^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	T. W. Burrows	NDS 108, 923 (2007)	20-Feb-2007

1986De13,1985DeZU measured yield curve, resonance energies, and strengths (E(p)=430-1340 keV; Ge(Li), γ-x; ^{27}Al(p,γ) calibration); S(p) (^{66}Ga calibration source); γ's, $\gamma(\theta)$ (Ge(Li), γ-x). DSAM. Shell-model calculations.

1993Ca12 analyzed the data of 1986De13 using a nonmetric multi-dimensional scaling method.

Data from the works listed under "Others" have been retained only if they complement the present work or were cited by 1986De13 in their spin and parity arguments.

Others: 1967Al18 (E(p)=1020-1365 keV), 1970Mc24 (E(p)=1363 keV), 1970Wi06 (E(p)=1095-1285 keV), and 1973Sc29 (E(p)=1546-1572 keV); see 1977Ha45 for a summary of these data. See 1986De13 for a comparison between their data and those compiled by 1977Ha45 and for a discussion of problems noted in the work of 1973Sc29. See also ^{46}Ti(p,γ) E=0.72-4 MeV and ^{46}Ti(p,γ),(p,p),(p,p'),(p,p'γ) for additional information on this reaction.

^{47}V Levels

Note: the 3491, 5233, and 5590 states suggested by 1973Sc29 were not observed by 1986De13.

E_p	Decay	TVArguments for Spin and Parity $\gamma(\theta)$	Limitations	Assignments of Resonance States 1991Ki11(a)	1993Ca12(b)	Conclusions
479		≠1/2	1/2,3/2-(c)			3/2$^-$
583	<5/2	≥1/2				
1/2,3/2						
701	≤5/2$^-$	1/2				
1/2$^{(-)}$(d)						
733	1/2$^+$,3/2,5/2$^-$	3/2				
3/2						
735	≤3/2	1/2				
1/2$^{(-)}$(d)						
743	≤3/2	1/2				
1/2						
811	≤3/2	1/2				
1/2						
845	≤3/2	1/2				
1/2						
875	1/2$^-$,3/2	1/2				
1/2$^-$						
940	3/2$^-$,5/2,7/2	5/2,7/2		≠7/2(e)		
5/2$^{(+)}$(f)						
975	≤3/2	1/2				
1/2$^{(+)}$(f)						
986	1/2$^+$,3/2,5/2$^-$	1/2				3/2
1/2$^+$						
1011	3/2$^+$,5/2,7/2$^+$				(≠7/2$^+$)(c)	5/2
5/2	(5/2$^+$)(f)					
1020	3/2					
3/2$^{(-)}$(d)						
1045	3/2,(5/2$^-$)					3/2
3/2	(3/2)					
1085	5/2$^+$	5/2	≠5/2-(e)			5/2$^+$
1096	3/2	3/2				
3/2$^{(-)}$(d)						
1127	1/2$^-$,3/2,5/2$^-$					3/2
3/2	(3/2$^-$)(d)					
1154	3/2,5/2$^+$	3/2	≠3/2+(e)			3/2$^-$
1209						
3/2	3/2	(3/2)				
1232	1/2,3/2					1/2
1/2	1/2					

1246	5/2,(7/2$^+$)			
5/2	(5/2$^+$)(f)			
1253	5/2	5/2	≠5/2-(e)	5/2$^+$
1286	3/2	3/2		
3/2$^{(-)}$(d)				
1287	5/2			
5/2				
1336	5/2	5/2		
5/2$^{(+)}$(f)				
1545	7/2	7/2		
7/2$^{(-)}$(d)				
1549		≠1/2,5/2	π=-(e)	
3/2$^{(-)}$(g)				
1559	1/2$^+$,3/2	1/2		
1/2$^+$				
1565		3/2	π=-(e)	
(3/2$^-$)(g)				
1825	7/2$^-$,9/2,11/2$^-$	≤11/2	9/2+(e)	9/2$^+$

(a) TVAverage-spin method.
(b) TVNonmetric multi-dimensional scaling method.
(c) TVFrom comparison of the calculated penetration factor to the Wigner limit. J^π excluded if it would imply a
TVreduced width which is larger than 50% of the Wigner limit. A reduced width between 30% and 50% of the limit
TVis rare and is considered by 1986De13 a weak argument.
(d) TVI$_\gamma$≈90% decay to π=- states indicates a negative resonance parity.
(e) TVExclusion based on δ's, leading to strengths exceeding RUL.
(f) TVI$_\gamma$≈80% decay to π=+ states indicates a positive resonance parity.
(g) TVFrom 1973Sc29.

TVIsobaric analogue states of ^{47}V and ^{47}Ti

^{47}Ti		^{47}V			
E$_x$	J^π	E$_p$	E$_x$	J^π	Comments
0	5/2$^-$	4168 *9*	(5/2$^-$)	TVD. Zwarts, Thesis (Utrecht, 1984). May correspond to the TV4150, 5/2$^{(-)}$, state.	
159	7/2$^-$	4296 *12*	7/2$^-$	(^{3}He,d)	(1967Ro13).
1550	3/2$^-$	479	5636	3/2$^-$	
1794	1/2$^-$	735	5887	1/2$^{(-)}$	
		875	6023	1/2$^-$	
1825	3/2$^+$,5/2$^+$	940	6157??	5/2$^+$,(3/2$^+$)	
2163	3/2$^-$	1127	6271	(3/2$^-$)	1970Wi06.
2260	5/2$^+$	1245	6387	5/2$^{(+)}$,(7/2$^+$)	
		1252	6394	5/2$^+$	
2548	3/2$^-$	1549	6683?	3/2$^{(-)}$	1973Sc29.
		1565	6699?	(3/2$^-$)	

See 1993Ca12 for other proposed analogs and fragments.

E(level)†	J$^\pi$‡	T$_{1/2}$#	Comments
0.	3/2$^-$&		
87.525 *9*	5/2$^-$&		
145.821 *15*	7/2$^-$&		
259.486 *4*	3/2$^+$&		
660.358 *9*	5/2$^+$		J$^\pi$: from 940 res primary $\gamma(\theta)$ and δ, RUL of 1780γ.
1138.55 *3*	7/2$^+$	>208 fs	J$^\pi$: from 940 res primary $\gamma(\theta)$ and decay $\gamma(\theta)$'s and RUL's.
1271.80 *5*	9/2$^-$	0.25 ps *8*	J$^\pi$: from decay $\gamma(\theta)$'s and RUL's.
1294.96 *6*	11/2$^-$&	>0.31 ps	
1660.62 *12*	1/2$^+$&	0.37 ps *16*	
1746.96 *4*	9/2$^+$	624 fs *+90−24*	J$^\pi$: from 1545,1825 res primary $\gamma(\theta)$ and 1825 res primary and decay δ's and RUL's.
1968.92 *3*	3/2$^+$	0.44 ps *12*	J$^\pi$: from 1085 res primary $\gamma(\theta)$ and decay $\gamma(\theta)$'s and RUL's.

2082.72 *2*	$3/2^-$	14.6 fs *35*	J^π: from 1253 res primary $\gamma(\theta)$ and 701 res primary and decay RUL′s.
2175.86 *4*	$5/2^-$	15 fs *5*	J^π: from 1545 res primary RUL and decay $\gamma(\theta)$′s and RUL′s.
2211.75 *3*	$1/2^-$	83 fs *21*	J^π: from 1096 res primary $\gamma(\theta)$ and decay RUL′s.
2439.54 *4*	$5/2^+$	65 fs *14*	J^π: from 940 res primary $\gamma(\theta)$ and RUL(2180).
2722.63 *7*	$5/2^-$	36 fs *10*	J^π: from decay $\gamma(\theta)$′s and RUL′s.
2747.12 *16*	$9/2^-$	25 fs *10*	J^π: from 1545 res primary $\gamma(\theta)$ and decay RUL′s.
2767.32 *6*	$(1/2)^-$	10.4 fs *28*	J^π: $1/2^-$,$3/2^-$ from L(^{3}He,d)=1 (1967Ro13). 1/2 from average-spin method (1991Ki11).
2810.04 *12*	$7/2^+$	0.11 ps *3*	J^π: from 1085 res primary $\gamma(\theta)$ and decay RUL′s.
2984.29 *11*	$7/2^-$	5 fs *2*	J^π: from 1545 res primary $\gamma(\theta)$ and decay RUL′s.
3005.45 *3*	$3/2^-$	6 fs *2*	J^π: 3/2 from 1085,811 res primary RUL′s and decay $\gamma(\theta)$′s and RUL′s; L(p)=1 in (^{3}He,d).
3054.22 *15*	$5/2^-$	5 fs *2*	J^π: from 875 res primary RUL and 1545 res primary $\gamma(\theta)$.
3247.73 *8*	$7/2^-$	76 fs *21*	J^π: from 1545 res primary $\gamma(\theta)$ and 1336 res primary and decay RUL′s.
3303.53[a] *4*	3/2	32 fs *7*	J^π: from 1336 res primary and decay $\gamma(\theta)$′s.
3355.49[a] *13*	$5/2^+$	5 fs *2*	J^π: from 1253 res primary $\gamma(\theta)$ and RUL and decay RUL′s.
3362.65 *9*	$1/2^{(-)}$	2.8 fs *14*	J^π: $\leq 5/2^+$ from 875,986 res primary RUL′s (1986De13). $\neq$ 3/2 from 1549 res primary $\gamma(\theta)$; π=− from almost 100% decay to g.s. (1973Sc29).
3370.52[a] *4*	$1/2,3/2,5/2^+$	11.8 fs *21*	J^π: from 986 res primary RUL. 3370.52,3370.56 doublet identified by differing γ-deexcitation patterns.
3370.56 *8*	3/2	<5 fs	J^π: $\leq$3/2 from 986,875 res primary RUL′s; $\neq$ 1/2 from 1154 res primary $\gamma(\theta)$.
3517.08 *15*	$5/2^{(-)}$	<6.9 fs	J^π: 5/2 from decay $\gamma(\theta)$ and decay RUL′s (1986De13). π=− since $\delta \neq 0$ for 1565 res primary (1973Sc29).
3524.60 *12*	$7/2^+$	9.7 fs *28*	J^π: from 1253 res primary $\gamma(\theta)$ and decay RUL′s.
3590.35 *6*	$5/2^{(-)}$	6 fs *2*	J^π: 5/2 from decay $\gamma(\theta)$ and RUL′s (1986De13). π=− since $\delta \neq 0$ for 1565 res primary (1973Sc29).
3659.71 *14*	(7/2)	14 fs *4*	J^π: from 1253 res primary $\gamma(\theta)$ and RUL and from decay RUL′s. Parentheses added by evaluator since this state is a possible doublet.

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^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

^{47}V Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	Comments
			Possible doublet.
3694.4[a] *3*	5/2$^{(+)}$,(3/2$^+$)	6 fs *3*	Jπ: from 1336 res primary RUL and decay $\gamma(\theta)$ and RUL′s.
3718.0[a] *3*	7/2,(5/2,9/2$^+$)		Jπ: from 1545,1085 res primary RUL′s and decay $\gamma(\theta)$.
3721.29 *13*	7/2	15 fs *6*	Jπ: from 1253 res primary $\gamma(\theta)$ and 1545 res primary RUL.
3762.7[a] *3*	1/2,3/2,5/2		Jπ: from 743 res primary RUL.
3773.4 *2*	(1/2)	<11 fs	Jπ: 1/2,(3/2$^-$,5/2$^-$) from 743,875,1154 res primary RUL′s (1986De13). 1/2 from average-spin method (1991Ki11).
3822.6 *2*	1/2,3/2	19 fs *9*	Jπ: from 875,1559 res primary RUL′s.
3869.0[a] *3*	5/2[b]	9.7 fs *35*	
3875.75[a] *30*	5/2,(3/2$^-$)	<8 fs	Jπ: from 1286 res primary and decay RUL′s.
3876.0 *2*	7/2$^-$[b]	<11 fs	
3890.1[a] *2*	≤5/2$^+$	<3.5 fs	Jπ: from 1559 res primary RUL.
3892.26 *11*	3/2,(5/2$^+$)	24 fs *18*	Jπ: from 986,1085 res primary and decay RUL′s.
3952.6[a] *4*	7/2,(5/2$^-$)	37 fs *14*	Jπ: from decay $\gamma(\theta)$ and 940 res primary and decay RUL′s.
3958.7[a] *3*	3/2$^+$	9.0 fs *28*	Jπ: from 1253 res primary $\gamma(\theta)$ and decay RUL′s.
3984.97[a] *17*	7/2,(3/2$^+$,5/2$^+$)	24 fs *9*	Jπ: from 1253 res primary RUL.
4080.60 *12*	3/2$^+$	15 fs *4*	Jπ: from decay $\gamma(\theta)$′s and 986 res primary and decay RUL′s.
4099.06[a] *14*	5/2$^-$,(3/2$^-$)[b]	<8.3 fs	
4100.31 *10*	3/2$^-$	5.5 fs *21*	Jπ: 3/2 from 986,875,1253 res primary and decay RUL′s. L(^{3}He,d)=1.
4118.12[a] *14*	3/2,(1/2,5/2)	13 fs *4*	Jπ: from 811 res primary RUL.
4150.35 *11*	5/2$^{(-)}$	<7 fs	Jπ: from 1085 res primary and decay RUL′s.
4197.3 *3*	5/2$^{(-)}$	<11 fs	Jπ: from 1085,1154 res primary and decay RUL′s.
4207.10[a] *14*	3/2,(1/2,5/2)		Jπ: from 1559 res primary RUL.
4222.48 *6*	5/2	<11 fs	Jπ: from decay $\gamma(\theta)$′s.
4271.60 *20*	7/2,(3/2$^+$,5/2$^+$)		Jπ: from 1336 res primary RUL.
4271.75 *12*	(1/2)	<11 fs	Jπ: 1/2,(3/2$^-$) from 986,875,1154 primary RUL′s (1986De13). 1/2 from average-spin method (1991Ki11).
4345.19 *10*	(1/2$^+$)	<9 fs	Jπ: 3/2,1/2$^+$ from 986,875,1253 primary RUL′s (1986De13). 1/2 from average-spin method (1991Ki11).
4392.80[a] *20*	3/2,(1/2$^-$)	<24 fs	Jπ: from 1559,875 res primary and decay RUL′s.
4402.6[a] *3*	7/2,(5/2,9/2)[b]	<28 fs	
4406.4[a] *4*			
4453.7[a] *2*	7/2	11 fs *6*	Jπ: from 1253 res primary $\gamma(\theta)$ and decay RUL′s.
4509.52[a] *14*	7/2,(3/2,5/2$^+$)		Jπ: from 1253 res primary $\gamma(\theta)$.
4510.01 *14*	5/2,(3/2$^-$)	<8.3 fs	Jπ: from 1154 res primary RUL and decay $\gamma(\theta)$.
4514.5[a] *3*	3/2,(1/2,5/2$^-$)		Jπ: from 875 res primary RUL.
4543.02[a] *20*	3/2,(1/2,5/2$^+$)		Jπ: from 1559 res primary RUL.
4568.68 *20*	5/2	<9 fs	Jπ: from 1545,1096 res primary RUL′s and $\gamma(\theta)$.
4694.33[a] *11*	5/2$^+$,(3/2$^+$)	<8.3 fs	Jπ: from decay $\gamma(\theta)$′s and 1085 res primary and decay RUL′s.
4719.2[a] *3*	3/2,(1/2,5/2$^-$)		Jπ: from 875 res primary RUL.
4733.8[a] *3*	9/2$^{(-)}$	<15 fs	Jπ: from 1545 res primary RUL and decay RUL′s and $\gamma(\theta)$′s.
4792.9[a] *3*	1/2,3/2		Jπ: from 875,986 res primary RUL′s.
4796.8[a] *3*	3/2,(1/2$^-$,5/2$^-$)		Jπ: from 875,1154 res primary RUL′s.
4807.30 *14*	5/2	15 fs *9*	Jπ: from 1253 res primary and decay RUL′s.
4852.5[a] *3*	5/2,(1/2$^-$,3/2$^-$)		Jπ: from 1154 res primary RUL.
4907.6[a] *2*	5/2,(3/2$^+$,7/2$^+$)	<13 fs	Jπ: from 1253 res primary RUL.
4955.12[a] *13*	1/2,3/2,5/2$^+$		Jπ: from 986 res primary RUL.
4976.5[a] *3*			
4998.7[a] *3*	5/2,(7/2)		Jπ: from 1545,1096 res primary RUL′s and decay $\gamma(\theta)$.
5016.0[a] *3*	3/2,(5/2$^+$)	<15 fs	Jπ: from 975,1085 res primary RUL′s and decay $\gamma(\theta)$.
5108.65[a] *13*	1/2,3/2,5/2$^+$		Jπ: from 986 res primary RUL′s.
5123.86 *14*	7/2,(5/2$^+$)		Jπ: from 1253 res primary and decay RUL′s.

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^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

^{47}V Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	(2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (meV)[@]	Comments
5142.16 *9*	3/2,(1/2$^-$,5/2$^-$)	<11 fs		Jπ: from 875,1154 res primary RUL′s.
5222.71[a] *20*	3/2,(5/2$^+$)			Jπ: from 1559 res primary RUL and decay $\gamma(\theta)$.
5233.3? *3*				From 1973Sc29. Jπ=(3/2$^-$) suggested by 1973Sc29 not adopted by evaluator due to possible problems with the data. See 1986De13 for discussion.
5240.0[a] *3*	5/2$^{(+)}$,(3/2$^+$,7/2$^+$)	<5 fs		Jπ: from 1253 res primary RUL.
S(p)+478.5 *3*	3/2$^-$	<19 fs	0.8 *2*	T=3/2 IAS(^{47}Ti,1550)? possibly fragmented. E(level): E(p) calculated from measured Ex=5635.8 *3*. $T_{1/2}$: based on the Doppler-shift of primary γ′s deexciting the resonance.
S(p)+583 *3*	1/2,3/2	<7 fs	1.5 *3*	$T_{1/2}$: based on the Doppler-shift of primary γ′s deexciting the resonance.
S(p)+700.72[c] *9*	1/2$^{(-)}$	<8 fs	27 *4*	$T_{1/2}$: based on the Doppler-shift of primary γ′s deexciting the resonance.
S(p)+733.2[c] *2*	3/2	<7 fs	8 *2*	$T_{1/2}$: based on the Doppler-shift of primary γ′s deexciting the resonance.
S(p)+735.38 *9*	1/2$^{(-)}$	<2 fs	124[d] *17*	Fragment of IAS(^{47}Ti,1794)? E(level): E(p) calculated from measured Ex=5887.17 *5*.
S(p)+742.80[c] *11*	1/2	<5 fs	47 *7*	
S(p)+810.9 *4*	1/2	<8.3 fs	28 *4*	
S(p)+844.7 *4*	3/2	<6 fs	13 *3*	$T_{1/2}$: based on the Doppler-shift of primary γ′s deexciting the resonance.
S(p)+875.02 *6*	1/2$^-$	<1.4 fs	240 *30*	Fragment of IAS(^{47}Ti,1794)?
S(p)+939.83 *6*	5/2$^{(+)}$	<5 fs	30 *4*	$T_{1/2}$: based on the Doppler-shift of primary γ′s deexciting the resonance.
S(p)+975.22 *6*	1/2$^{(+)}$	<3 fs	89 *11*	
S(p)+985.98 *5*	1/2$^+$	<1.4 fs	180 *20*	E(level): calibration point of all E(p) values, except as noted.
S(p)+1011.44 *6*	(5/2$^+$)	<17 fs	38 *5*	
S(p)+1020.30 *6*	3/2$^{(-)}$	<1.4 fs	460 *60*	
S(p)+1045.23 *6*	(3/2)	<2 fs	240 *30*	
S(p)+1085.04 *6*	5/2$^+$	<3 fs	200 *30*	
S(p)+1095.66 *6*	3/2$^{(-)}$	<0.7 fs	7.1×10^2[d] *10*	
S(p)+1127.31 *7*	(3/2$^-$)	<0.4 fs	1.22×10^3[d] *15*	
S(p)+1153.54 *7*	3/2$^-$	<1.4 fs	510 *60*	
S(p)+1209.11 *7*	(3/2)		9.8×10^2 *13*	
S(p)+1232.44 *7*	(1/2)	<2 fs	116 *14*	
S(p)+1246.19 *7*	(5/2$^+$)	<3 fs	170 *20*	Fragment of IAS(^{47}Ti,2260)?
S(p)+1253.01 *7*	5/2$^+$	<1.4 fs	440 *60*	Fragment of IAS(^{47}Ti,2260)?
S(p)+1285.62 *11*	3/2$^{(-)}$	<1.4 fs	470 *60*	
S(p)+1287.18 *11*	5/2	<1.4 fs	480 *60*	
S(p)+1336.13 *7*	5/2$^{(+)}$	<1.4 fs	510 *60*	
S(p)+1545.0 *2*	7/2$^{(-)}$	<1.4 fs	620 *90*	E(level): E(p) calculated from measured Ex=6679.38 *18*.
S(p)+1548.51 *9*	3/2$^{(-)}$		1.50×10^3 *20*	E(level): E(p) calculated from measured Ex=6682.84 *5*. Fragment of IAS(^{47}Ti,2549) (1973Sc29).
S(p)+1558.8 *2*	1/2$^+$	<0.9 fs	290 *50*	E(level): E(p) calculated from measured Ex=6692.86 *18*.

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^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

^{47}V Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$[#]	Comments
S(p)+1565	(3/2$^-$)		From 1973Sc29 (S(p)=5168.6 *15* compared to adopted S(p)=5167.60 *7*). J$^{\pi}$: arguments of 1973Sc29 considered weak by evaluator due to possible problems in data; see 1986De13 for for discussion. Fragment of IAS(^{47}Ti,2549) (1973Sc29).
S(p)+1825.0 *3*	9/2$^+$	<7 fs	E(level): E(p) calculated from measured Ex=6953.4 *3*. J$^{\pi}$: arguments given above based in part on J$^{\pi}$(1290) but may be substantiated by other, more complicated, arguments. T$_{1/2}$: based on the Doppler-shift of primary γ's deexciting the resonance.

[†] Bound-state excitation energies and proton resonance energies are from 1986De13. ^{182}Ta, ^{192}Ir, ^{66}Ga, and ^{144}Ce sources used to obtain energy calibration. S(p)=5167.60 keV *7* (2003Au03). Additional resonances were observed At E(p) [(2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$, meV; E$_x$]=655 *5* [0.5 *5*], 952.11 *9* [15 *5*], 1007.6 *2*, 1062.42 *8* [34 *11*], 1183.3 *2* [11 *4*], 1210.04 *9* [100 *50*], 1222.94 *7* [70 *20*], 1225.09 *11* [20 *7*], 1268.30 *7* [360 *120*], 1823.3 *5* [—; 6951.7 *5*], and 1825.9 *3* [—; 6954.3 *3*]. However, No conclusions could Be reached As to their probable spins and parities.

[‡] The arguments of 1986De13 are summarized below for bound-state J$^{\pi}$'s and in the table above for resonance J$^{\pi}$'s; trailing J$^{\pi}$'s enclosed in parentheses are considered less likely based on "weak arguments." see 1986De13 for additional details.

[#] Averaged values of DSAM data for the bound states; a 20% systematic uncertainty due to the stopping power has been added quadratically with the statistical uncertainty. Lifetimes of resonances from the resonance strength, except as noted.

[@] Absolute strengths were deduced from relative strengths by normalizing to the absolute strengths of the E(p)=735, 1096, and 1127 resonances as obtained in a special experiment.

[&] From the Adopted Levels, assumed by the 1986De13 In their analysis.

[a] Previously unreported state. 1986De13 used the following procedure to adopt a new state: 1. Energies of feeding and decay gammas are consistent. 2. The state is found in at least two resonances (except for the 4.73-MeV, 9/2$^{(-)}$, state which due to the high spin is observed in only one resonance).

[b] From decay RUL's.

[c] E(p) calibrated on 735-keV resonance.

[d] Absolute measurement serving as a secondary standard.

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

$\gamma(^{47}V)$

Transitions from resonances have been omitted if Iγ<1% and δ has not been determined.
Branching ratios for the 1209-keV resonance are also given by 1986De13 but have not been compiled since no conclusions were reached on the spin and parity of this resonance.
Coincidences for bound-state transitions from 1967Al18 ($\gamma\gamma$ and Σ $\gamma\gamma$; NaI, Ge(Li)) or 1970Wi06 ($\gamma\gamma(\theta)$; NaI, Ge(Li)). See 1967Al18 and 1970Wi06 for primary-secondary coincidences.

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
87.525	5/2$^-$	87.5	100	0.	3/2$^-$	M1+E2	+0.10 *6*	I_γ,Mult.,δ: from 1970Wi06 ($\gamma(\theta)$,$\gamma\gamma(\theta)$; Ge(Li),NaI).
259.486	3/2$^+$	172.0	8 *1*	87.525	5/2$^-$			
		259.5	92 *1*	0.	3/2$^-$			
660.358	5/2$^+$	400.9	29.9 *2*	259.486	3/2$^+$			
		514.5	18.1 *2*	145.821	7/2$^-$			
		572.8	14.1 *3*	87.525	5/2$^-$			
		660.4	38.0 *3*	0.	3/2$^-$			
1138.55	7/2$^+$	478.2	25.0 *5*	660.358	5/2$^+$			
		879.1	32.5 *4*	259.486	3/2$^+$	E2(+M3)	−0.03 *5*	
		992.7	4.4 *2*	145.821	7/2$^-$			
		1051	38.0 *4*	87.525	5/2$^-$	D+Q	+0.05 *4*	
		1139[h]	<0.2	0.	3/2$^-$			
1271.80	9/2$^-$	1126	81.8 *1*	145.821	7/2$^-$			Iγ<0.1% to other states (≤0.66 MeV).
		1184	18.2 *1*	87.525	5/2$^-$			
1294.96	11/2$^-$	1149	100	145.821	7/2$^-$			Iγ<2% to other states (≤0.66 MeV).
1660.62	1/2$^+$	1000	1.3 *1*	660.358	5/2$^+$			Iγ<0.1% to other states (≤1.29 MeV).
		1401	73.4 *4*	259.486	3/2$^+$			
		1661	25.3 *3*	0.	3/2$^-$			
1746.96	9/2$^+$	608.4	17 *1*	1138.55	7/2$^+$	M1+E2		Iγ<0.5% to other states (≤1.29 MeV). δ: −0.19 *4* or −2.0 *1*.
		1087	46 *1*	660.358	5/2$^+$	E2(+M3)	−0.00 *3*	
		1601	36 *2*	145.821	7/2$^-$	D(+Q)	+0.00 *1*	
1968.92	3/2$^+$	308.3	1.4 *4*	1660.62	1/2$^+$			Iγ<0.2% to other states (≤1.66 MeV).
		830.4	0.9 *2*	1138.55	7/2$^+$			
		1309	32 *1*	660.358	5/2$^+$	M1+E2		δ: −0.50 *3* or −1.2 *1*.
		1709	9 *1*	259.486	3/2$^+$	M1+E2		δ: −0.36 *4* or −11 *4*.
		1881	54.9 *3*	87.525	5/2$^-$	D(+Q)	−0.01 *1*	
		1969	2.9 *2*	0.	3/2$^-$	D(+Q)	−0.02 *4*	
2082.72	3/2$^-$	1422	0.3 *1*	660.358	5/2$^+$			Iγ<0.2% to other states (≤1.75 MeV).
		1937	1.7 *1*	145.821	7/2$^-$			
		1995	69.8 *2*	87.525	5/2$^-$	M1+E2		δ: +0.08 *2* or −7.1 *6*.
		2083	28.1 *3*	0.	3/2$^-$	D+Q		δ: −0.05 *4* or +4.6 *9*.
2175.86	5/2$^-$	1916	0.3 *1*	259.486	3/2$^+$			Iγ<0.1% to other states (≤1.97 MeV).
		2030	1.6 *1*	145.821	7/2$^-$			
		2088	21.5 *4*	87.525	5/2$^-$	M1+E2	+0.56 *11*	

$^{47}_{23}V_{24}$-7

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

$\gamma(^{47}V)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
2175.86	5/2$^-$	2176	76.5 *4*	0.	3/2$^-$	M1+E2		δ: +0.14 *1* or −6.7 *4*.
2211.75	1/2$^-$	551.1	0.6 *1*	1660.62	1/2$^+$			Iγ<0.3% to other states (≤1.97 MeV).
		1952	14.5 *2*	259.486	3/2$^+$			
		2124	4.3 *1*	87.525	5/2$^-$			
		2212	80.7 *2*	0.	3/2$^-$			
2439.54	5/2$^+$	263.7[h]	<0.7	2175.86	5/2$^-$			Iγ<0.2% to other states (≤2.18 MeV).
		470.6	11 *1*	1968.92	3/2$^+$	M1+E2	+0.08 *3*	
		778.9	0.9 *3*	1660.62	1/2$^+$			
		1779	27 *1*	660.358	5/2$^+$	M1+E2		δ: −0.42 *3* or +6 *1*.
		2180	36 *2*	259.486	3/2$^+$	M1+E2		δ: −0.40 *4* or −1.4 *1*.
		2294	15.4 *4*	145.821	7/2$^-$	D+Q	+0.06 *3*	
		2352	2 *1*	87.525	5/2$^-$			
		2439	8 *1*	0.	3/2$^-$	D+Q	+0.05 *4*	
2722.63	5/2$^-$	1451	0.8 *1*	1271.80	9/2$^-$			Iγ<0.3% to other states (≤2.18 MeV).
		1584	5.2 *2*	1138.55	7/2$^+$			
		2463	1.2 *2*	259.486	3/2$^+$			
		2577	20 *1*	145.821	7/2$^-$			
		2635	18.4 *5*	87.525	5/2$^-$	M1+E2	−3.8 *10*	
		2723	55 *1*	0.	3/2$^-$	M1+E2	+1.9 *1*	
2747.12	9/2$^-$	1452	1.8 *5*	1294.96	11/2$^-$			Iγ<0.7% to other states (≤2.18 MeV).
		1475	5.3 *4*	1271.80	9/2$^-$			
		2601	86 *1*	145.821	7/2$^-$	M1+E2	−0.46 *2*	
		2660	7 *1*	87.525	5/2$^-$	E2(+M3)	−0.01 *8*	
2767.32	(1/2)$^-$	2767	100	0.	3/2$^-$			Iγ<3% to other states (≤2.18 MeV).
2810.04	7/2$^+$	370	0.8 *3*	2439.54	5/2$^+$			Iγ<0.2% to other states (≤2.18 MeV).
		841	3.2 *3*	1968.92	3/2$^+$	E2(+M3)	−0.02 *4*	
		1063	12.1 *4*	1746.96	9/2$^+$	M1+E2	−0.29 *3*	
		1538	10.8 *3*	1271.80	9/2$^-$	D(+Q)	+0.02 *2*	
		1671	2.7 *4*	1138.55	7/2$^+$			
		2149	23.4 *3*	660.358	5/2$^+$	M1+E2	−0.29 *3*	
		2550	2.8 *4*	259.486	3/2$^+$			
		2664	0.8 *4*	145.821	7/2$^-$			
		2722	43 *1*	87.525	5/2$^-$	D(+Q)	+0.01 *1*	
2984.29	7/2$^-$	1712	29.0 *5*	1271.80	9/2$^-$	M1+E2	+0.15 *1*	Iγ<0.3% to other states (≤2.18 MeV).
		2838	58 *1*	145.821	7/2$^-$	M1+E2	+0.15 *3*	
		2896	12 *1*	87.525	5/2$^-$	M1+E2		δ: −0.36 *3* or −1.5 *1*.
		2984	1.3 *5*	0.	3/2$^-$			
3005.45	3/2$^-$	2918	64.5 *3*	87.525	5/2$^-$	D+Q		Iγ<0.3% to other states (≤2.18 MeV). δ: −0.03 *6* or −4.1 *10*.
		3005	35.5 *3*	0.	3/2$^-$	D+Q		δ: −0.01 *8* or +4.1 *13*.
3054.22	5/2$^-$	1307[h]	<14	1746.96	9/2$^+$			
		2908	57 *1*	145.821	7/2$^-$			
		2966	43 *1*	87.525	5/2$^-$			

$^{47}_{23}V_{24}$-8

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

$\gamma(^{47}V)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
3247.73	7/2$^-$	1072	23 *1*	2175.86	5/2$^-$	M1+E2	+0.39 *3*	Iγ<2% to other states (≤2.18 MeV).
		1953	12 *2*	1294.96	11/2$^-$	E2(+M3)	+0.07 *8*	
		1976	10 *1*	1271.80	9/2$^-$			
		2109[h]	<5	1138.55	7/2$^+$			
		3102	18 *2*	145.821	7/2$^-$			
		3160	19 *2*	87.525	5/2$^-$			
		3248	18 *2*	0.	3/2$^-$	E2+M3	+0.15 *9*	
3303.53	3/2	1221	4.5 *5*	2082.72	3/2$^-$	D+Q		Iγ<1.2% to other states (≤2.18 MeV). δ: +0.03 *4* or +3.4 *5*.
		1335	7 *1*	1968.92	3/2$^+$			
		2643	9 *3*	660.358	5/2$^+$			
		3044	7.5 *4*	259.486	3/2$^+$	D+Q		δ: −0.11 *4* or +7 *2*.
		3216	71 *2*	87.525	5/2$^-$	D+Q		δ: −0.05 *2* or −3.7 *3*.
3355.49	5/2$^+$	2695	18 *1*	660.358	5/2$^+$	D(+Q)	+0.09 *10*	Iγ<2% to other states (≤2.18 MeV).
		3096	78 *1*	259.486	3/2$^+$	D+Q		δ: +0.08 *2* or −5.3 *5*.
		3355	4.1 *4*	0.	3/2$^-$	D(+Q)	+0.06 *8*	
3362.65	1/2$^{(-)}$	1280	2.0 *3*	2082.72	3/2$^-$			Iγ<0.8% to other states (≤2.18 MeV).
		3363	98.1 *3*	0.	3/2$^-$			
3370.52	1/2,3/2,5/2$^+$	1288	2.9 *5*	2082.72	3/2$^-$			Iγ<0.9% to other states (≤2.18 MeV).
		1401	5 *1*	1968.92	3/2$^+$			
		3111	28 *1*	259.486	3/2$^+$			
		3283[h]	<8	87.525	5/2$^-$			
		3370	64 *1*	0.	3/2$^-$			
3370.56	3/2	3283	65 *2*	87.525	5/2$^-$	D+Q		Iγ<0.5% to other states (≤2.18 MeV). δ: +0.2 *1* or <−2.0.
		3370	35 *2*	0.	3/2$^-$	D+Q		δ: 0.0 *1* or <−0.3.
3517.08	5/2$^{(-)}$	3371	33 *3*	145.821	7/2$^-$	D+Q		Iγ<5% to other states (≤2.18 MeV). δ: +0.09 *6* or <−25.
		3429	50 *3*	87.525	5/2$^-$			
		3517	9 *2*	0.	3/2$^-$			
3524.60	7/2$^+$	2386	31.8 *4*	1138.55	7/2$^+$	D(+Q)	−0.02 *2*	Iγ<0.2% to other states (≤2.18 MeV).
		2864	66.7 *4*	660.358	5/2$^+$	D(+Q)	−0.01 *2*	
		3265	1.6 *3*	259.486	3/2$^+$	E2+M3	+0.10 *6*	
3590.35	5/2$^{(-)}$	3444	18 *2*	145.821	7/2$^-$			Iγ<1.3% to other states (≤2.18 MeV).
		3503	3 *2*	87.525	5/2$^-$			
		3590	73 *4*	0.	3/2$^-$	D+Q		δ: +0.06 *4* or −3.3 *7*.
3659.71	(7/2)	2388	35 *3*	1271.80	9/2$^-$			Iγ<1.1% to other states (≤2.18 MeV).
		2999	22 *2*	660.358	5/2$^+$			
		3400[h]	<5	259.486	3/2$^+$			
		3572	23 *1*	87.525	5/2$^-$			
3694.4	5/2$^{(+)}$,(3/2$^+$)	3034	16 *1*	660.358	5/2$^+$			Iγ<2% to other states (≤2.18 MeV).
		3435	72 *2*	259.486	3/2$^+$	D+Q		δ: +0.11 *7* or −8 *2* if J_i=5/2.

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

$\gamma(^{47}V)$ (continued)

E_i(level)	J_i^π	E_γ [†]	I_γ [‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
3694.4	$5/2^{(+)},(3/2^+)$	3607	13 *2*	87.525	$5/2^-$			
3718.0	$7/2,(5/2,9/2^+)$	3572	100	145.821	$7/2^-$	D+Q		δ: −0.4 *2* or +2.2 *8*.
		3630[h]	<20	87.525	$5/2^-$			
		3718[h]	<14	0.	$3/2^-$			
3721.29	7/2	2583	19 *1*	1138.55	$7/2^+$			Iγ<1.1% to other states (≤2.18 MeV).
		3061	74 *1*	660.358	$5/2^+$	D(+Q)	+0.02 *2*	δ: see 1986De13 for other value considered very unlikely.
		3462	1.5 *4*	259.486	$3/2^+$			
		3634	5.1 *5*	87.525	$5/2^-$			
3762.7	1/2,3/2,5/2	3102	17 *4*	660.358	$5/2^+$			Iγ<3% to other states (≤2.18 MeV).
		3675	29 *4*	87.525	$5/2^-$			
		3763	13 *7*	0.	$3/2^-$			
3773.4	(1/2)	3686[h]	<20	87.525	$5/2^-$			Iγ<6% to other states (≤2.18 MeV).
		3773	100	0.	$3/2^-$			
3822.6	1/2,3/2	1740	3 *1*	2082.72	$3/2^-$			Iγ<1.4% to other states (≤2.18 MeV).
		2162	6 *1*	1660.62	$1/2^+$			
		3563	18 *2*	259.486	$3/2^+$			
		3822	70 *3*	0.	$3/2^-$			
3869.0	5/2	3209[h]	<12	660.358	$5/2^+$			Iγ<5% to other states (≤2.18 MeV).
		3609	11 *1*	259.486	$3/2^+$			
		3723	86 *1*	145.821	$7/2^-$	D(+Q)	−0.01 *5*	
		3781	3 *1*	87.525	$5/2^-$			
3875.75	$5/2,(3/2^-)$	1793	27 *2*	2082.72	$3/2^-$			Iγ<3% to other states (≤2.18 MeV).
		3729	38 *3*	145.821	$7/2^-$	D+Q[@]		δ: −0.1 *2* or <−2 if J_i=5/2.
		3875	35 *3*	0.	$3/2^-$	D+Q		δ: −0.27 *12* or <−0.6 if J_i=5/2.
3876.0	$7/2^-$	1793[h]	<11	2082.72	$3/2^-$			Iγ<4% to other states (≤2.18 MeV).
		2581	73 *3*	1294.96	$11/2^-$			
		3788	27 *3*	87.525	$5/2^-$	M1+E2		δ: +0.23 *6* or <−25.
3890.1	$\leq 5/2^+$	2229	12 *3*	1660.62	$1/2^+$			Iγ<5% to other states (≤2.18 MeV).
		3230[h]	<6	660.358	$5/2^+$			
		3630	57 *6*	259.486	$3/2^+$			
		3744[h]	<6	145.821	$7/2^-$			
		3802[h]	<6	87.525	$5/2^-$			
		3890[h]	<7	0.	$3/2^-$			
3892.26	$3/2,(5/2^+)$	1716	9 *1*	2175.86	$5/2^-$			Iγ<2% to other states (≤2.18 MeV).
		1810	2 *1*	2082.72	$3/2^-$			
		3633	66 *2*	259.486	$3/2^+$			
3952.6	$7/2,(5/2^-)$	2292[h]	<16	1660.62	$1/2^+$			Iγ<4% to other states (≤2.18 MeV).
		2681	13 *3*	1271.80	$9/2^-$	D+Q		Mult.: if J_i=7/2.
								δ: −0.34 *35* or −2.3 *11* if J_i=7/2.
		2814	24 *5*	1138.55	$7/2^+$	D+Q		δ: −0.02 *25* or −0.9 *4*.

$^{47}_{23}V_{24}$-10

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

$\gamma(^{47}V)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
3952.6	7/2,(5/2$^-$)	3292	37 *6*	660.358	5/2$^+$	D+Q		δ: +0.01 *10* or −4.1 *15*.
		3693[h]	<5	259.486	3/2$^+$			
		3865[h]	<5	87.525	5/2$^-$			
		3952[h]	<6	0.	3/2$^-$			
3958.7	3/2$^+$	1876	4.3 *4*	2082.72	3/2$^-$			Iγ<1.3% to other states (≤2.18 MeV).
		1990	2 *1*	1968.92	3/2$^+$			
		3298	24 *2*	660.358	5/2$^+$			
		3699	29 *2*	259.486	3/2$^+$	M1+E2	−1.3 *5*	
		3959	40 *1*	0.	3/2$^-$	D(+Q)	−0.10 *15*	δ: +6 *3* excluded by $\Delta\pi$ and comparison to RUL.
3984.97	7/2,(3/2$^+$,5/2$^+$)	2846	4 *1*	1138.55	7/2$^+$			Iγ<4% to other states (≤2.18 MeV). Decays from this state are contaminated.
		3324	48 *2*	660.358	5/2$^+$			
		3725[h]	<44	259.486	3/2$^+$			
		3897	5 *1*	87.525	5/2$^-$			
4080.60	3/2$^+$	3420	9 *2*	660.358	5/2$^+$			Iγ<2% to other states (≤2.18 MeV).
		3821	59 *3*	259.486	3/2$^+$	M1+E2		δ: −0.15 *3* or +9 *3*.
		3993	25 *2*	87.525	5/2$^-$			
4099.06	5/2$^-$,(3/2$^-$)	3839	11 *1*	259.486	3/2$^+$	D(+Q)[@]	0.00[@] *11*	Iγ<2% to other states (≤1.29 MeV).
		3953	30 *1*	145.821	7/2$^-$	D+Q[@]		δ: −0.04 *8* or <−0.7 if J_i=5/2.
		4011	4 *1*	87.525	5/2$^-$			
		4099	35 *1*	0.	3/2$^-$			
4100.31	3/2$^-$	3841	9 *1*	259.486	3/2$^+$	D+Q		Iγ<2% to other states (≤2.18 MeV). δ: +0.30 *9* or <−0.3.
		4013	14 *1*	87.525	5/2$^-$	D+Q		δ: −0.04 *13* or −4 *+1−4*.
		4100	56 *2*	0.	3/2$^-$			
4118.12	3/2,(1/2,5/2)	4118	50 *4*	0.	3/2$^-$			Iγ<3% to other states (≤1.75 MeV).
4150.35	5/2$^{(-)}$	4004	13 *1*	145.821	7/2$^-$			Iγ<0.7% to other states (≤1.97 MeV).
		4063	37 *1*	87.525	5/2$^-$			
		4150	50 *1*	0.	3/2$^-$			
4197.3	5/2$^{(-)}$	4051[h]	<24	145.821	7/2$^-$			Iγ<2% to other states (≤2.18 MeV).
		4197	43 *4*	0.	3/2$^-$			
4207.10	3/2,(1/2,5/2)	2238	30 *8*	1968.92	3/2$^+$			
		2546[h]	<5	1660.62	1/2$^+$			
		3068[h]	<7	1138.55	7/2$^+$			
		3547[h]	<7	660.358	5/2$^+$			
		3947	29 *8*	259.486	3/2$^+$			
		4061[h]	<10	145.821	7/2$^-$			
		4119[h]	<5	87.525	5/2$^-$			
		4207[h]	<10	0.	3/2$^-$			
4222.48	5/2	4135	32 *2*	87.525	5/2$^-$			Iγ<3% to other states (≤2.08 MeV).

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

$\gamma(^{47}V)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	Comments
4222.48	5/2	4222	60 *2*	0.	$3/2^-$	D+Q	δ: −0.16 *5* or −2.1 *3*.
4271.60	7/2,($3/2^+$,$5/2^+$)	2189[h]	<3	2082.72	$3/2^-$		
		2611[h]	<11	1660.62	$1/2^+$		
		3611	16 *3*	660.358	$5/2^+$		
		4012	24 *3*	259.486	$3/2^+$		
		4126[h]	<3	145.821	$7/2^-$		
		4184[h]	<4	87.525	$5/2^-$		
		4272[h]	<3	0.	$3/2^-$		
4271.75	(1/2)	2611	13 *2*	1660.62	$1/2^+$		Iγ<2% to other states (≤2.18 MeV).
		4012[h]	<13	259.486	$3/2^+$		
		4272	24 *4*	0.	$3/2^-$		
4345.19	($1/2^+$)	2169[h]	<4	2175.86	$5/2^-$		Iγ<3% to other states (≤1.97 MeV).
		2262	10 *3*	2082.72	$3/2^-$		
		3685	29 *2*	660.358	$5/2^+$		
		4086	20 *3*	259.486	$3/2^+$		
		4345	14 *2*	0.	$3/2^-$		
4392.80	3/2,($1/2^-$)	4247[h]	<4	145.821	$7/2^-$		Iγ<1.2% to other states (≤2.18 MeV).
		4305	24 *4*	87.525	$5/2^-$		
		4393	15 *2*	0.	$3/2^-$		
4402.6	7/2,(5/2,9/2)	3108[h]	<10	1294.96	$11/2^-$		
		3130	42 *15*	1271.80	$9/2^-$	D+Q	δ: −0.10 *15* or <−2 if J_i=7/2.
		3264[h]	<23	1138.55	$7/2^+$		
		3742[h]	<14	660.358	$5/2^+$		
		4143[h]	<13	259.486	$3/2^+$		
		4257[h]	<13	145.821	$7/2^-$		
		4315[h]	<13	87.525	$5/2^-$		
		4402[h]	<14	0.	$3/2^-$		
4406.4		3746[h]	<6	660.358	$5/2^+$		
		4147	30 *5*	259.486	$3/2^+$		
		4260[h]	<5	145.821	$7/2^-$		
		4319[h]	<5	87.525	$5/2^-$		
		4406[h]	<11	0.	$3/2^-$		
4453.7	7/2	2793[h]	<3	1660.62	$1/2^+$		Iγ<2% to other states (≤2.08 MeV).
		3159[h]	<15	1294.96	$11/2^-$		
		3315	16 *2*	1138.55	$7/2^+$	D+Q	δ: −0.29 *7* or <−0.6 given by 1986De13 for 3793γ assumed to belong to this transition since 3793γ was not observed (evaluator).
		3793[h]	<9	660.358	$5/2^+$		
		4308	24 *4*	145.821	$7/2^-$		

$^{47}_{23}V_{24}$-12

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

$\gamma(^{47}V)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	Comments
4453.7	7/2	4366[h]	<5	87.525	5/2$^-$		
		4453[h]	<5	0.	3/2$^-$		
4509.52	7/2,(3/2,5/2$^+$)	3849	63 *8*	660.358	5/2$^+$	D+Q	Iγ<5% to g.s. and 145.8 state. δ: +0.02 *7* or −4 *1* if J_i=7/2.
4510.01	5/2,(3/2$^-$)	4422	50 *9*	87.525	5/2$^-$		Iγ<3% to other states (≤0.66 MeV).
		4510	31 *2*	0.	3/2$^-$		
4514.5	3/2,(1/2,5/2$^-$)	3854[h]	<16	660.358	5/2$^+$		
		4255[h]	<16	259.486	3/2$^+$		
		4368[h]	<17	145.821	7/2$^-$		
		4427[h]	<17	87.525	5/2$^-$		
		4514[h]	<17	0.	3/2$^-$		
4543.02	3/2,(1/2,5/2$^+$)	4283	89 *3*	259.486	3/2$^+$		Iγ<7% to other states (≤0.66 MeV).
		4543	11 *3*	0.	3/2$^-$		
4568.68	5/2	4568	73 *4*	0.	3/2$^-$		Iγ<5% to other states (≤0.66 MeV).
4694.33	5/2$^+$,(3/2$^+$)	4435	51 *4*	259.486	3/2$^+$	M1+E2[@]	Iγ<3% to g.s. and 87.5 state. δ: −0.29 *7* or −1.6 *2* if J_i=5/2.
4719.2	3/2,(1/2,5/2$^-$)	2543	35 *3*	2175.86	5/2$^-$		Iγ<4% to other states (≤1.75 MeV).
		2636	20 *9*	2082.72	3/2$^-$		
		2750[h]	<7	1968.92	3/2$^+$		
		3058[h]	<11	1660.62	1/2$^+$		
		4631	14 *4*	87.525	5/2$^-$		
4733.8	9/2$^{(-)}$	3462	46 *7*	1271.80	9/2$^-$	D+Q	δ: −0.04 *9* or <−5.
		3464	23 *9*				
		3594[h]	<8	1138.55	7/2$^+$		
		4588[h]	<7	145.821	7/2$^-$		
		4646[h]	<7	87.525	5/2$^-$		
		4734[h]	<7	0.	3/2$^-$		
4792.9	1/2,3/2	2710	17 *3*	2082.72	3/2$^-$		Iγ<6% to other states (≤2.18 MeV).
		4647[h]	<6	145.821	7/2$^-$		
		4705[h]	<7	87.525	5/2$^-$		
		4793	68 *7*	0.	3/2$^-$		
4796.8	3/2,(1/2$^-$,5/2$^-$)	2585	3 *1*	2211.75	1/2$^-$		Iγ<4% to other states (≤2.18 MeV).
		2714	21 *2*	2082.72	3/2$^-$		
		4709	9 *2*	87.525	5/2$^-$		
		4797	49 *3*	0.	3/2$^-$		
4807.30	5/2	4147	24 *6*	660.358	5/2$^+$		
		4548[h]	<5	259.486	3/2$^+$		
		4661	26 *4*	145.821	7/2$^-$	D+Q	δ: +0.06 *20* or <−3.5.
		4720[h]	<6	87.525	5/2$^-$		

$^{47}_{23}V_{24}$-13

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

$\gamma(^{47}V)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
4807.30	5/2	4807[h]	<4	0.	3/2$^-$			
4852.5	5/2,(1/2$^-$,3/2$^-$)	4192[h]	<6	660.358	5/2$^+$			
		4593	31 *4*	259.486	3/2$^+$			
		4706[h]	<6	145.821	7/2$^-$			
		4765	18 *4*	87.525	5/2$^-$			
		4852[h]	<6	0.	3/2$^-$			
4907.6	5/2,(3/2$^+$,7/2$^+$)	3769[h]	<12	1138.55	7/2$^+$			Iγ<3% to other states (≤0.15 MeV).
		4247	69 *5*	660.358	5/2$^+$	D(+Q)[@]	+0.6[@] *10*	
		4648[h]	<6	259.486	3/2$^+$			
4955.12	1/2,3/2,5/2$^+$	4295[h]	<10	660.358	5/2$^+$			
		4695	78 *11*	259.486	3/2$^+$			
		4809[h]	<14	145.821	7/2$^-$			
		4867[h]	<15	87.525	5/2$^-$			
		4955[h]	<17	0.	3/2$^-$			
4976.5		4976	22 *2*	0.	3/2$^-$			Iγ<4% to other states (≤0.66 MeV).
4998.7	5/2,(7/2)	4338[h]	<13	660.358	5/2$^+$			
		4739[h]	<13	259.486	3/2$^+$			
		4852	20 *9*	145.821	7/2$^-$			
		4911	49 *12*	87.525	5/2$^-$			
		4998[h]	<13	0.	3/2$^-$			
5016.0	3/2,(5/2$^+$)	4355[h]	<14	660.358	5/2$^+$			
		4756[h]	<6	259.486	3/2$^+$			
		4870[h]	<6	145.821	7/2$^-$			
		4928[h]	<7	87.525	5/2$^-$			
		5016	43 *6*	0.	3/2$^-$	D+Q[&]		δ: −0.02 *15* or <−3 if J_i=3/2.
5108.65	1/2,3/2,5/2$^+$	4448[h]	<13	660.358	5/2$^+$			
		4849[h]	<13	259.486	3/2$^+$			
		4962[h]	<15	145.821	7/2$^-$			
		5021[h]	<13	87.525	5/2$^-$			
		5108	54 *25*	0.	3/2$^-$			
5123.86	7/2,(5/2$^+$)	3376	17 *3*	1746.96	9/2$^+$			Iγ<5% to other states (≤1.97 MeV and 2.18 MeV).
		3985	24 *3*	1138.55	7/2$^+$			
		4463	38 *12*	660.358	5/2$^+$			
5142.16	3/2,(1/2$^-$,5/2$^-$)	4481[h]	<8	660.358	5/2$^+$			
		4882[h]	<9	259.486	3/2$^+$			
		4996[h]	<11	145.821	7/2$^-$			
		5054[h]	<12	87.525	5/2$^-$			

$^{47}_{23}V_{24}$-14

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

$\gamma(^{47}V)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	Comments
5142.16	3/2,(1/2$^-$,5/2$^-$)	5142	100	0.	3/2$^-$		
5222.71	3/2,(5/2$^+$)	4562[h]	<21	660.358	5/2$^+$		
		4963[h]	<21	259.486	3/2$^+$		
		5076[h]	<23	145.821	7/2$^-$		
		5135[h]	<13	87.525	5/2$^-$		
		5222	64 *24*	0.	3/2$^-$	D+Q[&]	δ: −0.3 *2* or <−3 if J_i=3/2.
5240.0	5/2$^{(+)}$,(3/2$^+$,7/2$^+$)	4579	76 *3*	660.358	5/2$^+$	D+Q[@]	Iγ<3% to other states (≤1.14 MeV). δ: −0.03 *8* or +1.8 *4* if J_i=5/2.
S(p)+478.5	3/2$^-$	3424	8			M1+E2	δ: −0.07 *17* or −1.5 *5*.
		3553	37			M1+E2	δ: +0.08 *8* or +2.9 *7*.
		3975	6				
		5548	30			M1+E2	δ: −0.14 *15* or −2.8 *10*.
		5635	19				
S(p)+583	1/2,3/2	3562	4	2175.86	5/2$^-$		
		4077	9	1660.62	1/2$^+$	D+Q	δ: +0.15 *8* or −2.5 *6*.
		5077	11	660.358	5/2$^+$		
		5478	72	259.486	3/2$^+$	D+Q	δ: −0.38 *8* or <−5.
		5650	4	87.525	5/2$^-$		
S(p)+700.72	1/2$^{(-)}$	2080	1.9				Σ Iγ=3.3% to other bound states.
		2091	1.0	3773.4	(1/2)		
		2482.69	8.1				
		3641	23				
		3770	58				
		5593	2.8				
		5853	1.3				
S(p)+733.2	3/2	2295	3			D+Q	δ: +0.02 *15* or <−3.
		3445	8			D+Q	δ: −0.05 *10* or −3.7 *+12−25*.
		3673	13			D+Q	δ: +0.08 *5* or −2.1 *3*.
		3802	6			D+Q	δ: −0.07 *9* or +5.3 *+48−18*.
		4224	12			D+Q	δ: +0.02 *5* or −1.8 *2*.
		5797	37			D+Q	δ: −0.13 *9* or −2.8 *7*.
		5885	21			D+Q	δ: −0.02 *13* or +3.6 *+33−13*.
S(p)+735.38	1/2$^{(-)}$	3675	2.1				Σ Iγ=3.4% to other bound states.
		3804	14				
		4226	3.5				
		5887	77				
S(p)+742.80	1/2	2590	1.1				Σ Iγ=4.2% to other bound states.
		3682	6.2				
		3811	7.4				
		4233	37				
		5634	24				
		5894	20				

$^{47}_{23}V_{24}$-15

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

$\gamma(^{47}V)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ ‡	E_f	J_f^π	Mult.#	δ#	Comments
S(p)+810.9	1/2	1690.25	1.2					Σ Iγ=4.0% to other bound states.
		1844	1.4					
		2070	2.9					
		3750	20					
		3993	15					
		4301	20					
		5702	7.0					
		5962	28					
S(p)+844.7	3/2	2171	1.6					
		2221	1.0					
		2623.54	1.0					
		2989	2.3					
		3227	4.9			D+Q		δ: +0.05 *6* or −2.0 *3*.
		3271	4.9	2747.12	9/2$^-$			
		3554	2.0			D+Q		δ: −0.1 *3* or −2.9 *+15−45*.
		3782	4.3			D+Q		δ: −0.4 *2* or −0.8 *+6−3*.
		3818	17					
		3911	2.4					
		4333	4.2			D(+Q)	+0.07 *8*	
		5333	28			D(+Q)	+0.03 *3*	
		5734	21			D+Q	−0.05 *3*	
		5994	6			D+Q		δ: −0.54 *10* or −4 *1*.
S(p)+875.02	1/2$^-$	1227	1.3					Σ Iγ=5.7% to other bound states.
		2201	1.2					
		2661	3.1					
		3811	5.7					
		3941	16					
		4054	1.5					
		5935	2.2					
		6023	63					
S(p)+939.83	5/2$^{(+)}$	1865	1.3					Σ Iγ=0.7% to other bound states.
		2135	4.6			D+Q	−0.04 *3*	
		2428	1.1					
		3082	1					
		3648	33			D(+Q)	−0.02 *2*	
		3911	1.0					
		4118	1.0					
		4340	2.0			D(+Q)	+0.06 *11*	
		4948	8			(M1+E2)		δ: +0.62 *6* or +2.1 *2*.
		5427	35			(M1+E2)	+0.23 *4*	
		5827	4			(M1+E2)	+2.0 *5*	
		5941	0.8			D(+Q)	+0.11 *16*	
		5999	1.0			D(+Q)	−0.2 *2*	
		6087	5			D+Q	−0.07 *6*	

$^{47}_{23}V_{24}$-16

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

$\gamma(^{47}V)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ ‡	E_f	J_f^π	Comments
S(p)+975.22	$1/2^{(+)}$	2163	8.2	3984.97	$7/2,(3/2^+,5/2^+)$	Σ Iγ=5.2% to other bound states.
		3354	1.4			
		3910	4.4			
		4039	8.1			
		4153	7.6			
		4461	45			
		5862	18			
		6121	1.8			
S(p)+985.98	$1/2^+$	2761.83	1.5			Σ Iγ=5.4% to other bound states.
		2761.87	5.3			
		2770	1.8			
		2829	5.7			
		3693	4.2			
		3920	3.7			
		4163	12			
		5472	11			
		5873	14			
		6132	35			
S(p)+1011.44	$(5/2^+)$	2199	1.5	3984.97	$7/2,(3/2^+,5/2^+)$	Σ Iγ=3.0% to other bound states.
		2463	4.8	3718.0	$7/2,(5/2,9/2^+)$	
		2802	1.0			
		3718	3.3			
		4188	4.1			
		5018	29			
		5497	17			
		5897	25			
		6011	1.9			
		6069	3.5			
		6157	6.3			
S(p)+1020.30	$3/2^{(-)}$	1656	1.0			Σ Iγ=8.3% to other bound states.
		1894.4	1.4			
		1969	1.2	4222.48	5/2	
		2016	7.6			
		2066	1.8	4118.12	3/2,(1/2,5/2)	
		2795	4.5			
		2803	2.2			
		3160	8.7			
		3399	1.5			
		3443	10	2747.12	$9/2^-$	
		3954	34			
		3990	4.1			
		4083	3.1			
		5906	2.2			
		6078	7.7			

$^{47}_{23}V_{24}$-17

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

$\gamma(^{47}V)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
S(p)+1045.23	(3/2)	1622	1.3					Σ Iγ=5.2% to other bound states.
		1968	1.3					
		3185	1.9					
		3423	1.8					
		3468	1.9	2747.12	$9/2^-$			
		4014	1.3					
		5530	11					
		5930	47					
		6102	3.2					
		6190	23					
S(p)+1085.04	$5/2^+$	1213	0.7			D(+Q)[a]	+0.03[a] *3*	Σ Iγ=2.8% to other bound states.
		1535	1.4	4719.2	$3/2,(1/2,5/2^-)$	D(+Q)[b]	+0.08[b] *8*	
		2032	0.3	4222.48	5/2	D(+Q)	+0.1 *3*	
		2079	0.3			D(+Q)	+0.1 *3*	
		2360	4.1	3892.26	$3/2,(5/2^+)$	D(+Q)	−0.03 *3*	
		2508	1.7			D+Q		δ: −0.14 *4* or −3.9 *6*.
		2511	0.6			D+Q		δ: −0.13 *11* or −4 *1*.
		2570	1.0			D+Q		δ: +0.37 *8* or +4 *1*.
		2705	1.5					
		2926	1.2					
		3224	2.8					
		3419	22			D+Q	+0.05 *1*	
		3790	14			D+Q	+0.04 *2*	
		4053	4.6			D(+Q)	+0.04 *4*	
		4147	2.0			D(+Q)	−0.01 *2*	
		4260	23			M1+E2	−0.15 *1*	
		4482	1.9			E2(+M3)	−0.02 *4*	
		4569	0.5			E2+M3	−0.09 *7*	
		5569	2.9			M1+E2		δ: −0.45 *5* or +4 *1*.
		5970	2.8			M1+E2	−2.75 *10*	
		6083	3.4			D+Q	+0.10 *4*	
		6142	2.8			D+Q	−0.15 *5*	
		6229	1.6			D+Q	−0.07 *2*	
S(p)+1095.66	$3/2^{(-)}$	1241	0.3	5016.0	$3/2,(5/2^+)$	D+Q[b]		Σ Iγ=2.7% to other bound states. δ: −0.21 *12* or −2.3 *6* if J_f=5/2.
		1521	0.4			D+Q[a]		δ: −0.05 *6* or +5 *1* if J_f=3/2.
		1671	0.8			D+Q		δ: +0.03 *5* or −6 *2*.
		1725	0.3	4543.02	$3/2,(1/2,5/2^+)$	D+Q[a]		δ: +0.03 *7* or +3.5 *10* if J_f=3/2.
		1847	0.4			D+Q[a]		δ: +0.04 *7* or +3.3 *7* if J_f=3/2.
		1895	1.1			D(+Q)	+0.01 *4*	
		2017	1.1					
		2139	3.6			D+Q	−0.14 *5*	
		2141	1.0	4118.12	3/2,(1/2,5/2)	D+Q		δ: −0.07 *2* or +5.4 *5*.

$^{47}_{23}V_{24}$-18

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

$\gamma(^{47}V)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
S(p)+1095.66	3/2$^{(-)}$	2649	2.4			D+Q		δ: −0.04 *3* or −3.8 *4*.
		2877	1.2			D+Q		δ: −0.05 *2* or −1.6 *8*.
		3185	2.8			D+Q		δ: −0.04 *3* or −1.9 *4*.
		3234	0.5			D+Q		δ: −0.21 *5* or +20 *10*.
		3472	3.2			D+Q		δ: +0.06 *1* or −2.0 *1*.
		3800	1.3			D+Q		δ: −0.16 *6* or −2.6 *4*.
		4028	4.9			D+Q	−0.14 *2*	
		4064	29			D+Q		δ: +0.01 *1* or −4.8 *3*.
		4157	0.5			D+Q		δ: +0.30 *10* or −1.7 *3*.
		4579	0.7			D+Q	−0.05 *3*	
		5579	1.2			D(+Q)	−0.04 *6*	
		5980	1.2			D(+Q)	+0.00 *6*	
		6152	35			D+Q		δ: −0.02 *2* or −4.3 *3*.
		6239	4.9			D+Q		δ: −0.39 *3* or −8 *2*.
S(p)+1127.31	(3/2$^-$)	1874	2.1					Σ Iγ=4.9% to other bound states.
		2048	1.8					
		2170	6.0					
		2378	1.4					
		2680	1.5					
		2754	1.2					
		2900.13	4.1					
		2908	1.9					
		3221	1.9					
		3503	1.0					
		3548	9.3	2747.12	9/2$^-$			
		6011	4.3					
		6183	46					
		6270	12					
S(p)+1153.54	3/2$^-$	1154	0.3			D(+Q)[a]	+0.02[a] *15*	Σ Iγ=4% to other bound states.
		1444	0.5			D+Q[b]		δ: −0.02 *7* or −4.3 *13* if J_f=5/2.
		1500	0.6			D+Q[a]		δ: −0.01 *7* or −4.2 *12* if J_f=3/2.
		1786	1.8			D+Q[b]		δ: −0.01 *5* or −4.3 *9* if J_f=5/2.
		2024.6	0.9			D+Q[c]		δ: +0.04 *3* or −1.9 *1* if J_f=1/2.
		2099	1.1	4222.48	5/2	D+Q		δ: −0.09 *5* or −3.2 *5*.
		2178	2.8					
		2197	4.2	4118.12	3/2,(1/2,5/2)	D+Q[b]		δ: −0.08 *2* or −3.4 *3* if J_f=5/2.
		2523	0.8			D+Q[c]		δ: +0.02 *4* or −1.8 *2* if J_f=1/2.
		2706	1.9					
		2925.79	9.4			D+Q		δ: −0.09 *2* or +6.2 *6*.
		2934	2.4					
		3857	1.8			D(+Q)	−0.01 *4*	
		4120	1.2					
		4213	5.1			M1+E2		δ: +0.33 *4* or +1.5 *1*.

$^{47}_{23}V_{24}$-19

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

$\gamma(^{47}V)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
S(p)+1153.54	3/2$^-$	4327	1.2			D+Q	−0.08 *4*	
		4635	5.4			D(+Q)	−0.00 *1*	
		6208	2.5			D+Q		δ: +0.85 *20* or +1.2 *+12−6*.
		6296	52			M1+E2		δ: +0.31 *2* or +1.6 *1*.
S(p)+1209.11	(3/2)	1209	0.1					
		1335	0.2					
		1352	0.1					
		1782	1.0					
		1836	0.1	4543.02	3/2,(1/2,5/2$^+$)			
		1841	0.4					
		2079	0.6					
		2128	0.9					
		2153	0.2	4222.48	5/2			
		2200	0.1					
		2233	0.5					
		2250	1.7					
		2270	1.0					
		2392	0.4	3984.97	7/2,(3/2$^+$,5/2$^+$)			
		2475.3	0.3					
		2528	0.3					
		2760	1.1					
		2834	0.6					
		2980	1.4					
		2980	1.2					
		3296	0.5					
		3345	0.1					
		3583	1.2					
		3628	2.9	2747.12	9/2$^-$			
		3911	0.9					
		4139	7.1					
		4175	0.9					
		4268	11					
		4383	2.3					
		4690	3.4					
		5690	1.8					
		6091	9.8					
		6204	0.6					
		6263	17					
		6350	28					
S(p)+1232.44	(1/2)	1831	3.5	4568.68	5/2			Σ Iγ=0.4% to other bound states.
		2166	2.2					
		2273	1.0					
		2293	9					
		2415	3.4	3984.97	7/2,(3/2$^+$,5/2$^+$)			

$^{47}_{23}V_{24}$-20

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

$\gamma(^{47}V)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
S(p)+1232.44	(1/2)	2483	2.5					
		2600	4.3					
		3003	1.0					
		3003	1.8					
		3606	3.6					
		4162	5.5					
		4291	1.4					
		4404	2.0					
		4713	32					
		6114	11					
		6373	15					
S(p)+1246.19	(5/2$^+$)	1147	1.1					Σ Iγ=7.9% to other bound states.
		1877.49	1.5					
		1933	1.3					
		1981	1.2					
		2402	5.1					
		2518	5.0	3892.26	3/2,(5/2$^+$)			
		2666	1.0					
		2727	1.9					
		2862	26					
		3031	2.8					
		3333	2.7					
		3403	1.4	3005.45	3/2$^-$			
		3577	3.2					
		3947	3.0					
		4418	7.5					
		5248	1.6					
		5726	21					
		6299	3.1					
		6387	1.7					
S(p)+1253.01	5/2$^+$	1154	1.2			D(+Q)[b]	+0.02[b] *3*	Σ Iγ=4% to other bound states.
		1270	0.8			D+Q[d]		δ: −0.01 *2* or −8 *1* if J_f=7/2.
		1486	0.7			D+Q[b]	−0.06[b] *4*	
		1584	0.4			D+Q[b]		δ: +0.04 *7* or +1.2 *2* if J_f=5/2.
		1884.1	0.7			D+Q[d]		δ: +0.02 *4* or −12 *3* if J_f=7/2.
		1940	1.2			D+Q		δ: +0.01 *4* or <−7.
		2244	0.1			D+Q	−0.16 *2*	
		2314	1.1					
		2409	3.1			D(+Q)	+0.02 *3*	
		2441	1.0	3984.97	7/2,(3/2$^+$,5/2$^+$)			
		2672	6.1			D+Q		δ: +0.08 *2* or <−15.
		2699	1	3721.29	7/2			
		2734	3.4			D+Q	+0.02 *1*	

$^{47}_{23}V_{24}$-21

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

$\gamma(^{47}V)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
S(p)+1253.01	5/2$^+$	2869	25			D+Q	+0.02 *1*	
		3038	8.4			D(+Q)	+0.02 *2*	
		3146	0.7			D+Q	−0.09 *6*	
		3583	10			D+Q	−0.04 *1*	
		3671	0.7	2747.12	9/2$^-$	D(+Q)	−0.09 *10*	
		3954	4.4			D+Q	+0.04 *3*	
		4311	3.7			D+Q	+0.04 *1*	
		4424	6.5			D+Q	−0.01 *1*	
		5733	12					
		6134	2.5			D+Q	+0.13 *1*	
		6247	0.7			D+Q	−0.16 *4*	
		6306	0.5			D+Q	+0.26 *12*	
S(p)+1285.62	3/2$^{(-)}$	2275	2.4			D+Q[b]		Σ Iγ=3.2% to other bound states. δ: +0.06 *3* or −7 *1* if J_f=5/2.
		2307	1.6	4150.35	5/2$^{(-)}$	D+Q[a]		δ: −0.06 *4* or +5 *1* if J_f=3/2.
		2325	2.3					
		2550.2	2.1			D+Q[b]		δ: +0.01 *5* or −5 *1* if J_f=5/2.
		2835	2.3			D+Q		δ: −0.01 *4* or −4.5 *9*.
		3055	1.8					
		3122	1.0					
		3659	1.1					
		4214	37			D+Q		δ: −0.06 *1* or −1.53 *2*.
		4250	30			D+Q	−0.06 *1*	
		4457	3.9			D+Q		δ: −0.01 *3* or 4.1 *5*.
		4765	1.9			D+Q		δ: −0.06 *4* or −1.5 *1*.
		5765	1.0					
		6166	0.9			D+Q		δ: −0.16 *9* or >+6.
		6279	0.3			Q+O		δ: +0.4 *3* or <−2.1.
		6338	3.6			D+Q		δ: −0.15 *5* or −2.7 *4*.
		6425	3.1			D(+Q)	<+0.1	
S(p)+1287.18	5/2	2346	1.1					Σ Iγ=9.3% to other bound states.
		2706	1.0					
		2902	2.1					
		3987	6.7					
		4458	21					
		5288	4.5					
		5766	26					
		6167	3.1					
		6339	25					
S(p)+1336.13	5/2$^{(+)}$	1252	0.5			D+Q[a]	+0.08[a] *3*	Σ Iγ=6% to other bound states.
		2394	2.5			(M1+E2)	+0.00 *1*	
		2490	0.6					
		2516	1.1	3984.97	7/2,(3/2$^+$,5/2$^+$)			

$^{47}_{23}V_{24}$-22

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

$\gamma(^{47}V)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
S(p)+1336.13	5/2$^{(+)}$	2522	2.4					
		2781	1.1	3721.29	7/2	D+Q[b]		δ: +0.07 *6* or +1.0 *2* if J_f=5/2.
		2815	2.6	3694.4	5/2$^{(+)}$,(3/2$^+$)			
		3171	19			D+Q	−0.10 *1*	
		3227	0.5			D+Q		δ: +0.09 *9* or <−15.
		3665	3.3					
		4035	1.6			D(+Q)	+0.04 *6*	
		4392	4.2			D+Q	+0.03 *1*	
		4506	20			D+Q	+0.02 *1*	
		5336	2.0			M1+E2	−1.00 *19*	
		5814	19			D+Q	−0.10 *2*	
		6215	7.0			D+Q	−0.47 *2*	
		6329	0.4			D(+Q)	−0.07 *10*	
		6475	7.0			D+Q	+0.07	
S(p)+1545.0	7/2$^{(-)}$	1681	0.3			D(+Q)[b]	+0.02[b] *4*	Σ Iγ=0.9% to other bound states.
		1946	0.8			D+Q		δ: −0.04 *4* or −11 *4*.
		2111	0.4			D+Q	+0.19 *6*	
		2277	0.4			D+Q[d]		δ: −0.12 *14* or +1.0 *3* if J_f=7/2.
		2457	1.4			D+Q	+0.05 *2*	
		2803	1.3			D(+Q)[d]	+0.03[d] *6*	
		2958	0.4			D(+Q)	+0.3 *3*	
		2961	0.6			D+Q		δ: −0.08 *9* or +0.9 *2*.
		3089	0.5			D+Q		δ: −0.03 *6* or −3.1 *7*.
		3162	2.3			D+Q	−0.06 *2*	
		3432	3.7			D(+Q)	−0.02 *2*	
		3625	3.4			D+Q	+0.03 *1*	
		3695	22			D(+Q)	+0.02 *2*	
		3932	6.6			D+Q	+0.02 *1*	
		3957	9.2			D(+Q)	−0.00 *1*	
		4240	4.2			D(+Q)	−0.01 *1*	
		4503	0.4	2211.75	1/2$^-$	D(+Q)	−0.06 *6*	
		4932	1.4			D(+Q)	−0.00 *3*	
		5407	19			D+Q	−0.04 *1*	
		6533	10			D+Q	−0.21 *2*	
		6591	10			D+Q	−0.03 *1*	
S(p)+1548.51	3/2$^{(-)}$	1440[eh]	0.7[e]			D+Q[e]	[e]	Σ Iγ=4.2% to other bound states.
								δ: −0.07 *2* or −2.9 *3*.
		1541[e]	0.4[e]			D+Q[e]	[e]	δ: −0.00 *3* or −3.7 *7*.
		2114[e]	2.1[e]					
		2173[geh]	4.2[ge]					
		2173[geh]	4.2[ge]					

$^{47}_{23}V_{24}$-23

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

γ(^{47}V) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	Comments
S(p)+1548.51	3/2[(−)]	2411[geh]	2.8[ge]			D+Q[e]	
		2411[geh]	2.8[ge]			D+Q[e]	
		2460[e]	12.3[e]			D+Q[e]	δ: +0.00 *1* or +4.5 *3*.
		2791[e]	1.4[e]				
		3092[e]	6.0[e]			D+Q[e]	δ: −0.02 *1* or +5.4 *3*.
		3166[e]	6.9[e]			D+Q[e]	δ: +0.01 *3* or +4.7 *9*.
		3312[geh]	6.6[ge]			D+Q[e]	
		3312[geh]	6.6[ge]			D+Q[e]	
		3320[e]	6.4[e]			D+Q[e]	δ: +0.07 *1* or +1.5 *1*.
		3629[e]	1.1[e]				
		3677[e]	12.0[e]			D+Q[e]	δ: −0.01 *2* or −4.0 *3*.
		3916[e]	1.1[e]				
		3960[e]	4.5[e]			D+Q[e]	δ: +0.04 *2* or +3.7 *2*.
		4507[e]	4.2[e]	2211.75	1/2−		
		4600[e]	0.9[e]			D+Q[e]	δ: −0.11 *6* or −2.5 *6*.
		4714[e]	0.5[e]			D+Q[e]	δ: +0.02 *3* or −4.2 *5*.
		5022[e]	1.2[e]			D+Q[e]	δ: −0.02 *3* or +1.8 *1*.
		6022[e]	3.9[e]			D+Q[e]	δ: +0.00 *1* or +4.6 *4*.
		6595[e]	2.8[e]			D+Q[e]	δ: +0.11 *3* or +2.9 *4*.
		6683[e]	14.1[e]			D+Q[e]	δ: +0.13 *1* or −7.9 *8*.
S(p)+1558.8	1/2+	2486	1.4				Σ Iγ=4.6% to other bound states.
		2734	1.0				
		2803	1.7				
		3322	1.5				
		4610	3.1				
		5032	37				
		6433	49				
S(p)+1565	(3/2−)	1460[e]	1.0[e]				Σ Iγ=3.9% to other bound states.
		2131[e]	1.8[e]			D+Q[e]	δ: −0.00 *2* or +4.5 *4*.
		2428[geh]	1.2[ge]				
		2428[geh]	1.2[ge]				
		2477[e]	7.7[e]			D+Q[e]	δ: −0.01 *2* or +4.8 *2*.
		3109[e]	4.1[e]			D+Q[e]	δ: −0.06 *2* or +6.6 *8*.
		3182[e]	5.3[e]			D+Q[e]	δ: −0.03 *1* or +5.2 *3*.
		3329[geh]	5.5[ge]			D+Q[e]	
		3329[geh]	5.5[ge]			D+Q[e]	
		3645[e]	4.2[e]			D+Q[e]	δ: +0.03 *3* or +4.1 *4*.
		3694[e]	2.3[e]				
		3932[e]	2.2[e]			D+Q[e]	δ: +0.01 *2* or +1.7 *1*.

$^{47}_{23}V_{24}$-24

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 (continued)

$\gamma(^{47}V)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
S(p)+1565	(3/2$^-$)	4523[e]	2.1[e]	2211.75	1/2$^-$			
		4617[e]	13.0[e]			D+Q[e]	[e]	δ: +0.04 *2* or −4.7 *6*.
		6039[e]	1.7[e]					
		6612[e]	43.8[e]			D+Q[e]	[e]	δ: −0.06 *1* or +6.5 *3*.
S(p)+1825.0	9/2$^+$	3001	13					
		5206	61			M1+E2	−0.18 *3*	
		5658	9			D(+Q)	+0.00 *7*	
		5681	5			D+Q		δ: −0.2 *2* or −0.8 *4*.
		6807	12			D(+Q)	+0.03 *4*	

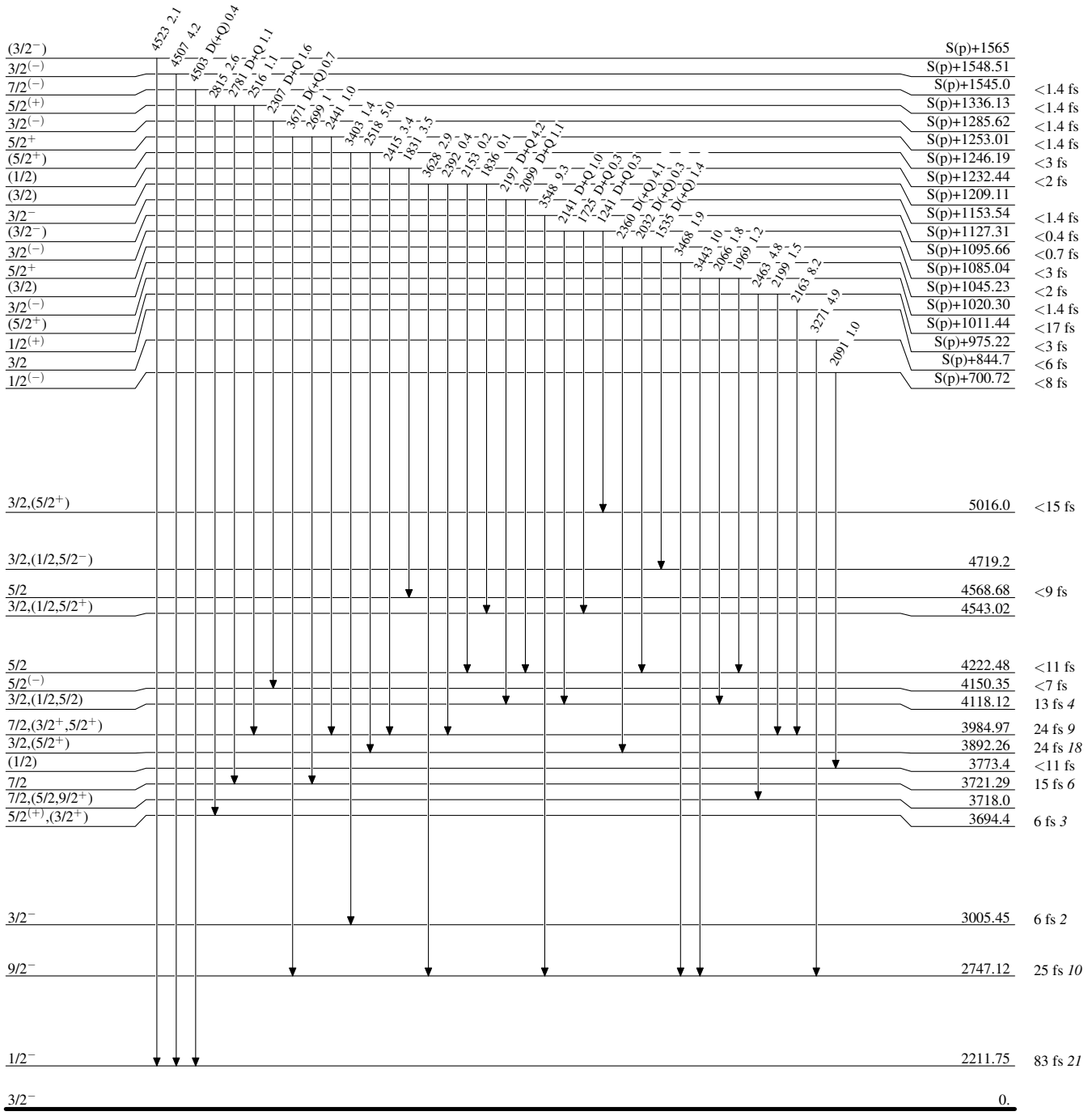
[†] Nominal energy obtained by evaluator from decay scheme of 1986De13.
[‡] % photon branching ratio from each state or resonance. Upper limits correspond to two standard deviations for unobserved transitions. Uncertainties for the primary γ branching ratio range from a few percent for strong transitions to 50% for the weak ones.
[#] From $\gamma(\theta)$ and comparison to RUL. Other δ's considered unlikely by evaluator from comparison to RUL and adopted J^π have been omitted.
[@] If J_i=5/2.
[&] If J_i=3/2.
[a] If J_f=3/2.
[b] If J_f=5/2.
[c] If J_f=1/2.
[d] If J_f=7/2.
[e] From 1973Sc29 (Ge(Li) (55°); NaI (0°, ±35°, ±55°, ±90°)); Iγ renormalized to % photon branchings by evaluator.
[f] δ(2411)=+0.14 *4* or +13 *+14−5*, δ(3317)=+0.07 *4* or −5.4 *10*, δ(3329)=−0.04 *1* or −3.3 *2*,
[g] Multiply placed with undivided intensity.
[h] Placement of transition in the level scheme is uncertain.

$^{47}_{23}V_{24}$-25

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13

Level Scheme

Intensities: % photon branching from each level



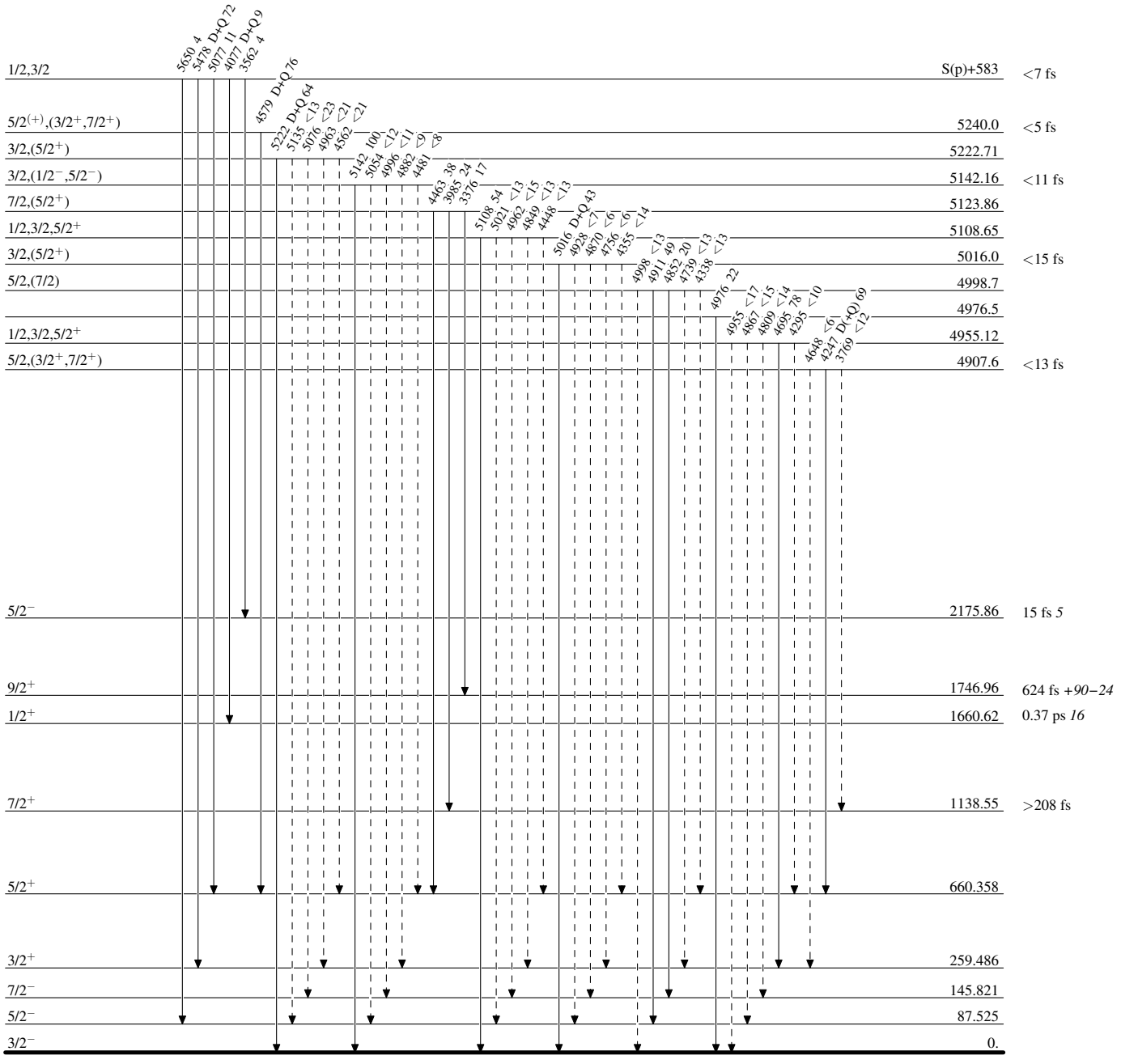
$^{47}_{23}V_{24}$

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 Legend

Level Scheme (continued)

Intensities: % photon branching from each level

γ Decay (Uncertain)



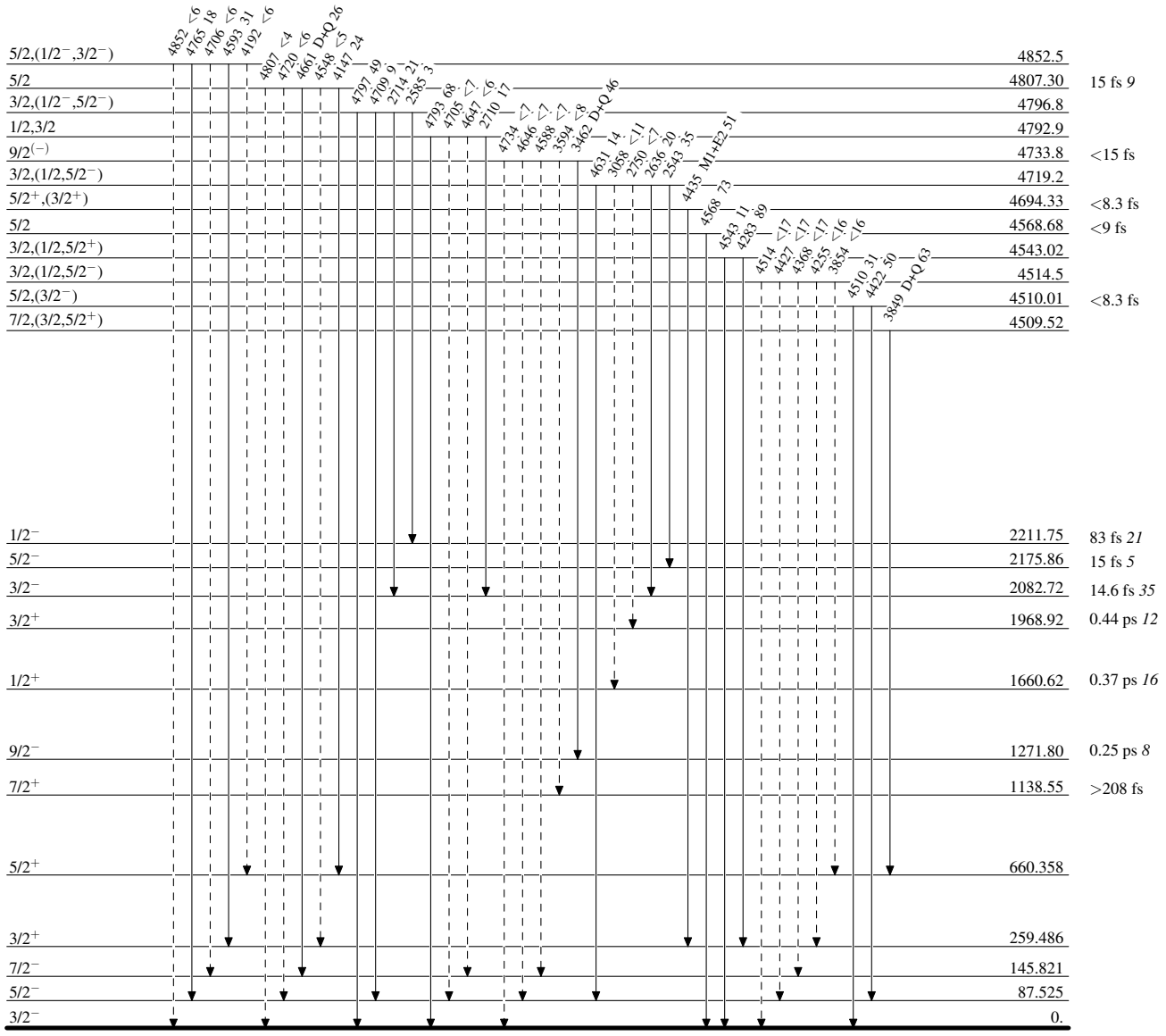
$^{47}_{23}V_{24}$

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 Legend

Level Scheme (continued)

Intensities: % photon branching from each level

– – – – – – ► γ Decay (Uncertain)



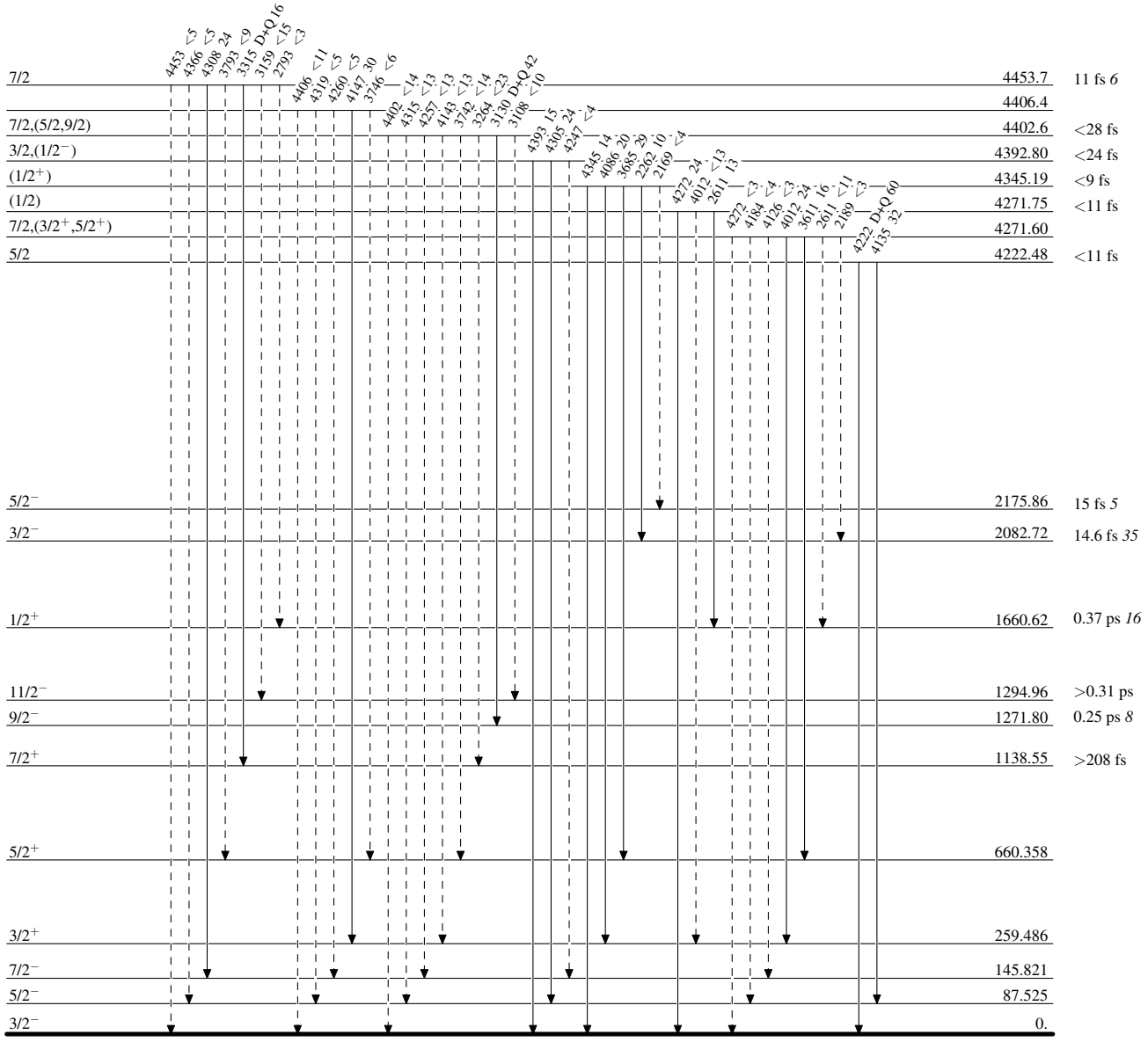
$^{47}_{23}V_{24}$

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 Legend

Level Scheme (continued)

Intensities: % photon branching from each level

– – – – – – ► γ Decay (Uncertain)



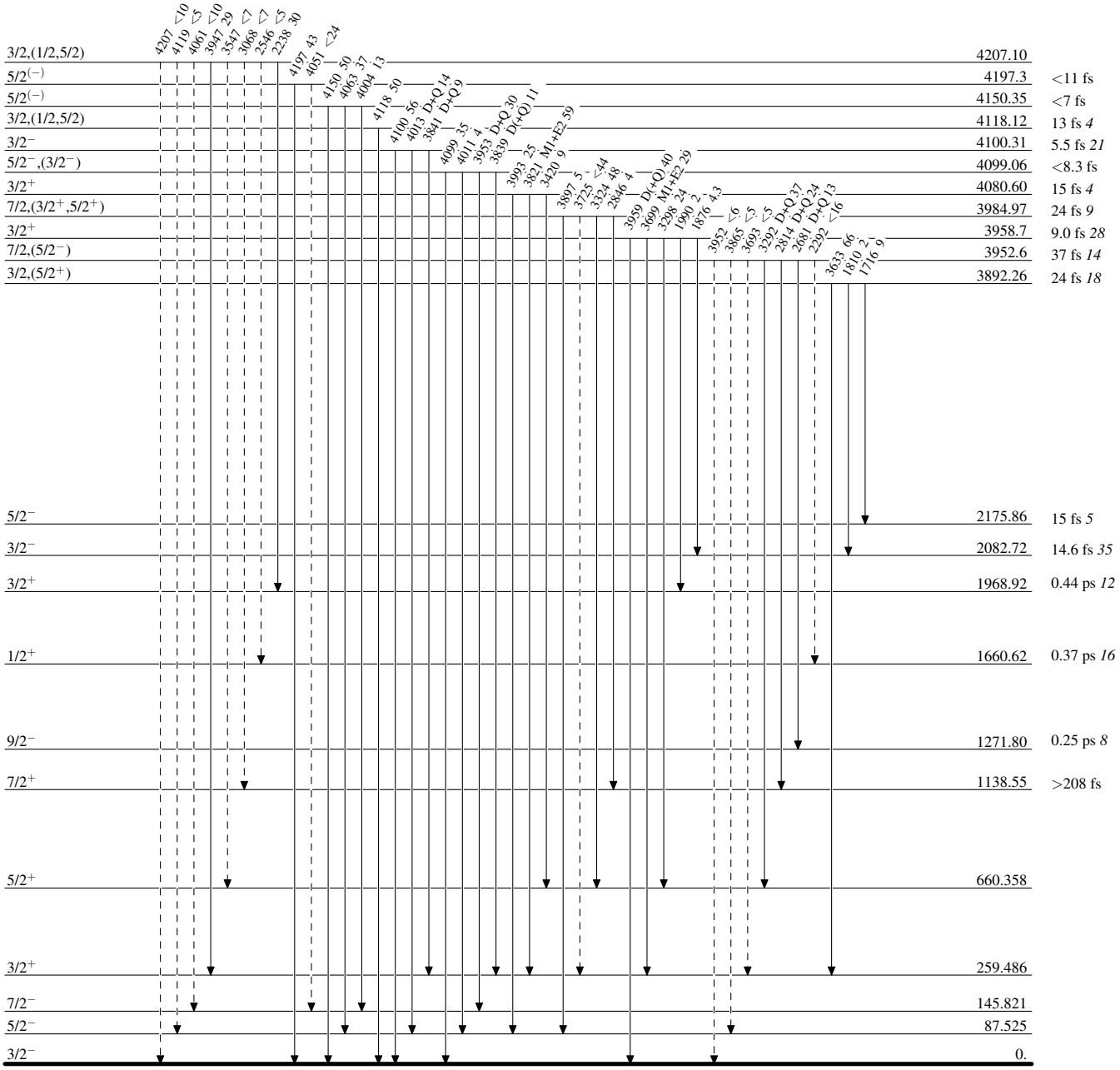
$^{47}_{23}V_{24}$

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13 Legend

Level Scheme (continued)

Intensities: % photon branching from each level

γ Decay (Uncertain)



$^{47}_{23}V_{24}$

Legend

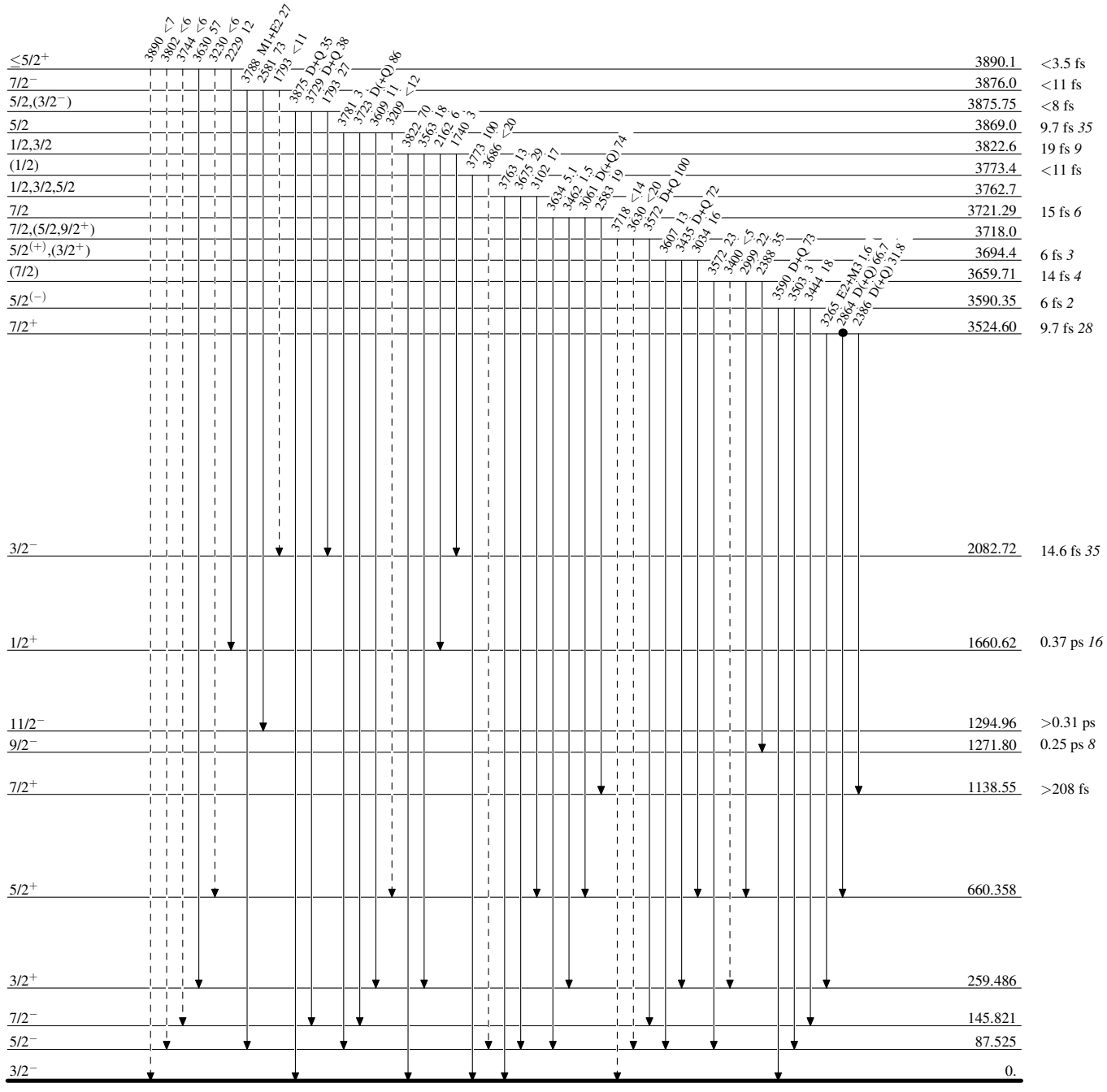
^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13

Level Scheme (continued)

Intensities: % photon branching from each level

γ Decay (Uncertain)

Coincidence



$^{47}_{23}V_{24}$

Legend

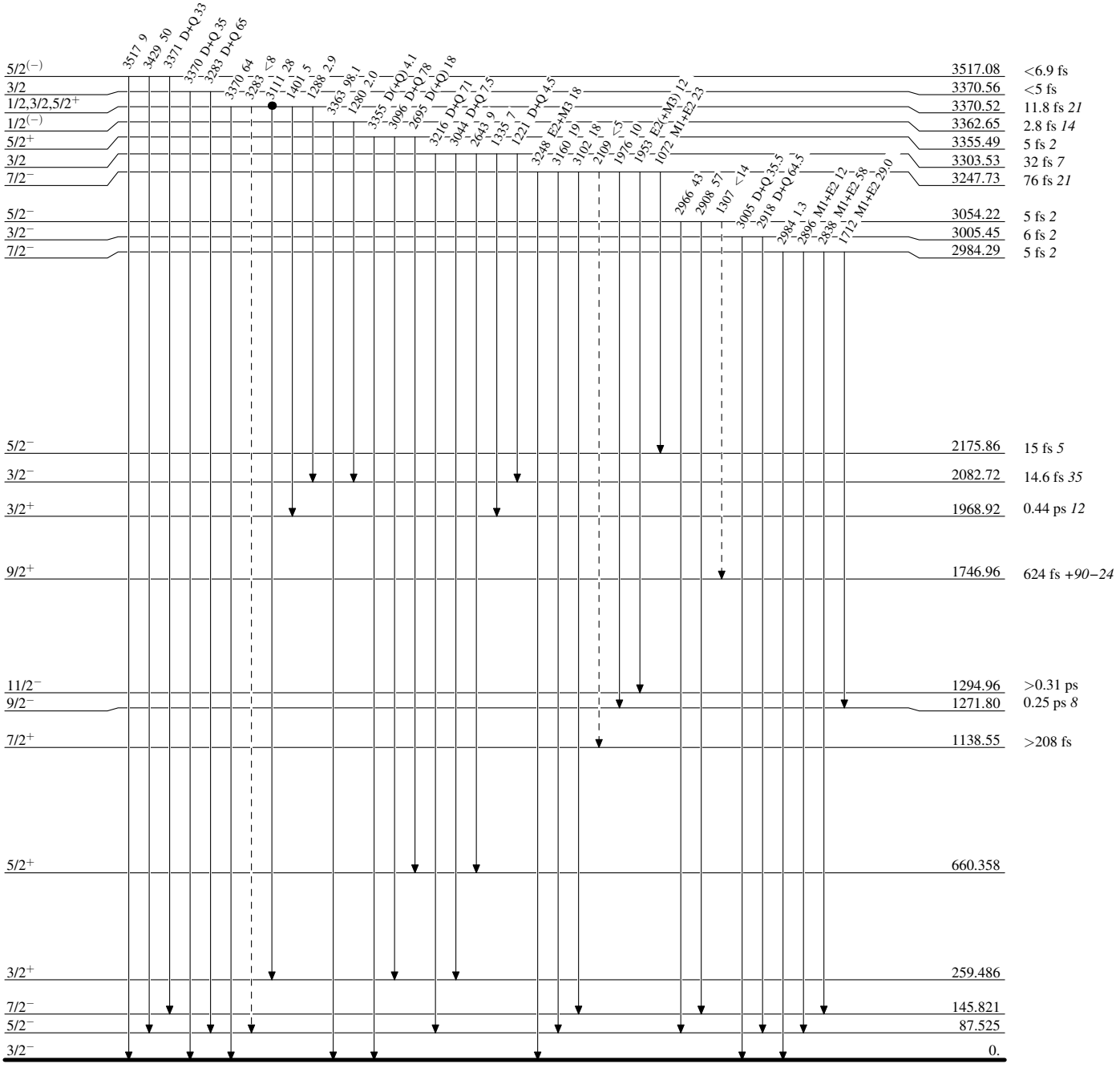
^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13

Level Scheme (continued)

Intensities: % photon branching from each level

γ Decay (Uncertain)

Coincidence



$^{47}_{23}V_{24}$

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13

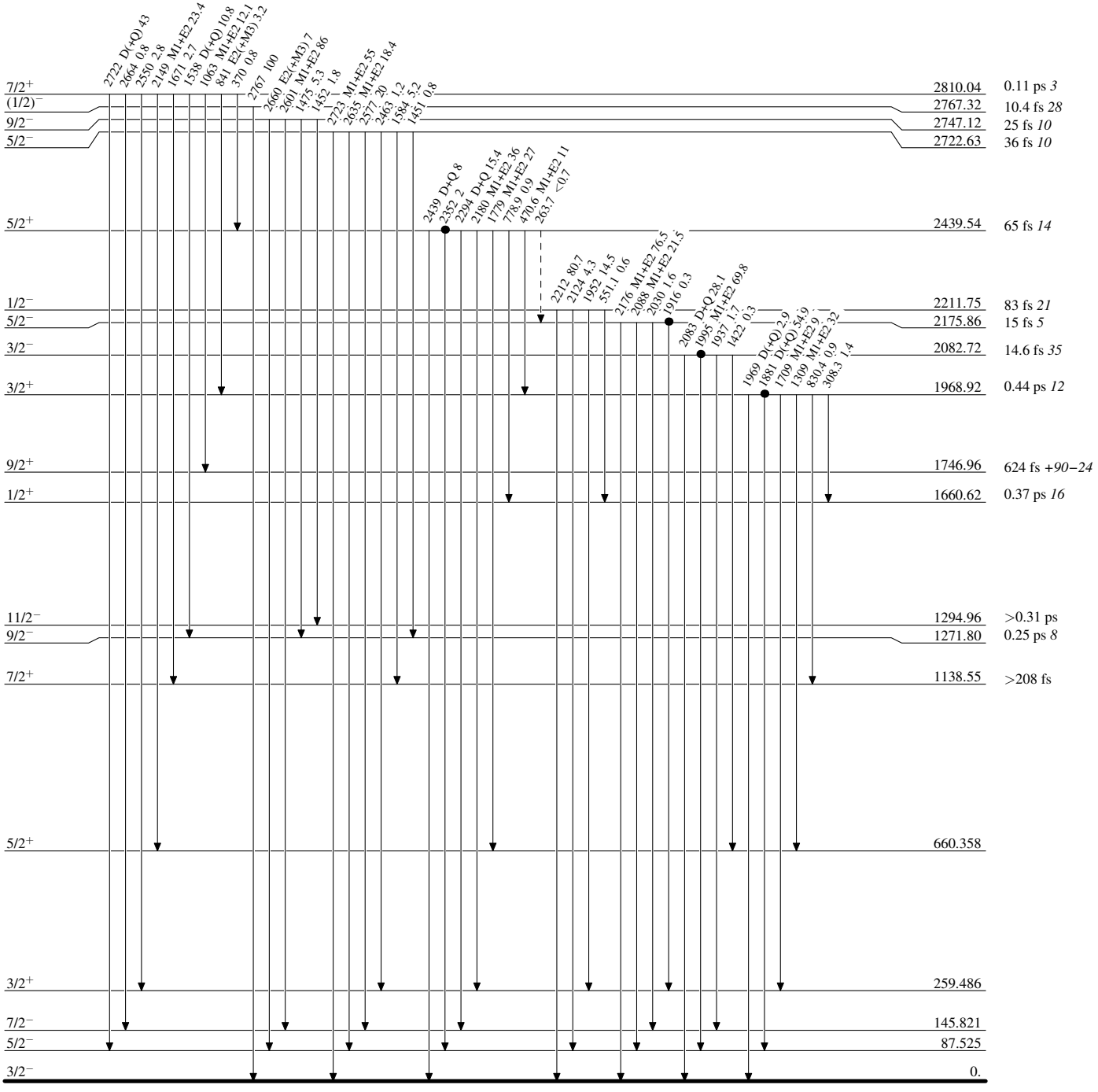
Legend

Level Scheme (continued)

Intensities: % photon branching from each level

γ Decay (Uncertain)

Coincidence



$^{47}_{23}V_{24}$

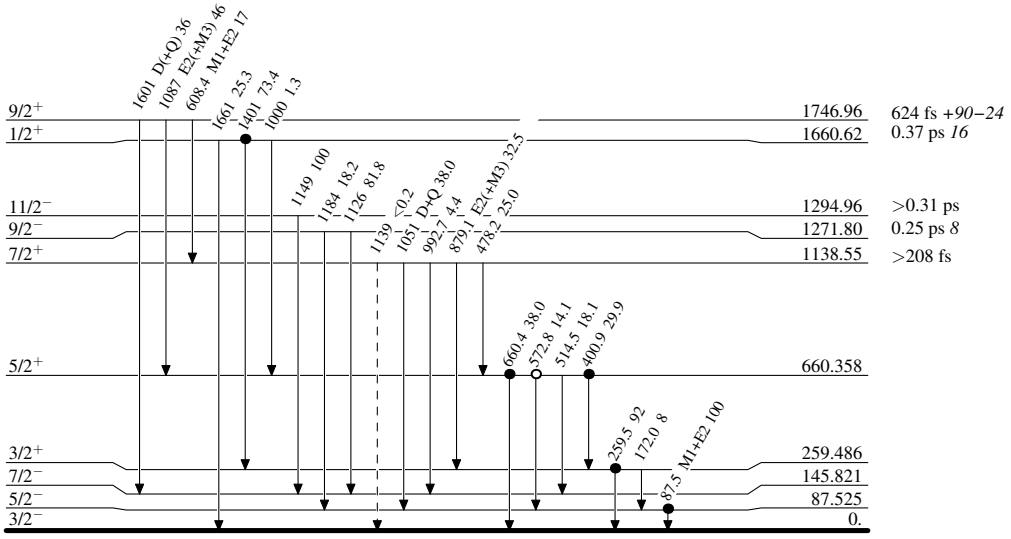
Legend

^{46}Ti(p,γ) E=0.4-1.8 MeV res 1993Ca12,1991Ki11,1986De13

Level Scheme (continued)

Intensities: % photon branching from each level

γ Decay (Uncertain)
Coincidence
Coincidence (Uncertain)



$^{47}_{23}V_{24}$