23, 1996Lu12, 1995Ga44, 1994An35, 1994GaZZ, 1994Lu18, 1992Az03.

^{48}Ti Levels

B(M1)↑, B(E2)↑ and B(M3)↑ under comments are from model-independent PWBA in (e,e′), unless otherwise noted.

Cross Reference (XREF) Flags

A	^{48}Sc β^- decay	M	^{47}Ti(d,p)	Y	^{48}Ti(α,α')
B	^{48}V ε decay	N	^{48}Ca(π^+,π^-)	Z	^{49}Ti(p,d)
C	^{48}Ca 2β^- decay	O	^{48}Ca(^{3}He,3nγ)	Others:	
D	^{9}Be(^{49}V,Xγ)	P	^{48}Ti(γ,γ),(γ,γ')	AA	^{49}Ti(d,t)
E	^{27}Al(^{24}Mg,3pγ)	Q	^{48}Ti(e,e′)	AB	^{49}Ti(^{3}He,α)
F	^{36}S(^{14}C,2nγ)	R	^{48}Ti(π^+,$\pi^{+\prime}$),(π^-,$\pi^{-\prime}$)	AC	^{50}Ti(p,t)
G	^{44}Ca(^{6}Li,d), ^{52}Cr(d,^{6}Li)	S	^{48}Ti(n,n′)	AD	^{50}V(d,α)
H	^{44}Ca(^{7}Li,p2nγ)	T	^{48}Ti(n,n′γ)	AE	^{50}Cr(^{14}C,^{16}O)
I	^{45}Sc(α,p)	U	^{48}Ti(p,p′),(pol p,p′)	AF	^{51}V(p,α)
J	^{45}Sc(α,pγ)	V	^{48}Ti(p,p′γ)	AG	Coulomb excitation
K	^{46}Ti(t,p)	W	^{48}Ti(d,d′),(pol d,d′)	AH	Inelastic scattering:giant res
L	^{47}Ti(n,γ) E=thermal	X	^{48}Ti(^{3}He,^{3}He′)		

E(level)[†]	J$^\pi$	T$_{1/2}$[@]	XREF	Comments
0.0	0$^+$	stable	AB DEFGHIJKLMNOPQR TUVWXYZ	XREF: Others: AA, AB, AC, AD, AE, AF, AG Nuclear rms charge radius=3.5921 fm *17* (2013An02).
983.531 *4*	2$^+$	4.5 ps *4*	AB DEFGHIJKLM OPQRSTUVWXYZ	XREF: Others: AA, AB, AC, AD, AE, AF, AG μ=+0.78 *4* (2000Er06); Q=−0.177 *8* (1972Li12) XREF: AB(1000). J$^\pi$: L(p,t)=L(α,α')=2 from 0$^+$. T$_{1/2}$: weighted average of 4.64 ps *42* (1981Ca10), 4.9 ps *15* (1963Ak03), and 4.2 ps *14* (1958Kn36) from Γ in (γ,γ); 2.9 ps *+21−13* (1973Ba02) from DASM in (p,p′γ); 3.95 ps *61* (2000Er01), 4.16 ps *90* (1973Ba02), 3.67 ps *56* (1972WaYZ), and 5.75 ps *89* (1973Fi15) from DSAM in Coulomb excitation, and 5.0 ps *5* from adopted B(E2)↑=0.061 *6* below. Other: 4.90 ps *+22−21* from B(E2) evaluation by 2016Pr01 using the same data, with its difference from the adopted value here due to the fact that 2016Pr01 does not take into account the additional systematic uncertainty from the stopping power theory in DSAM for values in 1973Fi15 and 2000Er01 in Coulomb excitation (see details in this dataset), which take up most of the weight in their weighted average. μ: from Transient Fields method (2000Er06). Others: +0.9 *4* (1981Sh19, TF). Q: from electron scattering (1972Li12). Others: −0.38 *13* (1971De29), −0.22 *8* (1970Ha24), and −0.135 eb *88* (1972Le19) from Coulomb excitation. See also 2016St14

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Adopted Levels, Gammas (continued)

^{48}Ti Levels (continued)

E(level)†	J^π	$T_{1/2}$@	XREF	Comments
				compilation. B(E2)↑=0.0613 *56*, unweighted average of 0.0537 *36* in (e,e′), 0.050 *15* in (p,p′), 0.0694 *52* in (π^+,π^-), 0.072 *4* in Coulomb excitation. Other: 0.0069 from (α,α') (1970Br07) is discrepant, lower than other values by one order of magnitude.
2295.648 *7*	4^+	0.87 ps *13*	AB DEFGHIJ LM OP R TUVW YZ	XREF: Others: AA, AB, AC, AD, AF, AG μ=+2.2 *5* (2000Er06) XREF: R(2400)AB(2310). J^π: L(p,t)=(α,α')=4 from 0^+. $T_{1/2}$: weighted average of 0.97 ps *35* from DSAM in (α,pγ), 1.4 ps *+6−5* from (γ,γ), 1.5 ps *8* from DSAM in (n,n′γ), and 0.76 ps *13* (2000Er01) and 1.66 ps *42* (1973Ba02) from DSAM Coulomb excitation. μ: from Transient Fields method (2000Er06).
2421.053 *10*	2^+	30.4 fs *23*	BCD IJ LM PQR TUVW YZ	XREF: Others: AA, AC, AD, AF, AG J^π: L(α,α')=L(p,t)=2 from 0^+. $T_{1/2}$: weighted average of 42 fs *14* (1979Gl07) and 30 fs *6* (1978Li13) in (α,pγ), 13.9 fs *28* (1993Ko57), 28 fs *12* (1989Ge05) and 31.9 fs *21* (1993BeZL) in (n,n′γ), 11 fs *+7−11* (1969Ka10), 24 fs *5* (1973Ba02) and 19 fs *+11−9* (1978DeYT) in (p,p′γ), and 51 fs *9* (2000Er06) in Coulomb excitation, all from DSAM. Others: 33 fs *+16−9* from Γ in (γ,γ') and 35 fs *+7−5* from adopted B(E2)↑ below, both depending on the adopted branching ratio of 2421γ. Averaging all values above gives a value of 30.8 fs *21*, with a reduced χ^2=1.5.
2465 *5*			U	
2997.31 *17*	0^+	80 fs *14*	iJkL Q TUVWXy	XREF: Others: AA, AC, AF J^π: L(t,p)=L(p,t)=0 from 0^+. $T_{1/2}$: weighted average of 64 fs *11*(1989Ge05) in (n,n′γ), 87 fs *21* (1969Ka10), 111 fs *22* (1973Ba02) and 194 fs *+76−49* (1978DeYT) in (p,p′γ), all from DSAM.
3062 *5*	2^+		Q U	XREF: Q(3017). E(level): from (p,p′). Other: 3017 from (e,e′). J^π: from PWBA analysis of $\sigma(\theta)$ in (e,e′). B(E2)↑=0.00112 *20* (1990Gu09) from (e,e′).
3223.971 *9*	3^+	33 fs *6*	B D iJ LM Q TUV z	XREF: Others: AA, AD, AF XREF: Q(3239)U(3230). J^π: spin=3 from p$\gamma(\theta)$ in (p,p′γ); 2240.4γ M1+E2 to 2^+. $T_{1/2}$: weighted average of 54 fs *17* (1979Gl07) and 39 fs *6* (1978Li13) in (α,pγ), 29 fs *18* (1993Ko57) in (n,n′γ), 17 fs *+9−11* (1969Ka10), 29 fs *+13−10* (1973Ba02) and 31 fs *+14−12* (1978DeYT) in (p,pγ), all from DSAM. B(M3)↑=0.50 *10* (1990Gu09) in (e,e′).
3239.771 *13*	4^+	46 fs *11*	B D G iJ L R TUVW Yz	XREF: Others: AA, AC, AD, AF XREF: G(3200). J^π: L(α,α')=L(p,t)=4 from 0^+. $T_{1/2}$: weighted average of 49 fs *14* (1979Gl07) in (α,pγ), 50 fs *11* (1993Ko57) in (n,n′γ), 69 fs *+37−29* (1969Ka10), 30 fs *+14−11* (1973Ba02), and 62 fs *+28−21* (1978DeYT) in (p,p′γ), all from DSAM.
3333.187 *13*	6^+	8.9 ps *8*	A DEFGHIJ LM O T V YZ	XREF: Others: AA, AB, AC, AD, AF XREF: G(3400)V(?). J^π: L(α,α')=L(p,t)=6 from 0^+.

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Adopted Levels, Gammas (continued)

^{48}Ti Levels (continued)

E(level)†	J^π	$T_{1/2}$@	XREF	Comments
				$T_{1/2}$: from RDM by 1974Br04 in (α,pγ). Others: >3.5 ps (1979Gl07), >1.3 ps (1978Li13), from DSAM in (α,pγ); >7 ps from DSAM by 1993Ko57 in (n,n′γ); 221 fs *+48−44* from DSAM by 1969Ka10 in (p,p′γ) is strongly discrepant with other values.
3358.823 *17*	3^-	186 fs *+38−34*	B D IJ L qr TUVW Y	XREF: Others: AA, AD, AF XREF: q(3374). J^π: L(p,p′)=3 from 0^+; L(d,t)=0 from $7/2^-$; 2375.2γ D(+Q) to 2^+. $T_{1/2}$: weighted average of 198 fs *+80−70* (1979Gl07) in (α,pγ), 173 fs *+38−34* (1969Ka10), 243 fs *62* (1973Ba02), and 173 fs *+55−42* (1978DeYT) in (p,p′γ), and 180 fs *56* (1993Ko57) in (n,n′γ), all from DSAM. B(E3)↑=0.0080 *16* from model-dependent analysis in (e,e′).
3370.87 *3*	2^+	11.2 fs *14*	J LM Pqr TUVW Y	XREF: Others: AA, AC, AD, AF XREF: AC(3363). J^π: spin=2 from p$\gamma(\theta)$ in (p,p′γ); L(d,p)=1+3 from $5/2^-$. $T_{1/2}$: weighted average of 13.2 fs *14* (1993BeZL) and 9.0 fs *14* (1989Ge05) in (n,n′γ), 15 fs *9* (1969Ka10) and 12 fs *5* (1973Ba02) in (p,p′γ), all from DSAM. Others: 30 fs *+13−9* (1978DeYT) in (p,p′γ) and 29.1 fs *56* (1993Ko57) in (n,n′γ) are discrepant; 12.5 fs *+35−27* from Γ in (γ,γ′) and 12.7 fs *+31−23* from B(E2)↑ in (e,e′), both depending on the adopted branching ratio of 3371γ. Averaging all values above gives 12.0 fs *14*, with a reduced χ^2=2.5.
3508.548 *12*	6^+	1.9 ps *5*	A DEFgHIJ M O TU YZ	XREF: Others: AA, AC, AD, AF XREF: g(3400). J^π: L(α,α′)=L(p,t)=6 from 0^+. $T_{1/2}$: deduced by the evaluator from 1.4 ps<$T_{1/2}$<2.4 ps, with lower limit from DSAM by 1979Gl07 and upper limit from RDM by 1974Br04 in (α,pγ). Other: 0.9 ps *+5−3* from DSAM by 1978Li13 in (α,pγ), but it is inconsistent with $T_{1/2}$>1 ps from RUL of 176γ assuming Mult(176γ)=M1.
3616.812 *21*	2^+	43 fs *13*	IJKLM QR TUV Y	XREF: Others: AA, AC, AD, AF XREF: AF(3631). J^π: L(α,α′)=L(p,t)=2 from 0^+. $T_{1/2}$: weighted average of 38 fs *13* (1979Gl07) from (α,pγ) and 53 fs *+21−14* (1978DeYT) from (p,p′γ), both from DSAM. Others: 8.3 fs *28* (1989Ge05) from DSAM in (n,n′γ) and 10.3 fs *26* (1969Ka10) from DSAM in (p,p′γ) are discrepant.
3699.52 *8*	$1^{(-)}$	11.3 fs *21*	J Lm PQ TuV	XREF: Others: AD, AF J^π: spin=1 from p$\gamma(\theta)$ in (p,p′γ); 1^- from model-dependent analysis of measured form factors by 1989Gu17 in (e,e′); π=− tentatively assigned by 1990De20 based on measured $\gamma(\theta)$ and azimuthal asymmetries; π=− is also supported by the 3703γ feeding from the 5643, 3^- level. But π=+ from 2715.8γ M1+E2 to 2^+ in (p,p′γ) (1968Mo20) is discrepant. Other: 1^+ assigned by 1993Ko57 in (n,n′γ). $T_{1/2}$: from DSAM in (n,n′γ). Other: 6.1 fs *+16−12* from Γ in (γ,γ′) and adopted branching ratio of 3699γ; 24 fs *4* from DSAM in (p,p′γ) is discrepant.

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Adopted Levels, Gammas (continued)

^{48}Ti Levels (continued)

E(level)[†]	J^π	$T_{1/2}$[@]	XREF	Comments
3711.6? *10*			J m u	XREF: Others: AD, AF
3738.60 *11*	1^+[‡]	3.1 fs *18*	IJ LM PQ TUV	XREF: Others: AA, AC, AD, AF XREF: I(?). J^π: 3738.4γ M1 to 0^+. $T_{1/2}$: from DSAM in (n,n′γ). Other: 3.1 fs *+9−7* from Γ in (γ,γ) and the adopted branching ratio of 3738γ; <1.4 fs from DSAM in (α,pγ); 112 fs (1978DeYT) and 11 fs *3* (1969Ka10) from DSAM in (p,p′γ) are discrepant.
3782.459 *18*	$3^-,4^-$	1.2 ps *+11−6*	D IJ LM TuV	XREF: Others: AA, AD J^π: L(d,t)=0 from $7/2^-$. $T_{1/2}$: other: 50 fs from DSAM in (p,p′γ) is discrepant.
3802.73 *11*	2^-		L Q	XREF: Others: AD, AF XREF: Q(3787)AF(3797). J^π: from model-independent PWBA analysis in (e,e′) (1990Gu09).
3850.9? *10*	0^+			XREF: Others: AC J^π: L(p,t)=0.
3852.24 *4*	3^-	32 fs *6*	D IJ LM QR TUV Y	XREF: Others: AA, AD, AF XREF: I(3842)Q(3871)R(3870)AF(3868). J^π: L(α,α′)=L(p,p′)=3 from 0^+. $T_{1/2}$: weighted average of 48 fs *14* (1979Gl07) and 27 fs *6* (1978Li13) in (α,pγ), 97 fs *66* in (n,n′γ), 39 fs *+14−11* in (p,p′γ), all from DSAM.
4035.153 *15*	2^+	22 fs *13*	iJKLM r T V Y	XREF: Others: AA, AC, AD XREF: i(4050)r(4050)T(?)Y(4045)AC(4044). J^π: L(α,α′)=L(p,t)=2 from 0^+. $T_{1/2}$: other: 26 fs *+28−21* from DSAM in (p,p′γ).
4046.6 *3*	$5^{(-)}$	0.37 ps *11*	D iJ U z	XREF: Others: AD XREF: i(4050)z(4060). J^π: spin=5 from pγ(θ) in (α,pγ) (1979Gl07); π=− proposed by 1989Hi05 in (p,p′), but no σ(θ) or analyzing power data given. $T_{1/2}$: from DSAM in (α,pγ).
4074.511 *21*	2^+	35 fs *11*	J Lm r tu Yz	XREF: Others: AA, AB, AD XREF: r(4050)z(4060)ab(4060). J^π: L(α,α′)=2 from 0^+.
4077 *3*	4^+		G m tu z	XREF: Others: AA, AB, AC, AD XREF: G(4200)z(4060)ab(4060). E(level): from (p,t). J^π: from L(p,t)=4 from 0^+.
4102	1^+		Q	XREF: Others: AD J^π: from model-independent analysis of measured σ(θ) in (e,e′) (1990Gu09). B(M1)↑=0.17 *7* (1990Gu09) in (e,e′).
4157 *5*			g r U	XREF: g(4200)r(4170). E(level): from (p,p′).
4196.90 *3*	(2^+)		J Lm r	XREF: r(4170). J^π: 4196.6γ to 0^+, possible 346γ to 3^-.
4204.9 *5*	$(1,2^+)$		Lm r U	XREF: Others: AD XREF: r(4170)ad(4212). J^π: 4204.7γ to 0^+.
4210 *8*	2^-		m Q T	XREF: Others: AD XREF: ad(4212). J^π: from model-independent analysis of measured σ(θ) in (e,e′) (1990Gu09).

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Adopted Levels, Gammas (continued)

^{48}Ti Levels (continued)

E(level)[†]	J^π	$T_{1/2}$[@]	XREF	Comments
4254.5 *10*	1^+		JK Q U	J^π: from model-independent analysis of measured $\sigma(\theta)$ in (e,e′) (1990Gu09). B(M1)↑=0.14 *10* (1990Gu09) in (e,e′).
4311.3 *5*	1^+[‡]	3.8 fs *+39−17*	J M P TU	XREF: Others: AD XREF: T(?)AD(4328). J^π: 4310γ M1 to 0^+. $T_{1/2}$: from $\Gamma^2_{\gamma0}/\Gamma$ in (γ,γ′) and adopted branching ratio of 4310γ.
4346.7 *6*	(2^+)		J M r TU	XREF: Others: AD XREF: r(4390)AD(4358). J^π: proposed in (pol p,p′) (1989Hi05), but no $\sigma(\theta)$ or analyzing power given.
4381.4 *3*	$(3,4,5^-)$	25 fs *14*	iJk m r T yz	XREF: Others: AA, AB XREF: i(4390)r(4390)aa(4383). J^π: 1142.3γ to 4^+ can not be pure E2 (ΔJ=2) from comparison with RUL; 1261γ from 3^-. $T_{1/2}$: weighted average of 21 fs *14* from (α,pγ) and 28 fs *14* from (n,n′γ), using DSAM.
4387.691 *20*	4^+	37 fs *14*	iJkLm r TU yz	XREF: Others: AA, AB, AC XREF: i(4390)U(4392)aa(4383)AC(4393). J^π: L(α,α′)=(p,t)=4 from 0^+. $T_{1/2}$: weighted average of 35 fs *14* from (α,pγ) and 55 fs *+49−28* from (n,n′γ), using DSAM.
4398.7 *4*	6^+	45 fs *14*	iJ	XREF: Others: AA, AD XREF: i(4390)aa(4402)ad(4402). J^π: spin=6 from pγ(θ) in (α,pγ); 2103γ to 4^+ can not be M2 from comparison with RUL.
4404.8 *4*	$5^{(+)}$	<42 fs	iJ z	XREF: Others: AA, AD XREF: i(4390)aa(4402)ad(4402). J^π: spin=5 from pγ(θ) in (α,pγ); parity=+ for a group at 4390 in (α,p).
4407	(2^+)		i Y	XREF: Others: AA, AD XREF: i(4390)aa(4402)AD(4417). E(level): from (α,α′). Other: 4417 *12* from (d,α). J^π: L(α,α′)=(2) from 0^+.
4457.455 *11*	3^+	49 fs *24*	G J LM	XREF: Others: AA, AD XREF: G(4500)ad(4472). J^π: spin=3 from nuclear orientation and circular polarization in (n,γ) E=thermal; parity=+ from L(d,p)=1 from $5/2^-$.
4472 *5*	3^-		U	XREF: Others: AD XREF: ad(4472). J^π: L(p,p′)=3 from 0^+.
4530 *15*	$3^-,4^-$		u Z	J^π: L(p,d)=0 from $7/2^-$.
4535 *3*	0^+		u	XREF: Others: AC J^π: L(p,t)=0 from 0^+.
4564.8 *3*	$8^{(+)}$	>3.5 ps	DEF H J O	XREF: Others: AD XREF: ad(4578). J^π: spin=8 from pγ(θ) in (α,pγ); 1056.2γ to 6^+.
4567	$(^-)$		i	XREF: Others: AA, AC, AD XREF: i(4570)ac(4571)ad(4578). J^π: L(d,t)=(2) from $7/2^-$ gives (1^- to 6^-).
4580.69 *7*	3^-	38 fs *16*	iJ LM QR TU Y	XREF: Others: AA, AC, AD XREF: i(4570)Q(4596)U(4591)ac(4571)ad(4578).

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Adopted Levels, Gammas (continued)

^{48}Ti Levels (continued)

E(level)†	Jπ	$T_{1/2}$@	XREF	Comments
				Jπ: L(α,α′)=L(p,t)=3 from 0+. $T_{1/2}$: weighted average of 28 fs *14* from (α,pγ) and 62 fs *21* from (n,n′γ), both using DSAM.
4589 *3*	0^+		K m r	XREF: Others: AC, AD E(level): from (p,t). Other: 4590 *15* from (t,p). Jπ: L(p,t)=L(t,p)=0 from 0+.
4719.137 *22*	4^+	66 fs *18*	IJ LM TU Y	XREF: Others: AA, AC, AD XREF: U(4726)AC(4725)ad(4729). Jπ: L(p,t)=L(p,p′)=4 from 0+. $T_{1/2}$: from DSAM in (n,n′γ) (1993Ko57). Other: 66 fs *24* from DSAM in (α,pγ).
4757.73 *10*	(3^-)		L Z	E(level),Jπ: L(p,d)=0 from 7/2− gives Jπ=3−,4− for a group at 4750 *15*, which could be the same level here; 1140.94γ to 2+ favors 3−.
4783.27 *12*	$(2^+,3,4^+)$		i kLm r	XREF: i(4791)k(4800)m(4789)r(4790). Jπ: 2486.4γ to 4+, 3799.6γ to 2+.
4792.31 *5*	$(1^-,2,3^-)$	28 fs *14*	iJkLm r yz	XREF: Others: AA, AC, AD XREF: i(4791)k(4800)m(4789)r(4790)ad(4806). Jπ: 1092.3γ to 1−, 2371.2γ to 2+, 1572.4γ from 3−. Others: L(d,t)=L(p,d)=0 from 7/2−, L(d,p)=1 from 5/2−, L(t,p)=L(α,α′)=2 from 0+, and L(p,t)=3 from 0+ for a multiplet.
4794.11 *13*	(2^+)		kLm r u y	XREF: Others: AD XREF: k(4800)m(4789)r(4790)u(4802)ad(4806). Jπ: 4793.5γ to 0+, 2498.4γ to 4+; L(t,p)=L(α,α′)=2 from 0+ and L(d,p)=1 from 5/2− for a multiplet.
4795.1 *4*	$(3^-,4)$	70 fs *35*	iJ m u z	XREF: Others: AA, AC, AD XREF: i(4791)m(4789)u(4802)ad(4806). Jπ: 749γ to 5(−), 942γ to 3−, 1571γ to 3+. Others: L(d,t)=L(p,d)=0 from 7/2−, L(d,p)=1 from 5/2−, and L(p,t)=3 from 0+ for a multiplet.
4861.0 *6*	$2^+,3^+,4^+$	21 fs *11*	g IJ M	XREF: g(4900)M(4852). Jπ: L(d,p)=1 from 5/2−; 1622γ to 4+.
4885.0 *7*	$(2^+,3^+,4^+)$		g J Z	XREF: Others: AA, AD XREF: g(4900)Z(4890)AD(4879). Jπ: L(p,d)=(1+3) from 7/2−; 2464γ to 2+, 1526γ to 3−.
4910.57 *5*	$(1^+,2^+)$		J Lm qr U	XREF: m(4914)q(4918)r(4910). Jπ: 4911.8γ to 0+, 1686.6γ to 3+. Other: 2+ from model-independent PWBA in (e,e′) for a doublet at 4918, with B(E2)↑=0.00138 *21*.
4916.3 *5*	5^-	0.19 ps *11*	iJ r Y	XREF: Others: AA, AC, AD XREF: i(4927)r(4910)ad(4927). Jπ: L(α,α′)=L(p,t)=5 from 0+.
4924.92 *14*	$(2,3,4)^+$	21 fs *11*	iJ Lm qr	XREF: Others: AA, AD XREF: i(4927)m(4914)q(4918)r(4910)AA(4930)ad(4927). Jπ: L(p,d)=1+3 from 7/2−; 2629.1γ to 4+, 851γ to 2+. Other: see comment for 4911 level.
4939.93 *15*	$(2,3,4)^+$		iJ LM T	XREF: Others: AA, AD XREF: i(4927)T(?)ad(4927). Jπ: L(d,p)=1 from 5/2−; 3956.2γ to 2+, 2644.5γ to 4+.
4956.6 *4*	$(4^+,5,6^-)$	>1.0 ps	iJ	XREF: Others: AD Jπ: 1624γ to 6+, 1173γ to Jπ=3−,4−.
4966	2^+		i Y	XREF: Others: AC, AD

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Adopted Levels, Gammas (continued)

^{48}Ti Levels (continued)

E(level)†	J^π	$T_{1/2}$@	XREF	Comments
				XREF: ac(5000). J^π: L(α,α')=2 from 0^+.
4970.7 *7*	0^+		iJK Q U	XREF: Others: AC, AD XREF: Q(4997)ac(5000). J^π: L(t,p)=0 from 0^+.
4992.0 *5*	5^-		J M U Y	XREF: Others: AA, AC, AD XREF: M(5000)U(5000)ac(5000)AD(5005). J^π: L(d,t)=2 from $7/2^-$; 1484γ to 6^+, 1139γ to 3^-; natural parity from presence in (α,α') spectra.
5063 *12*				XREF: Others: AD
5145.85 *7*	4^+	50 fs *28*	g IJ Lm r T Y	XREF: Others: AA, AC XREF: g(5200)m(5151)r(5150)T(?)AA(5150)ac(5160). J^π: L(α,α')=4 from 0^+.
5155.7 *7*	$5^{(+)}$	<7 fs	J	XREF: Others: AA, AD XREF: aa(5158)ad(5169). J^π: spin=5 from p$\gamma(\theta)$ in (α,pγ); 751γ to $5^{(+)}$ can only be M1 from comparison with RUL.
5158.0 *3*	4^+	<25 fs	g J Lm r U	XREF: Others: AA, AC, AD XREF: g(5200)m(5151)r(5150)aa(5158)ac(5160)ad(5169). J^π: L(p,p')=4 from 0^+; (2,3) from nuclear orientation and circular polarization in (n,γ) E=thermal is discrepant.
5169.8 *4*	7^+	28 fs *12*	J	XREF: Others: AD XREF: ad(5169). J^π: spin=7 from p$\gamma(\theta)$ in (α,pγ); 1661γ M1+E2 to 6^+.
5170	$(2,3,4,5)^+$			XREF: Others: AA, AD XREF: AD(5184). J^π: L(d,t)=3(+1) from $7/2^-$.
5197.9 *4*	8^+	76 fs *24*	EF HIJ	XREF: Others: AA, AD XREF: AA(5199)AD(5205). J^π: spin=8 from p$\gamma(\theta)$; 1689γ to 6^+ can not be M2 from comparison to RUL. Other: L(d,t)=3(+1) from $7/2^-$, giving J^π=(2 to 5)$^+$ for a group at 5199, is inconsistent.
5241	1^+		m Q	XREF: m(5255). J^π: from model-independent analysis of measured $\sigma(\theta)$ in (e,e'). B(M1)↑=0.11 *3* from (e,e').
5251.8 *6*	$(2^+,3,4,5^-)$	49 fs *+20−24*	J m	XREF: Others: AD XREF: m(5255)ad(5266). J^π: 1399γ to 3^-, 2957γ to 4^+.
5273.0 *5*	$(1^-,2)$		J U	XREF: Others: AD XREF: ad(5266). J^π: 962γ to 1^+, 1571γ to 1^-, 1915γ to 3^-.
5300.9 *6*	$(4^+,5,6)$	<35 fs	J m	XREF: m(5303). J^π: 1792γ to 6^+; 896γ to $5^{(+)}$ can not be E2 or M2.
5312.8 *4*	(5^-)	69 fs *28*	IJ m	XREF: Others: AA, AD XREF: m(5303)ad(5317). spin=5,6,7 from p$\gamma(\theta)$ in (α,pγ); 1266γ M1,E2 to $5^{(-)}$; 2185γ from (4^+).
5313.3 *6*	2^+		J m Q T Y	XREF: Others: AD

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Adopted Levels, Gammas (continued)

^{48}Ti Levels (continued)

E(level)†	J^π	$T_{1/2}$@	XREF	Comments
				XREF: m(5303)T(?)ad(5317). J^π: from model-independent analysis of measured $\sigma(\theta)$ in (e,e′). B(E2)↑=0.00164 *28* (1990Gu09) from (e,e′).
5340 *3*	$1^{(-)}$‡		P U	XREF: U(5329).
5356.23 *13*	(2^+,3,4^+)		J L r	XREF: Others: AD XREF: r(5360)AD(5371). J^π: 4372.6γ to 2^+, 3062γ to 4^+.
5383.8 *7*	$(3)^-$		IJ r Y	XREF: Others: AA, AD XREF: I(5378)r(5360)ad(5395). J^π: L(α,α′)=(3) from 0^+, L(d,t)=2 from $7/2^-$.
5391 *9*	4^+		M U	XREF: Others: AD XREF: M(5382)U(5400)ad(5395). J^π: L(p,p′)=4 from 0^+, L(d,p)=1+3 from $5/2^-$.
5461	2^+,3^+,4^+,5^+			XREF: Others: AA, AC XREF: ac(5510). J^π: L(d,p)=1+3 from $5/2^-$.
5490.95 *21*	2^+		iJKLm	XREF: Others: AC XREF: i(5497)K(5499)m(5493)ac(5510). J^π: L(t,p)=2 from 0^+.
5500.8 *4*	4^+	26 fs *12*	iJ m	XREF: Others: AC, AD XREF: i(5497)m(5493)ac(5510)ad(5509). J^π: 2168γ to 6^+ and 1226γ to 2^+ can not be M2 from comparison to RUL.
5521.7 *6*	3^-		iJ m Y	XREF: Others: AA, AC, AD XREF: i(5521)m(5520)ac(5510)ad(5509). J^π: L(α,α′)=3 from 0^+.
5526 *3*	1‡		i m P	XREF: Others: AC, AD XREF: i(5521)m(5520)ac(5510)AD(5530).
5545.9 *7*	(4^+ to 8^+)		iJ m	XREF: Others: AC, AD XREF: i(5547)m(5546)ac(5510)ad(5555). J^π: 2213γ to 6^+.
5545.9 *5*	3^-		iJ m R U	XREF: Others: AA, AC, AD XREF: i(5547)m(5546)R(5540)U(5537)ac(5510)ad(5555). J^π: L(p,p′)=L(π^+,π^+)=3 from 0^+.
5562	(3^-)		Q U	XREF: Others: AD XREF: U(5578)ad(5555). J^π: from $\sigma(\theta)$ and analyzing powers in (p,p′) and also from model-independent analysis of measured $\sigma(\theta)$ in (e,e′).
5567.9 *6*	2^+		J Q	XREF: Others: AD XREF: ad(5555). J^π: from model-dependent PWBA in (e,e′). B(E2)↑=0.00093 *20* (1990Gu09) from (e,e′).
5615.8 *5*	$(3)^-$		J	XREF: Others: AA J^π: L(d,t)=0 from $7/2^-$; 4632γ to 2^+.
5619.65 *10*	2^+		iJ LM QR U Y	XREF: Q(5633)U(5633)Y(5614). J^π: L(α,α′)=2 from 0^+. B(E2)↑=0.0019 *5* (1990Gu09) from (e,e′).
5630.9 *4*	7	24 fs *14*	iJ	XREF: Others: AD J^π: from pγ(θ) in (α,pγ).
5640.03 *5*	1^+‡	<0.96 fs	iJ LM PQ	XREF: Others: AD $T_{1/2}$: from $\Gamma^2_{\gamma 0}/\Gamma$ in (γ,γ′) and adopted branching ratio of 5640γ. B(M1)↑=0.47 *8* (1990Gu09) from (e,e′).

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Adopted Levels, Gammas (continued)

^{48}Ti Levels (continued)

E(level)[†]	J^{π}	$T_{1/2}$[@]	XREF	Comments
5641.5 *4*	3^-	24 fs *11*	J	XREF: Others: AA, AD J^{π}: L(d,t)=0+2 from $7/2^-$ gives 3^-,4^-; 4^- ruled out by 1939γ to 1^-.
5657	1^+		m Q	XREF: Others: AD XREF: m(5763). J^{π}: from model-independent analysis of measured $\sigma(\theta)$ in (e,e′). B(M1)↑=0.25 *4* (1990Gu09) from (e,e′).
5760	(3^-)		i m Y	XREF: i(5770)m(5763). J^{π}: L(α,α')=(3) from 0^+.
5762.8 *5*	$(4^+,5,6^+)$		iJ m u	XREF: Others: AD XREF: i(5770)m(5763)u(5777)ad(5775). J^{π}: 2254γ to 6^+, 2523γ to 4^+.
5764	2^+		i m Q u	XREF: Others: AD XREF: i(5770)m(5763)u(5777)ad(5775). J^{π}: from model-independent analysis of measured $\sigma(\theta)$ in (e,e′). B(E2)↑=0.00031 *10* (1990Gu09) from (e,e′).
5805.2 *7*	3^-,4^-	21 fs *12*	J	XREF: Others: AA J^{π}: L(d,t)=0+2 from $7/2^-$.
5827.1 *5*	3^-		iJ Q Y	XREF: Others: AA XREF: i(5840)Q(5835). J^{π}: L(α,α')=3 from 0^+.
5846.5 *6*	3^-	<21 fs	iJ r U Y	XREF: i(5840)r(5870). J^{π}: L(α,α')=L(p,p′)=3 from 0^+.
5884?	(3^-)		i Qr	XREF: Others: AA XREF: i(5886)r(5870). E(level): see comment for 5888.5 level. J^{π}: from model-independent analysis of measured $\sigma(\theta)$ in (e,e′); L(d,t)=2 from $7/2^-$ for a group at 5886.
5885?	2^+		i m r Y	XREF: i(5886)m(5888)r(5870). E(level): see comment for 5888.5 level. J^{π}: L(α,α')=2 from 0^+.
5886.7 *7*	$(4^+$ to $8^+)$		iJ m	XREF: i(5886)m(5888). J^{π}: 2378γ to 6^+. Other: L(d,p)=1 from $5/2^-$ for a group at 5888 *12* gives 1^+,2^+,3^+,4^+.
5888.41 *10*	(1,2,3)		i Lm r	XREF: i(5886)m(5888)r(5870). One of the 5884, (3^-) and 5885, 2^+ levels could correspond to this level, and the other one is a separate level. J^{π}: 2085.7γ to 2^-, 2517.6γ to 2^+.
5892.1 *5*	$(1^-,2^+)$		J m	XREF: m(5888). J^{π}: 5892γ to 0^+, 2533γ to 3^-.
5917.8 *10*	2^+		J Q U Y	XREF: Q(5940)U(5928). J^{π}: L(α,α')=L(p,p′)=2 from 0^+.
5974.8 *5*	$(4^+,5,6)$		iJ	XREF: i(5990). J^{π}: 2466γ to 6^+, 1570γ to $5^{(+)}$, 662γ to (5^-).
5988	1^+,3^+		i m Q y	XREF: Others: AA XREF: i(5990)m(5990). J^{π}: from model-dependent PWBA in (e,e′). B(M1)↑=0.08 *3*, B(M3)↑=0.236 *59* from (e,e′) (1990Gu09).
5990.8 *6*	$(4^+,5,6^+)$		iJ m	XREF: Others: AA XREF: i(5990)m(5990). J^{π}: 2751γ to 4^+, 1592γ to 6^+.
5993.6 *6*	$(2)^+$		iJ m Q Y	XREF: Others: AA

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Adopted Levels, Gammas (continued)

^{48}Ti Levels (continued)

E(level)†	J^π	$T_{1/2}$@	XREF	Comments
				XREF: i(5990)m(5990)Q(6011). J^π: L(α,α'=(2) from 0^+. Other: $2^+,3^+$ from model-dependent PWBA for a group at 6011 in (e,e′). B(E2)=0.00051 *12* (1990Gu09) from (e,e′).
6022 *10*	(3^-)		K Q U	E(level): weighted average of 6014 *15* from (t,p) and 6025 *10* from (p,p′). Other: 6029 from (e,e′). J^π: from model-independent analysis of measured $\sigma(\theta)$ in (e,e′);
6034.9 *6*	$9^+,7^+$#	<21 fs	F iJ	XREF: i(6050). J^π: spin from p$\gamma(\theta)$ in (α,pγ); M1+E2 γ to 8^+.
6036.8 *10*	4^+		iJ m Y	XREF: Others: AA, AC XREF: i(6050)m(6043)ac(6050). J^π: L(α,α')=4 from 0^+.
6039.7 *5*	6	25 fs *17*	iJ	XREF: i(6050). J^π: from p$\gamma(\theta)$ in (α,pγ).
6040.4 *10*	(1,2)		iJ m	XREF: Others: AA XREF: i(6050)m(6043). J^π: 6040γ to 0^+.
6042.40 *11*	(2,3)		iJ Lm	XREF: Others: AA XREF: i(6050)m(6043). J^π: from nuclear orientation and circular polarization in (n,γ) E=thermal.
6050.5 *10*			iJ m q	XREF: Others: AC XREF: i(6050)m(6043)q(6061)ac(6050). J^π: see comment for 6055 level.
6054.47 *22*	(0^+ to 4^+)		iJ L q	XREF: Others: AC XREF: i(6050)q(6061)ac(6050). J^π: 3633.4γ to 2^+. Other: $1^+,3^+$ from model-dependent PWBA in (e,e′) for a doublet, with B(M1)↑=0.10 *3* and B(M3)↑=0.15 *4* (1990Gu09).
6065	3^-		Qr U Y	XREF: Others: AA XREF: Q(6077)r(6090)U(6083). J^π: L(α,α')=3 from 0^+.
6084.3 *6*	($4^+,5,6^-$)		J	XREF: Others: AC XREF: ac(6050). J^π: 2576γ to 6^+, 2301γ to $3^-,4^-$.
6086 *4*	1‡		P	
6103.2 *7*	$10^{(+)},8$#	>1.4 ps	EF HIJ	J^π: spin from p$\gamma(\theta)$ in (α,pγ), 1538.8γ to 8^+.
6115	2^+		m Y	XREF: m(6118). J^π: L(α,α')=2 from 0^+.
6119.6 *5*	(4^+,5)		J m	XREF: m(6118). J^π: 2611γ to 6^+, 2336γ to $3^-,4^-$, 3824γ to 4^+.
6122	0^+		m Q	XREF: m(6118). J^π: from model-independent analysis of measured $\sigma(\theta)$ in (e,e′).
6126 *3*	1‡		J m P	XREF: m(6118).
6138 *4*	$1^{(+)}$‡		m P U	XREF: m(6144).
6147.8 *11*	(4^+ to 8^+)		J m	XREF: m(6144). J^π: 1749γ to 6^+.
6153.8 *6*	(4^+ to 7^-)		J	J^π: 2821γ to 6^+, 2107γ to $5^{(-)}$.
6168?	$3^-,4^-$			XREF: Others: AA J^π: L(d,t)=0 from $7/2^-$.
6172.9 *6*	$8^+,6^+$	35 fs *28*	J	J^π: spin from p$\gamma(\theta)$ in (α,pγ), 1003γ M1+E2 to 7^+.
6176.4 *7*	(2^+,3,4,5^-)		J T y	XREF: T(?)y(6178).

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Adopted Levels, Gammas (continued)

^{48}Ti Levels (continued)

E(level)†	Jπ	XREF	Comments
			Jπ: 2817γ to 3⁻, 3881γ to 4⁺. Other: L(α,α′)=2 from 0⁺ for a group at 6178.
6183.8 *7*	(2⁺ to 6⁺)	J u y	XREF: u(6200)y(6178). Jπ: 2944γ to 4⁺. Other: L(α,α′)=2 from 0⁺ for a group at 6178.
6203	2⁻	Q	Jπ: from model-independent analysis of measured σ(θ) in (e,e′).
6223.8 *10*	(0⁺ to 4⁺)	J u	XREF: Others: AC XREF: u(6200)ac(6230). Jπ: 5240γ to 2⁺.
6233.6 *6*	3⁻	J Y	XREF: Others: AC XREF: ac(6230). Jπ: L(α,α′)=3 from 0⁺.
6236 *3*	2⁺‡	P	XREF: Others: AC XREF: ac(6230).
6241.0 *4*	(4⁺,5⁻)	L	XREF: Others: AA XREF: aa(6248). Jπ: 2907.7γ to 6⁺; primary 5387.3γ from 2⁻,3⁻.
6243.8 *7*	(0⁺ to 3⁺)	J	XREF: Others: AA XREF: aa(6248). Jπ: 2505γ to 1⁺, 2873γ to 2⁺. Other: L(d,t)=3(+1) from 7/2⁻ for a group at 6248.
6253.7 *6*	3⁻	J Q u	XREF: Q(6248)u(6258). Jπ: from model-dependent PWBA in (e,e′); also L(p,p′)=3 from 0⁺ for a group at 6258 *10*. B(E3)↑=0.0035 *4* from (e,e′).
6267.8 *10*	(3⁻)	J Q u	XREF: u(6258). Jπ: from model-independent PWBA in (e,e′).
6313.7 *3*	(4⁺,5⁻)	Lm	Jπ: 2980.4γ to 6⁺; primary 5312.6γ from 2⁻,3⁻.
6315.4 *5*	(2⁺,3,4⁺)	J m	Jπ: 2698γ to 2⁺, 4021γ to 4⁺.
6322.0 *7*	(2,3,4)	J m u	XREF: Others: AA XREF: aa(6327). Jπ: 2963γ to 3⁻, 3098γ to 3⁺.
6331.1 *10*	(1⁺ to 5⁺)	J u	XREF: Others: AA XREF: aa(6327). Jπ: 3107γ to 3⁺.
6336.5 *10*	3⁻	J u Y	XREF: Others: AA XREF: Y(6342)aa(6327). Jπ: L(p,p′)=3 from 0⁺.
6363.8 *7*	(3,4)⁺	J M	Jπ: 1959γ to 5⁽⁺⁾, 3124γ to 4⁺; L(d,p)=1 from 5/2⁻.
6365.16 *9*	3⁻	L R U	XREF: R(6360). Jπ: L(p,p′)=L(π⁺,π⁺′)=3 from 0⁺.
6394.8 *6*	(6⁺,7⁻)	IJ	Jπ: 1197γ to 8⁺, 1082γ to (5⁻).
6400.9 *6*	(4⁺ to 8⁺)	J	Jπ: 2002γ to 6⁺.
6406.0 *3*	(1⁻ to 5⁻)	L	XREF: Others: AA XREF: aa(6407). Jπ: 2553.7γ to 3⁻. Other: L(d,t)=0 from 7/2⁻ gives 3⁻,4⁻ for a group at 6407.
6414.8 *10*	(2⁺ to 6⁺)	J q	XREF: Others: AA XREF: q(6424)aa(6407). Jπ: 4119γ to 4⁺. Other: L(d,t)=0 from 7/2⁻ gives 3⁻,4⁻ for a group at 6407; 3⁻ from model-dependent PWBA in (e,e′) for a group at 6424, with B(E3)↑=0.0056 *29*.
6434.6 *10*	(3⁻ to 7⁻)	J q	XREF: q(6424). Jπ: 2388γ to 5⁽⁻⁾. Others: see comment for 6414 level.
6451.1 *6*	(2⁺,3,4)	J r	XREF: r(6500). Jπ: 2598γ to 3⁻, 3227γ to 3⁺, 3212γ to 4⁺.
6461.3 *10*	(4⁺ to 8⁺)	J	Jπ: 3128γ to 6⁺.

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Adopted Levels, Gammas (continued)

^{48}Ti Levels (continued)

E(level)[†]	J^π	$T_{1/2}$[@]	XREF	Comments
6475.3 *10*	3^-		J r U Y	XREF: r(6500)U(6484)Y(6462). J^π: L(α,α')=L(p,p')=3 from 0^+.
6490.36 *15*	$(2^+,3)$		i Lm r	J^π: 2687.5γ to 2^-, 5506.4γ to 2^+, 3252.4γ to 4^+.
6491.6 *7*	$(0^+$ to $4^+)$		iJ m r u	XREF: u(6503). J^π: 4070γ to 2^+.
6493.5 *6*	$(4^+,5,6,7^-)$		iJ m u	XREF: u(6503). J^π: 2985γ to 6^+, 1577γ to 5^-.
6507.8 *5*	$(6^+,7^-)$		J	J^π: 1943γ to 8^+, 2461γ to $5^{(-)}$.
6518.5 *7*	4^+		J u Y	XREF: u(6503)Y(6509). J^π: L(α,α')=4 from 0^+.
6524.6 *10*	$(4^+$ to $8^+)$		J	J^π: 3016γ to 6^+.
6529.5 *10*	$(1^-$ to $6^-)$		J	J^π: 2747γ to $3^-,4^-$.
6537.0 *7*	$(4^+$ to $7^-)$		J u	XREF: u(6542). J^π: 2490γ to $5^{(-)}$, 3204γ to 6^+.
6538.9 *10*			J u	XREF: u(6542).
6542.0 *3*	$(0^+$ to $4^+)$		L u	XREF: u(6542). J^π: 5558.1γ to 2^+.
6544.8 *10*	$(2^+$ to $6^+)$		J u	XREF: u(6542). J^π: 4249γ to 4^+.
6573.9 *5*	$(5,6,7^+)$		J	J^π: 943γ to J=7, 2169γ to $5^{(+)}$.
6584.4 *7*	(3^-)		J Y	J^π: L(α,α')=(3) from 0^+.
6604.3 *24*	1^-	0.86 eV *20*	J P U	$T_{1/2}$: from resonance σ versus temperature in (γ,γ') (1983Mo06).
6617.7 *10*	$(4^+$ to $8^+)$		J	XREF: Others: AA, AC XREF: aa(6623)ac(6650). J^π: 3109γ to 6^+.
6627.6 *4*	$(0^-,1,2,3)$		Lm	XREF: Others: AA XREF: aa(6623). J^π: 2888.9γ to 1^+, primary 4999.97γ from $2^-,3^-$. Other: L(d,t)=(0+2) from $7/2^-$ gives $3^-,4^-$ for a group at 6623.
6634.3 *6*	$(3^-,4,5^-)$		J m u	XREF: Others: AA, AC XREF: u(6641)aa(6623)ac(6650). J^π: 2781γ to 3^-, 2588γ to $5^{(-)}$.
6652.6 *10*	$(1^-$ to $6^-)$		J q u	XREF: Others: AC XREF: q(6648)u(6641)ac(6650). J^π: 2870γ to $3^-,4^-$. Other: 3^+ from model-dependent PWBA in (e,e') with B(M3)↑=0.157 *41*.
6661.6 *10*	$(3^-$ to $7^-)$		IJ q	XREF: Others: AC XREF: q(6648)ac(6650). J^π: 2615γ to $5^{(-)}$. Other: see comment for 6653 level.
6672.6 *10*	$(2,3,4)^+$		J M U	XREF: M(6681)U(6687). J^π: L(d,p)=1+3 from $5/2^-$; 2890γ to $3^-,4^-$.
6707.29 *21*	$(2^+,3,4)$		i L qr y	XREF: Others: AA XREF: r(6700)y(6701)aa(6713). J^π: 3483.5γ to 3^+, 4411.1γ to 4^+; primary 4917.6γ from $2^-,3^-$. Other: see comment for 6707 level.
6707.4 *6*	$(2^+,3,4^+)$		iJ qr Y	XREF: Others: AA XREF: r(6700)Y(6701)aa(6713). J^π: 5724γ to 2^+, 4412γ to 4^+. Other: L(α,α')=4 from 0^+ for a group at 6701 and L($\pi^+,\pi^{+\prime}$) from 0^+ for a group at 6700 gives 4^+, L(d,t)=(3) from

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Adopted Levels, Gammas (continued)

^{48}Ti Levels (continued)

E(level)[†]	J^{π}	$T_{1/2}$[@]	XREF	Comments
				7/2$^-$ for a group at 6713; 1$^+$,3$^+$ from model-dependent PWBA in (e,e′) for a doublet, with B(M1)↑=0.21 *7*, B(M3)↑=0.206 *41*.
6711.6 *6*	(4$^+$,5,6,7$^-$)		iJ qr y	XREF: r(6700)y(6701). J$^{\pi}$: 3203γ to 6$^+$, 1795γ to 5$^-$. Other: see comment for 6707 level.
6722	3$^-$		U	J$^{\pi}$: L(p,p′)=3 from 0$^+$.
6740 *5*	(2$^+$,3$^-$)		m Y	XREF: m(6747). J$^{\pi}$: L(α,α′)=(2,3) from 0$^+$.
6744.9 *5*	(4$^+$,5,6$^+$)		J m	XREF: m(6747). J$^{\pi}$: 3236γ to 6$^+$, 4449γ to 4$^+$. Other: L(d,p)=1+3 from 5/2$^-$ for a group at 6747 *12*.
6755	3$^+$		m Q	XREF: m(6747). J$^{\pi}$: from model-dependent PWBA in (e,e′). B(M3)↑=0.327 *69* from in (e,e′).
6757.9 *6*	(6$^+$,7,8,9)		IJ U	J$^{\pi}$: 1560γ to 8$^+$, 1127γ to J=7.
6771.3 *10*	(4$^+$ to 8$^+$)		J	J$^{\pi}$: 3438γ to 6$^+$.
6798.0 *6*	(1$^+$,2,3,4)		L y	XREF: Others: AA J$^{\pi}$: 3573.9γ to 3$^+$; primary 4829.7γ from 2$^-$,3$^-$. Others: L(α,α′)=(5,4) from 0$^+$ for a group at 6797 is inconsistent with L(d,t)=(0+2) from 7/2$^-$ for a group at 6797.
6808.5 *11*			J r u y	XREF: Others: AA XREF: u(6816)y(6797)aa(6797).
6814.9 *10*	(3$^-$)		J u	XREF: u(6816). J$^{\pi}$: from DWBA analysis and analyzing power in (p,p′) for a group at 6816 *10*.
6825.7 *7*	(4$^+$ to 8$^+$)		J r	XREF: r(6830). J$^{\pi}$: 2427γ to 6$^+$.
6827.8 *3*	(2$^+$,3,4$^+$)		L r	XREF: r(6830). J$^{\pi}$: 5843.7γ to 2$^+$, 2108.7γ to 4$^+$; primary 4799.8γ from 2$^-$,3$^-$.
6831.6 *7*	(0$^+$ to 4$^+$)		J r	XREF: r(6830). J$^{\pi}$: 4410γ to 2$^+$.
6841.9 *7*	3$^-$		J r U Y	XREF: r(6830)U(6839)Y(6831). J$^{\pi}$: L(p,p′)=L(α,α′)=3 from 0$^+$.
6869.0 *10*	(1$^-$ to 5$^-$)		iJ	J$^{\pi}$: 3510γ to 3$^-$.
6878.3 *10*	(0$^+$ to 4$^+$)		iJ	J$^{\pi}$: 4457γ to 2$^+$.
6880.9 *8*	(6$^+$,7$^-$)	125 fs *+69−56*	iJ	J$^{\pi}$: 2316γ to 8$^+$, 1568γ to J$^{\pi}$=(5$^-$).
6886.0 *7*	(4$^+$ to 8$^+$)		iJ	J$^{\pi}$: 3377γ to 6$^+$.
6898.0 *6*	(1,2$^+$)		L	J$^{\pi}$: 3901γ to 0$^+$.
6907.0 *8*	10,8,6[#]	97 fs *+76−63*	F J	J$^{\pi}$: from $\gamma(\theta)$ in (α,pγ).
6916.7 *10*	(3$^-$ to 7$^-$)		J	XREF: Others: AC XREF: ac(6950). J$^{\pi}$: 2870γ to 5$^{(-)}$.
6944.7 *7*	(4$^+$,5,6,7$^-$)		J	XREF: Others: AC XREF: ac(6950). J$^{\pi}$: 2898γ to 5$^{(-)}$, 3436γ to 6$^+$.
6955.8 *7*	(5$^+$ to 8$^+$)		J	XREF: Others: AC XREF: ac(6950). J$^{\pi}$: 1786γ to 7$^+$, 3447γ to 6$^+$.
6957.0 *3*	(1$^-$,2,3,4$^+$)		L r u y	XREF: Others: AC XREF: r(6960)u(6963)y(6957)ac(6950). J$^{\pi}$: 3104.4γ to 3$^-$, 4536.0γ to 2$^+$. Others: L(α,α′)=3, L(p,p′)=3, and L(π^+,π^+′)=3 from 0$^+$ for a group at 6957, 6963 *10* and 6960, respectively.

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Adopted Levels, Gammas (continued)

^{48}Ti Levels (continued)

E(level)†	J$^{\pi}$	XREF	Comments
6966.9 *10*	(2$^+$ to 6$^+$)	J r u y	XREF: Others: AC XREF: r(6960)u(6963)y(6957)ac(6950). J$^{\pi}$: 4671γ to 4$^+$. Others: see comment for 6957 level.
6971.9 *10*	(0$^+$ to 4$^+$)	J	XREF: Others: AC XREF: ac(6950). J$^{\pi}$: 5988γ to 2$^+$.
6975.4 *8*	(3$^-$ to 7$^-$)	J	XREF: Others: AC XREF: ac(6950). J$^{\pi}$: 1983γ to 5$^-$.
6976.30 *20*	(1,2,3,4$^+$)	L	XREF: Others: AC XREF: ac(6950). J$^{\pi}$: 2941.0γ to 2$^+$; primary 4649.9γ from 2$^-$,3$^-$.
6979 *3*	1$^-$‡	P	XREF: Others: AC XREF: ac(6950).
6983.4 *10*	(1$^-$ to 5$^-$)	J	XREF: Others: AC XREF: ac(6950). J$^{\pi}$: 3131γ to 3$^-$.
6985.8 *5*	(6$^+$,7)	J	XREF: Others: AC XREF: ac(6950). J$^{\pi}$: 2421γ to 8$^+$, 3477γ to 6$^+$, 2029γ to (4$^+$,5,6$^-$).
7033.5 *11*	(4$^+$)	J U	XREF: U(7036). J$^{\pi}$: from DWBA analysis and analyzing power in (p,p′) for a group at 7036 *10*.
7040.9 *8*	(6$^+$,7,8,9$^+$)	iJ	J$^{\pi}$: 2476γ to 8$^+$, 467γ to (5,6,7$^+$).
7041 *4*	1,2‡	i P	
7054.0 *10*	(3$^-$)	J y	XREF: Others: AA XREF: y(7058)AA(7042). J$^{\pi}$: L(α,α′)=(3) for a group at 7058 and L(d,t)=(0+2) from 9/2$^-$ for a group at 7042.
7060.80 *22*	(0$^-$,1,2,3$^-$)	L	J$^{\pi}$: 3361.2γ to 1$^-$; primary 4566.3γ from 2$^-$,3$^-$.
7067.0 *10*	(3$^-$,4$^+$)	J U	XREF: U(7082). J$^{\pi}$: from DWBA analysis and analyzing power in (p,p′) for a group at 7082 *10*.
7071? *4*	1$^+$‡	PQ	J$^{\pi}$: also 1$^+$,3$^+$ from model-dependent PWBA analysis in (e,e′). B(M1)↑=0.18 *7*, B(M3)↑=0.186 *99* from (e,e′) (1990Gu09).
7076.0 *6*	(6$^+$ to 10$^+$)	J	J$^{\pi}$: 1878γ to 8$^+$.
7094.1 *7*	(5$^+$ to 8$^+$)	J	J$^{\pi}$: 1924γ to 7$^+$, 3761γ to 6$^+$.
7100.9 *10*	(2$^+$ to 6$^+$)	J	J$^{\pi}$: 4805γ to 4$^+$.
7110 *5*	1‡	P u	
7111.9 *11*	(5 to 9)	J u	J$^{\pi}$: 1481γ to 7.
7118.9 *4*	(6$^+$,7$^-$)	J u	J$^{\pi}$: 1921γ to 8$^+$, 1806γ to (5$^-$).
7124 *3*	1$^-$‡	P u	
7129? *10*	(2$^+$)	U	J$^{\pi}$: L(p,p′)=(2) from 0$^+$.
7149.8 *11*	(4$^+$ to 8$^+$)	J u	J$^{\pi}$: 2751γ to 6$^+$.
7162.7 *10*	(4$^+$ to 8$^+$)	J u	J$^{\pi}$: 3654γ to 6$^+$.
7183.6 *7*	(0$^+$ to 4$^+$)	J	J$^{\pi}$: 4762γ to 2$^+$.
7199.3 *10*	(0$^+$ to 4$^+$)	J u	J$^{\pi}$: 4778γ to 2$^+$. Other: L(p,p′)=(3) from 0$^+$ gives (3$^-$) for a group at 7221 *10*.
7221.6 *7*	(1,2,3,4$^+$)	J u	J$^{\pi}$: 3147γ to 2$^+$, 2840γ to (3,4,5$^-$). Other: L(p,p′)=(3) from 0$^+$ gives (3$^-$) for a group at 7221 *10*.
7221.6 *20*	1$^+$	M PQ	XREF: M(7228). J$^{\pi}$: also from model-dependent PWBA analysis in (e,e′). B(M1)↑=1.01 *6* from (e,e′) (1990Gu09).
7256.8 *7*	(4)$^+$	J M U	J$^{\pi}$: 3210γ to 5$^{(-)}$, 4017γ to 4$^+$; L(d,p)=1+3 from 5/2$^-$.
7275.1 *6*	(4$^+$)	J	J$^{\pi}$: 1962γ to 2$^+$, 3766γ to 6$^+$.

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Adopted Levels, Gammas (continued)

^{48}Ti Levels (continued)

E(level)[†]	J^π	$T_{1/2}$[@]	XREF	Comments
7290.0 *10*	3^+		J Q	XREF: Q(7296). J^π: from model-dependent PWBA in (e,e′). B(M3)↑=0.41 *16* from (e,e′) (1990Gu09).
7323.0 *10*	3^-		J U	J^π: L(p,p′)=3 from 0^+.
7326.9 *8*	(6^+ to 10^+)		J	J^π: 2129γ to 8^+.
7344.8 *11*	(4^+ to 8^+)		J m	XREF: m(7355). J^π: 2946γ to 6^+.
7353.9 *11*	(5 to 9)		iJ u	J^π: 1723γ to 7.
7358.98 *16*	2^+		i Lm Q u	XREF: m(7355)Q(7346). J^π: from model-dependent PWBA in (e,e′); L(d,p)=1 from $5/2^-$. B(E2)↑=0.00085 *19* from (e,e′) (1990Gu09).
7375.1 *10*	11,9,7[#]	28 fs +*42*−*28*	F J	J^π: from pγ(θ) in (α,pγ). $T_{1/2}$: from DSAM in (^{14}C,2nγ) (1986Wa19).
7387.9 *11*			J U	XREF: U(7400).
7427.9 *7*	9,7[#]	>0.7 ps	iJ	J^π: from pγ(θ) in (α,pγ).
7431.9 *10*	$(2,3,4)^+$		iJ M	XREF: M(7428). J^π: 5136γ to 4^+; L(d,p)=1 from $5/2^-$.
7442.9 *7*	(4^+,5,6^+)		J	J^π: 3044γ to 6^+, 5147γ to 4^+.
7450 *3*	1^-[‡]		P	
7476.8 *8*	(3^+ to 7^+)		J m	J^π: 3072γ to $5^{(+)}$.
7484.0 *10*	(0^+ to 4^+)		J m	J^π: 6500γ to 2^+.
7484 *4*	1[‡]		m P	
7497.9 *11*	(4^+)		J U	J^π: L(p,p′)=(4) from 0^+.
7531.9 *6*	(6^+,7,8^+)		iJ	XREF: Others: AC XREF: ac(7550). J^π: 2334γ to 8^+, 3133γ to 6^+.
7536.0 *7*			iJ	XREF: Others: AC XREF: ac(7550).
7541.71 *9*	(2^+,3,4^+)		L u	XREF: Others: AC XREF: u(7551)ac(7550). J^π: 4302.6γ to 4^+, 3344.7γ to (2^+). Other: L(p,p′)=3 from 0^+ gives 3^- for a group at 7551.
7557.0 *10*	(2^+ to 6^+)		J M u	XREF: Others: AC XREF: u(7551)ac(7550). J^π: 5261γ to 4^+. Other: see comment for 7542 level.
7572.4 *10*	(4^+ to 8^+)		J	XREF: Others: AC XREF: ac(7550). J^π: 4239γ to 6^+.
7574.15 *22*	(2^+,3,4,5^-)		L	XREF: Others: AC XREF: ac(7550). J^π: 3186.4γ to 4^+; primary 4052.5γ from 2^-,3^-.
7586 *4*	$1^{(-)}$[‡]		P	XREF: Others: AC XREF: ac(7550).
7588.1 *6*	(5,6,7,8^+)		J	XREF: Others: AC XREF: ac(7550). J^π: 4255γ to 6^+, 1957γ to 7.
7616.13 *17*	(1^-,2)		i L U	XREF: U(?). J^π: 3852.3γ to 3^-, 3876.8γ to 1^+, 3916.8γ to 1^-. Other: (4^+) from DWBA analysis and analyzing power in (p,p′) for a group at 7618 *10* is inconsistent, which could indicate a different level.
7623.9 *8*	(6^+,7^-)		iJ	J^π: 2311γ to (5^-), 3059γ to 8^+.

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Adopted Levels, Gammas (continued)

^{48}Ti Levels (continued)

E(level)[†]	J^π	$T_{1/2}$[@]	XREF	Comments
7656.9 *11*	(6^+ to 10^+)		J	J^π: 3092γ to 8^+.
7669.2 *12*	10,8[#]		J	J^π: from p$\gamma(\theta)$ in (α,pγ).
7683 *10*	(2^+,3^-)		U	J^π: from DWBA analysis and analyzing power in (p,p′).
7692 *10*			m U	XREF: m(7707).
7709.7 *10*	(3^- to 7^-)		J m	XREF: Others: AC XREF: m(7707)ac(7750). J^π: 3663γ to$5^{(-)}$.
7728 *10*	(3^-)		U	J^π: L(p,p′)=(3) from 0^+.
7765 *10*	1^+,2^+,3^+,4^+		M U	XREF: Others: AC XREF: ac(7750). E(level): weighted average of 7757 *12* from (d,p) and 7771 *10* from (p,p′). J^π: L(d,p)=1+3 from $5/2^-$.
7845 *10*	1^+,3^+		M Q U	XREF: Others: AC XREF: Q(7826)ac(7880). E(level): weighted average of 7836 *12* from (d,p) and 7853 *10* from (p,p′). J^π: 1^+,2^+,3^+,4^+ from L(d,p)=1+3; 1^+,3^+ from model-dependent PWBA in (e,e′). Other: (4^+) from $\sigma(\theta)$ and analyzing powers in (p,p′) is discrepant. B(M3)↑=0.038 *11* from (e,e′) (1990Gu09).
7876 *10*	3^+		Q U	XREF: Others: AC XREF: Q(7872)ac(7880). E(level): from (p,p′). J^π: from model-dependent PWBA in (e,e′). B(M3)↑=0.30 *9* from (e,e′) (1990Gu09).
7905 *10*	1^+		Q U	XREF: Others: AC XREF: Q(7911)ac(7880). E(level): from (p,p′). J^π: from model-dependent PWBA in (e,e′). B(M1)↑=0.08 *3* from (e,e′) (1990Gu09).
7969 *4*	1[‡]		P	
7986	2^+		M Y	XREF: M(7996)Y(7986). E(level): from (α,α′). J^π: L(α,α′)=2 from 0^+; L(d,p)=1+3 from $5/2^-$.
7999 *10*	3^-		U	J^π: L(p,p′)=3 from 0^+.
8010 *4*	1[‡]		m P	
8052 *10*	1^+,3^+		M Q U	XREF: Q(8059). E(level): weighted average of 8046 *12* from (d,p) and 8057 *10* from (p,p′). J^π: from model-dependent PWBA in (e,e′). B(M1)↑=0.09 *3*, B(M3)↑=0.084 *19* from (e,e′).
8090? *10*			M U	E(level): weighted average of 8086 *12* from (d,p) and 8093 *10* from (p,p′) This level could be a different level from the 8091 level from (α,pγ). See comment for 8091 level.
8092.1 *14*	12,10,8,6	0.21 ps *7*	F J m u	J^π: from p$\gamma(\theta)$ in (α,pγ). Excitation in (α,pγ) is consistent with prediction (1978Ku16) of a single 12^+ state near 8 MeV, which could indicate 8093 *10* from (p,p′) and 8086 *12* from (d,p) are different levels from this one. $T_{1/2}$: from DSAM in (^{14}C,2nγ).
8199 *4*	1^+		PQ U	XREF: Q(8197)U(8178). J^π: 1,2 from $\gamma(\theta)$ and azimuthal asymmetries in

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Adopted Levels, Gammas (continued)

^{48}Ti Levels (continued)

E(level)†	J^π	$T_{1/2}$@	XREF	Comments
				(γ,γ); 1+,3+ from model-dependent PWBA in (e,e′). B(M1)↑=0.24 *9* from model-dependent PWBA in (e,e′) (1990Gu09).
8212 *10*	3−		U	Jπ: L(p,p′)=3 from 0+.
8246 *10*	(2+)		U	Jπ: L(p,p′)=(2) from 0+.
8255 *4*	1‡		P U	
8323.9 *12*	10,8,6		IJ	Jπ: from pγ(θ) in (α,pγ).
8572 *4*	1(−)‡		P	
8592 *4*	1‡		P	
8672 *5*	1‡		P	
8933 *5*	1‡		P	
8996 *5*	1(+)‡		P	
9025 *5*	1‡		P	
9260			U	
9910			U	
9977 *6*	1−‡		P	
10460			U	
1.060×10^4 *5*				XREF: Others: AC
10726? *6*	(6+)			XREF: Others: AC T=(3) Jπ,T: suggested analog state in (p,t).
10982 *6*	(4+)			XREF: Others: AC T=(3) Jπ,T: suggested analog state in (p,t).
1.68×10^4 *3*	(1−)	7.27 MeV *+22−24*		XREF: Others: AH $T_{1/2}$: width for giant dipole resonance.
16.96×10^3 *16*	(2+)	3.72 MeV *+60−46*		XREF: Others: AH $T_{1/2}$: width for giant quadrupole resonance.
17379 *12*	(0+)		N	XREF: Others: AC T=(4) E(level): from (p,t). Jπ,T: suggested analog state in (p,t).
1.89×10^4 *3*	(0+)	4.5 MeV *+13−2*		XREF: Others: AH $T_{1/2}$: width for giant monopole resonance.
2.48×10^4 *3*	(3−)	7.25 MeV *20*		XREF: Others: AH $T_{1/2}$: width for giant octupole resonance.
28.9×10^3 *8*	(1−)	12.44 MeV *+56−68*		XREF: Others: AH $T_{1/2}$: width for giant dipole resonance.

† From a least-squares fit to γ-ray energies for levels connected with γ transitions, assuming ΔEγ=0.5 keV and 1.0 keV for Eγ values quoted to nearest tenth keV and keV, respectively, where ΔEγ not given, and from transfer reactions in other cases, unless otherwise noted.
‡ From γ(θ) and azimuthal asymmetries in (γ,γ′).
# If J(8091)=12 then J(7374)=11, J(7668,6906,6102)=10, and J(7427,6034)=9.
@ From DSAM in (α,pγ) (1979Gl07), unless otherwise noted..

$\gamma(^{48}\mathrm{Ti})$

E_i(level)	J^π_i	E_γ[‡]	I_γ[‡]	E_f	J^π_f	Mult.	δ	α[†]	Comments
983.531	2^+	983.521 *4*	100	0.0	0^+	E2		0.0001261 *18*	B(E2)(W.u.)=13.2 *+13−11* α=0.0001261 *18*; α(K)=0.0001145 *16*; α(L)=1.025×10^{-5} *14*; α(M)=1.311×10^{-6} *18* α(N)=7.10×10^{-8} *10* E_γ: weighted average of 983.526 *12* from ^{48}Sc β^- decay, 983.525 *4* from ^{48}V ε decay, and 983.517 *4* from (n,γ) E=thermal. Others: 983.4 *3* from (^{14}C,2nγ), 983.7 *5* from (^{7}Li,p2nγ), 983.1 *3* from (α,pγ), 983.50 *15* from (p,p$'\gamma$), and 983.1 *15* from Coulomb excitation. Mult.: from ce data in ε and β^- decay, $\gamma(\theta$,pol) in (p,p$'\gamma$), and $\gamma\gamma(\theta)$ in (n,γ) E=thermal.
2295.648	4^+	1312.104 *6*	100	983.531	2^+	E2		9.66×10^{-5} *14*	B(E2)(W.u.)=16.1 *+28−21* α=9.66×10^{-5} *14*; α(K)=5.89×10^{-5} *8*; α(L)=5.26×10^{-6} *7*; α(M)=6.73×10^{-7} *9* α(N)=3.65×10^{-8} *5*; α(IPF)=3.17×10^{-5} *4* E_γ: weighted average of 1312.120 *12* from ^{48}Sc β^- decay, 1312.105 *6* from ^{48}V ε decay, and 1312.096 *7* from (n,γ) E=thermal. Others: 1312.1 *6* from (^{14}C,2nγ), 1312.5 *7* from (^{7}Li,p2nγ), 1311.7 *3* from (α,pγ), and 1312.20 *10* from (p,p$'\gamma$). Mult.: from ce data in ε and β^- decay, $\gamma(\theta)$ in (p,p$'\gamma$), and $\gamma\gamma(\theta)$ in (n,γ) E=thermal.
2421.053	2^+	1437.493 *13*	100.0 *10*	983.531	2^+	M1+E2	+0.15 *3*	9.50×10^{-5} *14*	B(M1)(W.u.)=0.226 *+19−16*; B(E2)(W.u.)=6.1 *+27−22* α=9.50×10^{-5} *14*; α(K)=4.22×10^{-5} *6*; α(L)=3.76×10^{-6} *5*; α(M)=4.82×10^{-7} *7* α(N)=2.62×10^{-8} *4*; α(IPF)=4.85×10^{-5} *7* E_γ: weighted average of 1437.521 *21* from ^{48}V ε decay and 1437.487 *10* from (n,γ) E=thermal. Others: 1436.9 *5* from (α,pγ) and 1436.80 *10* from (p,p$'\gamma$). I_γ: from (p,p$'\gamma$). Others: 100.0 *25* from ^{48}V ε decay, 100 *6* from (n,γ) E=thermal, 100 *5* from (n,n$'\gamma$), and 100.0 *2* from (α,pγ). Mult.: D+Q from $\gamma\gamma(\theta)$ in (p,p$'\gamma$) and (n,γ) E=thermal, and $\gamma(\theta)$ in (n,n$'\gamma$); E1+M2 ruled out by RUL. δ: weighted average of +0.18 *3* in (n,n$'\gamma$), +0.10 *4* in (n,γ) E=thermal, and +0.18 *9* from (p,p$'\gamma$).
		2420.91 *4*	5.43 *25*	0.0	0^+	E2		0.000539 *8*	B(E2)(W.u.)=1.12 *10* α=0.000539 *8*; α(K)=1.821×10^{-5} *25*; α(L)=1.620×10^{-6} *23*; α(M)=2.073×10^{-7} *29* α(N)=1.130×10^{-8} *16*; α(IPF)=0.000519 *7* E_γ: weighted average of 2420.94 *5* from ^{48}V ε decay,

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Adopted Levels, Gammas (continued)

γ(^{48}Ti) (continued)

E_i(level)	J^π_i	E_γ‡	I_γ‡	E_f	J^π_f	Mult.	δ	α†	Comments
									2420.90 *4* from (n,γ) E=thermal, and 2420.70 *20* from (p,p′γ). I_γ: weighted average of 5.58 *25* from ^{48}V ε decay, 5.42 *36* from (n,γ) E=thermal, 5.0 *12* from (n,n′γ), and 3.5 *10* from (p,p′γ). Other: 1.0 *2* from (α,pγ) is discrepant. Mult.: Q from pγ(θ) and γ(θ) in (p,p′γ); M2 ruled out by RUL.
2997.31	0^+	2013.79 *17*	100	983.531	2^+	(E2)		0.000348 *5*	B(E2)(W.u.)=20.6 *+44−32* α=0.000348 *5*; α(K)=2.519×10^{-5} *35*; α(L)=2.244×10^{-6} *31*; α(M)=2.87×10^{-7} *4* α(N)=1.563×10^{-8} *22*; α(IPF)=0.000320 *4* E_γ: weighted average of 2013.66 *16* from (n,γ) E=thermal and 2014.00 *20* from (p,p′γ). Mult.: isotropic pγ(θ) in (p,p′γ); M2 ruled out by RUL.
3223.971	3^+	802.88 *6*	5.0 *3*	2421.053	2^+	[M1,E2]		0.000177 *35*	B(M1)(W.u.)=0.047 *+11−8* (if pure M1); B(E2)(W.u.)=179 *+41−29* (if pure E2) α=0.000177 *35*; α(K)=0.000161 *32*; α(L)=1.44×10^{-5} *29*; α(M)=1.8×10^{-6} *4* α(N)=1.00×10^{-7} *20* E_γ: weighted average of 803.05 *25* from ^{48}V ε decay, 802.87 *6* from (n,γ) E=thermal, and 804.0 *12* from (p,p′γ). I_γ: weighted average of 5.83 *52* from ^{48}V ε decay, 5.5 *14* from (α,pγ), 4.55 *33* from (n,γ) E=thermal, and 5.1 *11* from (p,p′γ). Other: 9.0 *50* from (n,n′γ).
		928.316 *16*	33.56 *13*	2295.648	4^+	(M1(+E2))	−0.02 *2*	0.0001061 *15*	B(M1)(W.u.)=0.202 *+47−33*; B(E2)(W.u.)<1.2 α=0.0001061 *15*; α(K)=9.64×10^{-5} *13*; α(L)=8.61×10^{-6} *12*; α(M)=1.102×10^{-6} *15* α(N)=5.99×10^{-8} *8* E_γ: unweighted average of 928.326 *6* from ^{48}V ε decay and 928.290 *10* from (n,γ) E=thermal. Others: 928.4 *6* from (p,p′γ); 927.4 *7* from (α,pγ) is discrepant. I_γ: from ^{48}V ε decay. Others: 31.5 *41* from (α,pγ), 31.8 *17* from (n,γ) E=thermal, 35.0 *60* from (n,n′γ), and 33.8 *24* from (p,p′γ). Mult.,δ: D(+Q) from γ(θ) in (p,p′γ); $\Delta\pi$=no from level scheme.
		2240.391 *10*	100.0 *6*	983.531	2^+	M1+E2	+0.26 *3*	0.000379 *5*	B(M1)(W.u.)=0.040 *+9−6*; B(E2)(W.u.)=1.34 *+46−33* α=0.000379 *5*; α(K)=1.961×10^{-5} *28*; α(L)=1.745×10^{-6} *24*; α(M)=2.232×10^{-7} *31* α(N)=1.217×10^{-8} *17*; α(IPF)=0.000357 *5* E_γ: weighted average of 2240.396 *10* from ^{48}V ε decay and 2240.375 *19* from (n,γ) E=thermal. Others: 2240.2 *7* from

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$\gamma(^{48}Ti)$ (continued)

E_i(level)	J^π_i	E_γ[‡]	I_γ[‡]	E_f	J^π_f	Mult.	δ	α[†]	Comments
									(α,pγ) and 2240.0 *3* from (p,p′γ). I_γ: from ^{48}V ε decay. Others: 100 *6* from (α,pγ), 100 *6* from (n,γ) E=thermal, 100 *15* from (n,n′γ), and 100 *3* from (p,p′γ). Mult.: D+Q from $\gamma(\theta)$ in (n,n′γ) and p$\gamma(\theta)$ in (p,p′γ); E1+M2 ruled out by RUL. δ: from $\gamma(\theta)$ in (n,n′γ). Other: +0.26 *5* from p$\gamma(\theta)$ in (p,p′γ).
3239.771	4^+	944.118 *12*	100	2295.648	4^+	M1+E2	−0.30 *5*	0.0001057 *18*	B(M1)(W.u.)=0.52 *+17−10*; B(E2)(W.u.)=131 *+64−43* α=0.0001057 *18*; α(K)=9.60×10^{-5} *16*; α(L)=8.58×10^{-6} *14*; α(M)=1.097×10^{-6} *18* α(N)=5.97×10^{-8} *10* E_γ: unweighted average of 944.129 *6* from ^{48}V ε decay and 944.104 *7* from (n,γ) E=thermal. Others: 943.6 *5* from (α,pγ) and 945.1 *5* from (p,p′γ) are discrepant. Mult.: D+Q from $\gamma(\theta)$ in (n,n′γ); E1+M2 ruled out by RUL. δ: from $\gamma(\theta)$ in (n,n′γ).
3333.187	6^+	1037.536 *18*	100	2295.648	4^+	E2		0.0001108 *16*	B(E2)(W.u.)=5.1 *+5−4* α=0.0001108 *16*; α(K)=0.0001006 *14*; α(L)=9.00×10^{-6} *13*; α(M)=1.151×10^{-6} *16* α(N)=6.23×10^{-8} *9* E_γ: weighted average of 1037.522 *12* from ^{48}Sc β^- decay, 1037.0 *5* from (^{14}C,2nγ), 1037.9 *5* from (^{7}Li,p2nγ), 1037.1 *4* from (α,pγ), and 1037.599 *25* from (n,γ) E=thermal. Mult.: Q from p$\gamma(\theta)$ in (α,pγ); M2 ruled out by RUL.
3358.823	3^-	938.0	1.7 *6*	2421.053	2^+	[E1]		5.98×10^{-5} *8*	B(E1)(W.u.)=4.8×10^{-5} *+21−18* α=5.98×10^{-5} *8*; α(K)=5.43×10^{-5} *8*; α(L)=4.84×10^{-6} *7*; α(M)=6.19×10^{-7} *9* α(N)=3.36×10^{-8} *5* E_γ: from (n,n′γ) and (α,pγ). I_γ: from (α,pγ). Other: 8 *3* from (n,n′γ) is discrepant. Note that this transition is not seen in ε decay, (p,p′γ) and (n,γ) E=thermal, indicating a weak intensity.
		1063.7 *3*	15.2 *4*	2295.648	4^+	[E1]		4.69×10^{-5} *7*	B(E1)(W.u.)=3.0×10^{-4} *+7−5* α=4.69×10^{-5} *7*; α(K)=4.26×10^{-5} *6*; α(L)=3.80×10^{-6} *5*; α(M)=4.85×10^{-7} *7* α(N)=2.64×10^{-8} *4* E_γ: unweighted average of 1063.9 *1* from ^{48}V ε decay, 1063.19 *5* from (n,γ) E=thermal, and 1064.0 *10* from (p,p′γ). I_γ: unweighted average of 8.2 *17* from (α,pγ), 10.3 *8* from

Adopted Levels, Gammas (continued)

$\gamma(^{48}Ti)$ (continued)

E_i(level)	J^π_i	E_γ‡	I_γ‡	E_f	J^π_f	Mult.	δ	α†	Comments
									(n,γ) E=thermal, 23 *8* from (n,n′γ), and 17.4 *8* from (p,p′γ). Other: 57 *12* from ^{48}V ε decay is strongly discrepant with other values.
3358.823	3^-	2375.209 *19*	100.0 *8*	983.531	2^+	(E1(+M2))	0.00 *3*	0.000902 *13*	B(E1)(W.u.)=1.76×10^{-4} *+40−30*; B(M2)(W.u.)<0.26 α=0.000902 *13*; α(K)=1.174×10^{-5} *16*; α(L)=1.043×10^{-6} *15*; α(M)=1.334×10^{-7} *19* α(N)=7.27×10^{-9} *10*; α(IPF)=0.000889 *12* E_γ: weighted average of 2375.20 *4* from ^{48}V ε decay and 2375.211 *19* from (n,γ) E=thermal. Others: 2374.7 *4* from (α,pγ) and 2374.8 *8* from (p,p′γ). I_γ: from (p,p′γ). Others: 100.0 *35* from ^{48}V ε decay, 100.0 *22* from (α,pγ), 100 *6* from (n,γ) E=thermal, and 100 *23* from (n,n′γ). Mult.,δ: D(+Q) from $\gamma(\theta)$ in (n,n′γ) with δ=0.00 *3* and p$\gamma(\theta)$ in (p,p′γ) with δ=0.00 *4*; $\Delta\pi$=yes from level scheme.
3370.87	2^+	2387.25 *3*	100.0 *12*	983.531	2^+	(M1+E2)	−0.2 *1*	0.000438 *7*	B(M1)(W.u.)=0.120 *16*; B(E2)(W.u.)=2.1 *+26−15* α=0.000438 *7*; α(K)=1.764×10^{-5} *25*; α(L)=1.569×10^{-6} *22*; α(M)=2.008×10^{-7} *29* α(N)=1.095×10^{-8} *16*; α(IPF)=0.000418 *7* E_γ: from (n,γ) E=thermal. Others: 2387.6 *5* from (α,pγ) and 2387.3 *3* from (p,p′γ). I_γ: from (p,p′γ). Others: 100.0 *34* from (α,pγ), 100 *6* from (n,γ) E=thermal, and 100 *15* from (n,n′γ). Mult.: D+Q from $\gamma\gamma(\theta)$ in (n,γ) E=thermal, $\gamma(\theta)$ in (γ,γ′) and p$\gamma(\theta)$ in (p,p′γ); $\Delta\pi$=no from level scheme. δ: from combination of −0.2 *1* or 4 *1* from (p,p′γ), <0.5 from (n,γ) E=thermal, and 0.1<δ<0.8 from (γ,γ′).
		3370.96 *13*	16.6 *11*	0.0	0^+	[E2]		0.000950 *13*	B(E2)(W.u.)=1.59 *+24−20* α=0.000950 *13*; α(K)=1.064×10^{-5} *15*; α(L)=9.46×10^{-7} *13*; α(M)=1.210×10^{-7} *17* α(N)=6.60×10^{-9} *9*; α(IPF)=0.000938 *13* E_γ: from (n,γ) E=thermal. Others: 3369.6 *14* from (α,pγ) and 3371.5 *12* from (p,p′γ). I_γ: weighted average of 12.4 *34* from (α,pγ), 19.0 *15* from (n,γ) E=thermal, 20 *5* from (n,n′γ), and 15.6 *11* from (p,p′γ).
3508.548	6^+	175.361 *5*	100.0 *12*	3333.187	6^+	[M1]		0.00449 *6*	B(M1)(W.u.)=1.6 *+6−4* α(K)=0.00407 *6*; α(L)=0.000371 *5*; α(M)=4.74×10^{-5} *7* α(N)=2.54×10^{-6} *4* E_γ: from ^{48}Sc β^- decay. Others: 175.3 *3* from (^{14}C,2nγ) and 175.9 *5* from (^{7}Li,p2nγ). I_γ: from ^{48}Sc β^- decay. Others: 100 *11* from (^{24}Mg,3pγ), 100 *4* from (α,pγ), and 100 *5* from (^{3}He,3nγ). Mult.: assumed based on comparions with RUL.

From ENSDF

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γ(^{48}Ti) (continued)

E_i(level)	J^π_i	E_γ‡	I_γ‡	E_f	J^π_f	Mult.	δ	α†	Comments
3508.548	6^+	1212.880 *12*	31.8 *6*	2295.648	4^+	E2		8.83×10^{-5} *12*	B(E2)(W.u.)=2.6 *+9−6* α=8.83×10^{-5} *12*; α(K)=7.00×10^{-5} *10*; α(L)=6.26×10^{-6} *9*; α(M)=8.00×10^{-7} *11* α(N)=4.34×10^{-8} *6*; α(IPF)=1.120×10^{-5} *16* E_γ: from ^{48}Sc β^- decay. Others: 1212.4 *10* from (^{7}Li,p2nγ) and 1212.3 *6* from (α,pγ). I_γ: weighted average of 31.86 *54* from ^{48}Sc β^- decay, 29.9 *39* from (α,pγ), and 27 *10* from (^{3}He,3nγ). Others: 20.1 *30* from (^{24}Mg,3pγ) is discrepant. Mult.: Q from p$\gamma(\theta)$ in (α,pγ); M2 ruled out by RUL.
3616.812	2^+	1195.83 *6*	8.1 *6*	2421.053	2^+	[M1,E2]		8.0×10^{-5} *9*	B(M1)(W.u.)=0.022 *+9−5* (if pure M1); B(E2)(W.u.)=38 *+16−9* (if pure E2) α=8.0×10^{-5} *9*; α(K)=6.6×10^{-5} *7*; α(L)=5.9×10^{-6} *6*; α(M)=7.5×10^{-7} *8* α(N)=4.1×10^{-8} *4*; α(IPF)=7.2×10^{-6} *14* E_γ: from (n,γ) E=thermal. I_γ: weighted average of 10.2 *23* from (α,pγ) and 7.96 *54* from (n,γ) E=thermal.
		2633.20 *3*	100 *4*	983.531	2^+	M1+E2	−0.15 *4*	0.000540 *8*	B(M1)(W.u.)=0.025 *+11−6*; B(E2)(W.u.)=0.20 *+16−10* α=0.000540 *8*; α(K)=1.505×10^{-5} *21*; α(L)=1.339×10^{-6} *19*; α(M)=1.713×10^{-7} *24* α(N)=9.34×10^{-9} *13*; α(IPF)=0.000523 *7* E_γ: from (n,γ) E=thermal. Other: 2632.5 *8* from (α,pγ). I_γ: from (α,pγ). Other: 100 *7* from (n,γ) E=thermal. Mult.: D+Q from $\gamma\gamma(\theta)$ in (n,γ) E=thermal and p$\gamma(\theta)$ in (p,p′γ); E1+M2 ruled out by RUL. δ: weighted average of −0.10 *5* from $\gamma\gamma(\theta)$ in (n,γ) E=thermal and −0.18 *4* from p$\gamma(\theta)$ in (p,p′γ).
		3616.8 *8*	2.2 *12*	0.0	0^+	[E2]		1.04×10^{-3} *2*	B(E2)(W.u.)=0.041 *+32−20* α(K)=9.55×10^{-6} *13*; α(L)=8.49×10^{-7} *12*; α(M)=1.086×10^{-7} *15* α(N)=5.93×10^{-9} *8*; α(IPF)=0.001034 *14* E_γ: from (n,γ) E=thermal. I_γ: unweighted average of 3.4 *11* from (α,pγ) and 1.08 *43* from (n,γ) E=thermal.
3699.52	$1^{(-)}$	2715.81 *13*	100 *3*	983.531	2^+	(E1)&		1.10×10^{-3} *2*	B(E1)(W.u.)=0.00143 *+33−23* α(K)=9.78×10^{-6} *14*; α(L)=8.69×10^{-7} *12*; α(M)=1.111×10^{-7} *16* α(N)=6.06×10^{-9} *8*; α(IPF)=0.001090 *15* E_γ: from (n,γ) E=thermal. Other: 2716 *1* from (γ,γ), 2714.9 from (p,p′γ). I_γ: from (p,p′γ). Others: 100 *13* from (α,pγ), 100 *8* from

$^{48}_{22}Ti_{26}$-22

$\gamma(^{48}Ti)$ (continued)

E_i(level)	J^π_i	E_γ[‡]	I_γ[‡]	E_f	J^π_f	Mult.	δ	α[†]	Comments
									(n,γ) E=thermal, 100 *6* from (γ,γ), and 100 *15* from (n,n′γ). Mult.: from γ(θ) and azimuthal asymmetries in (γ,γ′). Other: M1+E2 with δ=+0.9 *+14−5* from pγ(θ) and comparison to RUL in (p,p′γ) is discrepant.
3699.52	$1^{(-)}$	3699.11 *12*	58 *4*	0.0	0^+	(E1)[&]		1.57×10^{-3} *2*	B(E1)(W.u.)=3.3×10^{-4} *+8−6* α(K)=6.57×10^{-6} *9*; α(L)=5.83×10^{-7} *8*; α(M)=7.46×10^{-8} *10* α(N)=4.07×10^{-9} *6*; α(IPF)=0.001559 *22* E_γ: from (n,γ) E=thermal. Other: 3700 *1* from (γ,γ), 3698.3 from (p,p′γ). I_γ: weighted average of 61 *13* from (α,pγ), 67 *5* from (n,γ) E=thermal, 54 *8* from (n,n′γ), and 53.8 *31* from (p,p′γ). Other: 92 *6* from (γ,γ′) is discrepant.
3711.6?		2728[a]	100	983.531	2^+				E_γ: from (α,pγ) only. 1993Ko57 in (n,n′γ) suggest that this γ is the same as the 2726γ from the 5146 state in their work.
3738.60	1^+	1317.2[a]	12 *3*	2421.053	2^+				E_γ,I_γ: reported in (p,p′γ) (1968Mo20) only; energy from level-energy difference.
		2756.0 *7*	45 *8*	983.531	2^+	(M1(+E2))	−0.4 *+5−17*	0.00060 *7*	B(M1)(W.u.)=0.08 *+20−8*; B(E2)(W.u.)<74 α=0.00060 *7*; α(K)=1.41×10^{-5} *5*; α(L)=1.25×10^{-6} *4*; α(M)=1.60×10^{-7} *6* α(N)=8.74×10^{-9} *30*; α(IPF)=0.00059 *7* E_γ: weighted average of 2756.5 *7* from (n,γ) E=thermal and 2755 *1* from (γ,γ). Other: 2757.2 from (p,p′γ). I_γ: weighted average of 63 *15* from (n,γ) E=thermal, 42 *10* from (n,n′γ), and 42 *8* from (p,p′γ). Other: I(2756γ)/3738γ)=257 *22*/100 *22* is discrepant. Mult.,δ: D(+Q) and δ from pγ(θ) in (p,p′γ) and (M1) from azimuthal asymmetries in (γ,γ′).
		3738.35 *24*	100 *8*	0.0	0^+	M1[&]		0.000961 *13*	B(M1)(W.u.)=0.09 *+9−3* α=0.000961 *13*; α(K)=8.80×10^{-6} *12*; α(L)=7.82×10^{-7} *11*; α(M)=1.000×10^{-7} *14* α(N)=5.46×10^{-9} *8*; α(IPF)=0.000951 *13* E_γ: from (n,γ) E=thermal. Others: 3737.8 *13* from (α,pγ), 3739 *1* from (γ,γ), 3740.5 from (p,p′γ). I_γ: from (p,p′γ). Others: 100 *12* from (n,γ) E=thermal, 100 *16* from (n,n′γ).
3782.459	$3^-,4^-$	423.629 *10*	100 *5*	3358.823	3^-	[M1+E2]		1.0×10^{-3} *5*	B(M1)(W.u.)=0.17 *+16−8* (if pure M1) α(K)=9.E−4 *4*; α(L)=8.E−5 *4*; α(M)=1.1×10^{-5} *5* α(N)=5.8×10^{-7} *26* E_γ: weighted average of 423.2 *4* from (α,pγ) and

From ENSDF

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$\gamma(^{48}Ti)$ (continued)

E_i(level)	J^{π}_i	E_γ‡	I_γ‡	E_f	J^{π}_f	Mult.	δ	α†	Comments
									423.629 *9* from (n,γ) E=thermal. I_γ: from (n,γ) E=thermal. Other: 100 *6* from (α,pγ); I(424γ)/I(1487γ)=≈50/100 *25* in (n,n′γ) and 23 *5*/100 *5* in (p,p′γ) are discrepant. Mult.,δ: D+Q, −0.24 *14* or <−3.7, if J=4 from $\gamma\gamma(\theta)$ in (n,γ) E=thermal. Pure E2 ruled out by RUL.
3782.459	$3^-,4^-$	558.6	4.1 *14*	3223.971	3^+	[E1]		0.0001887 *26*	B(E1)(W.u.)=7×10^{-5} +*8*−*4* α=0.0001887 *26*; α(K)=0.0001713 *24*; α(L)=1.532×10^{-5} *21*; α(M)=1.958×10^{-6} *27* α(N)=1.059×10^{-7} *15* E_γ: from (n,n′γ). I_γ: from (α,pγ). Other: I(559γ)/I(1487γ)=50 *15*/100 *25* in (n,n′γ) is discrepant.
		1486.82 *3*	40 *3*	2295.648	4^+	[E1]		0.000278 *4*	B(E1)(W.u.)=3.6×10^{-5} +*36*−*17* α=0.000278 *4*; α(K)=2.369×10^{-5} *33*; α(L)=2.109×10^{-6} *30*; α(M)=2.70×10^{-7} *4* α(N)=1.467×10^{-8} *21*; α(IPF)=0.0002520 *35* E_γ: from (n,γ) E=thermal. Other: 1486.8 *17* from (α,pγ). I_γ: weighted average of 33 *6* from (α,pγ) and 41.5 *24* from (n,γ) E=thermal.
3802.73	2^-	2819.08 *13*	100	983.531	2^+				E_γ: from (n,γ) E=thermal only.
3852.24	3^-	1432#	6.7 *13*	2421.053	2^+	[E1]		0.0002389 *33*	B(E1)(W.u.)=2.8×10^{-4} +*9*−*7* α=0.0002389 *33*; α(K)=2.520×10^{-5} *35*; α(L)=2.244×10^{-6} *31*; α(M)=2.87×10^{-7} *4* α(N)=1.561×10^{-8} *22*; α(IPF)=0.0002112 *30* E_γ: from (α,pγ) and (n,n′γ). I_γ: from (α,pγ). Other: ≈2.5 from (n,n′γ).
		1556.57 *5*	24.8 *19*	2295.648	4^+	[E1]		0.000331 *5*	B(E1)(W.u.)=0.00080 +*19*−*14* α=0.000331 *5*; α(K)=2.200×10^{-5} *31*; α(L)=1.958×10^{-6} *27*; α(M)=2.504×10^{-7} *35* α(N)=1.363×10^{-8} *19*; α(IPF)=0.000307 *4* E_γ: from (n,γ) E=thermal. Other: 1556.6 in (n,n′γ), 1556.3 in (p,p′γ). I_γ: weighted average of 26.7 *40* from (α,pγ), 24.0 *15* from (n,γ) E=thermal, and 37.0 *69* from (p,p′γ).
		2868.59 *6*	100 *4*	983.531	2^+	(E1(+M2))	0.00 *2*	1.18×10^{-3} *2*	B(E1)(W.u.)=0.00052 +*12*−*8*; B(M2)(W.u.)<0.23 α(K)=9.10×10^{-6} *13*; α(L)=8.08×10^{-7} *11*; α(M)=1.033×10^{-7} *14* α(N)=5.63×10^{-9} *8*; α(IPF)=0.001175 *16* E_γ: weighted average of 2866.7 *13* from (α,pγ) and 2868.59 *4* from (n,γ) E=thermal. I_γ: from (α,pγ). Others: 100 *6* from (n,γ) E=thermal

$^{48}_{22}Ti_{26}$-24

$\gamma(^{48}Ti)$ (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[‡]	E_f	J_f^π	Mult.	δ	α[†]	Comments
									and 100 *7* from (p,p′γ). Mult.,δ: D(+Q) and δ from pγ(θ) in (p,p′γ); Δπ=yes from level scheme.
4035.153	2^+	811.198 *17*	44.7 *25*	3223.971	3^+	[M1+E2]		0.000173 *34*	α=0.000173 *34*; α(K)=0.000157 *31*; α(L)=1.41×10^{-5} *28*; α(M)=1.8×10^{-6} *4* α(N)=9.7×10^{-8} *19* B(M1)(W.u.)=0.58 *+56−23* (if pure M1) E_γ: from (n,γ) E=thermal. Other: 811 *3* from (n,n′γ). I_γ: weighted average of 56.3 *94* from (α,pγ), 44.2 *25* from (n,γ) E=thermal, and 41.0 *90* from (n,n′γ). Mult.: pure E2 ruled out by RUL.
		1614.041 *19*	100 *6*	2421.053	2^+	[M1,E2]		0.000158 *19*	B(M1)(W.u.)=0.16 *+16−6* (if pure M1); B(E2)(W.u.)=1.6×10^2 *+15−6* (if pure E2) α=0.000158 *19*; α(K)=3.63×10^{-5} *21*; α(L)=3.23×10^{-6} *19*; α(M)=4.14×10^{-7} *25* α(N)=2.25×10^{-8} *13*; α(IPF)=0.000118 *17* E_γ: from (n,γ) E=thermal. Others: 1614.3 *13* from (α,pγ), 1614 *4* from (n,n′γ), and 1615.1 *11* from (p,p′γ). I_γ: from (n,γ) E=thermal. Others: 100 *10* from (α,pγ) and 100 *15* from (n,n′γ).
4046.6	$5^{(-)}$	714	7.1 *12*	3333.187	6^+	[E1]		0.0001062 *15*	B(E1)(W.u.)=0.00023 *+11−6* α=0.0001062 *15*; α(K)=9.65×10^{-5} *14*; α(L)=8.61×10^{-6} *12*; α(M)=1.101×10^{-6} *15* α(N)=5.97×10^{-8} *8*
		807	10.6 *24*	3239.771	4^+	[E1]		8.14×10^{-5} *11*	B(E1)(W.u.)=0.00024 *+11−7* α=8.14×10^{-5} *11*; α(K)=7.39×10^{-5} *10*; α(L)=6.60×10^{-6} *9*; α(M)=8.43×10^{-7} *12* α(N)=4.57×10^{-8} *6*
		1750.1 *12*	100 *4*	2295.648	4^+	(E1(+M2))	−0.04 *7*	0.000477 *8*	B(E1)(W.u.)=0.00022 *+11−6* α=0.000477 *8*; α(K)=1.84×10^{-5} *4*; α(L)=1.63×10^{-6} *4*; α(M)=2.09×10^{-7} *5* α(N)=1.138×10^{-8} *27*; α(IPF)=0.000457 *8* E_γ,I_γ: from (α,pγ). Mult.,δ: D(+Q) and δ from pγ(θ) in (α,pγ); Δπ=(yes) from level scheme. Other: δ(4→4)=−0.32 *+16−25* in (α,pγ) excluded by comparison to RUL assuming Δπ=yes.
4074.511	2^+	834.736 *17*	69 *4*	3239.771	4^+	[E2]		0.0001917 *27*	α=0.0001917 *27*; α(K)=0.0001740 *24*; α(L)=1.561×10^{-5} *22*; α(M)=1.995×10^{-6} *28*

$^{48}_{22}Ti_{26}$-25

Adopted Levels, Gammas (continued)

γ(^{48}Ti) (continued)

E_i(level)	J^π_i	E_γ[‡]	I_γ[‡]	E_f	J^π_f	Mult.	α[†]	Comments
								α(N)=1.077×10^{-7} *15* E_γ: from (n,γ) E=thermal. Other: 834.0 *8* from (α,pγ). I_γ: weighted average of 73.1 *96* from (α,pγ) and 68.2 *39* from (n,γ) E=thermal. B(E2)(W.u.)=1.3×10^{3} *+6−3* exceeds RUL=300.
4074.511	2$^+$	1779[#a]	19 *4*	2295.648	4$^+$	[E2]	0.0002431 *34*	B(E2)(W.u.)=8.2 *+42−24* α=0.0002431 *34*; α(K)=3.17×10^{-5} *4*; α(L)=2.83×10^{-6} *4*; α(M)=3.62×10^{-7} *5* α(N)=1.969×10^{-8} *28*; α(IPF)=0.0002081 *29*
		3090.82 *6*	100 *6*	983.531	2$^+$	[M1,E2]	0.00078 *6*	B(M1)(W.u.)=0.0104 *+48−25* (if pure M1); B(E2)(W.u.)=2.7 *+13−7* (if pure E2) α=0.00078 *6*; α(K)=1.195×10^{-5} *29*; α(L)=1.062×10^{-6} *26*; α(M)=1.359×10^{-7} *33* α(N)=7.41×10^{-9} *18*; α(IPF)=0.00076 *6* E_γ: from (n,γ) E=thermal. Others: 3090.1 *11* from (α,pγ) and 3088 *7* from (n,n′γ). I_γ: from (n,γ) E=thermal. Other: 100 *12* from (α,pγ).
		4075.1 *5*	16 *4*	0.0	0$^+$	[E2]	1.21×10^{-3} *2*	B(E2)(W.u.)=0.11 *+6−4* α(K)=8.00×10^{-6} *11*; α(L)=7.11×10^{-7} *10*; α(M)=9.09×10^{-8} *13* α(N)=4.96×10^{-9} *7*; α(IPF)=0.001197 *17* E_γ,I_γ: from (n,γ) E=thermal only.
4196.90	(2$^+$)	346[#]	22 *5*	3852.24	3$^-$			
		458.45 *16*	24 *5*	3738.60	1$^+$			E_γ: from (n,γ) E=thermal. I_γ: weighted average of 22 *5* from (α,pγ) and 27 *5* from (n,γ) E=thermal.
		496[#]	13 *3*	3699.52	1$^{(-)}$			
		972.91 *3*	100 *7*	3223.971	3$^+$			E_γ: from (n,γ) E=thermal. I_γ: from (n,γ) E=thermal. Other: 100 *10* from (α,pγ).
		4196.63 *13*	63 *5*	0.0	0$^+$			E_γ,I_γ: from (n,γ) E=thermal only.
4204.9	(1,2$^+$)	4204.7 *5*	100	0.0	0$^+$			
4210	2$^-$	3226 *8*	100	983.531	2$^+$	[E1]	1.36×10^{-3} *2*	α(K)=7.81×10^{-6} *11*; α(L)=6.93×10^{-7} *10*; α(M)=8.87×10^{-8} *13* α(N)=4.84×10^{-9} *7*; α(IPF)=0.001351 *19* E_γ: from (n,n′γ).
4254.5	1$^+$	555	100	3699.52	1$^{(-)}$	[E1]	0.0001917 *27*	α=0.0001917 *27*; α(K)=0.0001741 *24*; α(L)=1.556×10^{-5} *22*; α(M)=1.989×10^{-6} *28* α(N)=1.076×10^{-7} *15*
4311.3	1$^+$	1891	19 *4*	2421.053	2$^+$			E_γ,I_γ: from (α,pγ) only.
		3328	52 *10*	983.531	2$^+$			E_γ: other: 3332 *8* from (n,n′γ). I_γ: weighted average of 53 *10* from (α,pγ) and 45 *22* from (n,n′γ).
		4310[@] *2*	100 *12*	0.0	0$^+$	M1[&]	1.15×10^{-3} *2*	B(M1)(W.u.)=0.042 *+35−21* α(K)=7.16×10^{-6} *10*; α(L)=6.36×10^{-7} *9*; α(M)=8.14×10^{-8} *11* α(N)=4.44×10^{-9} *6*; α(IPF)=0.001143 *16*

From ENSDF

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$\gamma(^{48}Ti)$ (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[‡]	E_f	J_f^π	Mult.	δ	α[†]	Comments
									E_γ: from (γ,γ). Other: 4314 *9* from (n,n′γ), 4312 from (α,pγ). I_γ: from (α,pγ). Other: 100 *22* from (n,n′γ).
4346.7	(2^+)	645	53 *9*	3699.52	$1^{(-)}$				
		989	79 *23*	3358.823	3^-				
		3364	100 *19*	983.531	2^+				E_γ: other: 3372 *8* from (n,n′γ).
4381.4	(3,4,5^-)	1142.3	45 *7*	3239.771	4^+				E_γ: from (n,n′γ). I_γ: from (α,pγ). Mult.: not pure E2 from comparison with RUL.
		2086	100 *7*	2295.648	4^+				
4387.691	4^+	1164.9[#]	98 *15*	3223.971	3^+	[M1,E2]		8.0×10^{-5} *9*	B(M1)(W.u.)=0.13 *+8−4* (if pure M1); B(E2)(W.u.)=2.4×10^2 *+14−7* (if pure E2) $\alpha=8.0\times10^{-5}$ *9*; α(K)=6.9×10^{-5} *7*; α(L)=6.2×10^{-6} *7*; α(M)=7.9×10^{-7} *8* α(N)=4.3×10^{-8} *5*; α(IPF)=4.0×10^{-6} *8* E_γ: from (n,n′γ). Other: 1165 from (α,pγ); not seen in (n,γ) E=thermal. I_γ: from (α,pγ) only.
		2092.007 *19*	85 *5*	2295.648	4^+	[M1,E2]		0.00035 *4*	B(M1)(W.u.)=0.020 *+12−6* (if pure M1); B(E2)(W.u.)=11 *+7−3* (if pure E2) α=0.00035 *4*; α(K)=2.27×10^{-5} *9*; α(L)=2.02×10^{-6} *8*; α(M)=2.59×10^{-7} *10* α(N)=1.41×10^{-8} *5*; α(IPF)=0.000324 *35* E_γ: from (n,γ) E=thermal. Other: 2094 from (α,pγ); not seen in (n,n′γ). I_γ: from (n,γ) E=thermal. Other: 20 *4* from (α,pγ) is discrepant.
		3403.83 *7*	100 *6*	983.531	2^+	[E2]		0.000963 *13*	B(E2)(W.u.)=1.1 *+7−3* α=0.000963 *13*; α(K)=1.048×10^{-5} *15*; α(L)=9.32×10^{-7} *13*; α(M)=1.192×10^{-7} *17* α(N)=6.50×10^{-9} *9*; α(IPF)=0.000951 *13* E_γ: from (n,γ) E=thermal. Other: 3401 *8* from (n,n′γ), 3406 from (α,pγ). I_γ: from (n,γ) E=thermal. Other: 100 *13* from (α,pγ).
4398.7	6^+	890	100 *7*	3508.548	6^+	(M1(+E2))	−0.1 *3*	0.000116 *6*	B(M1)(W.u.)=0.52 *+30−20* α=0.000116 *6*; α(K)=0.000105 *6*; α(L)=9.4×10^{-6} *5*; α(M)=1.20×10^{-6} *6* α(N)=6.54×10^{-8} *35* Mult.,δ: D+Q and δ from p$\gamma(\theta)$ in (α,pγ); $\Delta\pi$=no from level scheme.
		2103	33 *7*	2295.648	4^+	[E2]		0.000390 *5*	B(E2)(W.u.)=7.3 *+35−21* α=0.000390 *5*; α(K)=2.329×10^{-5} *33*; α(L)=2.075×10^{-6}

From ENSDF

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$\gamma(^{48}$Ti) (continued)

E_i(level)	J_i^π	E_γ ‡	I_γ ‡	E_f	J_f^π	Mult.	δ	α †	Comments
									29; α(M)=2.65×10^{-7} *4* α(N)=1.445×10^{-8} *20*; α(IPF)=0.000364 *5*
4404.8	5$^{(+)}$	1072	89 *15*	3333.187	6$^+$	(M1(+E2))	−0.04 *8*	8.02×10^{-5} *12*	B(M1)(W.u.)>0.16 α=8.02×10^{-5} *12*; α(K)=7.28×10^{-5} *11*; α(L)=6.50×10^{-6} *9*; α(M)=8.32×10^{-7} *12* α(N)=4.53×10^{-8} *7* Mult.,δ: D(+Q) and δ from p$\gamma(\theta)$ in (α,pγ); $\Delta\pi$=no from level scheme.
		2109	100 *15*	2295.648	4$^+$	[M1,E2]		0.00036 *4*	α=0.00036 *4*; α(K)=2.24×10^{-5} *9*; α(L)=1.99×10^{-6} *8*; α(M)=2.55×10^{-7} *10* α(N)=1.39×10^{-8} *5*; α(IPF)=0.00033 *4*
4457.455	3$^+$	840.66 *3*	8.0 *5*	3616.812	2$^+$				
		1086.51 *8*	4.9 *4*	3370.87	2$^+$				
		1233.33 *12*	2.61 *25*	3223.971	3$^+$				
		2036.349 *13*	86 *5*	2421.053	2$^+$				I_γ: weighted average of 100 *15* from (α,pγ) and 84 *5* from (n,γ) E=thermal.
		2161.759 *14*	100 *7*	2295.648	4$^+$				I_γ: from (n,γ) E=thermal. Other: 100 *15* from (α,pγ).
		3473.90 *9*	55 *5*	983.531	2$^+$	(M1+E2)	0.12 *2*	0.000868 *12*	B(M1)(W.u.)=0.0023 *+19−8*; B(E2)(W.u.)=0.007 *+7−3* α=0.000868 *12*; α(K)=9.81×10^{-6} *14*; α(L)=8.72×10^{-7} *12*; α(M)=1.116×10^{-7} *16* α(N)=6.09×10^{-9} *9*; α(IPF)=0.000857 *12* I_γ: weighted average of 50 *10* from (α,pγ) and 56 *5* from (n,γ) E=thermal. Mult.: D+Q from $\gamma\gamma(\theta)$ in (n,γ) E=thermal; $\Delta\pi$=no from level scheme. δ: from −0.13≤δ<−0.10 from 3473.9γ-983.5$\gamma(\theta)$ and +0.10≤δ<+0.13 from 7168.7γ-3473.9$\gamma(\theta)$ in (n,γ) E=thermal.
4564.8	8$^{(+)}$	1056.2 *10*	11.1 *22*	3508.548	6$^+$	[E2]		0.0001061 *15*	B(E2)(W.u.)<1.4 α=0.0001061 *15*; α(K)=9.64×10^{-5} *14*; α(L)=8.62×10^{-6} *12*; α(M)=1.103×10^{-6} *16* α(N)=5.97×10^{-8} *8* E_γ: from ^{44}Ca(^{7}Li,p2nγ). I_γ: from (α,pγ).
		1231.6 *5*	100.0 *22*	3333.187	6$^+$	(E2)		8.90×10^{-5} *12*	B(E2)(W.u.)<5 α=8.90×10^{-5} *12*; α(K)=6.77×10^{-5} *9*; α(L)=6.05×10^{-6} *8*; α(M)=7.73×10^{-7} *11* α(N)=4.20×10^{-8} *6*; α(IPF)=1.447×10^{-5} *22* E_γ: weighted average of 1231.4 *6* from (^{14}C,2nγ) and 1231.8 *5* from (^{7}Li,p2nγ). I_γ: from (α,pγ). Others: 100 *20* from (^{24}Mg,3pγ) and

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$\gamma(^{48}Ti)$ (continued)

E_i(level)	J^π_i	E_γ‡	I_γ‡	E_f	J^π_f	Mult.	α†	Comments
								100 *8* from (^{7}Li,p2nγ). Mult.: Q from p$\gamma(\theta)$ in (α,pγ). ΔJ^π=2,no from the level scheme.
4580.69	3^-	1221.81 *8*	76 *6*	3358.823	3^-	[M1,E2]	8.0×10^{-5} *9*	B(M1)(W.u.)=0.09 +*7*−*3* (if pure M1); B(E2)(W.u.)=1.5×10^2 +*11*−*5* (if pure E2) α=8.0×10^{-5} *9*; α(K)=6.3×10^{-5} *6*; α(L)=5.6×10^{-6} *6*; α(M)=7.2×10^{-7} *7* α(N)=3.9×10^{-8} *4*; α(IPF)=1.07×10^{-5} *20* I_γ: weighted average of 67 *14* from (α,pγ) and 77.1 *56* from (n,γ) E=thermal.
		2162#	21 *5*	2421.053	2^+	[E1]	0.000766 *11*	B(E1)(W.u.)=1.1×10^{-4} +*8*−*4* α=0.000766 *11*; α(K)=1.339×10^{-5} *19*; α(L)=1.191×10^{-6} *17*; α(M)=1.523×10^{-7} *21* α(N)=8.30×10^{-9} *12*; α(IPF)=0.000752 *11* E_γ: other: 2162 *5* from (n,n′γ).
		2285.41 *19*	65 *21*	2295.648	4^+	[E1]	0.000846 *12*	B(E1)(W.u.)=0.00028 +*20*−*11* α=0.000846 *12*; α(K)=1.238×10^{-5} *17*; α(L)=1.101×10^{-6} *15*; α(M)=1.408×10^{-7} *20* α(N)=7.67×10^{-9} *11*; α(IPF)=0.000833 *12* I_γ: unweighted average of 44 *9* from (α,pγ) and 85 *10* from (n,γ) E=thermal.
		3596.76 *17*	100 *10*	983.531	2^+	[E1]	1.52×10^{-3} *2*	B(E1)(W.u.)=1.1×10^{-4} +*8*−*4* α(K)=6.81×10^{-6} *10*; α(L)=6.04×10^{-7} *8*; α(M)=7.73×10^{-8} *11* α(N)=4.21×10^{-9} *6*; α(IPF)=0.001517 *21* E_γ: from (n,γ) E=thermal. Other: 3600 *8* from (n,n′γ). I_γ: from (n,γ) E=thermal. Other: 100 *19* from (α,pγ).
4719.137	4^+	1479.339 *18*	100 *6*	3239.771	4^+	[M1,E2]	0.000117 *14*	B(M1)(W.u.)=0.071 +*26*−*16* (if pure M1); B(E2)(W.u.)=81 +*30*−*18* (if pure E2) α=0.000117 *14*; α(K)=4.28×10^{-5} *30*; α(L)=3.82×10^{-6} *27*; α(M)=4.89×10^{-7} *34* α(N)=2.66×10^{-8} *18*; α(IPF)=7.0×10^{-5} *11* I_γ: from (α,pγ). Other: 100.0 *58* from (n,γ) E=thermal.
		1495.53 *21*	45 *3*	3223.971	3^+	[M1,E2]	0.000121 *14*	B(M1)(W.u.)=0.031 +*12*−*7* (if pure M1); B(E2)(W.u.)=34 +*13*−*8* (if pure E2) α=0.000121 *14*; α(K)=4.20×10^{-5} *28*; α(L)=3.74×10^{-6} *26*; α(M)=4.79×10^{-7} *33* α(N)=2.60×10^{-8} *17*; α(IPF)=7.5×10^{-5} *11* I_γ: weighted average of 43 *6* from (α,pγ) and 45.8 *26* from (n,γ) E=thermal.
4757.73	(3^-)	1140.94 *10*	100 *12*	3616.812	2^+			
		3774.8 *6*	20 *5*	983.531	2^+			
4783.27	$(2^+,3,4^+)$	2486.4 *5*	50 *13*	2295.648	4^+			
		3799.64 *12*	100 *7*	983.531	2^+			

Adopted Levels, Gammas (continued)

$\gamma(^{48}Ti)$ (continued)

E_i(level)	J^π_i	E_γ‡	I_γ‡	E_f	J^π_f	Mult.	α†	Comments
4792.31	(1⁻,2,3⁻)	1092.3 *3*	9.5 *16*	3699.52	$1^{(-)}$			E_γ,I_γ: from (n,γ) E=thermal only; not seen in (α,pγ).
		1421#	12.5 *25*	3370.87	2⁺			
		2371.18 *8*	82 *6*	2421.053	2⁺			I_γ: from (n,γ) E=thermal. Other: 137 *18* from (α,pγ) is discrepant.
		3808.58 *7*	100 *6*	983.531	2⁺			I_γ: from (n,γ) E=thermal. Other: 100 *15* from (α,pγ).
4794.11	(2⁺)	2498.44 *14*	100 *10*	2295.648	4⁺			
		4793.5 *4*	14.7 *25*	0.0	0⁺			
4795.1	(3⁻,4)	749	41 *7*	4046.6	$5^{(-)}$			
		942	62 *17*	3852.24	3⁻			
		1012	34 *7*	3782.459	3⁻,4⁻			
		1556	100 *17*	3239.771	4⁺			
		1571	38 *7*	3223.971	3⁺			
		2500	69 *14*	2295.648	4⁺			
4861.0	2⁺,3⁺,4⁺	1622	100 *15*	3239.771	4⁺			
		2566	92 *15*	2295.648	4⁺			
4885.0	(2⁺,3⁺,4⁺)	1526	75 *18*	3358.823	3⁻			
		2464	100 *18*	2421.053	2⁺			
4910.57	(1⁺,2⁺)	1293.71 *6*	100 *6*	3616.812	2⁺			I_γ: from (n,γ) E=thermal. Other: 100 *18* from (α,pγ).
		1539.63 *18*	53 *7*	3370.87	2⁺			I_γ: weighted average of 70 *14* from (α,pγ) and 50 *6* from (n,γ) E=thermal.
		1686.63 *9*	67 *5*	3223.971	3⁺			E_γ,I_γ: from (n,γ) E=thermal only; not seen in (α,pγ).
		2489.7 *4*	57 *11*	2421.053	2⁺			I_γ: from (α,pγ). Other: 60 *14* from (n,γ) E=thermal.
		4911.8 *8*	14 *4*	0.0	0⁺			
4916.3	5⁻	870	56 *8*	4046.6	$5^{(-)}$	[M1,E2]	0.000146 *26*	α=0.000146 *26*; α(K)=0.000133 *23*; α(L)=1.19×10^{-5} *21*; α(M)=1.52×10^{-6} *27* α(N)=8.2×10^{-8} *14* B(M1)(W.u.)=0.049 *+49−20* (if pure M1); B(E2)(W.u.)=1.6×10^{2} *+16−6* (if pure E2)
		1133	100 *14*	3782.459	3⁻,4⁻	[M1,E2]	8.3×10^{-5} *9*	B(M1)(W.u.)=0.040 *+39−16* (if pure M1); B(E2)(W.u.)=8×10^{1} *+8−3* (if pure E2) α=8.3×10^{-5} *9*; α(K)=7.4×10^{-5} *8*; α(L)=6.6×10^{-6} *7*; α(M)=8.4×10^{-7} *9* α(N)=4.6×10^{-8} *5*; α(IPF)=1.9×10^{-6} *4*
		1408	44 *8*	3508.548	6⁺	[E1]	0.0002227 *31*	B(E1)(W.u.)=0.00021 *+23−9* α=0.0002227 *31*; α(K)=2.59×10^{-5} *4*; α(L)=2.308×10^{-6} *32*; α(M)=2.95×10^{-7} *4* α(N)=1.605×10^{-8} *22*; α(IPF)=0.0001942 *27*
4924.92	(2,3,4)⁺	544#	6.8 *17*	4381.4	(3,4,5⁻)			
		851#	8.5 *17*	4074.511	2⁺	[M1,E2]	0.000154 *28*	B(M1)(W.u.)=0.08 *+7−3* (if pure M1); B(E2)(W.u.)=2.7×10^{2} *+25−11* (if pure E2)

From ENSDF

$^{48}_{22}Ti_{26}$-30

$\gamma(^{48}Ti)$ (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[‡]	E_f	J_f^π	Mult.	α[†]	Comments
								α=0.000154 *28*; α(K)=0.000140 *25*; α(L)=1.25×10^{-5} *23*; α(M)=1.60×10^{-6} *29* α(N)=8.7×10^{-8} *16*
4924.92	$(2,3,4)^+$	1686[#]	32 *5*	3239.771	4^+	[M1,E2]	0.000183 *22*	B(M1)(W.u.)=0.038 +*35*−*14* (if pure M1); B(E2)(W.u.)=33 +*30*−*12* (if pure E2) α=0.000183 *22*; α(K)=3.34×10^{-5} *18*; α(L)=2.98×10^{-6} *16*; α(M)=3.81×10^{-7} *21* α(N)=2.08×10^{-8} *11*; α(IPF)=0.000147 *20*
		1700.89 *16*	39 *17*	3223.971	3^+	[M1,E2]	0.000189 *22*	B(M1)(W.u.)=0.045 +*43*−*21* (if pure M1); B(E2)(W.u.)=38 +*37*−*18* (if pure E2) α=0.000189 *22*; α(K)=3.29×10^{-5} *18*; α(L)=2.93×10^{-6} *16*; α(M)=3.75×10^{-7} *20* α(N)=2.04×10^{-8} *11*; α(IPF)=0.000153 *20* I_γ: unweighted average of 22.0 *51* from (α,pγ) and 55.6 *56* from (n,γ) E=thermal.
		2629.1 *3*	100 *12*	2295.648	4^+	[M1,E2]	0.00059 *5*	B(M1)(W.u.)=0.031 +*28*−*11* (if pure M1); B(E2)(W.u.)=11 +*10*−*4* (if pure E2) α=0.00059 *5*; α(K)=1.55×10^{-5} *4*; α(L)=1.37×10^{-6} *4*; α(M)=1.76×10^{-7} *5* α(N)=9.59×10^{-9} *27*; α(IPF)=0.00057 *5* I_γ: from (α,pγ). Other: 100 *17* from (n,γ) E=thermal.
4939.93	$(2,3,4)^+$	1157[#]	12. *4*	3782.459	$3^-,4^-$			
		1701[#]	43 *8*	3239.771	4^+			
		2644.5 *4*	47 *11*	2295.648	4^+			I_γ: weighted average of 41 *8* from (α,pγ) and 68 *15* from (n,γ) E=thermal.
		3956.17 *16*	100 *9*	983.531	2^+			E_γ,I_γ: from (n,γ) E=thermal. Other: 3963 *9* from (n,n′γ). I_γ: from (n,γ) E=thermal. Other: 100 *18* from (α,pγ).
4956.6	$(4^+,5,6^-)$	910	36 *7*	4046.6	$5^{(-)}$			
		1173	100 *16*	3782.459	$3^-,4^-$			
		1448	45 *7*	3508.548	6^+			
		1624	45 *7*	3333.187	6^+			
4970.7	0^+	1231	100 *18*	3738.60	1^+			
		3988	82 *18*	983.531	2^+			
4992.0	5^-	946	100 *10*	4046.6	$5^{(-)}$			
		1139	18 *3*	3852.24	3^-			
		1209	21 *3*	3782.459	$3^-,4^-$			
		1484	23 *5*	3508.548	6^+			
5145.85	4^+	1073[#]	88 *25*	4074.511	2^+	[E2]	0.0001022 *14*	B(E2)(W.u.)=1.9×10^2 +*19*−*8* α=0.0001022 *14*; α(K)=9.28×10^{-5} *13*; α(L)=8.31×10^{-6} *12*; α(M)=1.062×10^{-6} *15* α(N)=5.75×10^{-8} *8*

$^{48}_{22}Ti_{26}$-31

$\gamma(^{48}Ti)$ (continued)

E_i(level)	J^π_i	E_γ‡	I_γ‡	E_f	J^π_f	Mult.	δ	α†	Comments
5145.85	4^+	1906.08 *9*	52 *4*	3239.771	4^+	[M1,E2]		0.000269 *30*	B(M1)(W.u.)=0.010 *+9−4* (if pure M1); B(E2)(W.u.)=6.5 *+64−24* (if pure E2) α=0.000269 *30*; α(K)=2.67×10^{-5} *12*; α(L)=2.38×10^{-6} *11*; α(M)=3.05×10^{-7} *14* α(N)=1.66×10^{-8} *7*; α(IPF)=0.000240 *28* E_γ,I_γ: from (n,γ) E=thermal. Other: Iγ=104 *16* from (α,pγ) is discrepant.
		1921.63 *22*	100 *18*	3223.971	3^+	[M1,E2]		0.000276 *30*	B(M1)(W.u.)=0.018 *+17−7* (if pure M1); B(E2)(W.u.)=12 *+12−5* (if pure E2) α=0.000276 *30*; α(K)=2.64×10^{-5} *12*; α(L)=2.35×10^{-6} *10*; α(M)=3.00×10^{-7} *13* α(N)=1.64×10^{-8} *7*; α(IPF)=0.000247 *29* I_γ: from (n,γ) E=thermal. Other: 100 *16* from (α,pγ).
		2725.7 *5*	22 *5*	2421.053	2^+	[E2]		0.000678 *9*	B(E2)(W.u.)=0.46 *+46−19* α=0.000678 *9*; α(K)=1.493×10^{-5} *21*; α(L)=1.328×10^{-6} *19*; α(M)=1.699×10^{-7} *24* α(N)=9.26×10^{-9} *13*; α(IPF)=0.000661 *9*
		2850.01 *12*	87 *7*	2295.648	4^+	[M1,E2]		0.00068 *5*	B(M1)(W.u.)=0.0047 *+45−18* (if pure M1); B(E2)(W.u.)=1.5 *+14−6* (if pure E2) α=0.00068 *5*; α(K)=1.36×10^{-5} *4*; α(L)=1.207×10^{-6} *32*; α(M)=1.54×10^{-7} *4* α(N)=8.42×10^{-9} *22*; α(IPF)=0.00066 *5* I_γ: from (n,γ) E=thermal. Other: 125 *21* from (α,pγ).
5155.7	$5^{(+)}$	751	32 *5*	4404.8	$5^{(+)}$	[M1]		0.0001626 *23*	B(M1)(W.u.)>1.5 α=0.0001626 *23*; α(K)=0.0001476 *21*; α(L)=1.321×10^{-5} *18*; α(M)=1.690×10^{-6} *24* α(N)=9.18×10^{-8} *13* Mult.: M1 from comparison with RUL for $T_{1/2}$<7 fs.
		1647	100 *5*	3508.548	6^+	(M1(+E2))	−0.04 *8*	0.0001494 *22*	B(M1)(W.u.)>0.5 α=0.0001494 *22*; α(K)=3.30×10^{-5} *5*; α(L)=2.94×10^{-6} *4*; α(M)=3.76×10^{-7} *5* α(N)=2.050×10^{-8} *29*; α(IPF)=0.0001130 *16* Mult.,δ: D(+Q) and δ from p$\gamma(\theta)$ in (α,pγ); $\Delta\pi$=no from level scheme.
5158.0	4^+	1919#	70 *12*	3239.771	4^+	[M1,E2]		0.000275 *30*	α=0.000275 *30*; α(K)=2.64×10^{-5} *12*; α(L)=2.35×10^{-6} *10*; α(M)=3.01×10^{-7} *13* α(N)=1.64×10^{-8} *7*; α(IPF)=0.000245 *29*
		1933.9 *3*	100 *18*	3223.971	3^+	[M1,E2]		0.000281 *31*	α=0.000281 *31*; α(K)=2.61×10^{-5} *11*; α(L)=2.32×10^{-6} *10*; α(M)=2.97×10^{-7} *13* α(N)=1.62×10^{-8} *7*; α(IPF)=0.000252 *29*
		2863#	100 *18*	2295.648	4^+	[M1,E2]		0.00068 *5*	α=0.00068 *5*; α(K)=1.348×10^{-5} *35*; α(L)=1.199×10^{-6} *32*;

Adopted Levels, Gammas (continued)

$\gamma(^{48}Ti)$ (continued)

E_i(level)	J^{π}_i	E_γ‡	I_γ‡	E_f	J^{π}_f	Mult.	δ	α†	Comments
									α(M)=1.53×10^{-7} *4* α(N)=8.36×10^{-9} *22*; α(IPF)=0.00067 *5*
5158.0	4^+	4174#	33 *9*	983.531	2^+	[E2]		1.24×10^{-3} *2*	B(E2)(W.u.)>0.12 α(K)=7.72×10^{-6} *11*; α(L)=6.86×10^{-7} *10*; α(M)=8.78×10^{-8} *12* α(N)=4.79×10^{-9} *7*; α(IPF)=0.001232 *17*
5169.8	7^+	605	7.7 *15*	4564.8	$8^{(+)}$	[M1+E2]		3.7×10^{-4} *11*	B(M1)(W.u.)=0.18 *+13−6* (if pure M1); B(E2)(W.u.)=1.2×10^3 *+9−4* (if pure E2) α=3.7×10^{-4} *11*; α(K)=3.3×10^{-4} *10*; α(L)=3.0×10^{-5} *9*; α(M)=3.8×10^{-6} *12* α(N)=2.1×10^{-7} *6* Mult.: pure E2 ruled out by RUL.
		1661	46 *6*	3508.548	6^+	M1+E2	+0.11 *+9−4*	0.0001542 *24*	B(M1)(W.u.)=0.051 *+34−17*; B(E2)(W.u.)=0.6 *+17−4* α=0.0001542 *24*; α(K)=3.26×10^{-5} *5*; α(L)=2.90×10^{-6} *4*; α(M)=3.71×10^{-7} *5* α(N)=2.022×10^{-8} *29*; α(IPF)=0.0001183 *19* Mult.: D+Q from p$\gamma(\theta)$ in (α,pγ); E1+M2 ruled out by RUL.
		1837	100 *8*	3333.187	6^+	M1+E2	+0.09 *7*	0.0002139 *31*	B(M1)(W.u.)=0.08 *+6−3*; B(E2)(W.u.)=0.5 *+14−4* α=0.0002139 *31*; α(K)=2.73×10^{-5} *4*; α(L)=2.431×10^{-6} *34*; α(M)=3.11×10^{-7} *4* α(N)=1.696×10^{-8} *24*; α(IPF)=0.0001839 *27* Mult.: D+Q from p$\gamma(\theta)$ in (α,pγ); E1+M2 ruled out by RUL.
5197.9	8^+	632.7 *10*	100 *4*	4564.8	$8^{(+)}$	(M1(+E2))	−0.03 *+25−35*	0.000232 *23*	B(M1)(W.u.)=0.95 *+50−35* α=0.000232 *23*; α(K)=0.000211 *21*; α(L)=1.89×10^{-5} *19*; α(M)=2.42×10^{-6} *24* α(N)=1.31×10^{-7} *13* E_γ: from (^{7}Li,p2nγ). I_γ: from (α,pγ). Mult.: D(+Q) from p$\gamma(\theta)$ in (α,pγ); $\Delta\pi$=no from level scheme .
		1689	16.9 *24*	3508.548	6^+	[E2]		0.0002062 *29*	B(E2)(W.u.)=7.3 *+35−20* α=0.0002062 *29*; α(K)=3.51×10^{-5} *5*; α(L)=3.13×10^{-6} *4*; α(M)=4.00×10^{-7} *6* α(N)=2.176×10^{-8} *30*; α(IPF)=0.0001676 *23*
		1865	3.6 *12*	3333.187	6^+	[E2]		0.000280 *4*	B(E2)(W.u.)=1.0 *+6−4* α=0.000280 *4*; α(K)=2.90×10^{-5} *4*; α(L)=2.59×10^{-6} *4*; α(M)=3.31×10^{-7} *5* α(N)=1.801×10^{-8} *25*; α(IPF)=0.0002483 *35*

From ENSDF

$\gamma(^{48}Ti)$ (continued)

E_i(level)	J_i^π	E_γ‡	I_γ‡	E_f	J_f^π	Mult.	δ	α†	Comments
5251.8	(2^+,3,4,5^-)	1399	100 *8*	3852.24	3^-				
		1469	13 *4*	3782.459	3^-,4^-				
		2957	13 *4*	2295.648	4^+				
5273.0	(1^-,2)	962	26 *7*	4311.3	1^+				
		1571	20 *5*	3699.52	$1^{(-)}$				
		1915	100 *20*	3358.823	3^-				
		2853	72 *13*	2421.053	2^+				
5300.9	(4^+,5,6)	896	68 *10*	4404.8	$5^{(+)}$				Mult.: not pure M2 or E2 from RUL.
		1792	100 *15*	3508.548	6^+				
		1968	83 *15*	3333.187	6^+				
5312.8	(5^-)	1266	42 *5*	4046.6	$5^{(-)}$	M1,E2		8.2×10^{-5} *9*	B(M1)(W.u.)=0.040 *+26−12* (if pure M1); B(E2)(W.u.)=61 *+41−19* (if pure E2) $\alpha=8.2\times10^{-5}$ *9*; α(K)=5.8×10^{-5} *5*; α(L)=5.2×10^{-6} *5*; α(M)=6.7×10^{-7} *6* α(N)=3.63×10^{-8} *33*; α(IPF)=1.81×10^{-5} *32* Mult.,δ: E2 if J=7, M1+E2, δ=−1.25 *25* if J=5, or M1+E2, δ=−1.7 *+9−12* if J=6, from p$\gamma(\theta)$ in (α,pγ) and comparison to RUL.
		1804	25 *4*	3508.548	6^+	[E1]		0.000517 *7*	B(E1)(W.u.)=0.00019 *+13−6* α=0.000517 *7*; α(K)=1.748×10^{-5} *24*; α(L)=1.555×10^{-6} *22*; α(M)=1.989×10^{-7} *28* α(N)=1.083×10^{-8} *15*; α(IPF)=0.000498 *7*
		1980	100 *7*	3333.187	6^+	(E1(+M2))	−0.07 *+7−9*	0.000640 *13*	B(E1)(W.u.)=0.00057 *+48−21* α=0.000640 *13*; α(K)=1.53×10^{-5} *6*; α(L)=1.36×10^{-6} *5*; α(M)=1.74×10^{-7} *6* α(N)=9.50×10^{-9} *34*; α(IPF)=0.000623 *13* Mult.,δ: D+Q, δ=−0.02 *+7−3* if J=7, or δ=−0.07 *+7−9* if J=5, or M1+E2, δ=+1.5 *3* if J=6, from p$\gamma(\theta)$ in (α,pγ) and comparison to RUL.
5313.3	2^+	2892	41 *10*	2421.053	2^+				E_γ: other: 2890 *5* from (n,n′γ). I_γ: other: I(2890γ)/I(4332γ)=100 *28*/12 *6* is discrepant.
		4330	100 *10*	983.531	2^+				E_γ: other: 4332 *9* from (n,n′γ).
5340	$1^{(-)}$	5340@ *3*		0.0	0^+	(E1)&		2.13×10^{-3} *3*	α(K)=4.23×10^{-6} *6*; α(L)=3.75×10^{-7} *5*; α(M)=4.80×10^{-8} *7* α(N)=2.62×10^{-9} *4*; α(IPF)=0.002121 *30*
5356.23	(2^+,3,4^+)	1158.7 *3*	62 *12*	4196.90	(2^+)				I_γ: weighted average of 57 *14* from (α,pγ) and 65 *12* from (n,γ) E=thermal.
		1504#	32 *6*	3852.24	3^-				
		1998#	43 *9*	3358.823	3^-				
		2118#	23 *6*	3239.771	4^+				

From ENSDF

$^{48}_{22}Ti_{26}$-34

γ(^{48}Ti) (continued)

E_i(level)	J^π_i	E_γ[‡]	I_γ[‡]	E_f	J^π_f	Mult.	α[†]	Comments
5356.23	$(2^+,3,4^+)$	3062[#]	31 9	2295.648	4^+			
		4372.56 15	100 9	983.531	2^+			I_γ: from (n,γ) E=thermal. Other: 100 20 from (α,pγ).
5383.8	$(3)^-$	2144	79 13	3239.771	4^+			
		3088	100 13	2295.648	4^+			
5490.95	2^+	1790.7 3	68 14	3699.52	$1^{(-)}$			
		2267[#]	64 12	3223.971	3^+			
		3070.4 3	100 18	2421.053	2^+			
		4508[#]	36 10	983.531	2^+			
5500.8	4^+	1096	14 4	4404.8	$5^{(+)}$	[M1,E2]	8.7×10^{-5} 10	B(M1)(W.u.)=0.046 +38−18 (if pure M1); B(E2)(W.u.)=1.0×10^2 +8−4 (if pure E2) $\alpha=8.7\times10^{-5}$ 10; α(K)=7.9×10^{-5} 9; α(L)=7.1×10^{-6} 8; α(M)=9.0×10^{-7} 11 α(N)=4.9×10^{-8} 6
		1102	41 6	4398.7	6^+	[E2]	9.70×10^{-5} 14	B(E2)(W.u.)=2.7×10^2 +22−9 $\alpha=9.70\times10^{-5}$ 14; α(K)=8.72×10^{-5} 12; α(L)=7.80×10^{-6} 11; α(M)=9.97×10^{-7} 14 α(N)=5.41×10^{-8} 8; α(IPF)=1.003×10^{-6} 14
		1426	7.8 20	4074.511	2^+	[E2]	0.0001167 16	B(E2)(W.u.)=14 +12−6 α=0.0001167 16; α(K)=4.93×10^{-5} 7; α(L)=4.41×10^{-6} 6; α(M)=5.63×10^{-7} 8 α(N)=3.06×10^{-8} 4; α(IPF)=6.24×10^{-5} 9
		1454	5.9 20	4046.6	$5^{(-)}$	[E1]	0.000254 4	B(E1)(W.u.)=0.00019 +17−9 α=0.000254 4; α(K)=2.457×10^{-5} 34; α(L)=2.188×10^{-6} 31; α(M)=2.80×10^{-7} 4 α(N)=1.522×10^{-8} 21; α(IPF)=0.0002272 32
		2168	27 8	3333.187	6^+	[E2]	0.000420 6	B(E2)(W.u.)=6.0 +50−24 α=0.000420 6; α(K)=2.206×10^{-5} 31; α(L)=1.965×10^{-6} 28; α(M)=2.513×10^{-7} 35 α(N)=1.369×10^{-8} 19; α(IPF)=0.000396 6
		3205	100 18	2295.648	4^+	[M1,E2]	0.00082 6	B(M1)(W.u.)=0.013 +10−4 (if pure M1); B(E2)(W.u.)=3.2 +24−10 (if pure E2) α=0.00082 6; α(K)=1.129×10^{-5} 27; α(L)=1.004×10^{-6} 24; α(M)=1.284×10^{-7} 31 α(N)=7.01×10^{-9} 17; α(IPF)=0.00081 6
5521.7	3^-	1739	100 14	3782.459	$3^-,4^-$			
		2163	92 25	3358.823	3^-			
		4538	86 14	983.531	2^+			
5526	1	5526[@] 3		0.0	0^+	D[&]		E_γ: from (γ,γ').
5545.9	$(4^+$ to $8^+)$	2037	28 5	3508.548	6^+			

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$\gamma(^{48}$Ti) (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[‡]	E_f	J_f^π	Mult.	δ	α[†]	Comments
5545.9	(4^+ to 8^+)	2213	100 *5*	3333.187	6^+				
5545.9	3^-	1165	100 *22*	4381.4	(3,4,5^-)				
		1693	38 *9*	3852.24	3^-				
		2322	47 *13*	3223.971	3^+				
		4562	88 *19*	983.531	2^+				
5567.9	2^+	1257	36 *9*	4311.3	1^+				
		1866	100 *22*	3699.52	$1^{(-)}$				
		4586	87 *20*	983.531	2^+				
5615.8	$(3)^-$	821[a]	20 *4*	4795.1	(3^-,4)				
		1833	100 *16*	3782.459	3^-,4^-				
		2257	20 *8*	3358.823	3^-				
		4632	60 *12*	983.531	2^+				
5619.65	2^+	2381[#]	100 *24*	3239.771	4^+				E_γ,I_γ: not seen in (n,γ) E=thermal.
		2395.62 *11*	78 *14*	3223.971	3^+				E_γ: from (n,γ) E=thermal. I_γ: from (α,pγ). Other: I(2396γ)/I(3198γ)=100 *8*/97 *3* from (n,γ) E=thermal is discrepant.
		3198.44 *20*	92 *19*	2421.053	2^+				I_γ: other: see comment for 2396γ.
5630.9	7	1066	78 *10*	4564.8	$8^{(+)}$	D(+Q)	−0.03 *5*		Mult.,δ: from p$\gamma(\theta)$ in (α,pγ).
		2122	22 *4*	3508.548	6^+				
		2298	100 *12*	3333.187	6^+	D+Q	+0.06 *4*		Mult.,δ: from p$\gamma(\theta)$ in (α,pγ).
5640.03	1^+	1182.56 *5*	100 *6*	4457.455	3^+	[E2]		8.84×10^{-5} *12*	$\alpha=8.84\times10^{-5}$ *12*; α(K)=7.41×10^{-5} *10*; α(L)=6.63×10^{-6} *9*; α(M)=8.47×10^{-7} *12* α(N)=4.60×10^{-8} *6*; α(IPF)=6.80×10^{-6} *10* B(E2)(W.u.)≥7200 exceeds RUL.
		4655.8 *6*	35 *8*	983.531	2^+	M1[&]		1.26×10^{-3} *2*	B(M1)(W.u.)>0.02 α(K)=6.42×10^{-6} *9*; α(L)=5.70×10^{-7} *8*; α(M)=7.30×10^{-8} *10* α(N)=3.98×10^{-9} *6*; α(IPF)=0.001252 *18* E_γ: from (n,γ) E=thermal. Other: 4655 *3* from (γ,γ).
		5639.9 *10*	8×10^1 *10*	0.0	0^+	M1[&]		1.52×10^{-3} *2*	α(K)=4.93×10^{-6} *7*; α(L)=4.38×10^{-7} *6*; α(M)=5.60×10^{-8} *8* α(N)=3.06×10^{-9} *4*; α(IPF)=0.001517 *21* E_γ: from (n,γ) E=thermal. Other: 5640 *2* from (γ,γ). I_γ: from 82 +*103*−*82* in (n,γ) E=thermal.
5641.5	3^-	923	24 *4*	4719.137	4^+	[E1]		6.17×10^{-5} *9*	B(E1)(W.u.)=0.0032 +*25*−*11* $\alpha=6.17\times10^{-5}$ *9*; α(K)=5.61×10^{-5} *8*; α(L)=5.00×10^{-6} *7*; α(M)=6.39×10^{-7} *9* α(N)=3.47×10^{-8} *5*
		1261	22 *4*	4381.4	(3,4,5^-)				
		1789	14 *4*	3852.24	3^-	[M1,E2]		0.000222 *26*	B(M1)(W.u.)=0.011 +*10*−*5* (if pure M1);

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γ(^{48}Ti) (continued)

E_i(level)	J^π_i	E_γ‡	I_γ‡	E_f	J^π_f	Mult.	α†	Comments
								B(E2)(W.u.)=9 +7−4 (if pure E2) α=0.000222 26; α(K)=3.00×10^{-5} 15; α(L)=2.67×10^{-6} 13; α(M)=3.42×10^{-7} 17 α(N)=1.86×10^{-8} 9; α(IPF)=0.000189 24
5641.5	3$^-$	1939	22 4	3699.52	1$^{(-)}$	[E2]	0.000314 4	B(E2)(W.u.)=9 +7−3 α=0.000314 4; α(K)=2.70×10^{-5} 4; α(L)=2.406×10^{-6} 34; α(M)=3.08×10^{-7} 4 α(N)=1.675×10^{-8} 23; α(IPF)=0.000284 4
		2418	20 4	3223.971	3$^+$	[E1]	0.000927 13	B(E1)(W.u.)=0.00015 +12−5 α=0.000927 13; α(K)=1.145×10^{-5} 16; α(L)=1.018×10^{-6} 14; α(M)=1.301×10^{-7} 18 α(N)=7.09×10^{-9} 10; α(IPF)=0.000915 13
		3347	100 16	2295.648	4$^+$	[E1]	1.41×10^{-3} 2	B(E1)(W.u.)=0.00028 +20−10 α(K)=7.45×10^{-6} 10; α(L)=6.62×10^{-7} 9; α(M)=8.46×10^{-8} 12 α(N)=4.61×10^{-9} 6; α(IPF)=0.001406 20
5762.8	(4$^+$,5,6$^+$)	1716	15 3	4046.6	5$^{(-)}$			
		2254	100 21	3508.548	6$^+$			
		2430	41 9	3333.187	6$^+$			
		2523	91 18	3239.771	4$^+$			
		3467	47 12	2295.648	4$^+$			
5805.2	3$^-$,4$^-$	1759	4.2 21	4046.6	5$^{(-)}$	[M1,E2]	0.000210 25	B(M1)(W.u.)=0.008 +10−4 (if pure M1); B(E2)(W.u.)=6 +8−3 (if pure E2) α=0.000210 25; α(K)=3.09×10^{-5} 16; α(L)=2.76×10^{-6} 14; α(M)=3.52×10^{-7} 18 α(N)=1.92×10^{-8} 10; α(IPF)=0.000176 23
		2446	100.0 21	3358.823	3$^-$	[M1,E2]	0.00050 5	B(M1)(W.u.)=0.07 +7−3 (if pure M1); B(E2)(W.u.)=29 +30−11 (if pure E2) α=0.00050 5; α(K)=1.74×10^{-5} 5; α(L)=1.55×10^{-6} 5; α(M)=1.98×10^{-7} 6 α(N)=1.080×10^{-8} 33; α(IPF)=0.00049 5
5827.1	3$^-$	2044	57 11	3782.459	3$^-$,4$^-$			
		2468	100 19	3358.823	3$^-$			
		3406	84 14	2421.053	2$^+$			
		4844	30 8	983.531	2$^+$			
5846.5	3$^-$	2607	53 9	3239.771	4$^+$	[E1]	1.04×10^{-3} 1	α(K)=1.033×10^{-5} 14; α(L)=9.18×10^{-7} 13; α(M)=1.174×10^{-7} 16 α(N)=6.40×10^{-9} 9; α(IPF)=0.001024 14
		3551	100 12	2295.648	4$^+$	[E1]	1.50×10^{-3} 2	α(K)=6.92×10^{-6} 10; α(L)=6.14×10^{-7} 9; α(M)=7.85×10^{-8} 11 α(N)=4.28×10^{-9} 6; α(IPF)=0.001497 21
		4862	19 5	983.531	2$^+$	[E1]	1.98×10^{-3} 3	α(K)=4.72×10^{-6} 7; α(L)=4.19×10^{-7} 6; α(M)=5.36×10^{-8} 7 α(N)=2.92×10^{-9} 4; α(IPF)=0.001978 28
5886.7	(4$^+$ to 8$^+$)	1488	37 10	4398.7	6$^+$			
		2378	100 10	3508.548	6$^+$			

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$\gamma(^{48}Ti)$ (continued)

E_i(level)	J^π_i	E_γ‡	I_γ‡	E_f	J^π_f	Mult.	δ	α†	Comments
5888.41	(1,2,3)	2085.67 *16*	100 *18*	3802.73	2^-				
		2517.62 *24*	48 *8*	3370.87	2^+				
		3467.36 *21*	96 *14*	2421.053	2^+				
		4904.42 *17*	34 *3*	983.531	2^+				
5892.1	$(1^-,2^+)$	2533	39 *9*	3358.823	3^-				
		3471	79 *18*	2421.053	2^+				
		4908	85 *21*	983.531	2^+				
		5892	100 *24*	0.0	0^+				
5917.8	2^+	4934	100	983.531	2^+				
5974.8	$(4^+,5,6)$	662	65 *12*	5312.8	(5^-)				
		1018	88 *15*	4956.6	$(4^+,5,6^-)$				
		1570	100 *19*	4404.8	$5^{(+)}$				
		2466	85 *15*	3508.548	6^+				
		2642	46 *12*	3333.187	6^+				
5990.8	$(4^+,5,6^+)$	1586	100 *22*	4404.8	$5^{(+)}$				
		1592	76 *19*	4398.7	6^+				
		2751	95 *16*	3239.771	4^+				
5993.6	$(2)^+$	3572	100 *14*	2421.053	2^+				
		3698	33 *7*	2295.648	4^+				
		5010	42 *11*	983.531	2^+				
6034.9	$9^+,7^+$	837	54 *8*	5197.9	8^+	M1(+E2)		0.000160 *30*	α=0.000160 *30*; α(K)=0.000146 *27*; α(L)=1.30×10^{-5} *25*; α(M)=1.67×10^{-6} *31* α(N)=9.0×10^{-8} *17* Mult.: D(+Q) from p$\gamma(\theta)$ in (α,pγ); E1(+M2) ruled out by RUL. δ: $\delta(9\rightarrow8)$=0.00 *5* or $\delta(7\rightarrow8)$=−0.09 *9* from p$\gamma(\theta)$ in (α,pγ).
		1470	100 *8*	4564.8	$8^{(+)}$	M1+E2		0.000115 *14*	α=0.000115 *14*; α(K)=4.34×10^{-5} *30*; α(L)=3.87×10^{-6} *27*; α(M)=4.95×10^{-7} *35* α(N)=2.69×10^{-8} *19*; α(IPF)=6.7×10^{-5} *10* Mult.: D+Q from p$\gamma(\theta)$ in (α,pγ); E1+M2 ruled out by RUL. δ: $\delta(9\rightarrow8)$=0.10 *5* or $\delta(7\rightarrow8)$=−0.14 *8* from p$\gamma(\theta)$ in (α,pγ).
6036.8	4^+	3741	100	2295.648	4^+				
6039.7	6	870	16 *4*	5169.8	7^+				
		1641	100 *6*	4398.7	6^+	D(+Q)	0.0 *+2−3*		Mult.,δ: from p$\gamma(\theta)$ in (α,pγ).
		2531	8.8 *25*	3508.548	6^+				
6040.4	(1,2)	6040	100	0.0	0^+				
6042.40	(2,3)	1183#	32 *7*	4861.0	$2^+,3^+,4^+$				
		1967.78 *23*	100 *7*	4074.511	2^+				I_γ: from (α,pγ). Other: 100 *18* from (n,γ) E=thermal.
		5058.58 *13*	53 *4*	983.531	2^+				
6050.5		2268	100	3782.459	$3^-,4^-$				

From ENSDF

$\gamma(^{48}Ti)$ (continued)

E_i(level)	J_i^π	E_γ‡	I_γ‡	E_f	J_f^π	Mult.	α†	Comments
6054.47	(0^+ to 4^+)	3633.38 *25*	100 *13*	2421.053	2^+			
		5070.2 *5*	53 *8*	983.531	2^+			
6084.3	(4^+,5,6^-)	1680	100 *11*	4404.8	$5^{(+)}$			
		2301	21 *5*	3782.459	3^-,4^-			
		2576	40 *8*	3508.548	6^+			
6086	1	6086@ *4*		0.0	0^+	D&		
6103.2	$10^{(+)}$,8	1538.8 *10*	100	4564.8	$8^{(+)}$			E_γ: from (^{7}Li,p2nγ). Other: 1538 from (α,pγ). Mult.,δ: Q if J=10 or D+Q, −0.78 *7*, if J=8 from p$\gamma(\theta)$ in (α,pγ).
6119.6	(4^+,5)	2336	30 *5*	3782.459	3^-,4^-			
		2611	29 *5*	3508.548	6^+			
		2787	20 *4*	3333.187	6^+			
		3824	100 *11*	2295.648	4^+			
6126	1	6126@ *3*	100	0.0	0^+	D&		
6138	$1^{(+)}$	6138@ *4*		0.0	0^+	(M1)&		
6147.8	(4^+ to 8^+)	1749	100	4398.7	6^+			
6153.8	(4^+ to 7^-)	2107	28 *10*	4046.6	$5^{(-)}$			
		2645	45 *9*	3508.548	6^+			
		2821	100 *16*	3333.187	6^+			
6172.9	8^+,6^+	975	10 *3*	5197.9	8^+			
		1003	37 *5*	5169.8	7^+	M1+E2	0.000106 *15*	B(M1)(W.u.)=0.16 +*18*−*8* (if pure M1); B(E2)(W.u.)=3.9×10^2 +*42*−*19* (if pure E2) α=0.000106 *15*; α(K)=9.6×10^{-5} *13*; α(L)=8.6×10^{-6} *12*; α(M)=1.10×10^{-6} *15* α(N)=6.0×10^{-8} *8* Mult.: D+Q from p$\gamma(\theta)$ in (α,pγ); E1+M2 ruled out by RUL. δ: δ(8→7)=+0.07 +*7*−*5* or δ(6→7)=−0.10 *5* from p$\gamma(\theta)$ in (α,pγ).
		1608	100 *7*	4564.8	$8^{(+)}$			Mult.,δ: D+Q, 0.00 +*4*−*6* if J=8 or E2 if J=6 from p$\gamma(\theta)$ in (α,pγ).
6176.4	(2^+,3,4,5^-)	2817	100 *40*	3358.823	3^-			
		3881	100 *40*	2295.648	4^+			
6183.8	(2^+ to 6^+)	2944	82 *27*	3239.771	4^+			
		3888	100 *27*	2295.648	4^+			
6223.8	(0^+ to 4^+)	5240	100	983.531	2^+			
6233.6	3^-	2616	88 *18*	3616.812	2^+			
		3813	63 *15*	2421.053	2^+			
		5250	100 *25*	983.531	2^+			
6236	2^+	6236@ *3*		0.0	0^+	Q&		
6241.0	(4^+,5^-)	2907.7 *4*	100	3333.187	6^+			
6243.8	(0^+ to 3^+)	2505	67 *13*	3738.60	1^+			
		2873	100 *13*	3370.87	2^+			
6253.7	3^-	1873	78 *15*	4381.4	(3,4,5^-)			
		2180	100 *22*	4074.511	2^+			
		2881	66 *15*	3370.87	2^+			

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$\gamma(^{48}Ti)$ (continued)

E_i(level)	J^π_i	E_γ‡	I_γ‡	E_f	J^π_f
6267.8	(3⁻)	5284	100	983.531	2⁺
6313.7	(4⁺,5⁻)	2980.4 *3*	100	3333.187	6⁺
6315.4	(2⁺,3,4⁺)	2698	25 *6*	3616.812	2⁺
		2943	94 *16*	3370.87	2⁺
		4021	94 *16*	2295.648	4⁺
		5332	100 *22*	983.531	2⁺
6322.0	(2,3,4)	2963	100 *16*	3358.823	3⁻
		3098	100 *16*	3223.971	3⁺
6331.1	(1⁺ to 5⁺)	3107	100	3223.971	3⁺
6336.5	3⁻	2554	100	3782.459	3⁻,4⁻
6363.8	(3,4)⁺	1959	100 *17*	4404.8	$5^{(+)}$
		3124	89 *17*	3239.771	4⁺
6365.16	3⁻	1572.41 *17*	25 *3*	4792.31	(1⁻,2,3⁻)
		4069.47 *10*	100 *7*	2295.648	4⁺
6394.8	(6⁺,7⁻)	764	17 *3*	5630.9	7
		1082	14 *3*	5312.8	(5⁻)
		1197	11 *3*	5197.9	8⁺
		1438	100 *9*	4956.6	(4⁺,5,6⁻)
6400.9	(4⁺ to 8⁺)	2002	100 *20*	4398.7	6⁺
		2892	44 *13*	3508.548	6⁺
		3068	56 *5*	3333.187	6⁺
6406.0	(1⁻ to 5⁻)	2553.7 *3*	100	3852.24	3⁻
6414.8	(2⁺ to 6⁺)	4119	100	2295.648	4⁺
6434.6	(3⁻ to 7⁻)	2388	100	4046.6	$5^{(-)}$
6451.1	(2⁺,3,4)	2598	61 *13*	3852.24	3⁻
		3212	100 *22*	3239.771	4⁺
		3227	57 *13*	3223.971	3⁺
6461.3	(4⁺ to 8⁺)	3128	100	3333.187	6⁺
6475.3	3⁻	2623	100	3852.24	3⁻
6490.36	(2⁺,3)	2687.52 *11*	100 *8*	3802.73	2⁻
		3252.4 *8*	16 *6*	3239.771	4⁺
		5506.4 *7*	33 *10*	983.531	2⁺
6491.6	(0⁺ to 4⁺)	4070	100 *33*	2421.053	2⁺
		5508	67 *33*	983.531	2⁺
6493.5	(4⁺,5,6,7⁻)	1577	43 *9*	4916.3	5⁻
		2447	100 *14*	4046.6	$5^{(-)}$
		2985	29 *5*	3508.548	6⁺
6507.8	(6⁺,7⁻)	1551	82 *29*	4956.6	(4⁺,5,6⁻)
		1943	25 *7*	4564.8	$8^{(+)}$
		2461	79 *14*	4046.6	$5^{(-)}$
		2999	100 *18*	3508.548	6⁺
		3175	71 *14*	3333.187	6⁺
6518.5	4⁺	3279	100 *16*	3239.771	4⁺

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$\gamma(^{48}Ti)$ (continued)

E_i(level)	J^{π}_i	E_{γ}‡	I_{γ}‡	E_f	J^{π}_f	Mult.	α†	Comments
6518.5	4^+	3294	75 *16*	3223.971	3^+			
6524.6	(4^+ to 8^+)	3016	100	3508.548	6^+			
6529.5	(1^- to 6^-)	2747	100	3782.459	$3^-,4^-$			
6537.0	(4^+ to 7^-)	2490	59 *10*	4046.6	$5^{(-)}$			
		3204	100 *10*	3333.187	6^+			
6538.9		1614	100	4924.92	$(2,3,4)^+$			
6542.0	(0^+ to 4^+)	5558.1 *3*	100	983.531	2^+			
6544.8	(2^+ to 6^+)	4249	100	2295.648	4^+			
6573.9	$(5,6,7^+)$	943	52 *15*	5630.9	7			
		2169	30 *12*	4404.8	$5^{(+)}$			
		2175	67 *18*	4398.7	6^+			
		3065	100 *18*	3508.548	6^+			
		3241	55 *12*	3333.187	6^+			
6584.4	(3^-)	4289	79 *14*	2295.648	4^+			
		5600	100 *14*	983.531	2^+			
6604.3	1^-	5620@ *4*	33@	983.531	2^+	E1&	2.20×10^{-3} *3*	B(E1)(W.u.)=0.00135 α(K)=3.98×10^{-6} *6*; α(L)=3.53×10^{-7} *5*; α(M)=4.52×10^{-8} *6* α(N)=2.467×10^{-9} *35*; α(IPF)=0.002196 *31*
		6604@ *3*	100@	0.0	0^+	E1&		B(E1)(W.u.)=0.00251
6617.7	(4^+ to 8^+)	3109	100	3508.548	6^+			
6627.6	$(0^-,1,2,3)$	2888.9 *4*	100	3738.60	1^+			
6634.3	$(3^-,4,5^-)$	2588	89 *16*	4046.6	$5^{(-)}$			
		2781	100 *21*	3852.24	3^-			
		3395	74 *13*	3239.771	4^+			
6652.6	(1^- to 6^-)	2870	100	3782.459	$3^-,4^-$			
6661.6	(3^- to 7^-)	2615	100	4046.6	$5^{(-)}$			
6672.6	$(2,3,4)^+$	2890	100	3782.459	$3^-,4^-$			
6707.29	$(2^+,3,4)$	3483.5 *3*	100 *14*	3223.971	3^+			
		4411.1 *3*	99 *12*	2295.648	4^+			
6707.4	$(2^+,3,4^+)$	2854	100 *15*	3852.24	3^-			
		4412	42 *10*	2295.648	4^+			
		5724	50 *12*	983.531	2^+			
6711.6	$(4^+,5,6,7^-)$	672	75 *17*	6039.7	6			
		1795	100 *22*	4916.3	5^-			
		2665	39 *11*	4046.6	$5^{(-)}$			
		3203	64 *14*	3508.548	6^+			
6744.9	$(4^+,5,6^+)$	2698	49 *9*	4046.6	$5^{(-)}$			
		3236	40 *9*	3508.548	6^+			
		3412	100 *20*	3333.187	6^+			
		4449	97 *17*	2295.648	4^+			
6757.9	$(6^+,7,8,9)$	723	29 *6*	6034.9	$9^+,7^+$			
		1127	14 *4*	5630.9	7			

Adopted Levels, Gammas (continued)

$\gamma(^{48}Ti)$ (continued)

E_i(level)	J^π_i	E_γ ‡	I_γ ‡	E_f	J^π_f	Mult.	Comments
6757.9	$(6^+,7,8,9)$	1560	100 *7*	5197.9	8^+		
6771.3	$(4^+$ to $8^+)$	3438	100	3333.187	6^+		
6798.0	$(1^+,2,3,4)$	3573.9 *6*	100	3223.971	3^+		
6808.5		2427	100	4381.4	$(3,4,5^-)$		
6814.9	(3^-)	3575	100	3239.771	4^+		
6825.7	$(4^+$ to $8^+)$	2427	100 *17*	4398.7	6^+		
		3317	67 *17*	3508.548	6^+		
6827.8	$(2^+,3,4^+)$	2108.7 *3*	100 *22*	4719.137	4^+		
		5843.7 *5*	20 *4*	983.531	2^+		
6831.6	$(0^+$ to $4^+)$	4410	100 *17*	2421.053	2^+		
		5848	67 *17*	983.531	2^+		
6841.9	3^-	3602	67 *12*	3239.771	4^+		
		4546	100 *12*	2295.648	4^+		
6869.0	$(1^-$ to $5^-)$	3510	100	3358.823	3^-		
6878.3	$(0^+$ to $4^+)$	4457	100	2421.053	2^+		
6880.9	$(6^+,7^-)$	1568	100 *3*	5312.8	(5^-)		
		2316	11 *3*	4564.8	$8^{(+)}$		
6886.0	$(4^+$ to $8^+)$	3377	100 *18*	3508.548	6^+		
		3553	82 *18*	3333.187	6^+		
6898.0	$(1,2^+)$	3901.4 *7*	100 *29*	2997.31	0^+		
		5912.3 *10*	73 *23*	983.531	2^+		
6907.0	10,8,6	872	100	6034.9	$9^+,7^+$	D+Q	Mult.,δ: $\delta(10\rightarrow9)=-0.03$ *4*, $\delta(8\rightarrow9)=-0.02$ *4*, $\delta(8\rightarrow7)=-0.05+5-2$, or $\delta(6\rightarrow7)=-0.19$ *+13−3* from p$\gamma(\theta)$ in (α,pγ).
6916.7	$(3^-$ to $7^-)$	2870	100	4046.6	$5^{(-)}$		
6944.7	$(4^+,5,6,7^-)$	2898	100 *14*	4046.6	$5^{(-)}$		
		3436	43 *14*	3508.548	6^+		
6955.8	$(5^+$ to $8^+)$	1786	43 *7*	5169.8	7^+		
		3447	100 *7*	3508.548	6^+		
6957.0	$(1^-,2,3,4^+)$	3104.4 *4*	100 *24*	3852.24	3^-		
		4536.0 *4*	51 *11*	2421.053	2^+		
6966.9	$(2^+$ to $6^+)$	4671	100	2295.648	4^+		
6971.9	$(0^+$ to $4^+)$	5988	100	983.531	2^+		
6975.4	$(3^-$ to $7^-)$	1983	52 *9*	4992.0	5^-		
		2019	100 *9*	4956.6	$(4^+,5,6^-)$		
6976.30	$(1,2,3,4^+)$	1620.05 *18*	86 *10*	5356.23	$(2^+,3,4^+)$		
		2941.0 *4*	100 *26*	4035.153	2^+		
6979	1^-	6978@ *3*		0.0	0^+	E1&	
6983.4	$(1^-$ to $5^-)$	3131	100	3852.24	3^-		
6985.8	$(6^+,7)$	1816	41 *9*	5169.8	7^+		
		2029	94 *19*	4956.6	$(4^+,5,6^-)$		
		2421	78 *16*	4564.8	$8^{(+)}$		
		3477	100 *22*	3508.548	6^+		
7033.5	(4^+)	2652	100	4381.4	$(3,4,5^-)$		

$^{48}_{22}Ti_{26}$-42

Adopted Levels, Gammas (continued)

γ(^{48}Ti) (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[‡]	E_f	J_f^π	Mult.
7040.9	$(6^+,7,8,9^+)$	467	11.1 22	6573.9	$(5,6,7^+)$	
		2476	100 11	4564.8	$8^{(+)}$	
7041	1,2	7040[@] 4		0.0	0^+	D,Q[&]
7054.0	(3^-)	3695	100	3358.823	3^-	
7060.80	$(0^-,1,2,3^-)$	3361.16 20	100	3699.52	$1^{(-)}$	
7067.0	$(3^-,4^+)$	2870	100	4196.90	(2^+)	
7071?	1^+	7070[@a] 4		0.0	0^+	M1[&]
7076.0	$(6^+$ to $10^+)$	973	100 25	6103.2	$10^{(+)},8$	
		1878	75 15	5197.9	8^+	
		2511	75 15	4564.8	$8^{(+)}$	
7094.1	$(5^+$ to $8^+)$	1924	25 13	5169.8	7^+	
		3761	100 13	3333.187	6^+	
7100.9	$(2^+$ to $6^+)$	4805	100	2295.648	4^+	
7110	1	7109[@] 5		0.0	0^+	D[&]
7111.9	(5 to 9)	1481	100	5630.9	7	
7118.9	$(6^+,7^-)$	1806	100 23	5312.8	(5^-)	
		1921	64 9	5197.9	8^+	
		2554	64 9	4564.8	$8^{(+)}$	
		2720	82 14	4398.7	6^+	
		3610	45 9	3508.548	6^+	
		3786	100 18	3333.187	6^+	
7124	1^-	7123[@] 3		0.0	0^+	E1[&]
7149.8	$(4^+$ to $8^+)$	2751	100	4398.7	6^+	
7162.7	$(4^+$ to $8^+)$	3654	100	3508.548	6^+	
7183.6	$(0^+$ to $4^+)$	4762	67 17	2421.053	2^+	
		6200	100 17	983.531	2^+	
7199.3	$(0^+$ to $4^+)$	4778	100	2421.053	2^+	
7221.6	$(1,2,3,4^+)$	2840	100 12	4381.4	$(3,4,5^-)$	
		3147	67 12	4074.511	2^+	
7221.6	1^+	7221[@] 2		0.0	0^+	M1[&]
7256.8	$(4)^+$	3210	100 15	4046.6	$5^{(-)}$	
		4017	67 15	3239.771	4^+	
7275.1	(4^+)	1962	51 10	5313.3	2^+	
		3766	100 16	3508.548	6^+	
		3942	45 10	3333.187	6^+	
7290.0	3^+	6306	100	983.531	2^+	
7323.0	3^-	6339	100	983.531	2^+	
7326.9	$(6^+$ to $10^+)$	2129	100 11	5197.9	8^+	
		2762	54 11	4564.8	$8^{(+)}$	
7344.8	$(4^+$ to $8^+)$	2946	100	4398.7	6^+	
7353.9	(5 to 9)	1723	100	5630.9	7	
7358.98	2^+	3620.3 3	84 11	3738.60	1^+	

$^{48}_{22}Ti_{26}$-43

$\gamma(^{48}Ti)$ (continued)

E_i(level)	J^π_i	E_γ[‡]	I_γ[‡]	E_f	J^π_f	Mult.	Comments
7358.98	2^+	4134.85 *23*	100 *14*	3223.971	3^+		
		4937.6 *4*	73 *14*	2421.053	2^+		
		6374.7 *5*	51 *8*	983.531	2^+		
7375.1	11,9,7	468	11.1 *22*	6907.0	10,8,6		Mult.: not pure E2 or M2 (ΔJ=2) from comparison to RUL.
		1272	100.0 *22*	6103.2	$10^{(+)}$,8	D+Q	Mult.,δ: δ(11→10)=0.00 *6*, δ(9→10)=−0.05 *7*, δ(9→8)=0.00 *7*, or δ(7→8)=−0.07 *9* from p$\gamma(\theta)$ in (α,pγ).
7387.9		814	100	6573.9	$(5,6,7^+)$		
7427.9	9,7	1393	100 *9*	6034.9	$9^+,7^+$		Mult.,δ: D+Q, −0.60 *15*, if 9→9, Q if 9→7, or D+Q, −0.67 *15*, if 7→7.
		2230	21 *5*	5197.9	8^+		
		2863	30 *8*	4564.8	$8^{(+)}$		
7431.9	$(2,3,4)^+$	5136	100	2295.648	4^+		
7442.9	$(4^+,5,6^+)$	3044	54 *12*	4398.7	6^+		
		5147	100 *12*	2295.648	4^+		
7450	1^-	7449[@] *3*		0.0	0^+	E1[&]	
7476.8	(3^+ to 7^+)	2520	100 *12*	4956.6	$(4^+,5,6^-)$		
		3072	47 *12*	4404.8	$5^{(+)}$		
7484.0	(0^+ to 4^+)	6500	100	983.531	2^+		
7484	1	7483[@] *4*		0.0	0^+	D[&]	
7497.9	(4^+)	2185	100	5312.8	(5^-)		
7531.9	$(6^+,7,8^+)$	1901	43 *7*	5630.9	7		
		2334	100 *16*	5197.9	8^+		
		3133	84 *14*	4398.7	6^+		
7536.0		460	29 *14*	7076.0	(6^+ to 10^+)		
		629	86 *14*	6907.0	10,8,6		
		778	71 *14*	6757.9	$(6^+,7,8,9)$		
		1433	100 *14*	6103.2	$10^{(+)}$,8		
7541.71	$(2^+,3,4^+)$	3344.66 *9*	100 *7*	4196.90	(2^+)		
		4184.5 *15*	3.7 *22*	3358.823	3^-		
		4302.6 *4*	13.8 *27*	3239.771	4^+		
		4316.8 *5*	12.4 *27*	3223.971	3^+		
7557.0	(2^+ to 6^+)	5261	100	2295.648	4^+		
7572.4	(4^+ to 8^+)	4239	100	3333.187	6^+		
7574.15	$(2^+,3,4,5^-)$	3186.35 *22*	100	4387.691	4^+		
7586	$1^{(-)}$	7585[@] *4*		0.0	0^+	(E1)[&]	
7588.1	$(5,6,7,8^+)$	1415	50 *10*	6172.9	$8^+,6^+$		
		1957	88 *14*	5630.9	7		
		4255	100 *19*	3333.187	6^+		
7616.13	$(1^-,2)$	2858.8 *3*	100 *16*	4757.73	(3^-)		
		3763.7 *3*	55 *10*	3852.24	3^-		
		3876.8 *3*	100 *16*	3738.60	1^+		
		3916.8 *6*	42 *10*	3699.52	$1^{(-)}$		
7623.9	$(6^+,7^-)$	2311	100 *20*	5312.8	(5^-)		

$^{48}_{22}Ti_{26}$-44

Adopted Levels, Gammas (continued)

$\gamma(^{48}Ti)$ (continued)

E_i(level)	J^π_i	E_γ‡	I_γ‡	E_f	J^π_f	Mult.	Comments
7623.9	$(6^+,7^-)$	3059	100 *20*	4564.8	$8^{(+)}$		
7656.9	$(6^+$ to $10^+)$	3092	100	4564.8	$8^{(+)}$		
7669.2	10,8	1566	100	6103.2	$10^{(+)}$,8	D+Q	Mult.,δ: $\delta(10\rightarrow10)=-0.90$ *14* or $\delta(8\rightarrow8)=-0.95$ *15* from p$\gamma(\theta)$ in (α,pγ).
7709.7	$(3^-$ to $7^-)$	3663	100	4046.6	$5^{(-)}$		
7969	1	7968@ *4*		0.0	0^+	D&	
8010	1	8009@ *4*		0.0	0^+	D&	
8092.1	12,10,8,6	717	100	7375.1	11,9,7	D+Q	δ,Mult.: $\delta(12\rightarrow11)=+0.02$ *6*, $\delta(10\rightarrow11)=-0.05$ *6*, $\delta(10\rightarrow9)=+0.02$ *6*, $\delta(8\rightarrow9)=-0.05$ *6*, $\delta(8\rightarrow7)=+0.02$ *6*, or $\delta(6\rightarrow7)=-0.07$ *6* from p$\gamma(\theta)$ in (α,pγ).
8199	1^+	8198@ *4*		0.0	0^+	(M1)	Mult.: D,Q from $\gamma(\theta)$ and azimuthal asymmetries in (γ,γ); $\Delta\pi$=no from level scheme.
8255	1	8254@ *4*		0.0	0^+	D&	
8323.9	10,8,6	896	100	7427.9	9,7	D+Q	Mult.,δ: $\delta(10\rightarrow9)=+0.05$ *7*, $\delta(8\rightarrow9)=-0.14$ *8*, $\delta(8\rightarrow7)=+0.10$ *+10−5*, $\delta(6\rightarrow7)=-0.19$ *+13−3*.
8572	$1^{(-)}$	8571@ *4*		0.0	0^+	(E1)&	
8592	1	8591@ *4*		0.0	0^+	D&	
8672	1	8671@ *5*		0.0	0^+	D&	
8933	1	8932@ *5*		0.0	0^+	D&	
8996	$1^{(+)}$	8995@ *5*		0.0	0^+	(M1)&	
9025	1	9024@ *5*		0.0	0^+	D&	
9977	1^-	9976@ *6*		0.0	0^+	E1&	

† Additional information 1.

‡ From (α,pγ) for those with no $\Delta E\gamma$ and from (n,γ) E=thermal for those with $\Delta E\gamma$, unless otherwise noted. For Eγ from (α,pγ), $\Delta E\gamma$=1 keV is assumed in the least-squares fit to get E(level).

Those γ branches are reported by 1979Gl07 in (α,pγ), but not confirmed in (n,γ) E=thermal by 1984Ru06, which constructs the (n,γ) level scheme with the aid of the Ritz combination and previous experiments. This method in 1984Ru06 is, perhaps, more rigorous than those employed by other authors for the placement of transitions. Therefore, if for states observed in (n,γ) there are transitions assigned in other experiments which are not confirmed, the placements of these transitions are probably questionable.

@ From (γ,γ').

& From $\gamma(\theta)$ and azimuthal asymmetries in (γ,γ').

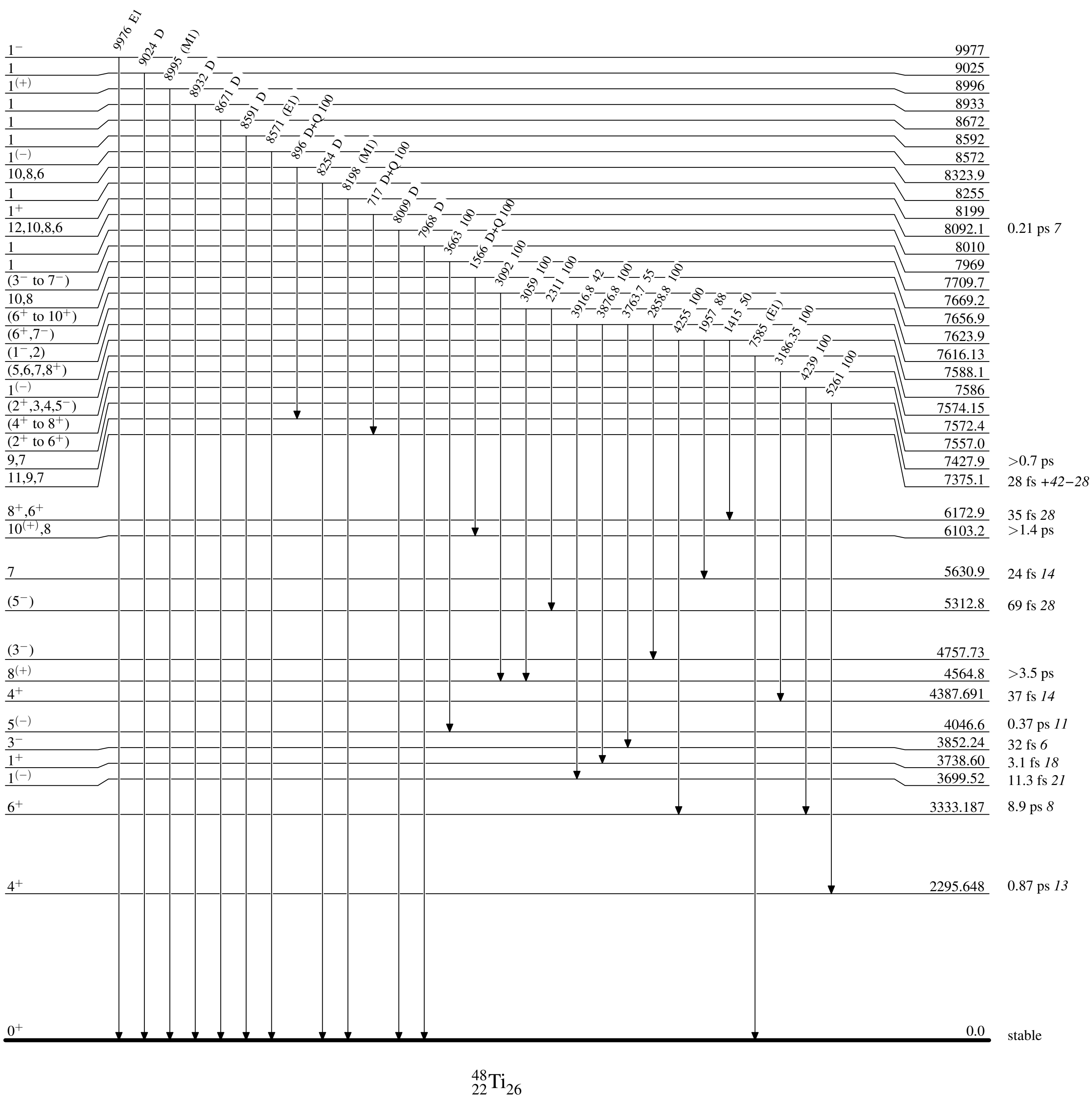
[a] Placement of transition in the level scheme is uncertain.

$^{48}_{22}Ti_{26}$-45

Adopted Levels, Gammas

Level Scheme

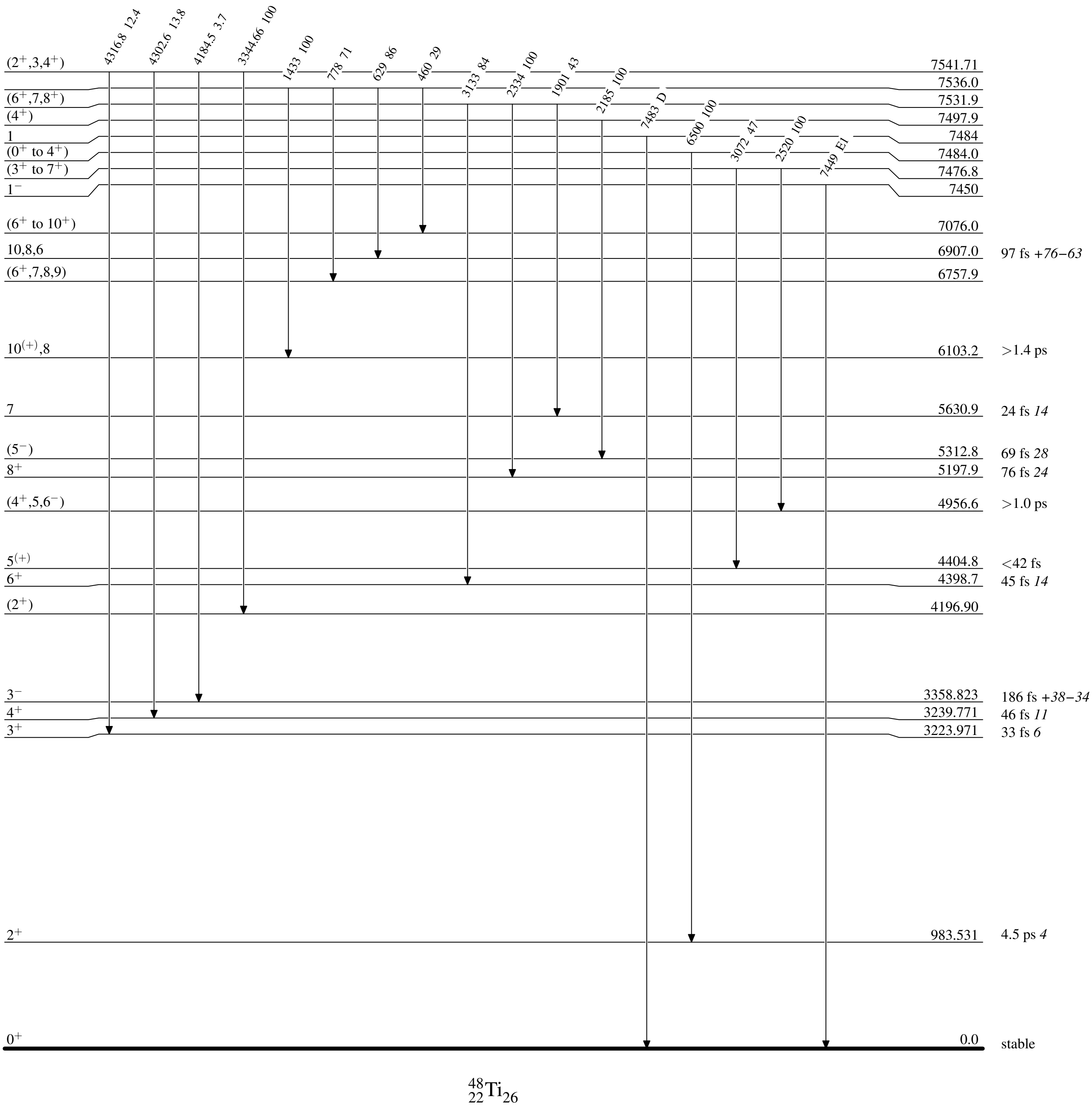
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

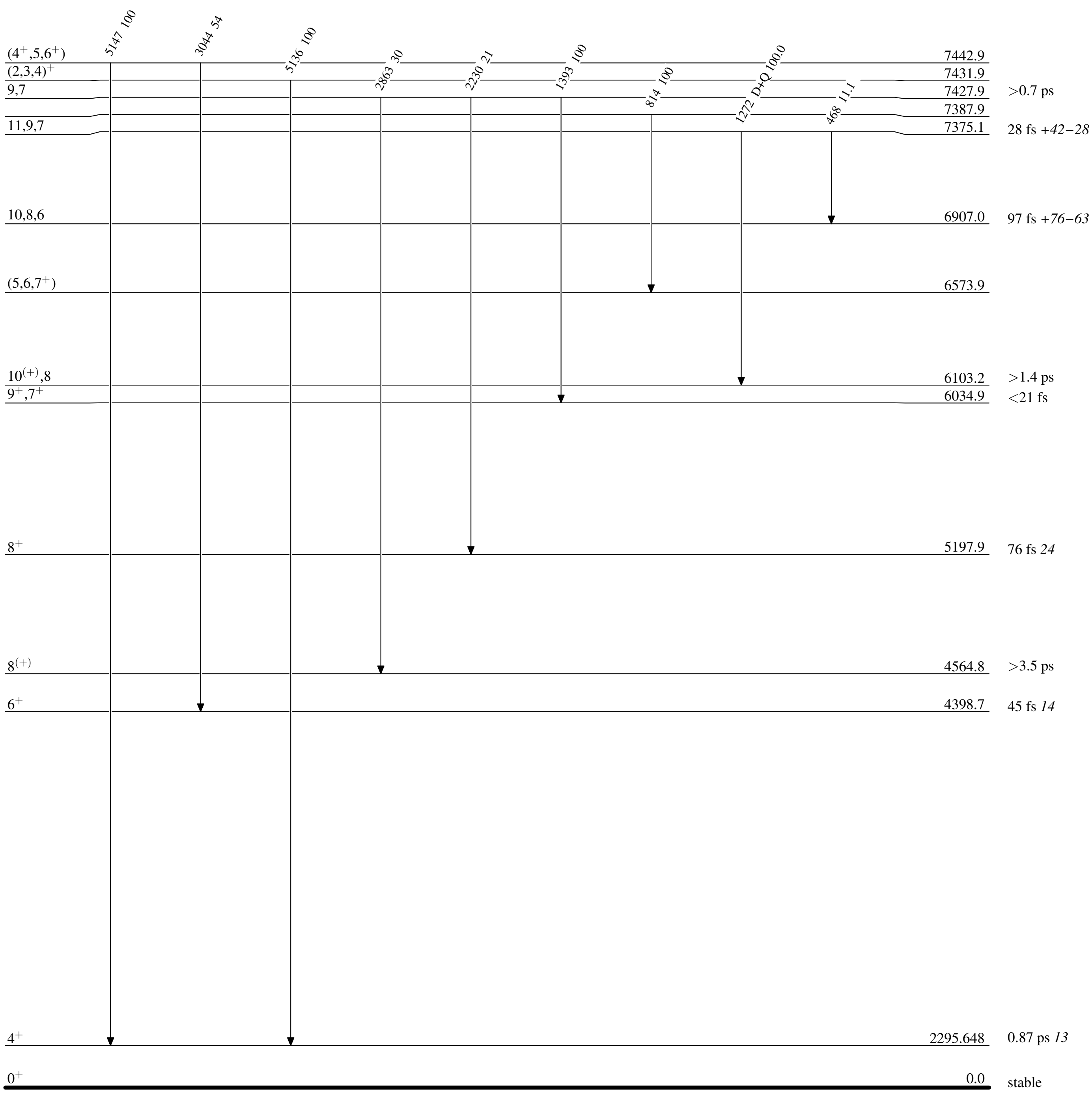
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

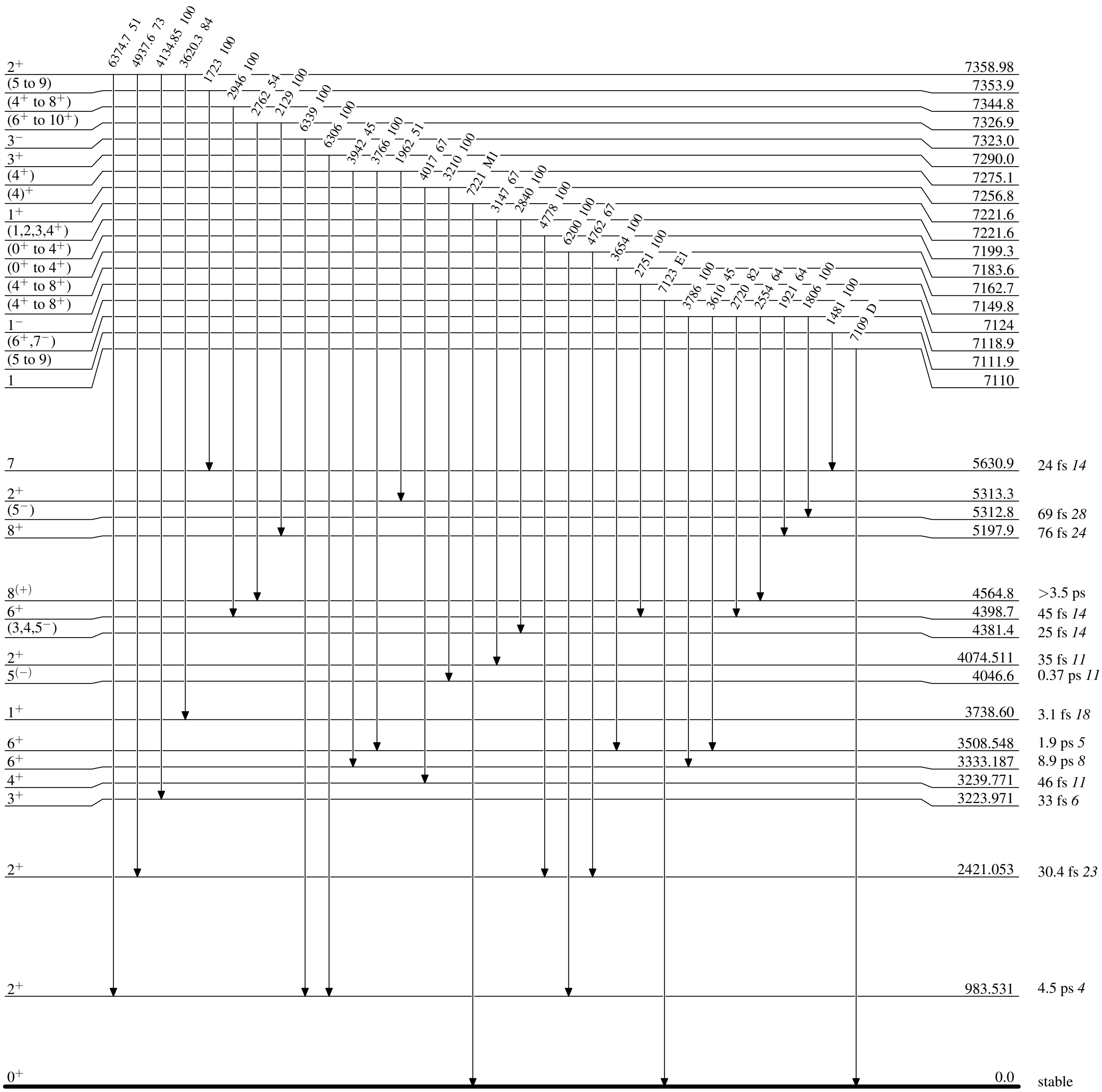


$^{48}_{22}Ti_{26}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

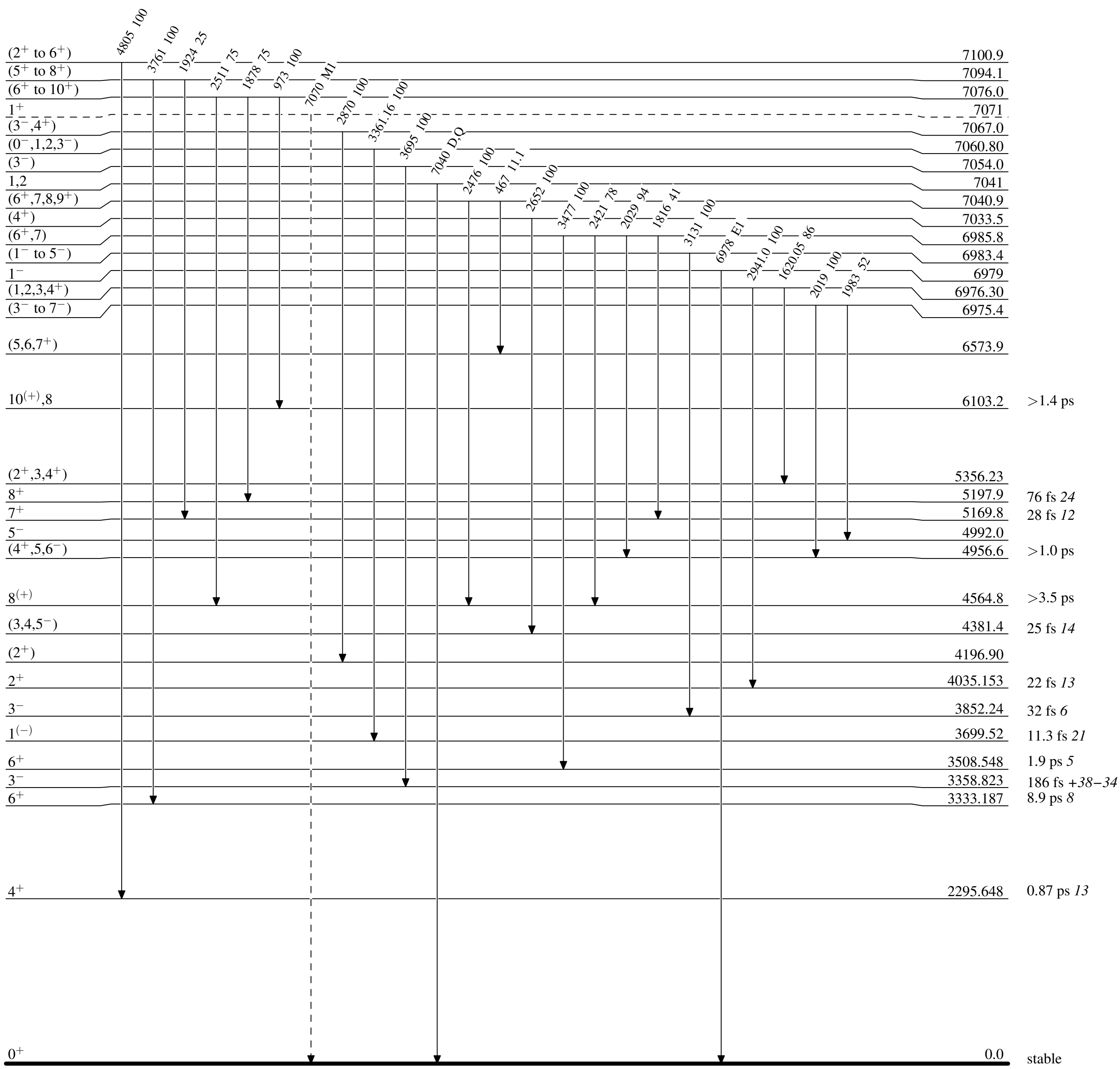


$^{48}_{22}Ti_{26}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

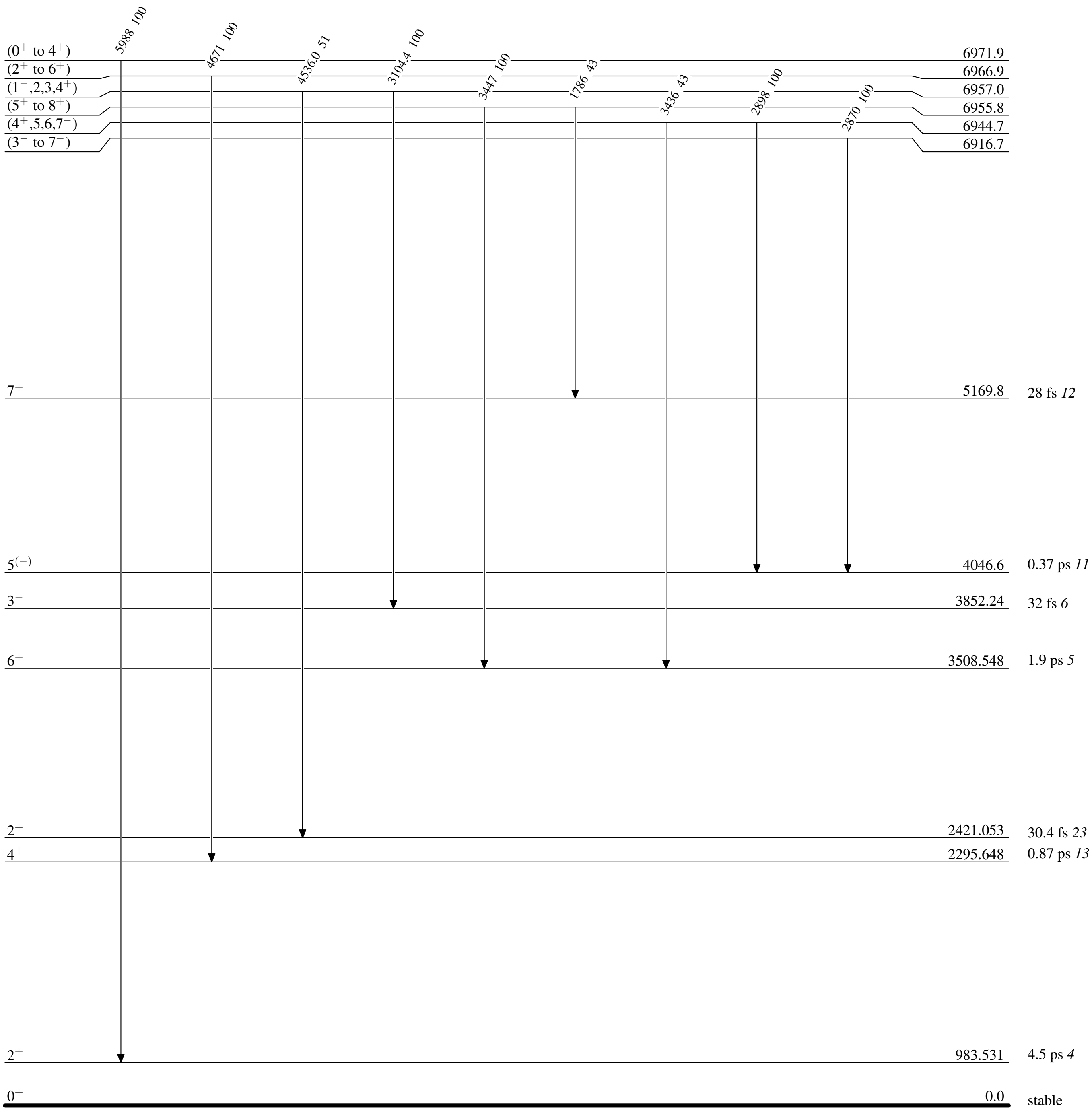


$^{48}_{22}Ti_{26}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

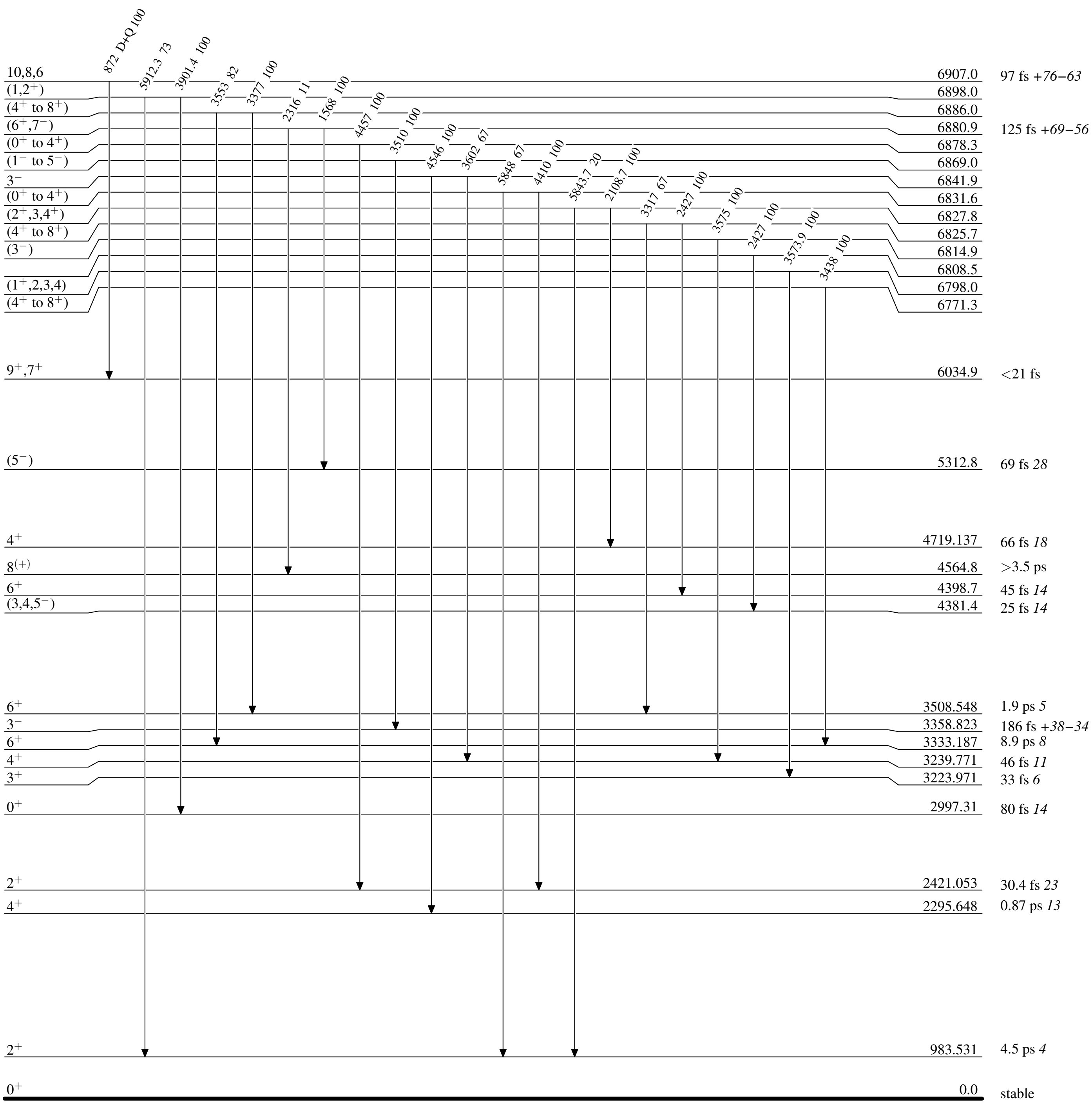


$^{48}_{22}Ti_{26}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

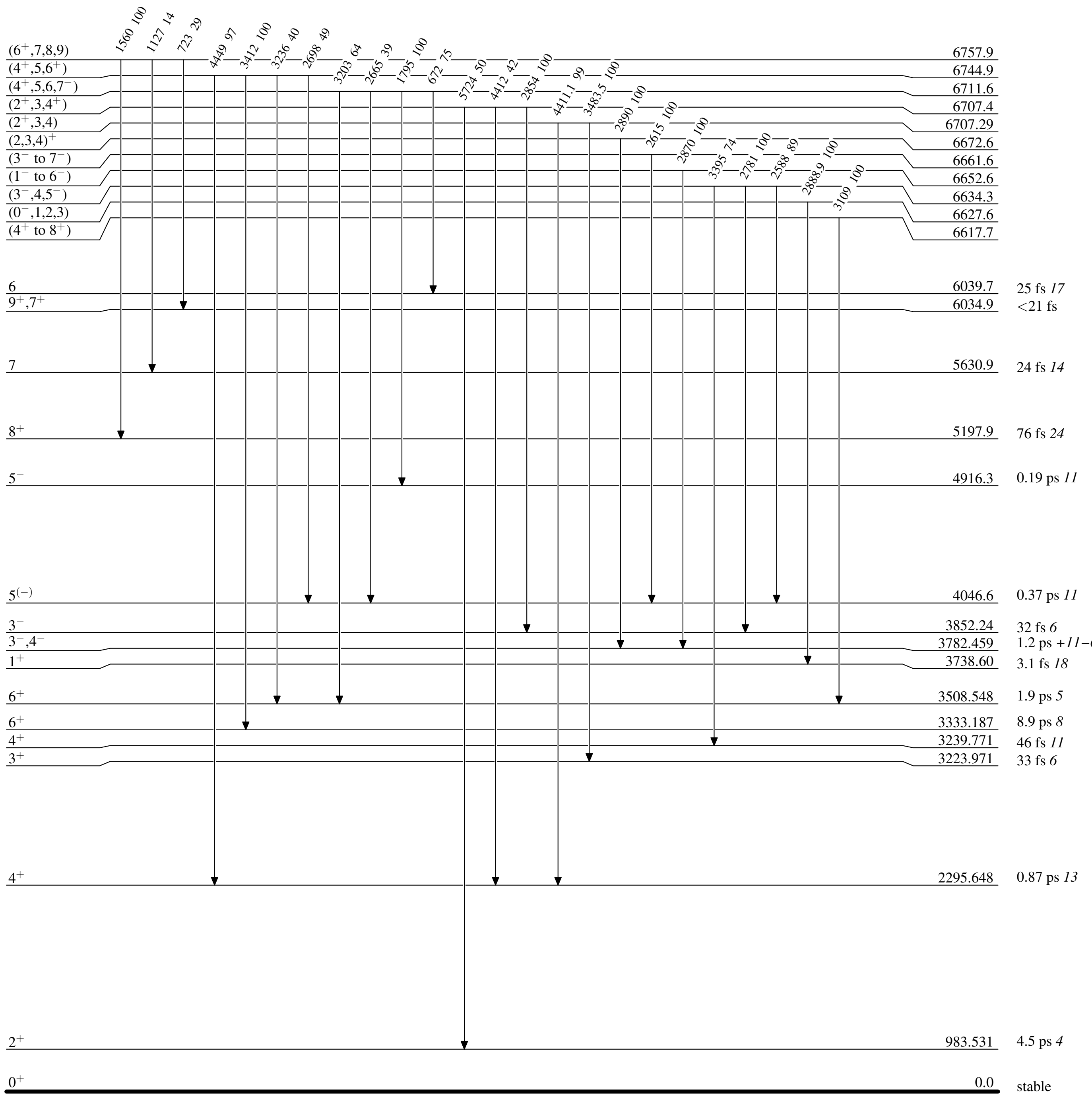


$^{48}_{22}Ti_{26}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

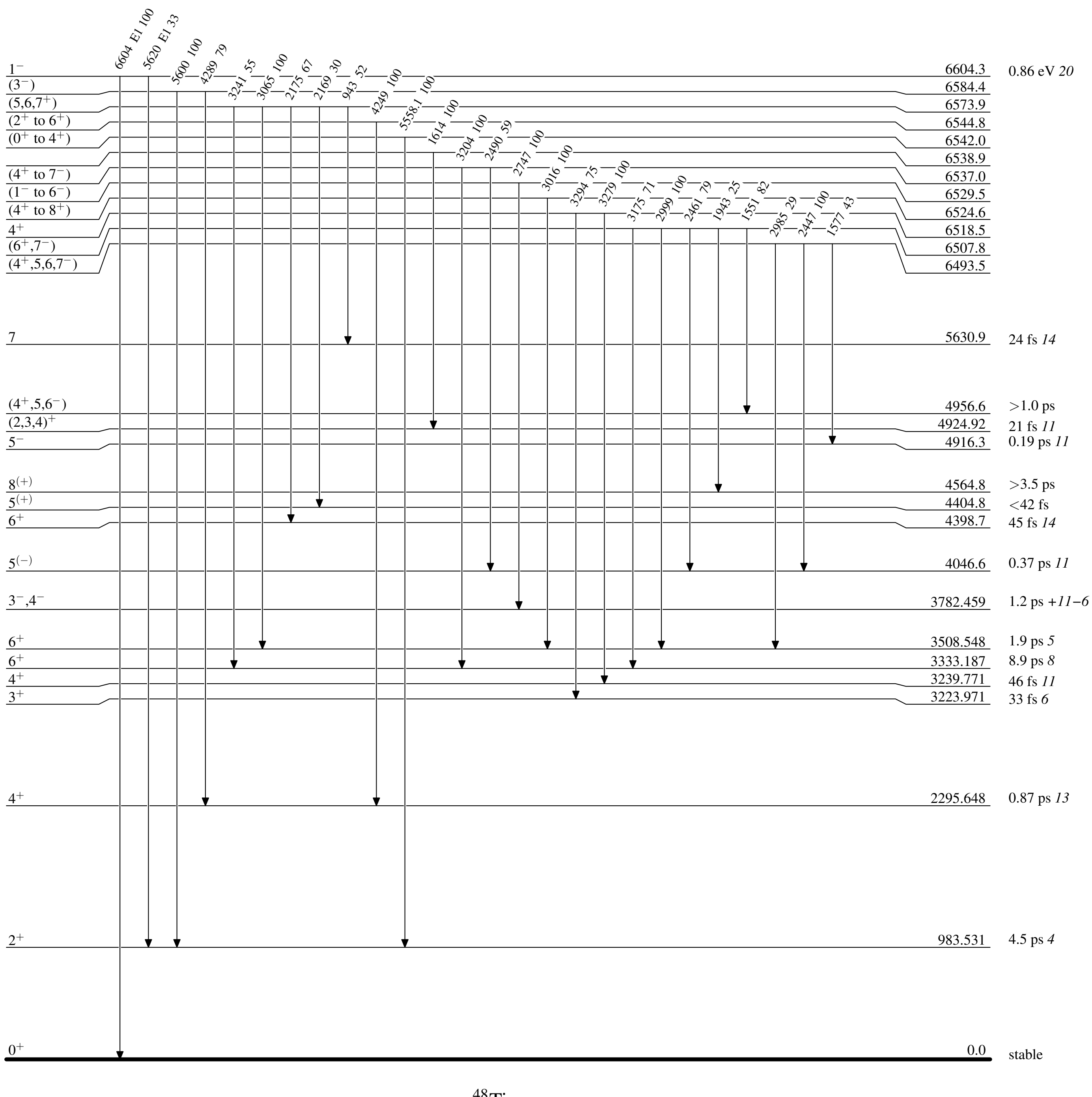


$^{48}_{22}Ti_{26}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

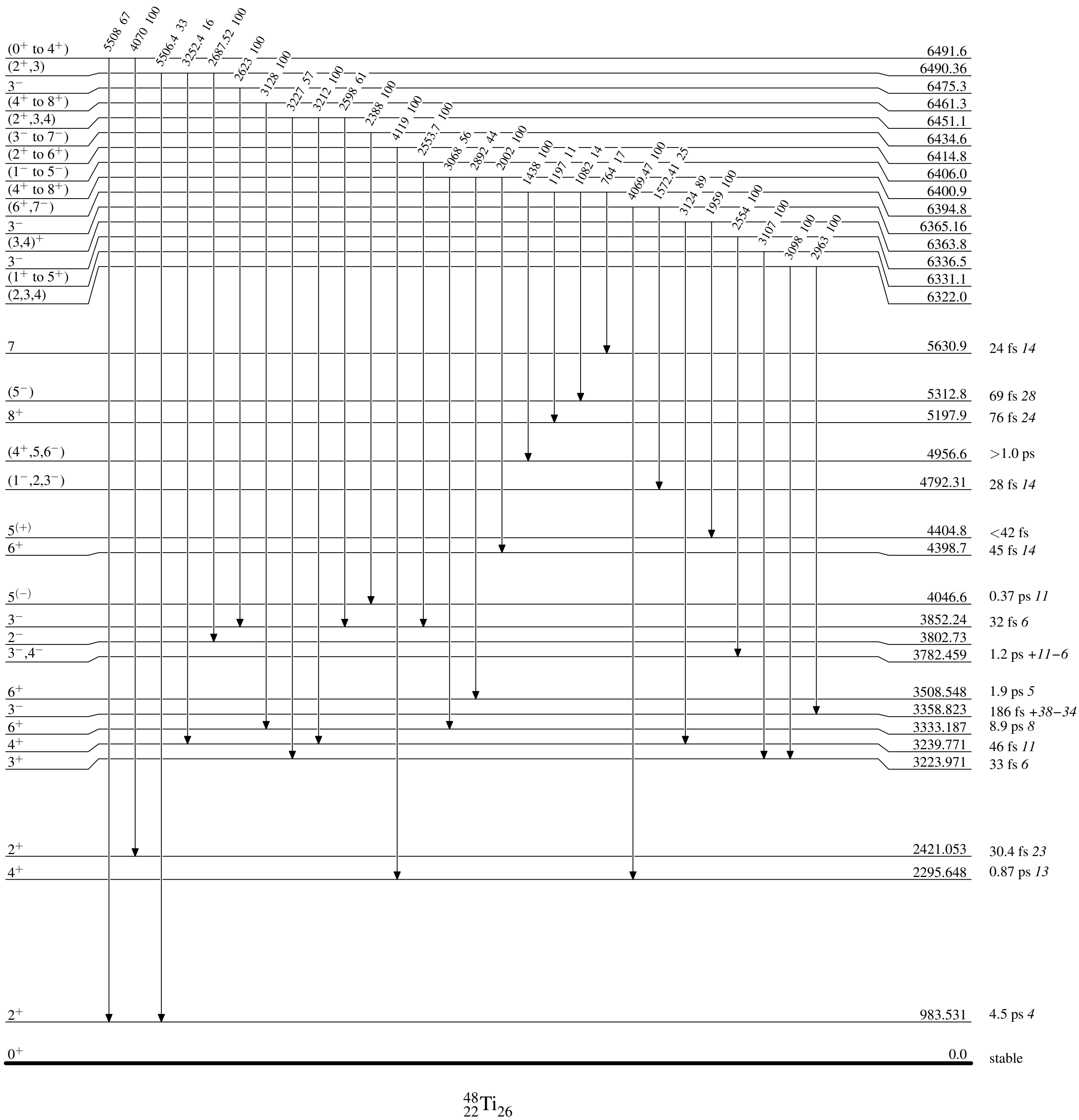


$^{48}_{22}Ti_{26}$

Adopted Levels, Gammas

Level Scheme (continued)

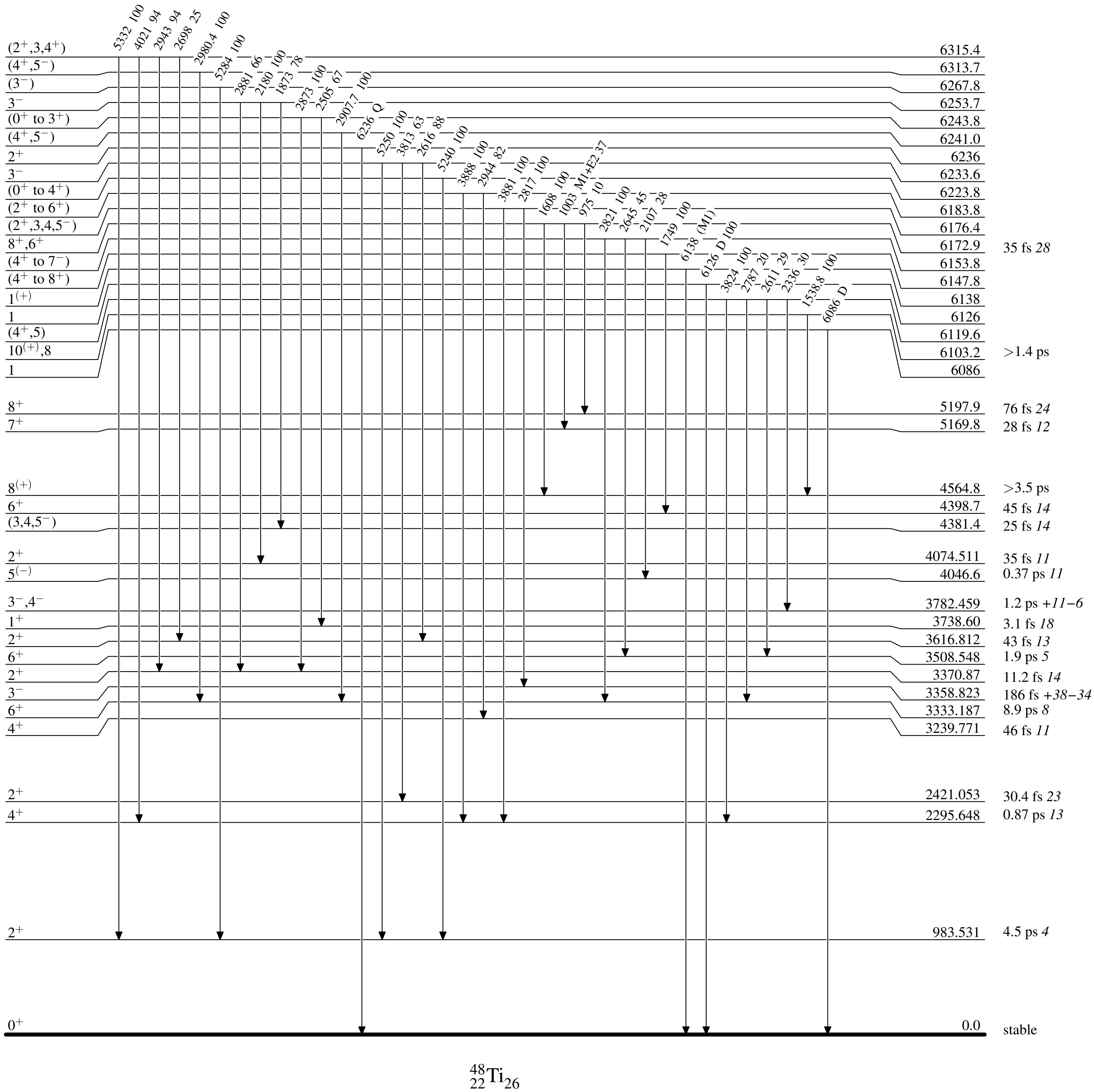
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

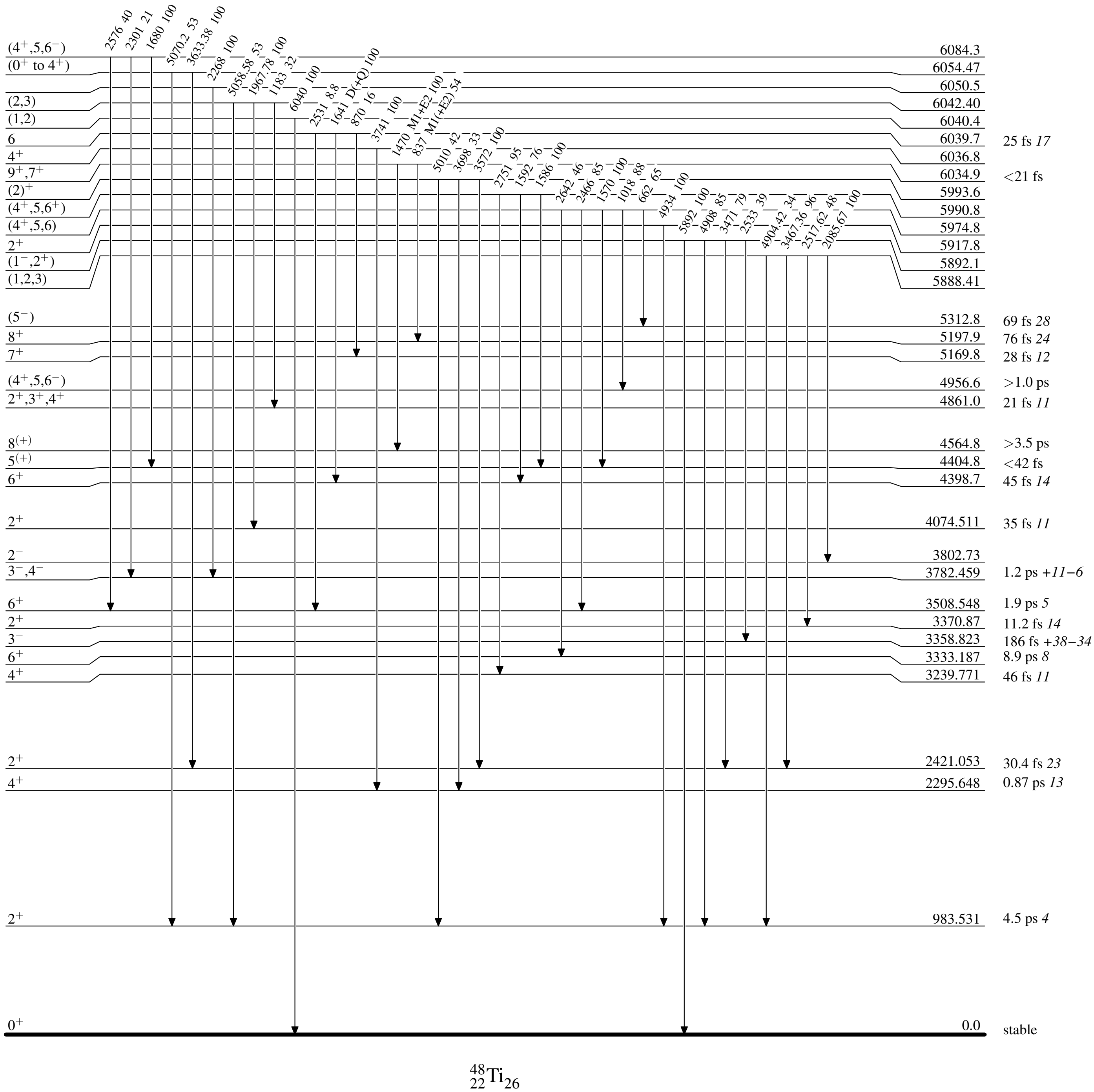
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

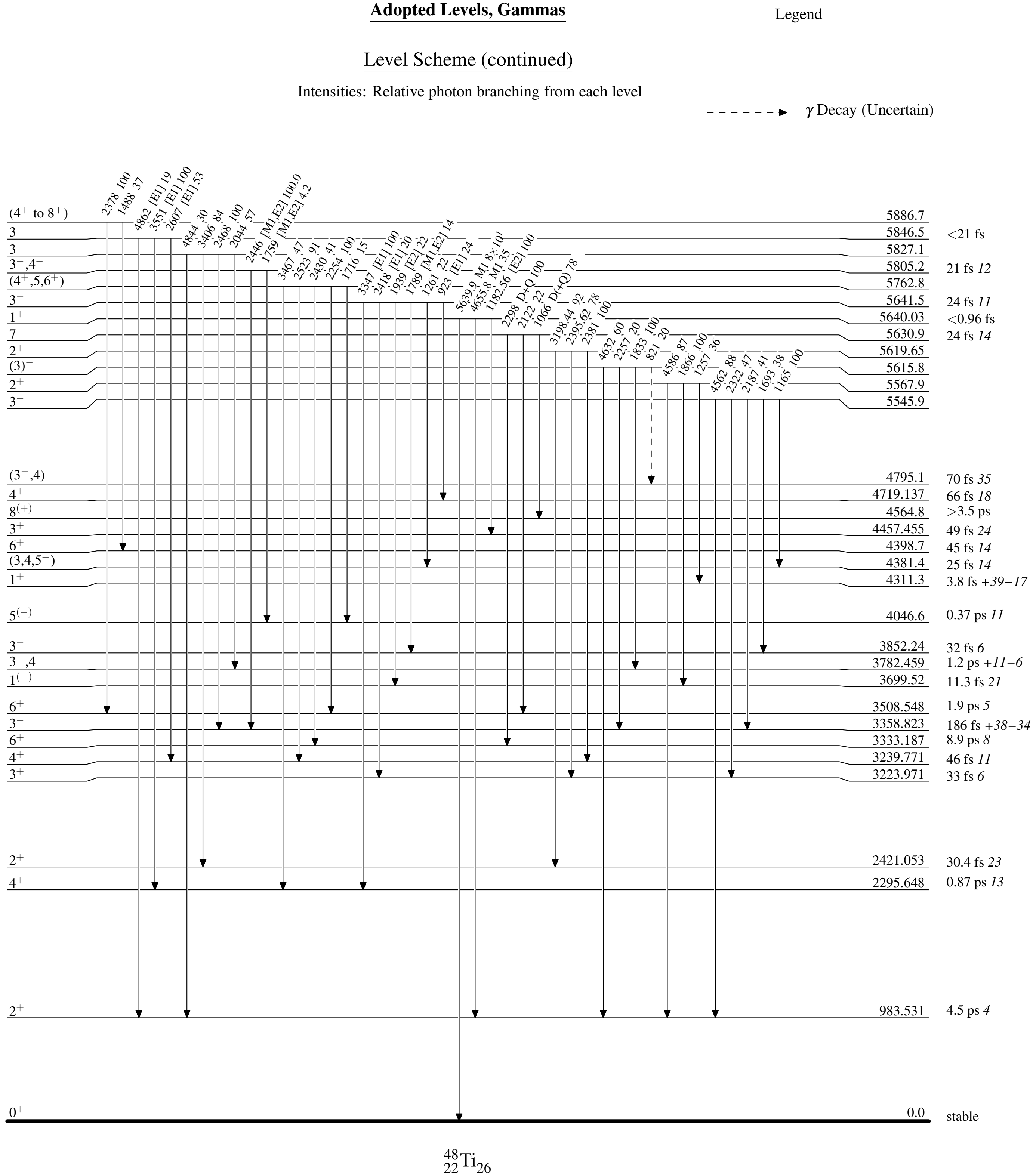
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

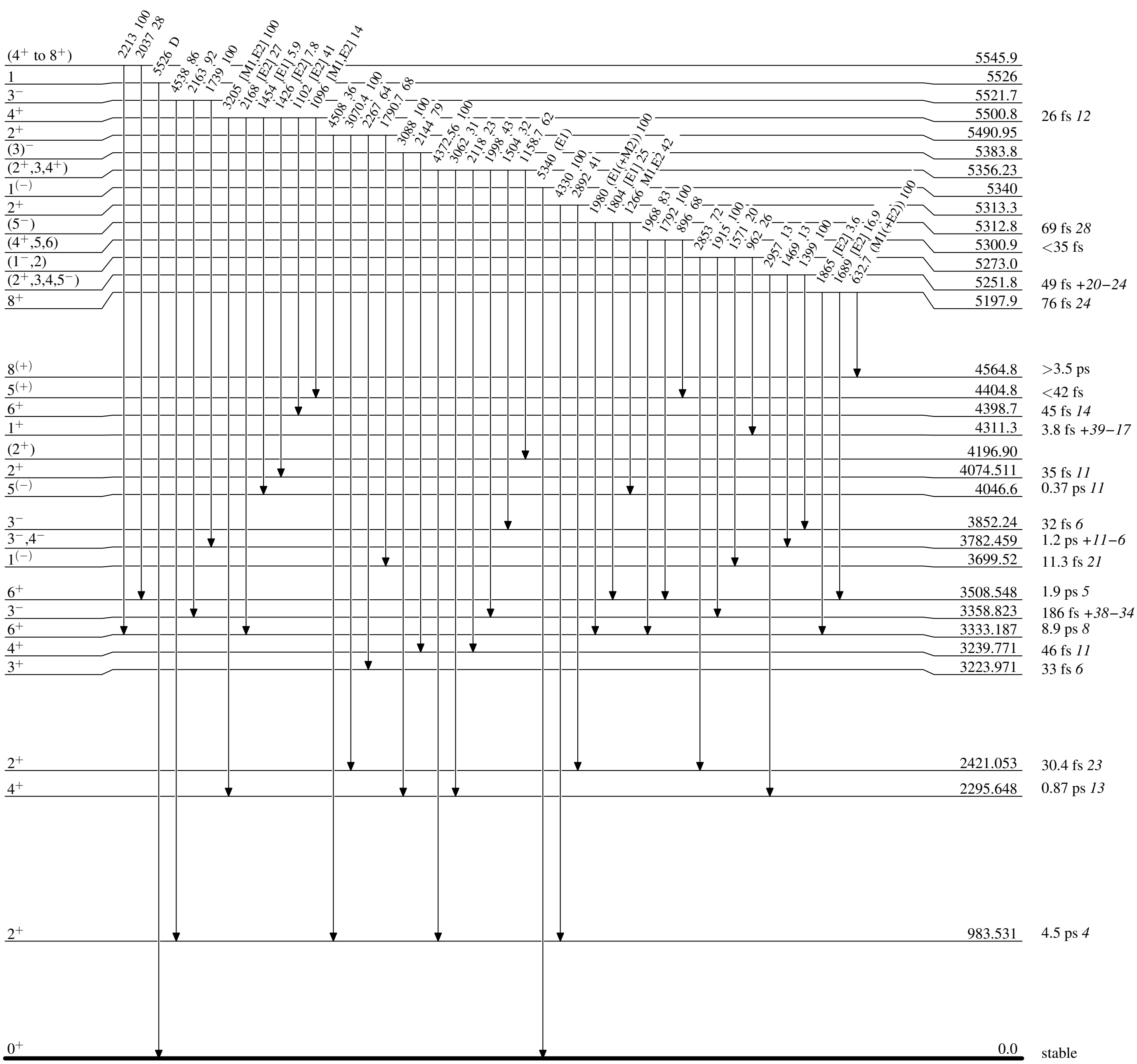
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

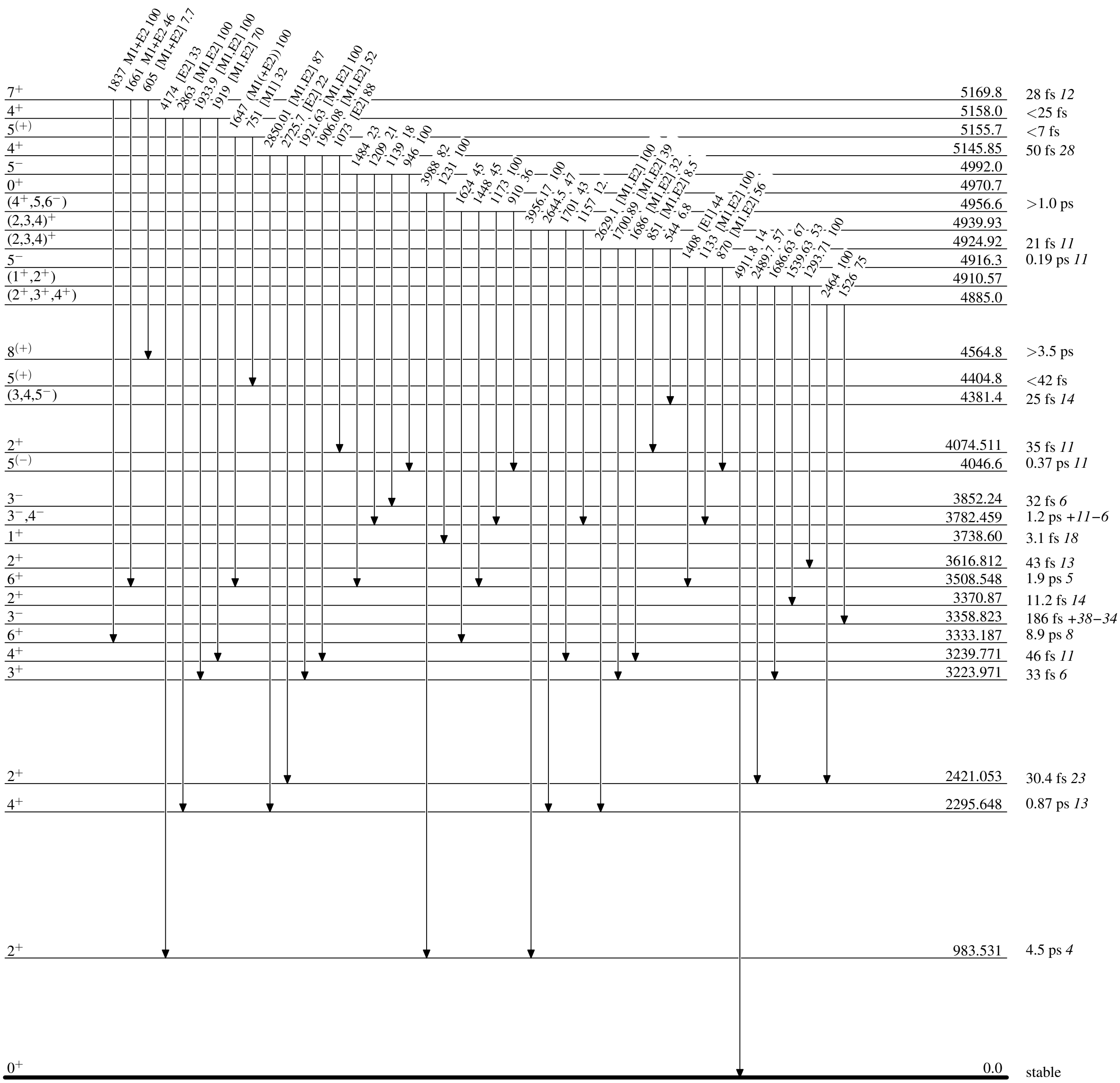


$^{48}_{22}Ti_{26}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

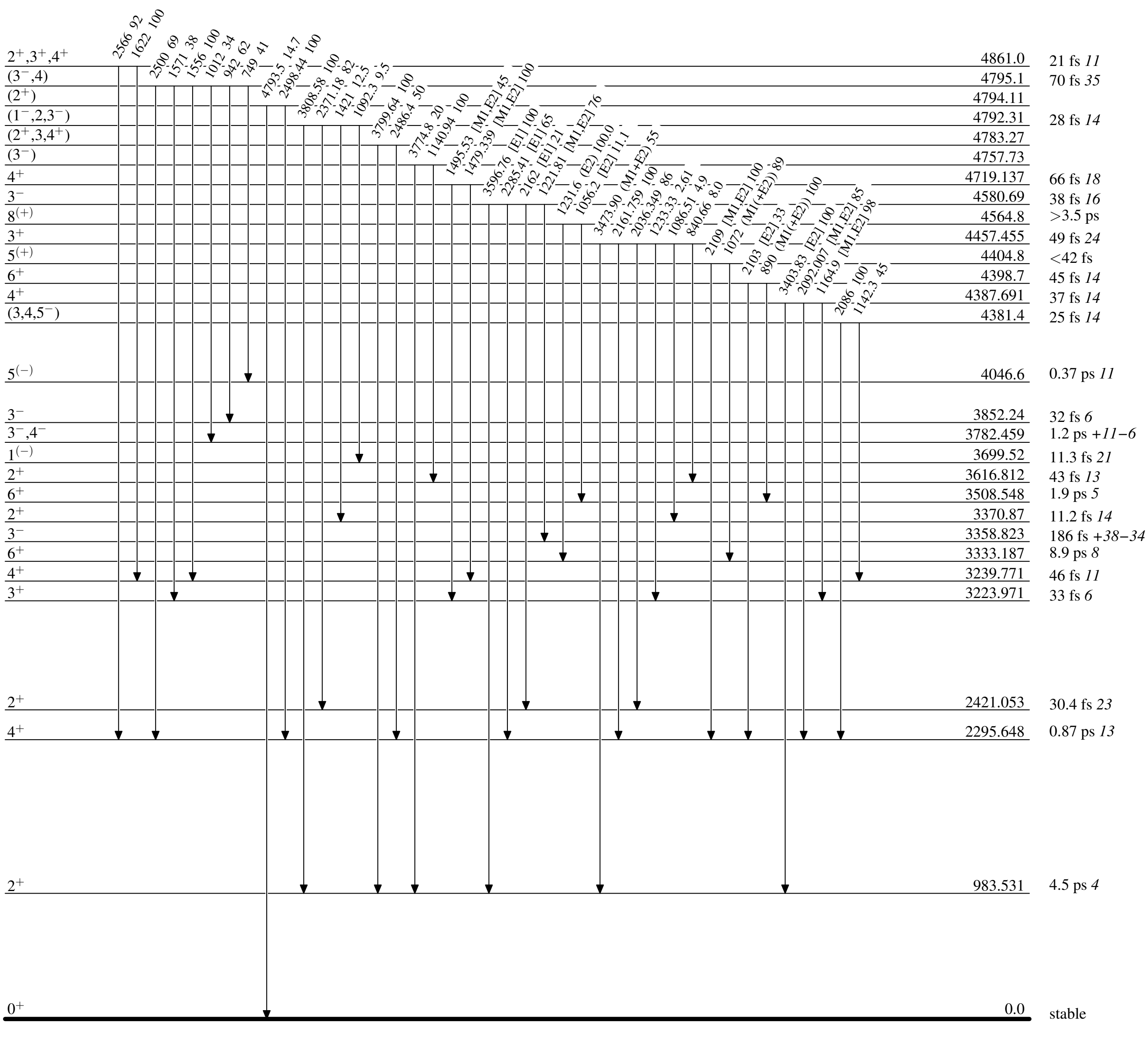


$^{48}_{22}Ti_{26}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



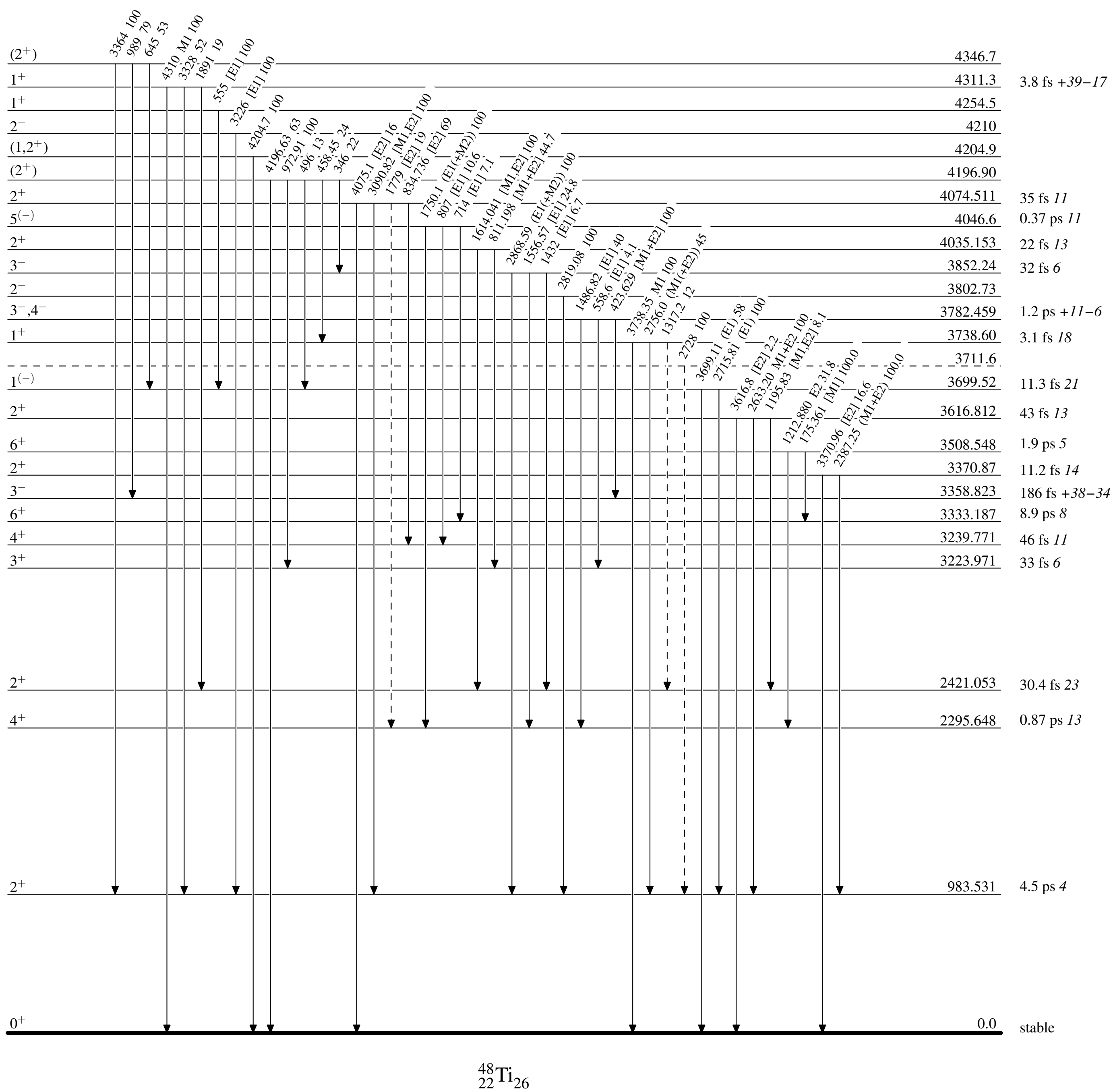
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

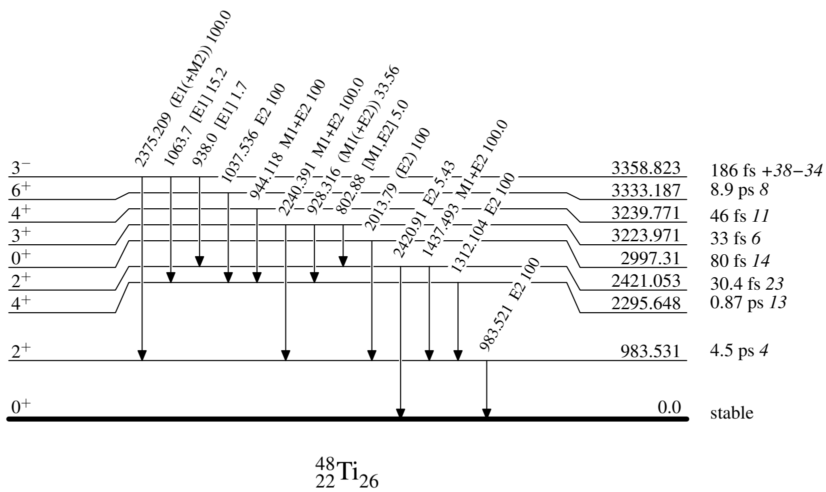
γ Decay (Uncertain)



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 157,1 (2019)	15-Apr-2019

Q(β^-)=−2207.6 *4*; S(n)=10939.19 *4*; S(p)=12159.4 *27*; Q(α)=−10717.2 *22* 2017Wa10
S(2n)=19081.59 *5*, S(2p)=21784.97 *9* (2017Wa10).
Other measurements:
Mass measurements: 2017Ka53 (using LEBIT at NSCL-MSU), 1972De39.
Hyperfine structure measurements:
2004Ga34, 2002Ca47, 2000Ga58: measured hyperfine structure for g.s. using collinear laser spectroscopy; deduced isotope shift, charge radius.
1996Fu23: measured optical isotope shift for g.s., deduced mean square nuclear charge radius.
1996Lu12, 1994Lu18, 1992Az03: measured hyperfine structure, deduced isotope shift for g.s., and mass shifts.
1995Ga44, 1994An35: measured hyperfine structure, deduced isotopes shifts, mass shifts.
1983Ku10, 1980Po01: measured pionic x-rays, strong interaction shifts, and widths; deduced rms radius.
1981Wo02: measured muonic x-rays; deduced charge radius, and isotone shifts.
Other reactions:
Additional information 1.
1990We05: ^{50}Ti(π^+,π^-),E=35 MeV. Measured $\sigma(\theta)$ for double isobaric analog transitions using a clamshell spectrometer.
1975We11: ^{51}V(γ,p),E=17.62 MeV. Measured σ and correlated the results to L(d,^{3}He)=3 spectroscopic factors for the first 0^+ and 4^+ states.
Theory references: consult the NSR database (www.nndc.bnl.gov/nsr/) for 200 primary references dealing with various aspects of nuclear structure.

^{50}Ti Levels

States at 3771 observed by 1964Bj01 in (d,p) and at 4226, 5282, 5510, and 5919 keV observed by 1989Og01 in (^{16}O,^{14}C) have not been adopted by the evaluators.

Cross Reference (XREF) Flags

A	^{50}Sc β^- decay (102.5 s)	K	^{49}Ti(n,γ),(pol n,γ) E=thermal	U	^{50}V(d,^{2}He)
B	^{50}Sc β^- decay (0.35 s):?	L	^{49}Ti(n,γ),(n,n):resonances	V	^{51}V(e,e′p)
C	^{50}V ε decay (2.65×10^{17} y)	M	^{49}Ti(d,p)	W	^{51}V(n,d)
D	^{9}Be(^{46}Ar,5nγ)	N	^{49}Ti(d,pγ)	X	^{51}V(p,2p)
E	C(^{46}Ca,^{50}Tiγ)	O	^{50}Ti(γ,γ')	Y	^{51}V(d,^{3}He),(pol d,^{3}He)
F	^{48}Ca(^{3}He,n)	P	^{50}Ti(e,e′)	Z	^{51}V(α,α'p)
G	^{48}Ca(α,2nγ),(^{6}Li,3npγ)	Q	^{50}Ti(π^-,$\pi^{-\prime}$),(π^+,$\pi^{+\prime}$)	Others:	
H	^{48}Ca(^{9}Be,3n$\alpha\gamma$)	R	^{50}Ti(p,p′)	AA	^{52}Cr(^{14}C,^{16}O)
I	^{48}Ca(^{16}O,^{14}C),(^{18}O,^{16}C)	S	^{50}Ti(^{3}He,^{3}He′),(α,α')		
J	^{48}Ti(t,p),(t,pγ)	T	Coulomb excitation		

E(level)[†]	J$^{\pi}$[#]	T$_{1/2}$[‡]	XREF	Comments
0.0[b]	0^+	stable	ABCDEFGHIJK MNOPQRST VWXYZ	XREF: Others: AA XREF: B(?).
1553.794[b] *8*	2^+	1.047[a] ps *35*	ABCDEFGHIJK MNOPQRST VW Y	XREF: Others: AA μ=+2.89 *15* (2000Sp08,2014StZZ) Q=+0.08 *16* (1975To06,2016St14) XREF: B(?)S(1520). J$^{\pi}$: ΔJ=2, E2 1553.8γ to 0^+; L(α,α')=L(e,e′)=2. μ: from g=+1.444 *77* from transient magnetic fields in Coulomb excitation in inverse kinematics (2000Sp08)

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Adopted Levels, Gammas (continued)

^{50}Ti Levels (continued)

E(level)[†]	J^{π}[#]	$T_{1/2}$[‡]	XREF	Comments
				using $T_{1/2}$=1.12 ps for level half−life. Others: +2.2 *22* (2003Sp04, same group as 2000Sp08), 2.68 *84* (quoted by 1989Ra17 from D.Phil. thesis by B.J. Murphy, Oxford,1980; using $T_{1/2}$=0.97 ps). Q: reorientation method in Coul. ex. (1975To06). Other: −0.02 *9* (1970Ha24). Evaluated rms charge radius: $<r^2>^{1/2}$=3.5704 fm *22* (2013An02). Evaluated $\delta<r^2>$(^{50}Ti,^{48}Ti)=−0.160 fm^2 *7* (2013An02).
2674.932[b] *10*	4^+	5.3 ps *11*	A DE GHIJK MN PQRS VW Y	XREF: Others: AA XREF: M(2688)S(2640). J^{π}: ΔJ=2, E2 1121.1γ to 2^+; L(α,α′)=L(p,p′)=4 from 0^+. $T_{1/2}$: from RDM in (^{6}Li,3npγ). Other: <2.8 ns from γ(t) in (d,pγ); 6.22 ps *+21−19* from B(E4)(W.u.) in (e,e′). B(E4)(W.u.)=4.70 *15* (1971He08) in (e,e′).
3198.730[b] *21*	6^+	418 ps *20*	A D GHI K MN P R VW Y	XREF: Others: AA μ=+9.4 *10* (1976Bo25) J^{π}: ΔJ=2, E2 523.8γ to 4^+; L(p,p′)=6 from 0^+. $T_{1/2}$: βγ(t) in ^{50}Sc β^- decay. Other: <2.8 ns from γ(t) in (d,pγ). μ: g=+1.57 *17* measured using integral perturbed angular distribution (IPAD) method in (α,2nγ) (1976Bo25). +9.3 *10* in 2014StZZ compilation.
3862.81 *4*	$(2,3)^+$		K m R w	XREF: m(3879)R(3870)w(3800). J^{π}: L(p,p′)=2 from 0^+; 2867.4γ from 3^-.
3868.3 *20*	0^+	0.50 ps *23*	J m Q w	XREF: m(3879)Q(3870)w(3800). J^{π}: L(t,p)=0 from 0^+. $T_{1/2}$: from DSAM in (t,pγ).
3974.9? *10*			G	
4147? *7*	$3^-,4^-$		Y	E(level): may correspond to 4147.2 state but π suggests different level. J^{π}: L(d,^{3}He)=0 from $7/2^-$.
4147.210 *13*	4^+	33 fs *+7−5*	A G IJK MN RS	XREF: I(4180). J^{π}: spin from nuclear orientation and circ pol in (n,γ) assuming the primary γ rays are dipole; π=+ from L(d,p)=1; also L(p,p′)=4 from 0^+.
4172.003 *19*	3^+	>0.83 ps	A i K mN r y	XREF: i(4226). J^{π}: spin from nuclear orientation and circ pol in (n,γ) assuming the primary γ rays are dipole. Parity from L(d,p)=1 which gives J^{π}=2 to 5, π=+; L(d,^{3}He)=3 giving J=0 to 7, π=+; and $1^+,2^+,3^+$ from L=2 in (p,p′), (^{3}He,^{3}He′) and (α,α′) for 4172 doublet.
4172.8 *3*	(2^+)	<11 fs	iJ mN Qr y	XREF: i(4226). J^{π}: L(t,p)=(2) from 0^+. 2^+ from calculations of 1978Jo06. See also comment for 4171.96 level. $T_{1/2}$: other: ≤0.2 ps DSAM in (t,pγ).
4309.86 *11*	2^+	6.1 fs *12*	IJK MNOPQR Y	XREF: Others: AA XREF: N(4322). J^{π}: L(p,p′)=L(e,e′)=L(t,p)=2 from 0^+, L(d,p)=1 from $7/2^-$; 4309.7γ to 0^+. $T_{1/2}$: from B(E2)↑=0.0051 *8* in (e,e′) and adopted branching ratios. Others: 0.7 fs<$T_{1/2}$<4.2 fs from $\Gamma_{\gamma0}$ in (γ,γ′) and 4.3 fs from B(E2)↑ in

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Adopted Levels, Gammas (continued)

^{50}Ti Levels (continued)

E(level)†	J^{π}#	$T_{1/2}$‡	XREF	Comments
				(p,p′),(^{3}He,^{3}He),(α,α′); <2.8 ps from γ(t) in (d,pγ) and ≤60 fs from DSAM in (t,pγ).
4410.02 *3*	3^-	<2.8 ns	JK MN PQRS V Y	XREF: J(4424)P(4420)S(4380). J^{π}: L(d,^{3}He)=0 from $7/2^-$; L(e,e′)=L(α,α′)=3 from 0^+. $T_{1/2}$: from γ(t) in (d,pγ). B(E3)(W.u.)=3.76 *15* from (e,e′) (1971He08).
4486.74 *6*	(2^+)		F K	XREF: F(4440). J^{π}: primary γ from 3^-,4^-; 4486.0γ to 0^+; L(^{3}He,n)=(2) from 0^+.
4536 *20*			M	
4576 *20*			M	
4789.97 *6*	2^+	<14 fs	IJK MN RS Y	XREF: M(4805). J^{π}: L(d,p)=1 from $7/2^-$; L(p,p′)=2 from 0^+; 4789.3γ to 0^+. But L(α,α′)=4 from 0^+ is inconsistent and could indicate a separate level.
4880.705 *15*	5^+	215 fs *+45−35*	A K MN P	XREF: M(4896). J^{π}: spin from nuclear orientation and circ pol in (n,γ) assuming the primary γ rays are dipole; π from L(d,p)=1.
4928 *8*	(1 to 6)$^-$		j Y	XREF: j(4911). J^{π}: L(d,^{3}He)=2 from $7/2^-$.
4940 *20*	$(2)^+$		j R	XREF: j(4911). J^{π}: L(p,p′)=2 from 0^+.
5110 *8*			J M	E(level): weighted average of 5125 *15* from (t,p) and 5106 *8* from (d,p).
5186.103 *18*	$(3,4)^+$	<6.9 fs	jK MN	XREF: j(5198)M(5202). J^{π}: spin from nuclear orientation and circ pol in (n,γ) assuming the primary γ rays are dipole; π from L(d,p)=1.
5191 *8*	3^-,4^-		j R Y	XREF: j(5198)R(5203). J^{π}: L(d,^{3}He)=0+2 from $7/2^-$; L(p,p′)=3 from 0^+.
5282?			I	E(level): could be the 5191 level in other studies.
5334 *5*	$(4,5,6)^-$		M R V Y	E(level): weighted average of 5346 *8* (d,p); 5329 *5* (p,p′); 5333 *8* (d,^{3}He). J^{π}: L(d,^{3}He)=2 from $7/2^-$; L(p,p′)=5,6 from 0^+.
5379.942 *19*	4^+	33 fs *+9−7*	A jK MN Rs	XREF: j(5395)s(5380). J^{π}: spin from nuclear orientation and circ pol in (n,γ) assuming the primary γ rays are dipole; π from L(d,p)=1; also L(p,p′)=4 from 0^+.
5407 *8*	3^-,4^-		j s Y	XREF: j(5395)s(5380). J^{π}: L(d,^{3}He)=0+2 from $7/2^-$.
5440.74 *20*	4^+,5^+		A IJ M R	XREF: I(5420). J^{π}: L(p,p′)=4 from 0^+; L(d,p)=1+3 from $7/2^-$; log *ft*=6.4 from 5^+ parent.
5528 *8*	3^-,4^-		i Y	XREF: i(5510). J^{π}: L(d,^{3}He)=0+2 from 0^+.
5547.81 *4*	(4^+)		i K	XREF: i(5510). J^{π}: 2872.7γ to 4^+, 3993.9γ to 2^+, possible 2348.3γ to 6^+.
5560 *20*	$(3)^-$		R	J^{π}: L(p,p′)=3 from 0^+.
5561 *6*	(2 to 5)$^+$		M	J^{π}: L(d,p)=1 from $7/2^-$.
5600 *6*	(2 to 5)$^+$		M	J^{π}: L(d,p)=1+3 from $7/2^-$.
5633 *15*	0^+		J	J^{π}: L(t,p)=0 from 0^+.
5694.87 *8*	2^+,3^+		jK R	XREF: j(5697)R(5679).

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Adopted Levels, Gammas (continued)

^{50}Ti Levels (continued)

E(level)†	J$^{\pi}$#	$T_{1/2}$‡	XREF	Comments
				J$^{\pi}$: L(p,p′)=2 from 0$^+$; 3019.9γ to 4$^+$.
5717 *6*			j M	XREF: j(5697).
5771 *9*	3$^-$,4$^-$		Y	J$^{\pi}$: L(d,^{3}He)=0 from 7/2$^-$.
5787 *5*	(4)$^+$		R	J$^{\pi}$: L(p,p′)=4 from 0$^+$.
5795 *9*	(1 to 6)$^-$		s V Y	XREF: s(5810). J$^{\pi}$: L(d,^{3}He)=2 from 7/2$^-$.
5806.54 *16*	4$^+$,5$^+$		A K M Rs	XREF: M(5821)R(5817)s(5810). J$^{\pi}$: log *ft*=5.7 from 5$^+$ parent; L(p,p′)=4 from 0$^+$; L(d,p)=1+3 from 7/2$^-$; primary γ from 3$^-$,4$^-$ n-capture state.
5837.2 *6*	(2 to 5)$^{(+)}$	26 fs +*19*−*14*	i mN s	XREF: i(5850)m(5851)s(5810). J$^{\pi}$: 1690.0γ and 3162γ to 4$^+$; 2$^+$,3$^+$,4$^+$,5$^+$ from L(d,p)=1+3 for 5837 and/ or 5880 levels.
5880 *9*	(0 to 7)$^+$		i m Y	XREF: i(5850)m(5851). J$^{\pi}$: L(d,^{3}He)=3 from 7/2$^-$.
5945 *5*	(3)$^-$		i R xY	XREF: i(5919)x(6100). J$^{\pi}$: L(p,p′)=3 from 0$^+$.
5946.479 *22*	3$^+$,4$^+$	19 fs *5*	i K MN z	XREF: i(5919)z(6000). J$^{\pi}$: spin from nuclear orientation and circ pol in (n,γ) assuming the primary γ rays are dipole; π from L(d,p)=1 from 7/2$^-$.
6044 *5*	3$^-$,4$^-$		R V xYz	XREF: x(6100)z(6000). J$^{\pi}$: L(d,^{3}He)=0 from 7/2$^-$.
6045 *15*	0$^+$		J	J$^{\pi}$: L(t,p)=0 from 0$^+$.
6072 *15*	(2)$^+$		J M	E(level): from (d,pγ). Others: 6068 *15* from (t,p), 6079 *20* from (d,p). J$^{\pi}$: L(t,p)=2 from 0$^+$; L(d,p)=1 from 7/2$^-$.
6123.15 *4*	(4$^+$)	38 fs +*12*−*9*	K N R	J$^{\pi}$: 2924.0γ to 6$^+$, 1636.5γ to (2$^+$); D,E2 γ rays to 1$^-$,2$^+$ and 6$^+$; spin=(3,4,5) from nuclear orientation and CP in (n,γ).
6136.3[c] *6*	(7)$^+$		D GH M Y	J$^{\pi}$: ΔJ=1, M1+E2 2937.6γ to 6$^+$. But L(d,p)=1+3 from 7/2$^-$ for a level at 6138 is inconsistent; it could be for the 6123 level.
6156.47 *22*	(2,3,4$^+$)		K	J$^{\pi}$: spin from nuclear orientation and circ pol in (n,γ) assuming the primary γ rays are dipole. 4602.5γ to 2$^+$.
6172 *7*	(2 to 5)$^+$		M R Y	XREF: M(6176)R(6166)Y(6191). E(level): weighted average of 6176 *20* in (d,p), 6166 *5* in (p,p) and 6191 *9* in (d,^{3}He). J$^{\pi}$: L(d,^{3}He)=3 and L(d,p)=1 from 7/2$^-$.
6212 *5*	(1 to 6)$^{(-)}$		J M R	E(level): weighted average of 6207 *15* from (t,p), 6210 *20* from (d,p), and 6213 *5* from (p,p′). J$^{\pi}$: L(d,p)=(2) from 7/2$^-$.
6249 *6*	(0 to 7)$^+$		M Y	E(level): weighted average of 6250 *6* from (d,p) and 6248 *9* from (d,^{3}He). J$^{\pi}$: L(d,^{3}He)=3 from 7/2$^-$.
6301.81 *4*	(1,2,3)$^-$		K M Y	J$^{\pi}$: L(d,^{3}He)=2 from 7/2$^-$; 4747.7γ to 2$^+$.
6379.88 *14*	(5)$^-$	<19 fs	K N r v Y	XREF: r(6380)v(6386). J$^{\pi}$: L(d,^{3}He)=2 from 7/2$^-$; 3181.9$\gamma\gamma$ to 6$^+$; possible 2232.3γ to 4$^+$.
6392 *6*	(2 to 5)$^+$		M r	XREF: r(6380). J$^{\pi}$: L(d,p)=1 from 7/2$^-$.

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Adopted Levels, Gammas (continued)

^{50}Ti Levels (continued)

E(level)[†]	J^{π}[#]	$T_{1/2}$[‡]	XREF	Comments
6399.81 *15*	(3)$^-$		K v Y	XREF: v(6386). J^{π}: L(d,^{3}He)=0 from 7/2$^-$; 4845.6γ to 2$^+$.
6.4×10^3 *5*			U	E(level): energy bin=5.9-6.9 MeV. L(d,^{2}H)=0 from 6$^+$ target for a wide bin.
6461 *9*	(1 to 6)$^-$		Y	J^{π}: L(d,^{3}He)=2 from 7/2$^-$.
6481.2 *4*	3$^+$	<17 fs	J MN R	J^{π}: L(p,p$'$)=4 from 0$^+$; L(t,p)=2 from 0$^+$; also L(d,p)=1 from 7/2$^-$.
6521.41 *4*	3$^+$,4$^+$	7.6 fs *+35−28*	K MN R Y	J^{π}: L(p,p$'$)=4 from 0$^+$; 1730.8γ to 2$^+$.
6540.7[c] *8*	(8)$^+$		D GH	J^{π}: ΔJ=1, M1+E2 404.4γ to (7)$^+$.
6548 *15*			J	
6583 *10*	(1 to 6)$^-$		m s V Y	XREF: m(6592)s(6570). J^{π}: L(d,^{3}He)=2 from 7/2$^-$.
6608 *5*	(3)$^-$		j m Rs Y	XREF: j(6624)m(6592)s(6570). E(level): weighted average of 6609 *5* from (p,p$'$), and 6606 *10* from (d,^{3}He). J^{π}: L(p,p$'$)=3 from 0$^+$.
6636 *6*	(0 to 7)$^+$		j M	XREF: j(6624). J^{π}: L(d,p)=3 from 7/2$^-$.
6665 *10*	(1 to 6)$^-$		M Y	XREF: M(6697). J^{π}: L(d,^{3}He)=2 from 7/2$^-$.
6710.570 *24*	4$^+$	11 fs *5*	jK MN R Y	XREF: j(6724)M(6726). J^{π}: spin from nuclear orientation and circ pol in (n,γ) assuming the primary γ rays are dipole; π=+ from L(d,^{3}He)=1; also L(p,p$'$)=4 from 0$^+$.
6729.86 *6*	3$^-$		jK M S	XREF: j(6724)M(6744)S(6720). J^{π}: L(α,α')=3.
6766 *10*	(0 to 7)$^+$		J Y	E(level): weighted average of 6756 *15* from (t,p) and 6770 *10* from (d,^{3}He). J^{π}: L(d,^{3}He)=3 from 7/2$^-$.
6770.5[c] *9*	(9)$^+$		D GH	J^{π}: ΔJ=1, M1+E2 229.8γ to (8)$^+$.
6837.64 *7*	(2$^+$,3,4$^+$)		K	J^{π}: 1457.6γ to 4$^+$ and 5283.4γ to 2$^+$.
6849.05 *8*	(5)$^-$		K Y	J^{π}: L(d,^{3}He)=2 from 7/2$^-$; primary 4089.9γ from 3$^-$,4$^-$; 2700.6γ to 4$^+$ and 3649.9γ to 6$^+$;
6864 *5*	(5)$^+$		M R	J^{π}: L(d,p)=1+3 from 7/2$^-$; L(p,p$'$)=5,6 from 0$^+$.
6933 *15*			J M	E(level): weighted average of 6945 *15* from (t,p) and 6913 *20* from (d,p).
6975 *5*	3$^-$,4$^-$		J M R v Y	XREF: v(7000). E(level): weighted average of 6992 *15* from (t,p), 6986 *20* from (d,p), 6975 *5* from (p,p$'$), and 6963 *10* from (d,^{3}He). J^{π}: L(d,^{3}He)=0 from 7/2$^-$.
7029.39 *25*	2$^+$,3$^+$,4$^+$		jK M y	XREF: j(7041)y(7037). J^{π}: L(d,p)=1 from 7/2$^-$; 2719.1γ to 2$^+$; L(t,p)=2 from 0$^+$ for 7029 and/or 7049 levels.
7047 *10*	(3)$^-$		R v	XREF: v(7000). J^{π}: L(p,p$'$)=3 from 0$^+$.
7049 *20*	(2 to 5)$^+$		j M y	XREF: j(7041)y(7037). J^{π}: L(d,p)=1 from 7/2$^-$.
7078.72 *23*	(3)$^-$		jK M R y	XREF: j(7091)y(7083).

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Adopted Levels, Gammas (continued)

^{50}Ti Levels (continued)

E(level)†	Jπ#	XREF	Comments
			Jπ: L(p,p′)=3 from 0+; L(d,^{3}He)=2 from 7/2−; 4402.1γ to 4+ and 5525.5γ to 2+. But L(d,p)=3 from 7/2− for a level at 7978 is inconsistent.
7094 *20*	(1 to 6)−	j M y	XREF: j(7091)y(7083). Jπ: L(d,p)=2 from 7/2−.
7115 *10*	(1)+&	R	Jπ: L(p,p′)=0 from 0+.
7132 *20*	3−	M S	E(level): from (d,p). Jπ: L(α,α′)=3 from 0+.
7.19×10^3 *6*	0+	F I	Jπ: L(^{3}He,n)=0; also L=0 in (^{16}O,^{14}C).
7210 *10*	(3)−	j R	XREF: j(7230). Jπ: L(p,p′)=3 from 0+.
7232.19 *23*	(2)+	jK M R	XREF: j(7230). Jπ: L(d,p)=1 from 7/2−; L(p,p′)=2 from 0+.
7249 *6*	(2 to 5)+	M	Jπ: L(d,p)=1 from 7/2−.
7280 *20*	(1 to 7)+	M	Jπ: L(d,p)=3 from 7/2−.
7293 *10*		P	
7335 *10*	(2)+	R	Jπ: L(p,p′)=2 from 0+.
7382 *9*	(3)−	j M R	XREF: j(7387)M(7367)R(7407). E(level): weighted average of 7387 *6* from (d,p) and 7367 *10* from (p,p′). Jπ: L(p,p′)=3 from 0+.
7407 *20*	(2 to 5)+	j M	XREF: j(7387). Jπ: L(d,p)=1 from 7/2−.
7441 *15*		J M	E(level): weighted average of 7438 *15* from (t,p) and 7447 *20* from (d,p) (p,p′).
7471 *20*	(2 to 5)+	j M r	XREF: j(7494)r(7482). Jπ: L(d,p)=1 from 7/2−.
7482.96 *7*	(2)+	jK M r	XREF: j(7494)M(7504)r(7482). Jπ: L(d,p)=1 from 7/2−; 5929.1γ to 2+; L(t,p)=2 for 7471 and/or 7483 levels.
7536 *10*	(3)−	m R	XREF: m(7550). Jπ: L(p,p′)=3 from 0+.
7539.5? *22*		G m	XREF: m(7550). Jπ: possible 770.2γ to (9)+ suggests high spin.
7572.6c *11*	(10)+	D GH	Jπ: ΔJ=1, M1+E2 802.1γ to (9)+.
7577 *10*	0+,1+	J m R	XREF: m(7550). E(level): from (p,p′). Other: 7579 *15* from (t,p). Jπ: L(p,p′)=0 from 0+.
7605 *11*	(3−,4−)	V Y	E(level): from (d,^{3}He). Jπ: L(d,^{3}He)=(0) from 7/2−.
7631 *20*	(5)+	M R	XREF: R(7650). Jπ: L(d,p)=1 from 7/2−; L(p,p′)=5,6 from 0+.
7667 *15*	(2)+	J M	E(level): weighted average of 7670 *15* (t,p) and 7663 *20* (d,p). Jπ: L(t,p)=2 from 0+.
7699 *10*	(3)−	J Rs Y	XREF: s(7720). E(level): weighted average of 7701 *15* (t,p), 7700 *10* (p,p′) and 7697 *11* (d,^{3}He). Jπ: L(p,p′)=3 from 0+; L(d,^{3}He)=(0) from 7/2−.
7734 *15*		J s	XREF: s(7720).
7808 *15*	(0+)	J	Jπ: L(t,p)=(0) from 0+.
7867 *10*	0+,1+	J R	E(level): weighted average of 7871 *15* from (t,p) and 7862 *10* from (p,p′). Jπ: L(p,p′)=0 from 0+.
7924 *10*	(5)−	J R	E(level): weighted average of 7921 *15* from (t,p) and 7925 *10* from (p,p′). Jπ: L(p,p′)=5 from 0+.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{50}Ti Levels (continued)

E(level)†	Jπ#	XREF	Comments
7941 *15*		J	
8034 *10*	(4)$^+$	J R	E(level): weighted average of 8031 *15* from (t,p) and 8035 *10* from (p,p′). J$^\pi$: L(p,p′)=4 from 0$^+$.
8079 *10*	(1)$^{+}$&	J R	E(level): weighted average of 8089 *15* from (t,p) and 8074 *10* from (p,p′). J$^\pi$: L(p,p′)=0 from 0$^+$.
8150 *10*		J R	E(level): weighted average of 8156 *15* from (t,p) and 8148 *10* from (p,p′).
8.15×10^3 *25*		U	E(level): energy bin=7.9-8.4 MeV. L(d,^{2}H)=0 from 6$^+$ target for a wide bin.
8203 *10*	(3)$^-$	J R	E(level): weighted average of 8200 *15* from (t,p) and 8205 *10* from (p,p′). J$^\pi$: L(p,p′)=3 from 0$^+$.
8241 *10*	0$^+$,1$^+$	J R	E(level): weighted average of 8247 *15* from and 8238 *10* from (p,p′). J$^\pi$: L(p,p′)=0 from 0$^+$.
8257.7? *24*		G	
8290 *10*	(3)$^-$	J R	E(level): weighted average of 8292 *15* from (t,p) and 8287 *10* from (p,p′). J$^\pi$: L(p,p′)=3 from 0$^+$.
8407 *12*		P	E(level): Unresolved purely transverse multiplet in (e,e′).
8444 *10*	0$^+$,1$^+$	R	J$^\pi$: L(p,p′)=0 from 0$^+$.
8.56×10^3 *2*	1$^+$	P	J$^\pi$: M1 excitation in (e,e′).
8578 *10*	(3)$^-$	R	E(level): due to J^π consideration, level is different from 8560 level. J$^\pi$: L(p,p′)=3 from 0$^+$.
8606 *10*	(1)$^{+}$&	R	J$^\pi$: L(p,p′)=0 from 0$^+$.
8.64×10^3 *2*	2$^-$	P	J$^\pi$: M2 excitation in (e,e′).
8.65×10^3 *25*		U	E(level): energy bin=8.4-8.9 MeV. L(d,^{2}H)=0 from 6$^+$ target for a wide bin.
8725 *10*	(2$^-$)	P R	E(level): weighted average of 8720 *2* from (e,e′) and 8726 *10* from (p,p′). J$^\pi$: L(p,p′)=(1) from 0$^+$; M2,(E3) excitation in (e,e′).
8755 *7*		P	
8793.7^c *17*	(11$^+$)	D GH	J$^\pi$: ΔJ=1, (M1+E2) 1221.1γ to (10)$^+$; J=11 favored from excitation function in (α,2nγ).
8.81×10^3 *2*	1^{+}&	P R	E(level): from (e,e′) and (p,p′). J$^\pi$: M1 excitation in (e,e′); L(p,p′)=0 from 0$^+$.
8815 *10*	(3)$^-$	R	J$^\pi$: L(p,p′)=3 from 0$^+$.
8.87×10^3 *2*	(2$^+$)	P	J$^\pi$: (E2) excitation in (e,e′).
8883 *10*	(2,3)$^-$	P R	E(level): weighted average of 8890 *2* from (e,e′) and 8881 *10* from (p,p′). J$^\pi$: L(p,p′)=3; Q,(E3) excitation in (e,e′).
8973 *10*	(3)$^-$	P R	E(level): weighted average of 8980 *2* from (e,e′) and 8971 *10* from (p,p′). J$^\pi$: L(p,p′)=3 from 0$^+$; (E3) excitation in (e,e′).
9.03×10^3 *2*	(1)$^{+}$&	R	J$^\pi$: L(p,p′)=0 from 0$^+$.
9.05×10^3 *2*	2$^-$	P	J$^\pi$: M2 excitation in (e,e′).
9061 *12*		P	
9127 *10*		R	
9188 *15*		P	
9.21×10^3 *2*	1^{+}&	P R	E(level): from (e,e′) and (p,p′). J$^\pi$: L(p,p′)=0 from 0$^+$; E1,(M1) excitation in (e,e′).
9232 *10*	(4$^+$,5$^-$)	R	J$^\pi$: L(p,p′)=4,5 from 0$^+$.
9240 *20*	(1$^+$,2)	P	J$^\pi$: M1,M2,(E2) excitation in (e,e′).

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Adopted Levels, Gammas (continued)

^{50}Ti Levels (continued)

E(level)[†]	J^{π}[#]	XREF	Comments
9.28×10^3 *2*	(1,2$^-$)	P	J^{π}: M1,(M2,E1) excitation in (e,e′).
9282 *10*	(5$^-$,6$^+$)	R	J^{π}: L(p,p′)=5,6 from 0$^+$.
9.3×10^3 *4*		U	E(level): energy bin=8.9-9.7 MeV. L(d,^{2}H)=0(+1) from 6$^+$ target for a wide bin.
9339 *10*	(3)$^-$	R	J^{π}: L(p,p′)=3 from 0$^+$.
9368 *10*	(1$^+$)	P R	E(level): weighted average of 9370 *2* from (e,e′) and 9367 *10* from (p,p′). J^{π}: M1,(Q) excitation in (e,e′).
9391 *10*	(4)$^+$	R	J^{π}: L(p,p′)=4 from 0$^+$.
9442 *10*		P	
9504 *10*		R	
9508 *10*	(5$^-$,6$^+$)	R	J^{π}: L(p,p′)=5,6 from 0$^+$.
9550 *10*		R	
9614 *10*	(1)$^+$[&]	R	J^{π}: L(p,p′)=0 from 0$^+$.
9752 *10*	(3)$^-$	R	J^{π}: L(p,p′)=3 from 0$^+$.
9790	0$^+$,1$^+$	R	J^{π}: L(p,p′)=0 from 0$^+$.
9809 *10*		R	
9842 *10*	(4$^-$,5$^+$)	R	J^{π}: L(p,p′)=4,5 from 0$^+$.
9909 *10*	(3)$^-$	R	J^{π}: L(p,p′)=3 from 0$^+$.
9957 *14*	1$^+$[&]	P R	E(level): weighted average of 9930 *2* from (e,e′) and 9964 *10* from (p,p′). J^{π}: L(p,p′)=0 from 0$^+$; M1 excitation in (e,e′).
9999 *10*	(3)$^-$	R	J^{π}: L(p,p′)=3 from 0$^+$.
10.00×10^3 *2*	(2$^-$,1$^+$)	P	J^{π}: M2,(M1) excitation in (e,e′).
10045 *10*	(1)$^+$[&]	P R	E(level): weighted average of 10030 *2* from (e,e′), and 10049 *10* from (p,p′). J^{π}: M1+E3 excitation in (e,e′); L(p,p′)=0 from 0$^+$.
10.05×10^3 *35*		U	E(level): energy bin=9.7-10.4 MeV. L(d,^{2}H)=0(+1) from 6$^+$ target for a wide bin.
10.14×10^3 *2*	(1$^+$,2$^-$)	P	J^{π}: M1,M2 excitation in (e,e′).
10162 *10*	1$^+$	P R	E(level): weighted average of 10170 *2* from (e,e′), and 10160 *10* from (p,p′). J^{π}: M1 excitation in (e,e′); L(p,p′)=0 from 0$^+$.
10206 *10*	(1)$^+$	f P R	XREF: f(10220). E(level): weighted average of 10210 *2* from (e,e′), and 10205 *10* from (p,p′). J^{π}: L(p,p′)=0 from 0$^+$; E1,(M1) excitation in (e,e′).
10240 *10*	(1$^+$,2$^-$,3$^-$)	f P R	XREF: f(10220). E(level): weighted average of 10250 *2* from (e,e′), and 10237 *10* from (p,p′). J^{π}: E3,(M1,M2) excitation in (e,e′).
10357 *14*	1$^+$	P R	E(level): weighted average of 10330 *2* from (e,e′), and 10364 *10* from (p,p′). J^{π}: M1 excitation in (e,e′); L(p,p′)=0 from 0$^+$.
10.38×10^3 *2*	(2$^-$,1$^+$)	P	J^{π}: M2,(M1) excitation in (e,e′).
10472 *11*	1$^+$	P R	E(level): weighted average of 10450 *2* from (e,e′) and 10478 *10* from (p,p′). J^{π}: M1 excitation in (e,e′); L(p,p′)=0 from 0$^+$.
10495 *10*	(3)$^-$	R	J^{π}: L(p,p′)=3 from 0$^+$.
10.54×10^3 *2*	(1$^+$,2$^-$)	P	J^{π}: M1,(M2) excitation in (e,e′).
10.58×10^3 *2*	1$^+$	P R	J^{π}: M1 excitation in (e,e′); L(p,p′)=0 for a doublet.
10.66×10^3 *2*	1$^+$	P	J^{π}: M1 excitation in (e,e′).
10.80×10^3 *2*	1$^+$	P R	J^{π}: L(p,p′)=0 from 0$^+$; M1,(E1,Q) excitation in (e,e′).
10.87×10^3 *2*	(1,2$^-$)	P	J^{π}: E1,M1,(M2) excitation in (e,e′).

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Adopted Levels, Gammas (continued)

^{50}Ti Levels (continued)

E(level)[†]	J^{π}[#]	$T_{1/2}$[‡]	XREF	Comments
10.90×10^3 *2*	2^+		P	J^{π}: E2 excitation in (e,e′).
10.91×10^3 *2*	$(1)^+$[&]		R	J^{π}: L(p,p′)=0 from 0^+.
(10939.184 *15*)	$3^-,4^-$		K	E(level): S(n) from 2017Wa10; held fixed in least-squares adjustment. J^{π}: s-wave neutron capture on a $7/2^-$ target.
10942.94 *4*	3^-[@]	0.26[@] keV *3*	L	
10943.89 *4*	(2 to $5)^+$[@]		L	
10946.67 *4*	(2 to $5)^+$[@]		L	
10947.45 *5*	4^-[@]	0.28[@] keV *3*	L	
10.95×10^3 *2*	1		P	J^{π}: dipole excitation in (e,e′).
10952.09 *4*	(2 to $5)^+$[@]		L	
10952.89 *4*	(2 to $5)^+$[@]		L	
10953.67 *5*	(2 to $5)^+$[@]		L	
10955.91 *5*	(2 to $5)^+$[@]		L	
10957.41 *5*	(2 to $5)^+$[@]		L	
10957.86 *5*	3^-[@]	126[@] eV *23*	L	
10960.63 *5*	3^-[@]	149[@] eV *17*	L	
10961.65 *5*	(2 to $5)^+$[@]		L	
10961.73 *5*	3^-[@]	0.65[@] keV *12*	L	
10964.51 *6*	(2 to $5)^+$[@]		L	
10965.94 *6*	4^-[@]	0.37[@] keV *6*	L	
10966.93 *6*	(2 to $5)^+$[@]		L	
10967.25 *6*	(2 to $5)^+$[@]		L	
10968.22 *6*	(2 to $5)^+$[@]		L	
10968.39 *6*	(2 to $5)^+$[@]		L	
10.97×10^3? *2*	$(2^-,3^+)$		P	J^{π}: M2,(M3) excitation in (e,e′).
10970.13 *6*		32[@] eV *16*	L	
10970.94 *6*	4^-[@]	1.4[@] keV *4*	L	
10972.61 *4*	(2 to $5)^+$[@]		L	
10973.80 *6*	(2 to $5)^+$[@]		L	
10974.64 *6*	(2 to $5)^+$[@]		L	
10975.15 *6*		0.0026[@] eV *7*	L	
10975.41 *6*	(2 to $5)^+$[@]	0.39[@] keV *10*	L	
10976.81 *6*	4^-[@]	1.51[@] keV *18*	L	
10980.84 *6*	$(3)^+$[@]		L	
10981.05 *6*			L	
10981.76 *6*	$(4)^+$[@]		L	
10982.31 *7*	$(3)^+$[@]		L	
10984.21 *7*	$(3)^+$[@]		L	
10987.91 *7*	$(3)^+$[@]		L	
10988.38 *7*	[@]		L	
10988.63 *7*	$(5)^+$[@]		L	
10989.60 *7*	(3)[@]	0.23[@] keV *6*	L	
10990.11 *8*			L	

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Adopted Levels, Gammas (continued)

^{50}Ti Levels (continued)

E(level)[†]	J^{π}[#]	$T_{1/2}$[‡]	XREF	Comments
10991.32 *8*			L	
10994.86 *8*	4^-[@]	0.53[@] keV *9*	L	
10996.41 *8*			L	
10996.72 *8*			L	
10997.39 *8*			L	
10998.05 *9*	3^-[@]	0.45[@] keV *11*	L	
10998.31 *9*	$(2\text{ to }5)^+$[@]		L	
11000.04 *10*	$(2\text{ to }5)^+$[@]		L	
11001.13 *10*	(3)[@]	0.23[@] keV *12*	L	
11001.34 *10*	$(2\text{ to }5)^+$[@]		L	
11005.43 *10*	3^-[@]		L	
11005.91 *10*	$(2\text{ to }5)^+$[@]		L	
11009.74 *10*	$(2\text{ to }5)^+$[@]		L	
11009.93 *10*	$(2\text{ to }5)^+$[@]		L	
11010.47 *10*	$(2\text{ to }5)^+$[@]		L	
11014.34 *11*	4^-[@]	0.89[@] keV *20*	L	
11015.54 *11*			L	
11015.96 *11*	$(2\text{ to }5)^+$[@]		L	
11.03×10^3 *2*	$(1,2^-)$		P	J^{π}: M1,(M2,E1) excitation in (e,e′).
11033.8 *3*	3^-[@]		L	
11043.4 *3*	3^-[@]		L	
11.07×10^3 *2*	1		P	J^{π}: dipole excitation in (e,e′).
11075.2 *4*	4^-[@]		L	
11082.0 *4*	3^-[@]		L	
11087.3 *5*	3^-[@]		L	
11088.3 *5*	4^-[@]		L	
11106.3 *5*	4^-[@]		L	
11108.0 *5*	4^-[@]		L	
11111.8 *5*	4^-[@]		L	
11120.2 *5*	3^-[@]		L	
11121.2 *6*	4^-[@]		L	
11123.1 *6*	3^-[@]		L	
11.13×10^3 *2*	$(2,1^+)$		P	J^{π}: M2,(M1,E2) excitation in (e,e′).
11132.2 *6*	4^-[@]		L	
11143.5 *6*	3^-[@]		L	
11150.8 *6*	4^-[@]		L	
11159.2 *7*	3^-[@]		L	
11173.4 *7*	4^-[@]		L	
11.19×10^3 *2*	$(1^-,2^-)$		P	J^{π}: E1,(M2) excitation in (e,e′).
11.22×10^3 *2*	$(2^-,1^+)$		P	J^{π}: M2,(M1) excitation in (e,e′).
11.29×10^3 *2*	3		P	J^{π}: octupole excitation in (e,e′).
11.3×10^3 *9*			U	E(level): energy bin=10.4-12.2 MeV. L(d,^{2}H)=0+1 from 6^+ target for a wide bin.
11.31×10^3 *2*	$(2^-,1^+)$		P	J^{π}: M2,(M1) excitation in (e,e′).
11.35×10^3 *2*	$(2^-,1^+)$		P	J^{π}: M2,(M1) excitation in (e,e′).

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Adopted Levels, Gammas (continued)

^{50}Ti Levels (continued)

E(level)[†]	J$^\pi$[#]	XREF	Comments
11.42×10^3 *2*	2$^-$	P	J$^\pi$: M2 excitation in (e,e′).
11.61×10^3 *2*	1	P	J$^\pi$: E1,(M1) excitation in (e,e′).
11.83×10^3 *2*	2$^-$	P	J$^\pi$: M2 excitation in (e,e′).
13.83×10^3 *6*	(2$^+$)	F	J$^\pi$: L(^{3}He,n)=(2) from 0$^+$.
14.1×10^3 *7*		U	E(level): energy bin=13.4-14.8 MeV. L(d,^{2}H)=1(+0) from 6$^+$ target for a wide bin.
15.39×10^3 *2*	(1)$^+$[&]	R	J$^\pi$: L(p,p′)=0 from 0$^+$.
16.01×10^3 *6*	(0$^+$)	F	J$^\pi$: L(^{3}He,n)=(0) from 0$^+$.
16.58×10^3 *6*	0$^+$	F	J$^\pi$: L(^{3}He,n)=0 from 0$^+$.

[†] From least-squares fit to Eγ data including primary γ rays from (n,γ), keeping the capture-state energy fixed. For levels not populated in γ-ray studies, values are the weighted averages of all the available data. In addition there are high-lying excitations at 6, 11 and 16 MeV in ^{51}V(α,α'p) reaction.

[‡] $T_{1/2}$ from DSAM in (d,pγ), except as noted.

[#] In ^{48}Ca(^{3}He,n) and ^{48}Ti(t,p) reactions, where J^π(target g.s.)=0$^+$, implied J^π=0$^+$ for L=0, 2$^+$ for L=2, 3$^-$ for L=3, 4$^+$ for L=4, assuming that for strong groups, the two neutrons or two protons are identical particles in S=0 state, whereas for weaker groups, S=1 state is also possible leading to unnatural−parity states with J=L−1 and L+1. In ^{49}Ti(d,p); ^{51}V(e,e′p) and ^{51}V(d,^{3}He) where J^π(target g.s.)=7/2$^-$, implied J^π=3$^-$,4$^-$ for L=0,0+2; 2 to 5, π=+ for L=1,1+3; 1 to 6, π=− for L=2,2+4; 0 to 7, π=+ for L=3; and 0 to 8, π=− for L=4. In ^{50}V(d,^{2}He) with J^π(target g.s.=6$^+$), implied J^π=5$^+$,6$^+$,7$^+$ for L=0; and 4 to 8, π=− for L=1.

[@] From ^{49}Ti(n,γ),(n,n):resonances.

[&] From L(p,p′)=0 in E_p=201 MeV and theory, $V_{\sigma\tau}$ part of the nucleon-nucleon interaction is strongly enhanced compared to the V_{00} part through which 0$^+$ states may be excited and also with respect to the $V_{\sigma 0}$ and $V_{0\tau}$ parts.

[a] Mean lifetime τ=1.51 ps *7* from weighted average of the following experimental results for mean lifetime τ=1.62 ps *7* (2000Sp08, DSAM in Coul. ex.), 1.73 ps *20* in 2003Sp04, DSAM in C(^{46}Ca,^{50}Ti), same group as 2000Sp08); 1.30 ps *40* (1976Ra03, from width in (γ,γ')); 1.44 ps *14* (from B(E2)↑=0.0315 *30* in Coul. ex. 1975To06); 1.10 ps *15* (1972WaYZ, DSAM in Coul. ex.); 1.469 ps *48* (from B(E2)↑=0.0307 *10* in (e,e′) 1971He08, uncertainty increased to 5% in averaging); 1.38 ps *13* (from B(E2)↑=0.033*30* in Coul. ex. 1970Ha24); 1.74 ps *13* (from B(E2)↑=0.026 *2* in Coul. ex. 1965Si02, 0.024 *2* in 1965Si02 reanalyzed by 1970Ha24); 1.17 ps *23* (from B(E2)↑=0.040 *8* in Coul. ex. 1962Va22). Other: 2.7 ps *5* (from B(E2)↑=0.0173 *35* in Coul. ex. 1967Af03) seems discrepant thus not used in the averaging procedure. 2016Pr01 evaluation gives τ=1.64 ps *+10−9* from model-independent analyses, and 1.59 ps *8*, which includes methods involving some model dependency.

[b] Seq.(A): Yrast sequence.

[c] Seq.(B): γ cascade based on (7$^+$).

Adopted Levels, Gammas (continued)

$\gamma(^{50}Ti)$

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[a]	δ	α[e]	Comments
1553.794	2^+	1553.768[‡] 8	100	0.0	0^+	E2			B(E2)(W.u.)=5.46 19 Mult.: ΔJ=2, Q from DCO in (^{9}Be,3nαγ); M2 ruled out by RUL.
2674.932	4^+	1121.124[‡] 5	100	1553.794	2^+	E2			B(E2)(W.u.)=5.5 +15−10 Mult.: Q from γ(DCO) in (^{9}Be,3nαγ); M2 ruled out by RUL.
3198.730	6^+	523.792[‡] 18	100	2674.932	4^+	E2			B(E2)(W.u.)=3.14 13 Mult.: stretched Q from γ(θ) in (α,2nγ) and γ(DCO) in (^{9}Be,3nαγ), M2 ruled out by RUL.
3862.81	$(2,3)^+$	2308.98 4	100	1553.794	2^+				
3868.3	0^+	2314.4 20	100	1553.794	2^+	(E2)[b]			B(E2)(W.u.)=1.6 +14−5 E_γ: from (t,pγ).
3974.9?		1300.0[#f] 10	100	2674.932	4^+				
4147.210	4^+	1472.255 8	100	2674.932	4^+	D,E2			
4172.003	3^+	1497.054 25	48 3	2674.932	4^+				
		2618.33 7	100 6	1553.794	2^+				
4172.8	(2^+)	2618.6[@] 4	100	1553.794	2^+	D,E2			
4309.86	2^+	2755.89 13	100 10	1553.794	2^+	M1+E2	−0.26 17		B(M1)(W.u.)=0.135 +49−37; B(E2)(W.u.)=2.8 +61−25 Mult.,δ: from pγ(θ) in (t,pγ) and comparison to RUL.
		4309.74 20	19.6 21	0.0	0^+	[E2]		1.29×10^{-3}	B(E2)(W.u.)=0.93 +45−28 α(K)=7.37×10^{-6} 11; α(L)=6.55×10^{-7} 10; α(M)=8.38×10^{-8} 12 α(N)=4.57×10^{-9} 7; α(IPF)=0.001278 18
4410.02	3^-	1735.00 5	25.5 17	2674.932	4^+				
		2856.13 4	100 7	1553.794	2^+				
4486.74	(2^+)	2933.27 12	100 10	1553.794	2^+				
		4486.0 4	17 3	0.0	0^+				
4789.97	2^+	3236.09 7	100 7	1553.794	2^+	D,E2			
		4789.3 4	11.3 19	0.0	0^+	(E2)[b]		1.43×10^{-3}	α(K)=6.34×10^{-6} 9; α(L)=5.63×10^{-7} 8; α(M)=7.20×10^{-8} 10 α(N)=3.93×10^{-9} 6; α(IPF)=0.001428 20
4880.705	5^+	733.69 9	2.12 20	4147.210	4^+	D,E2			
		1681.69 15	8.3[&] 24	3198.730	6^+	D,E2			
		2205.722 13	100[&] 6	2674.932	4^+	D,E2			
5186.103	$(3,4)^+$	1039[@f] 1	<6[@]	4147.210	4^+	D,E2			
		2511.110 22	100 7	2674.932	4^+	D,E2			
		3632.10 5	40.4 24	1553.794	2^+	D,E2			
5379.942	4^+	1207.930 12	54.8 31	4172.003	3^+	D,E2			
		2704.92 4	100[&] 7	2674.932	4^+	D,E2			
		3826.08 11	12.8[&] 10	1553.794	2^+	(E2)[b]		1.12×10^{-3}	B(E2)(W.u.)=0.15 +7−5

$^{50}_{22}Ti_{28}$-12

$\gamma(^{50}$Ti) (continued)

E_i(level)	J^{π}_i	E_γ[†]	I_γ[†]	E_f	J^{π}_f	Mult.[a]	δ	Comments
								α(K)=8.78×10^{-6} *13*; α(L)=7.80×10^{-7} *11*; α(M)=9.98×10^{-8} *14* α(N)=5.45×10^{-9} *8*; α(IPF)=0.001110 *16*
5440.74	$4^+,5^+$	2765.73[‡] *20*	100	2674.932	4^+			
5547.81	(4^+)	2348.3[f] *3*	27 *6*	3198.730	6^+			
		2872.72 *10*	100 *8*	2674.932	4^+			
		3993.87 *5*	82 *5*	1553.794	2^+			
5694.87	$2^+,3^+$	3019.86 *11*	100	2674.932	4^+			
5806.54	$4^+,5^+$	3131.71 *19*	100	2674.932	4^+			
5837.2	(2 to 5)$^{(+)}$	1690.0[@] *7*	100[@]	4147.210	4^+	D,E2		
		3162[@] *1*	82[@]	2674.932	4^+	D,E2		
5946.479	$3^+,4^+$	760.31 *8*	8.9 *9*	5186.103	$(3,4)^+$	(M1)		B(M1)(W.u.)=0.18 *+12−7* Mult.: dipole from comparison to RUL. $\Delta\pi$=no from level scheme. δ: ≤0.037 *6*.
		1156.65 *16*	5.2 *8*	4789.97	2^+	D,E2		
		1799[@][f] *1*	≈14[@]	4147.210	4^+	D,E2		
		3271.41 *3*	100 *6*	2674.932	4^+	D,E2		
6123.15	(4^+)	1242.38 *4*	100 *7*	4880.705	5^+	D,E2		
		1636.45 *5*	85 *6*	4486.74	(2^+)	(E2)[b]		
		1975.8[@][f] *6*	<15[@]	4147.210	4^+			
		2924.9 *5*	31 *7*	3198.730	6^+	(E2)[b]		
		3448.4 *5*	20 *5*	2674.932	4^+	D,E2		
6136.3	$(7)^+$	2937.5 *6*	100	3198.730	6^+	M1+E2[c]	−0.141[c] *25*	E_γ: weighted average of 2938.0 *7* from (^{46}Ar,5nγ), 2936.4 *16* from (α,2nγ), and 2935.5 *20* from (^{9}Be,3n$\alpha\gamma$).
6156.47	$(2,3,4^+)$	4602.50 *25*	100	1553.794	2^+			
6301.81	$(1,2,3)^-$	2128.4 *5*	15 *5*	4172.8	(2^+)			
		4747.73 *7*	100 *6*	1553.794	2^+			
6379.88	$(5)^-$	1498.8[@][f] *4*	117[@]	4880.705	5^+			
		2232.3[@][f] *7*	117[@]	4147.210	4^+			
		3181.9 *6*	100 *32*	3198.730	6^+			
6399.81	$(3)^-$	3724.1 *5*	65 *15*	2674.932	4^+			
		4845.6 *3*	100 *11*	1553.794	2^+			
6481.2	3^+	2309.1[@] *4*	100	4172.003	3^+	D,E2		
6521.41	$3^+,4^+$	1730.8 *3*	22 *6*	4789.97	2^+	D,E2		
		2348.5[@] *7*	21[@]	4172.8	(2^+)	D,E2		
		2373.3[@][f] *6*	21[@]	4147.210	4^+	D,E2		
		2658.75 *20*	47 *7*	3862.81	$(2,3)^+$	D,E2		
		3846.18 *11*	100 *9*	2674.932	4^+	D,E2		

$^{50}_{22}$Ti$_{28}$-13

Adopted Levels, Gammas (continued)

$\gamma(^{50}Ti)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[a]	δ	α[e]	Comments
6540.7	$(8)^+$	404.4 *4*	100	6136.3	$(7)^+$	M1+E2[c]	−0.017[c] *9*		E_γ: weighted average of 404.4 *4* from (^{46}Ar,5nγ) and 404.5 *7* from (α,2nγ),
6710.570	4^+	1524.53 *4*	64 *5*	5186.103	$(3,4)^+$	D,E2			
		2300.43 *5*	62 *5*	4410.02	3^-	(E1)			B(E1)(W.u.)=0.0008 *+8−3* Mult.: dipole from comparison to RUL. $\Delta\pi$=no from level scheme.
		2538.37 *10*	100 *10*	4172.003	3^+	D,E2			
		5156.46 *7*	78 *5*	1553.794	2^+	(E2)[b]		1.54×10^{-3}	B(E2)(W.u.)=0.33 *+35−13* α(K)=5.72×10^{-6} *8*; α(L)=5.08×10^{-7} *8*; α(M)=6.50×10^{-8} *9* α(N)=3.55×10^{-9} *5*; α(IPF)=0.001529 *22*
6729.86	3^-	2867.39 *21*	85 *11*	3862.81	$(2,3)^+$				
		4054.75 *11*	100 *8*	2674.932	4^+				
6770.5	$(9)^+$	229.8 *4*	100	6540.7	$(8)^+$	M1+E2[c]	−0.035[c] *15*	0.00233	α(K)=0.00211 *4*; α(L)=0.000192 *3*; α(M)=2.45×10^{-5} *4* α(N)=1.317×10^{-6} *21* E_γ: weighted average of 230.39 *30* from (^{46}Ar,5nγ), 229.6 *7* from (α,2nγ), and 229.3 *3* from (^{9}Be,3n$\alpha\gamma$).
6837.64	$(2^+,3,4^+)$	1457.6 *3*	33 *7*	5379.942	4^+				
		5283.39 *14*	100 *6*	1553.794	2^+				
6849.05	$(5)^-$	2700.6 *6*	100 *32*	4147.210	4^+				
		3649.9 *5*	69 *20*	3198.730	6^+				
7029.39	$2^+,3^+,4^+$	2719.1 *3*	100	4309.86	2^+				
7078.72	$(3)^-$	4402.1 *5*	100 *23*	2674.932	4^+				
		5525.5 *5*	90 *19*	1553.794	2^+				
7232.19	$(2)^+$	1852.9 *4*	100 *32*	5379.942	4^+				
		5677.8 *3*	30 *5*	1553.794	2^+				
7482.96	$(2)^+$	5929.14 *15*	100	1553.794	2^+				
7539.5?		770.2[#f] *10*	100[#]	6770.5	$(9)^+$				
7572.6	$(10)^+$	802.1 *7*	100	6770.5	$(9)^+$	M1+E2[c]	−0.044[c] *18*		E_γ: unweighted average of 803.4 *4* from (^{46}Ar,5nγ), 801.3 *6* from (α,2nγ), and 801.5 *6* from (^{9}Be,3n$\alpha\gamma$).
8257.7?		1718.0[#f] *15*	100	6540.7	$(8)^+$				
8793.7	(11^+)	1221.1 *13*	100	7572.6	$(10)^+$	(M1+E2)[c]	−0.17[c] *10*		E_γ: unweighted average of 1223.7 *11* from (^{46}Ar,5nγ), 1219.8 *10* from (α,2nγ), and 1219.9 *10* from (^{9}Be,3n$\alpha\gamma$).
(10939.184)	$3^-,4^-$	3456.17[d] *7*	5.79[d] *22*	7482.96	$(2)^+$				
		3707.4[d] *6*	3.4[d] *23*	7232.19	$(2)^+$				

$\gamma(^{50}Ti)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[a]
(10939.184)	$3^-,4^-$	3860.1[d] *3*	1.12[d] *17*	7078.72	$(3)^-$	
		3909.0[d] *4*	0.79[d] *13*	7029.39	$2^+,3^+,4^+$	
		4089.93[d] *8*	4.44[d] *17*	6849.05	$(5)^-$	
		4101.32[d] *7*	4.72[d] *17*	6837.64	$(2^+,3,4^+)$	
		4209.17[d] *6*	5.62[d] *17*	6729.86	3^-	
		4228.43[d] *3*	22.5[d] *4*	6710.570	4^+	
		4417.55[d] *4*	10.34[d] *22*	6521.41	$3^+,4^+$	
		4539.01[d] *18*	1.67[d] *12*	6399.81	$(3)^-$	
		4559.13[d] *14*	3.03[d] *17*	6379.88	$(5)^-$	
		4637.13[d] *4*	10.28[d] *22*	6301.81	$(1,2,3)^-$	
		4782.6[d] *4*	0.79[d] *12*	6156.47	$(2,3,4^+)$	
		4815.79[d] *6*	6.01[d] *17*	6123.15	(4^+)	
		4992.420[d] *25*	25.2[d] *4*	5946.479	$3^+,4^+$	
		5132.72[d] *25*	1.13[d] *11*	5806.54	$4^+,5^+$	
		5244.04[d] *10*	3.07[d] *12*	5694.87	$2^+,3^+$	
		5391.07[d] *5*	11.01[d] *22*	5547.81	(4^+)	
		5558.937[d] *24*	34.5[d] *5*	5379.942	4^+	
		5752.692[d] *24*	26.5[d] *3*	5186.103	$(3,4)^+$	
		6058.105[d] *20*	56.4[d] *6*	4880.705	5^+	
		6148.85[d] *14*	2.98[d] *17*	4789.97	2^+	
		6451.6[d] *5*	1.40[d] *22*	4486.74	(2^+)	
		6528.72[d] *10*	5.17[d] *17*	4410.02	3^-	
		6766.73[d] *5*	100.0[d] *17*	4172.003	3^+	
		6791.41[d] *7*	42.6[d] *11*	4147.210	4^+	
		8263.51[d] *3*	48.2[d] *6*	2674.932	4^+	D
		9384.41[d] *6*	28.5[d] *4*	1553.794	2^+	D

[†] From (n,γ), except as noted. 2.6 ppm ($E\gamma$<1.8 MeV) and 3.2 ppm ($E\gamma$>1.8 MeV) systematic uncertainty in $E\gamma$ added in quadrature. 5% systematic uncertainty in $I\gamma$ added in quadrature.

[‡] From ^{50}Sc β^- decay. Other precise $E\gamma$=1553.785 *6*, 1121.130 *6*, and $E\gamma$=523.759 *10* (plus 2.6 ppm systematic uncertainty) from (n,γ).

[#] From (α,2nγ).

[@] From (d,pγ).

From ENSDF

$^{50}_{22}Ti_{28}$-15

$\gamma(^{50}\mathrm{Ti})$ (continued)

[&] 4881 state: Iγ(1682)/Iγ(2206)=0.220 *24* in ^{50}Sc β^- decay, 0.083 *23* in (n,γ), and 0.13 in (d,pγ) are discrepant. 5380 state: Iγ(3826)/Iγ(2705)=0.42 *12* in ^{50}Sc β^- decay is discrepant with 0.128 *9* in (n,γ); 3826γ not observed in (d,pγ).

[a] The assignment of Mult=D,E2 where given are from measured $T_{1/2}$ and γ branchings compared with RUL.

[b] D,E2 from comparison to RUL; ΔJ=2 from level scheme.

[c] From $\gamma(\theta)$, $\gamma\gamma(\theta)$(DCO), and $\gamma\gamma$ linear polarization in (α,2nγ).

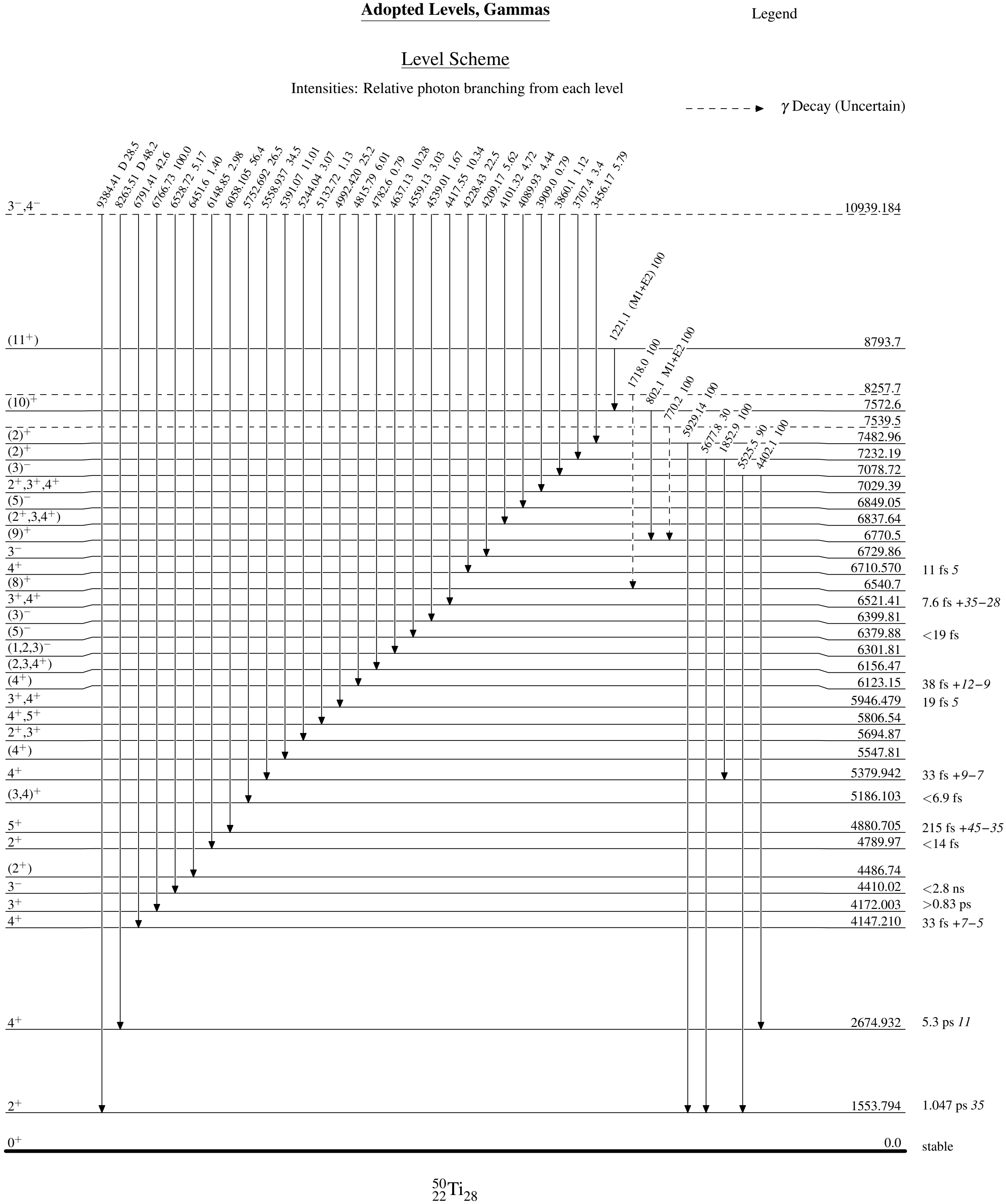
[d] Primary γ from (n,γ) E=thermal.

[e] 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.

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

$^{50}_{22}\mathrm{Ti}_{28}$-16

Adopted Levels, Gammas



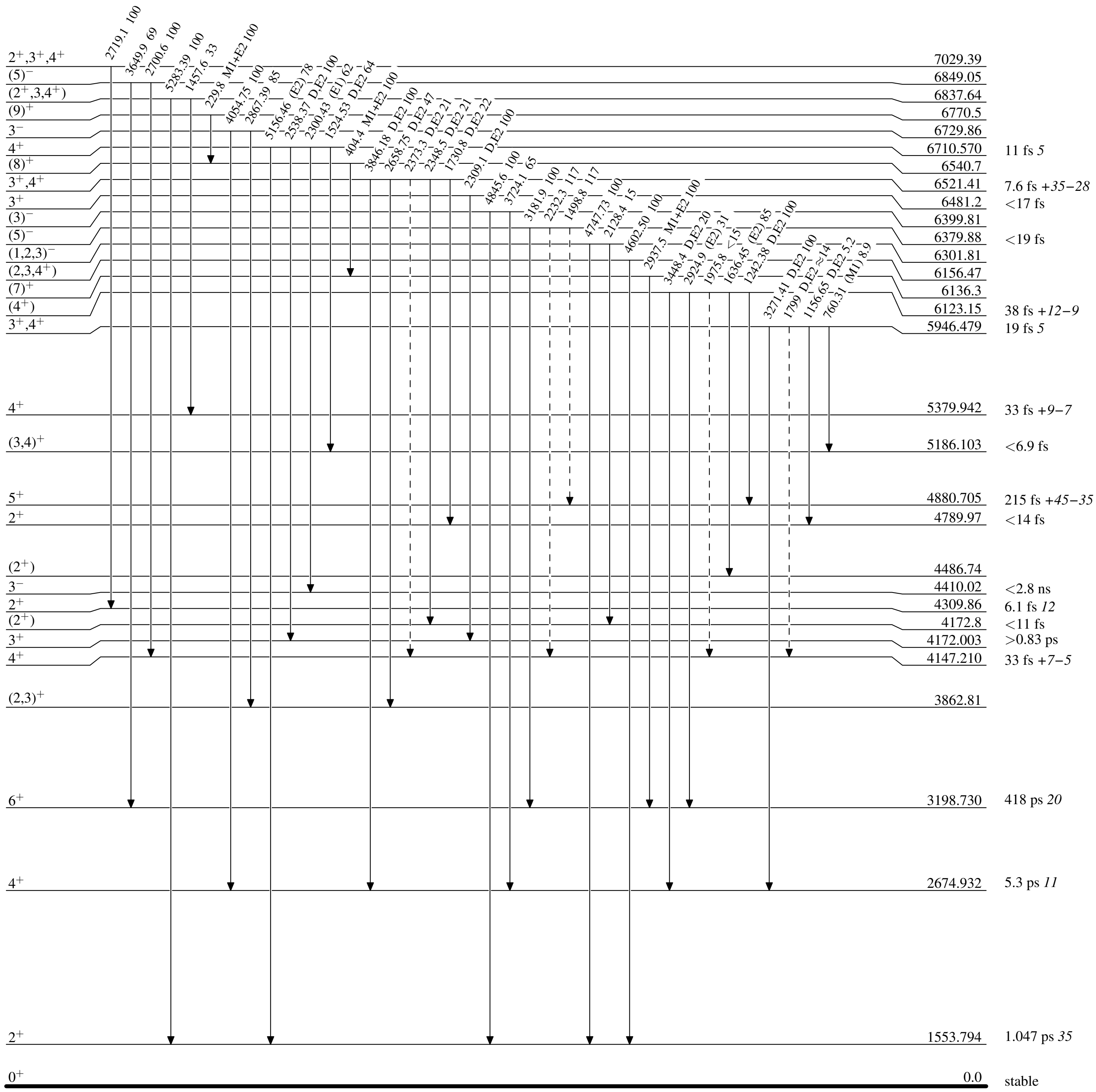
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



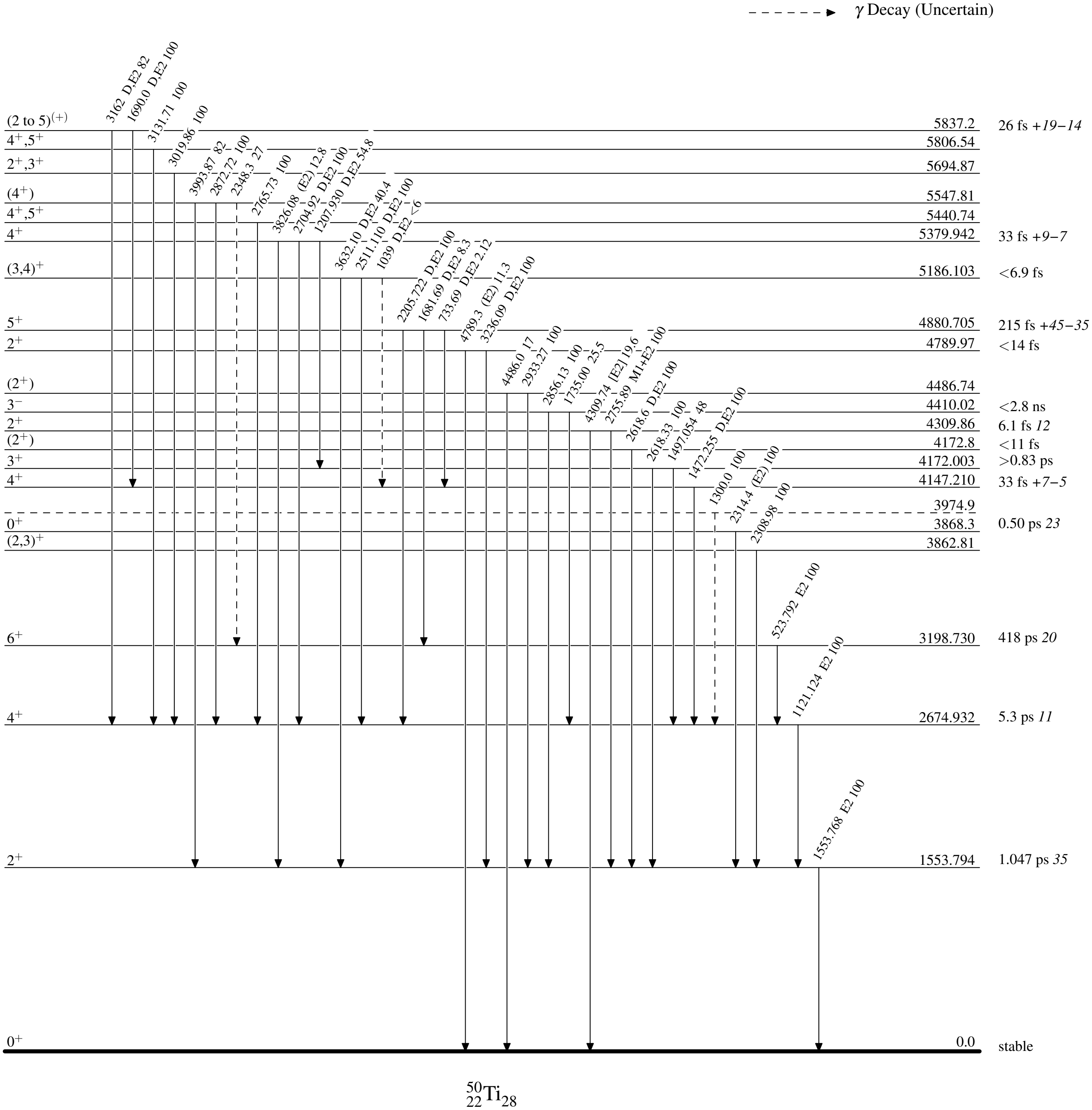
$^{50}_{22}Ti_{28}$

Adopted Levels, Gammas

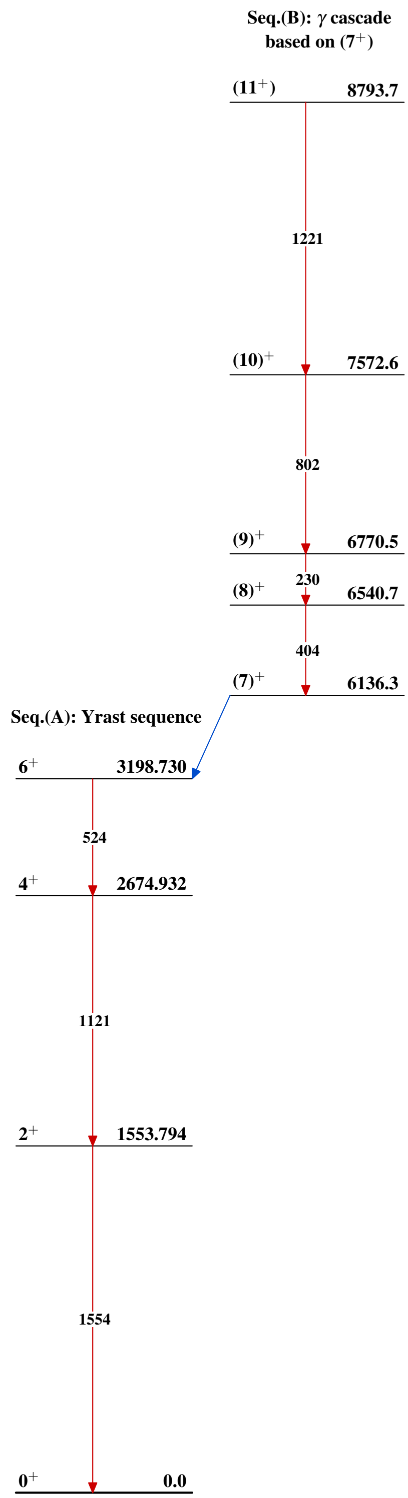
Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level



Adopted Levels, Gammas



$^{50}_{22}Ti_{28}$

Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Yang Dong, Huo Junde	NDS 128, 185 (2015)	10-Jul-2015

Q(β^-)=1975 *7*; S(n)=7808 *7*; S(p)=13529 *21*; Q(α)=−7669 *7* 2012Wa38

^{52}Ti Levels

Cross Reference (XREF) Flags

A	^{52}Sc β^- decay	E	^{48}Ca(^{16}O,^{12}C)	I	Coulomb excitation
B	^{48}Ca(^{6}Li,d)	F	^{50}Ti(t,p)	J	^{9}Be(^{48}Ca,Xγ)
C	^{48}Ca(^{7}Li,p2nγ)	G	^{50}Ti(t,pγ)	K	^{12}C(^{48}Ca,^{8}Beγ)
D	^{48}Ca(^{12}C,^{8}Be)	H	^{208}Pb(^{48}Ca,Xγ)		

E(level)[†]	J$^\pi$[@]	T$_{1/2}$[‡]	XREF	Comments
0.0	0$^+$	1.7 min *1*	ABCDEFGHIJK	%β^-=100 T$_{1/2}$: from 1967Mo11.
1050.06 *9*	2$^+$	3.60 ps *14*	ABCDEFGHIJK	μ=+1.7 *4* (2006Sp02) XREF: D(1045)E(1045). B(E2)↑: B(E2)=0.0567 *51* (2005Di05). T$_{1/2}$: from 12C(48CA,8BEG) (2006Sp02). Others: 3.9 ps 4 from B(E2) in Coulomb excitation and 3.3 ps *+56−15* DSAM in ^{50}Ti(t,pγ). J$^\pi$: L(t,p)=2.
2264.49 *11*	2$^+$	39[#] fs *8*	AB eFG IJK	XREF: B(2260)e(2350). J$^\pi$: L(t,p)=2. T$_{1/2}$: Other: 35 Fs +20-13, DSAM in ^{50}Ti(t,pγ).
2318.19 *11*	4$^+$	3.3 ps *4*	A CD F H JK	μ=+1.8 *6* (2006Sp02) XREF: D(2300). J$^\pi$: L(t,p)=4. T$_{1/2}$: From 12C(48CA,8BEG) (2006Sp02).
2432.29 *11*	2$^+$	119[#] fs *8*	A eFG JK	XREF: e(2350)F(2429). J$^\pi$: L(t,p)=2. T$_{1/2}$: Other: < 70 Fs, DSAM in ^{50}Ti(t,pγ), 0.15 ps 3 in ^{12}C(^{48}Ca,^{8}Beγ).
3029.09 *15*	6$^+$[a]	25 ps *4*	C H JK	T$_{1/2}$: RDM in ^{48}Ca(^{7}Li,p2nγ).
3143.02 *11*	4$^+$[a]	96[#] fs *19*	A J	
3350.60 *13*	4$^+$		A F J	XREF: F(3346). J$^\pi$: L(t,p)=4.
3453.52 *13*	3$^-$	41[#] fs *6*	A F JK	XREF: F(3447). J$^\pi$: L(t,p)=3.
3589.30 *13*	2$^+$	≤62 fs	A FG J	XREF: F(3583). J$^\pi$: L(t,p)=2.
3872 *8*	3$^-$		F	J$^\pi$: L(t,p)=3.
3881.5 *10*	0$^+$[a]		J	
3923.49 *13*	2$^+$		A FG J	XREF: F(3916)G(3900). J$^\pi$: L(t,p)=2.
4023.30 *12*	(4$^+$)[a]		A J	
4054.5 *8*	5$^+$[a]		F J	
4078.3 *6*			A	
4098 *8*	0$^+$,1$^-$		F	J$^\pi$: L(t,p)=0,1.
4102.2 *7*	6$^+$[a]		J	
4212 *6*	1$^-$		FG	XREF: G(4230). J$^\pi$: L(t,p)=0,1. Anisotropic $\gamma(\theta)$ in (t,pγ).
4286.6 *9*			A	
4287.72 *18*	(8$^+$)[&]		H J	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{52}Ti Levels (continued)

E(level)[†]	Jπ[@]	$T_{1/2}$[‡]	XREF	Comments
4324 *8*	$1^-,0^+$		FG	XREF: G(4300). Jπ: L(t,p)=1,0.
4479.22 *14*			A J	
4535.4 *7*	7^+[a]	85[#] fs *15*	J	
4646.58 *24*	4^+		A J	
4691 *8*	$1^-,0^+$		F	Jπ: L(t,p)=1,0.
4787.56 *14*	(2^+)		A F J	XREF: F(4772). Jπ: L(t,p)=(2).
4831.1 *6*	5^-[a]		F J	
4839.9 *10*	5^+[a]	60[#] fs *18*	J	
4907.1 *11*	(6^+)[a]	37[#] fs *13*	F J	
5010 *8*			F	
5103.5 *10*	5^-[a]		J	
5142 *6*	6^+[a]		J	
5236.5 *12*	5^+[a]		J	
5319.23 *17*			A J	
5818.5 *12*	(8^+)[a]		J	
6098.5 *22*	$6^{(+)}$[a]	60[#] fs *18*	J	
6693.38 *21*	(10^+)[&]		H J	
7520 *3*	10^+[a]	41[#] fs *18*	J	
8858.02 *23*			H J	
9088.7 *5*			H J	

[†] Energies for levels connected by gammas are from least-squares fit to Eγ, others are from ^{50}Ti(t,p).
[‡] From DSAM in ^{50}Ti(t,pγ), except as noted.
[#] From ^{9}Be(^{48}Ca,Xγ).
[@] From L(t,p) values, except as noted.
[&] From assumption of preferential yrast feeding and the close correspondence between established and calculated levels.
[a] From 9BE(48CA,XG) (2009Zh23) based on the measured angular ratios.

γ(^{52}Ti)

E_i(level)	J^π_i	Eγ[†]	Iγ[†&]	E_f	J^π_f	Mult.[@]	δ[@]	Comments
1050.06	2^+	1050.2[#] *1*	100[#]	0.0	0^+	[E2]		B(E2)(W.u.)=9.9 *11*
2264.49	2^+	1214.4[#] *1*	100 *8*	1050.06	2^+	M1(+E2)	+0.03 *10*	B(M1)(W.u.)=0.31 *+23−14*
		2265.2 *13*	13 *3*	0.0	0^+	[E2]		B(E2)(W.u.)=2.4 *8* Iγ: <5 in (t,pγ).
2318.19	4^+	1268.2[#] *1*	100[#]	1050.06	2^+	[E2]		
2432.29	2^+	1382.3[#] *1*	100[#] *6*	1050.06	2^+	M1+E2	−0.39 *8*	B(M1)(W.u.)=0.056 *8*; B(E2)(W.u.)=10 *4* Mult.: from p-γ(θ) in (t,pγ) and RUL.
		2431.6[‡] *2*	<18[‡]	0.0	0^+			
3029.09	6^+	710.9[#] *1*	100[#]	2318.19	4^+	[E2]		B(E2)(W.u.)=10.8 *18*
3143.02	4^+	710.6[#] *1*	41[#] *7*	2432.29	2^+			
		824.9[#] *1*	100[#] *7*	2318.19	4^+			
		2093.0[#] *1*	41[#] *7*	1050.06	2^+			
3350.60	4^+	1032.3[#] *1*	100[#]	2318.19	4^+	[M1]		
3453.52	3^-	1135.4[#] *1*	100[#]	2318.19	4^+	[E1]		

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

$\gamma(^{52}Ti)$ (continued)

E_i(level)	J^π_i	E_γ †	I_γ †&	E_f	J^π_f	Mult. @	δ @	Comments
3589.30	2+	1157.1# 1	33# 5	2432.29	2+			
		1324.7# 1	100# 17	2264.49	2+	[M1]		
		2539.0‡ 20	45‡ 12	1050.06	2+			
		3588.8‡ 20	≤14‡	0.0	0+			
3881.5	0+	1617# 1	100# 11	2264.49	2+	[E2]		
		2831# 3	67# 11	1050.06	2+			
3923.49	2+	1491.2# 1	77 15	2432.29	2+			
		1659.0#‡ 1	82‡ 9	2264.49	2+	M1+E2	−0.31 22	
		2872.0 5	100 18	1050.06	2+	E2(+M1)	≤−0.46	
		3923 3	23 8	0.0	0+			
4023.30	(4+)	672.6# 1	100# 17	3350.60	4+			
		880.4# 2		3143.02	4+			
		1590.5# 3		2432.29	2+			
		1705.2# 1		2318.19	4+			
		1758.8# 1	47# 8	2264.49	2+			
		2972.2 5	30 5	1050.06	2+			I_γ: From $I\gamma(1758.8)=4.1$ 7 and $I\gamma(2972.2)=2.6$ 5 in ^{52}Sc β^- decay.
4054.5	5+	1026# 1	57# 14	3029.09	6+			
		1738# 2	100# 14	2318.19	4+	[M1]		
4078.3		1646.0 6	100	2432.29	2+			
4102.2	6+	752# 1	63# 21	3350.60	4+			
		1073# 1	100# 11	3029.09	6+	[M1]		
		1783# 2	79# 11	2318.19	4+			
4212	1−	3162‡ 8		1050.06	2+	M1(+E2)	+0.12 13	
		4212‡ 8		0.0	0+			
4286.6		1968.4 9	100	2318.19	4+			
4287.72	(8+)	1258.6# 1	100#	3029.09	6+	[E2]		
4479.22		1025.7# 1	100# 7	3453.52	3−			
		1128.6# 1	18# 4	3350.60	4+			
4535.4	7+	247# 1	10# 2	4287.72	(8+)			
		482# 1	0.8# 2	4054.5	5+			
		1506# 1	100# 5	3029.09	6+	[M1]		
4646.58	4+	1617# 1	#	3029.09	6+	[E2]		
		2328.3# 3		2318.19	4+			
		2382.1# 3		2264.49	2+			
4787.56	(2+)	1334.1# 1		3453.52	3−			
		1644.5# 3		3143.02	4+			
		2468.8 4	100 12	2318.19	4+			
		2524.1# 5		2264.49	2+			
		3737.2 11	26 6	1050.06	2+			
4831.1	5−	1376# 1	31# 6	3453.52	3−			
		1481# 1	62# 21	3350.60	4+	[E1]		
		1803# 1	100# 9	3029.09	6+	[E1]		
4839.9	5+	1697# 1	100# 18	3143.02	4+	[M1]		
		2520# 3	24# 6	2318.19	4+			
4907.1	(6+)	1878# 1	100#	3029.09	6+			

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

$\gamma(^{52}Ti)$ (continued)

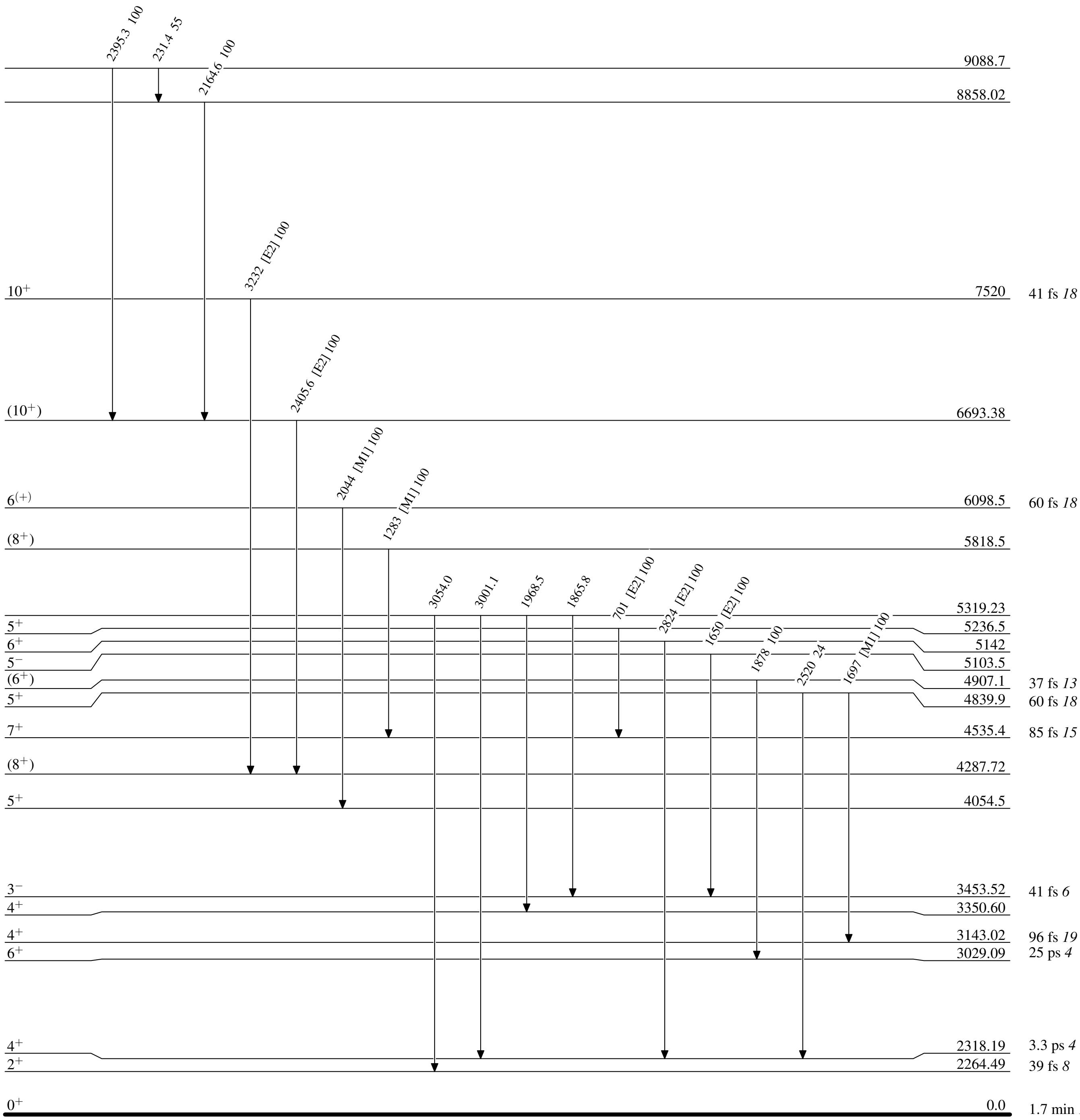
E_i(level)	J^π_i	E_γ †	I_γ †&	E_f	J^π_f	Mult. @
5103.5	5^-	1650# *1*	100#	3453.52	3^-	[E2]
5142	6^+	2824# *6*	100#	2318.19	4^+	[E2]
5236.5	5^+	701# *1*	100#	4535.4	7^+	[E2]
5319.23		1865.8# *2*		3453.52	3^-	
		1968.5# *2*		3350.60	4^+	
		3001.1# *3*		2318.19	4^+	
		3054.0# *5*		2264.49	2^+	
5818.5	(8^+)	1283# *1*	100#	4535.4	7^+	[M1]
6098.5	$6^{(+)}$	2044# *2*	100#	4054.5	5^+	[M1]
6693.38	(10^+)	2405.6# *1*	100#	4287.72	(8^+)	[E2]
7520	10^+	3232# *3*	100#	4287.72	(8^+)	[E2]
8858.02		2164.6# *1*	100#	6693.38	(10^+)	
9088.7		231.4# *1*	55# *23*	8858.02		
		2395.3# *1*	100# *45*	6693.38	(10^+)	

† From ^{52}Sc β^- decay, except as noted.
‡ From $^{50}Ti(t,p\gamma)$. Eγ recalculated from level energy differences by evaluator using adopted level energies.
# From $^{9}Be(^{48}Ca,X\gamma)$.
@ From $p\gamma(\theta)$ in $(t,p\gamma)$.
& Relative photon branching from each level.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

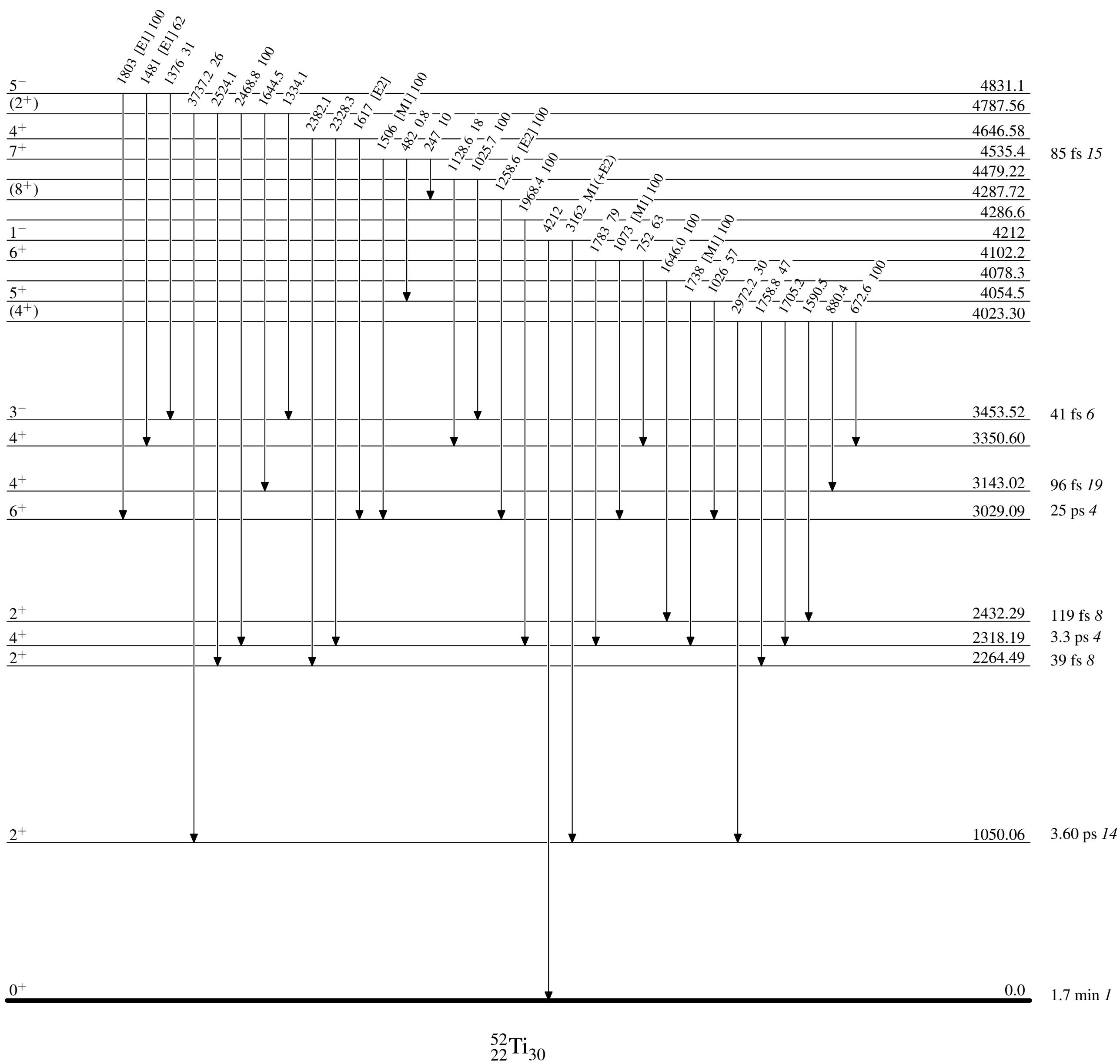


$^{52}_{22}Ti_{30}$

Adopted Levels, Gammas

Level Scheme (continued)

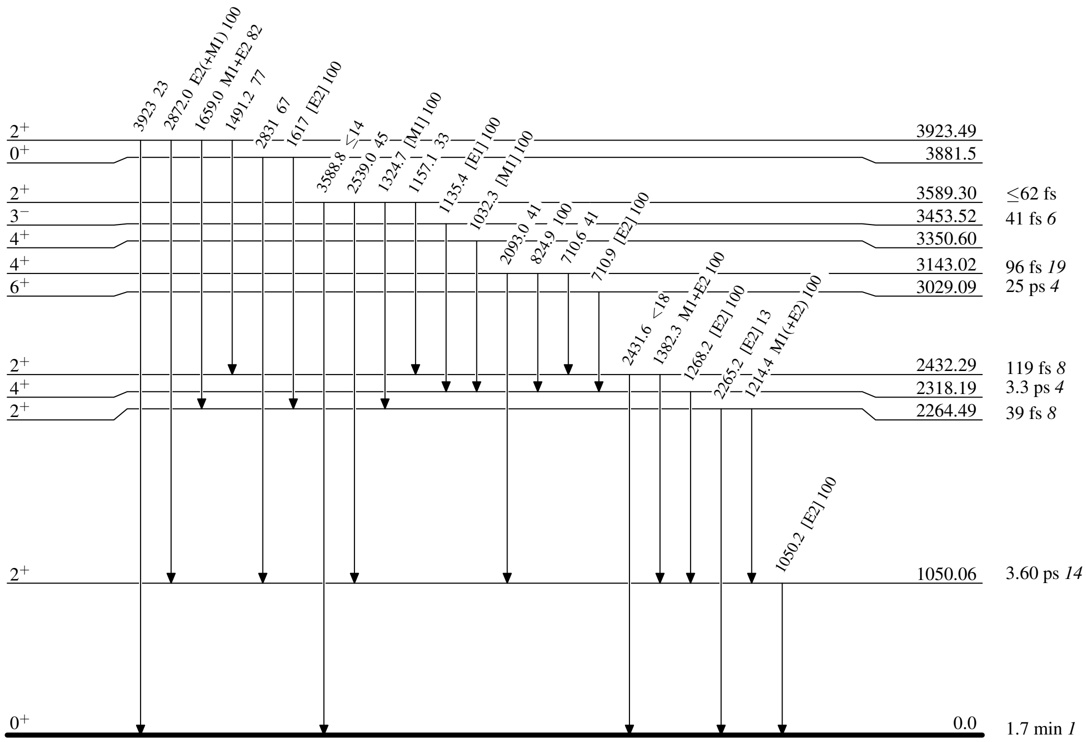
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{52}_{22}Ti_{30}$