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^-)=−7016.48 *22*; S(n)=11550.05 *16*; S(p)=4272.23 *10*; Q(α)=−5745.30 *26* 2012Wa38
S(2n)=27740.4 *28*, S(2p)=13163.59 *18* (2012Wa38).
Identification and production of ms activity of ^{42}Sc by 1955Mo83 in ^{39}K(α,n) reaction at 18 MeV. The 62-s isomer was identified much later by 1963Ro10.
Mass measurements: 2009Ku19, 2006Er08.

^{42}Sc Levels

In (^{3}He,t) reaction total experimental B(GT) strength=2.7 *4* (2015Fu08) out of which ≈80% is concentrated in the 611, 1$^+$ state.
All the isospin (T) assignments are from 1990En08 evaluation, see the arguments there for such assignments.

Cross Reference (XREF) Flags

A	^{42}Ti ε decay (208.65 ms)	F	^{40}Ca(α,d)	K	^{42}Ca(^{3}He,t)
B	^{24}Mg(^{24}Mg,αpnγ),	G	^{40}Ca(^{12}C,^{10}B)	L	^{42}Ca(^{6}Li,^{6}He)
C	^{39}K(α,n),(α,nγ)	H	^{41}Ca(p,γ)	M	Pb(^{16}O,Xγ)
D	^{40}Ca(^{3}He,p)	I	^{41}Ca(^{3}He,d)		
E	^{40}Ca(^{3}He,pγ)	J	^{42}Ca(p,n)		

E(level)[†]	J$^\pi$[#]	T$_{1/2}$[@]	XREF	Comments
0.0[a]	0$^+$	680.79 ms *28*	ABCDEF HIJKLM	%ε+%β^+=100 T=1 IAS of ^{42}Ca g.s. The rms charge radius (<r^2>)$^{1/2}$: 3.570 fm *24* (2013An02 evaluation). Other: 3.539 fm *4* (2006Ga47). δ<r^2>(^{45}Sc,^{42}Sc)=+0.172 fm^2 *31*(stat) *136*(syst) (2011Av01). J$^\pi$: superallowed β decay to ^{42}Ca g.s. and from ^{42}Ti g.s.; L(^{3}He,t)=0. T$_{1/2}$: weighted average of 680.67 ms *28* (1997Ko65), 683.0 ms *15* (1965Fr08) and 681.0 ms *6* (1976Wi08). Others: 684.5 ms *12* (1972Ha82), 650 ms *10* (1965Ne02), 720 ms *30* (1960Mi09), 690 ms *20* (1961Ja22), 680 ms *10* (1957Cl40), 620 ms *50* (1955Mo83). In 2015Ha07 evaluation, T$_{1/2}$=680.72 ms *26*.
611.051[a] *6*	1$^+$	28 fs *12*	ABCdEF HIJKLM	T=0 XREF: K(615). J$^\pi$: L(^{3}He,p)=0+2 and $\gamma(\theta)$; L(^{6}Li,^{6}He)=0 and J(^{6}Li)=1$^+$; L(^{3}He,t)=0.
616.28[b] *6*	7$^+$	61.7 s *4*	BCdEFGHI K M	%ε+%β^+=100 T=0 XREF: K(624). Additional information 1. J$^\pi$: log *ft*=4.16 to 6$^+$; J=7 from p$\gamma(\theta)$ in (^{3}He,pγ). 7$^+$ is most likely from level systematics and shell model expectations. T$_{1/2}$$weighted average of 62.0 s *4* (1963Ro10), 60.6 s *4* (1965Ne02), 62.0 s *3* (1974Wi14), and 62.2 s *9* (1978Be61). Other: 68 s *8* (1994Uz01),
1490.97[a] *10*	3$^+$	31 ps *5*	BCdEF HI K M	T=0 J$^\pi$: L(^{3}He,d)=1+3; ΔJ=2 γ to 1$^+$ in (^{3}He,pγ).
1510.36 *11*	5$^+$	44 ps *8*	BCdEF HI K M	T=0 J$^\pi$: L(α,d)=4; γ to 7$^+$; ΔJ=2 γ to 7$^+$ in (^{3}He,pγ).
1586.32[&] *3*	2$^+$	54 fs *12*	B DE HI K M	T=1 J$^\pi$: L(^{3}He,p)=2; ΔJ=1 γ to 1$^+$.

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Adopted Levels, Gammas (continued)

^{42}Sc Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$[@]	XREF	Comments
1704? *15*			D	E(level): level seen weakly in (^{3}He,p) only.
1844.84[&] *11*	3(+)	<3.5 ns	B DEF HI K M	T=0 Jπ: ΔJ=1 γ to 2+; ΔJ=2 γ to 1+; weak γ from 4+; RUL. $T_{1/2}$: 0.7 ps to 3.5 ns.
1873.7 *7*	0+	<70 fs	E HI	T=1 Jπ: L(^{3}He,d)=3; isotropic γ(θ) to 1+ allows (0,1,2)+. This level is the only candidate as isobaric analog of ^{42}Ca (1837,0+).
1888.4 *2*	1+	<42 fs	A cDEF HI K	T=0 Jπ: L(^{3}He,p)=L(^{3}He,t)=0; ΔJ=1 γ to 0+. $T_{1/2}$: other: 42 fs *21*.
2187.42 *11*	3+	0.54 ps *24*	BcDEF HI K	T=0 Jπ: L(α,d)=2; L(^{3}He,d)=1+3; ΔJ=1 γ to 2+.
2222.8 *4*	1+	87 fs *35*	cdef i Kl	T=0 Jπ: L(^{3}He,t)=0, GT state. γ(θ) to 0+ favors 1 but 2 is not completely ruled out. $T_{1/2}$: from DSAM on 2222.6γ (1971Ro30).
2223.16 *4*	3+	0.63 ps *35*	Bcdef Hi l	T=0 Jπ: L(^{3}He,d)=1+3; ΔJ=1 γ to 2+ and RUL. $T_{1/2}$: from DSAM on 636γ (1971Ro30). Assume contribution of 636.4γ from 2222.7 level is small (evaluators).
2269.14 *4*	2+	>70 fs	B EF HI K	T=0 Jπ: γ to 0+; ΔJ=1 γ to 1+.
2295.73 *21*	(1,2)		B DE I	T=0 Jπ: ΔJ=0 or 1 γ to 2+.
2388.66 *19*	3+		B D F HI K M	Jπ: L(α,d)=2; gammas to 3+ and 5+.
2433.62[a] *18*	4+	>0.14 ps	B EF HI M	T=0 Jπ: L(^{3}He,d)=1; ΔJ=1 gammas to 3+ and 5+; RUL.
2455 *2*	1+	0.18 ps *11*	DEF I K	Jπ: L(^{3}He,t)=0, GT state.
2486.59[‡] *12*	2+	<50 fs	dE HI K	T=1 Jπ: γ to 1+ and ΔJ=1 γ to 3+; E2 to 3+ excluded by RUL.
2507 *5*	(1,2,3)+		d K	XREF: K(?). Jπ: L(^{3}He,p)=2.
2535.1 *20*	(1,2+)	0.66 ps *28*	DEF I	Jπ: γ to 0+.
2586.7 *16*	(2,4)		DEF H	T=0 Jπ: D+Q γ to 3+.
2606.93[&] *14*	4(+)		B M	Jπ: ΔJ=1 γ to 3(+).
2651.64 *19*	(2+)	35 fs *21*	B DEF HI K	T=0 Jπ: gammas to 1+ and 2+; γ from (p,γ) resonance (3,4)+ and RUL.
2669 *5*			K	
2726 *6*			D F	
2795.3[‡] *3*	(5+,6+)		d F HI	Jπ: γ to 7+; γ from (3+,4+); L(^{3}He,d)=(1+3).
2815.56 *20*	4+	35 fs *14*	B dE HI K	T=1 Jπ: L(^{3}He,d)=3(+1) from 7/2−; ΔJ=1 γ gammas to 3+ and 5+; RUL.
2833.2 *11*	(2+,3,4+)	0.21 ps *11*	EF	Jπ: γ to 2+.
2847.7 *7*	3+	0.20 ps *13*	DEF HI K	T=0 E(level): from 1989Ki11. E=2853.47 *18* adopted by 1990En08 apparently from 1989Ki11 seems to be a misprint. Jπ: L(^{3}He,p)=4 and L(α,d)=2.
2883 *6*			F	
2910.3 *7*	4+	>0.8 ps	DEF HI K	Jπ: L(α,d)=4 and ΔJ=1 γ to 3+.
2966 *4*	1+		CD F K	Jπ: L(^{3}He,t)=0, GT state.
2995.53[‡] *7*	4+	>0.14 ps	BC F HI M	Jπ: L(α,d)=4; ΔJ=1 γ to 3+.
3022.80[‡] *15*	4−		DEF HI	Jπ: parity from L(^{3}He,d)=0 and decay to (5)+; ΔJ=1 γ to 5+.

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Adopted Levels, Gammas (continued)

^{42}Sc Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$[@]	XREF	Comments
3089.1[‡] *3*	5^+	0.21 ps *4*	DEF HI K	XREF: K(?). Jπ: L(^{3}He,p)=L(α,d)=4 and γ to 7^+.
3146 *5*			d I	
3166 *5*			d I	
3174.66 *15*	$(5)^+$		B F	Jπ: L(α,d)=4; ΔJ=(2) γ to $3^{(+)}$; population in heavy-ion reaction favors higher spin.
3224.01 *20*	(5^+)	>0.21 ps	B H	Jπ: gammas to 3^+ and 5^+.
3238 *5*	$(5,6,7)^+$		D I K	T=1 Jπ: L(^{3}He,p)=6.
3285.35 *14*	7^+		B I K	Jπ: L(^{3}He,d)=3; γ to 5^+; ΔJ=1 γ to 7^+.
3321.36 *10*	$(1^+,2,3^+)$	>0.14 ps	d Hi k	Jπ: gammas to 1^+ and 3^+.
3323.8 *3*	$(3^+,4,5^+)$	<35 fs	B d Hi k	T=1 Jπ: gammas to 3^+ and 5^+.
3348 *4*	1^+		I K	Jπ: L(^{3}He,t)=0, GT state.
3366 *5*			K	
3391.4 *7*	3^+	62 fs *49*	DEF I K	Jπ: L(^{3}He,p)=L(α,d)=2, L(^{3}He,d)=1+3 and ΔJ=1 γ to 2^+.
3446 *5*	$(2 \text{ to } 5)^{(+)}$		I	Jπ: L(^{3}He,d)=(1).
3468 *5*			d I	
3493 *5*			d I	
3512 *5*			d I	
3529 *5*			cd I	
3546.0 *6*	(5^+)		B	Jπ: γ to 3^+.
3580 *5*			c I K	
3602 *5*	$(5,6,7)^+$		cD F I	Jπ: L(α,d)=6.
3603.23[c] *10*	(8^-)		B	Jπ: ΔJ=1 γ to 7^+; bandhead.
3668.7[‡] *3*			H	
3687.6 *8*	1^+	<28 fs	DE I K	T=0 Jπ: L(^{3}He,p)=0+2; L(^{3}He,t)=0, GT state.
3701 *10*			F	
3710.3 *3*	(5^+)		B	Jπ: ΔJ=1 γ to 4^+.
3718.6 *5*	(5^+)	>70 fs	B HI	Jπ: L(^{3}He,d)=3; gammas to 3^+ and 7^+.
3752.06 *13*	(7^+)		B I	Jπ: ΔJ=(2) γ to 5^+.
3775 *5*			d K	
3797.3 *3*	3^+		B d F I K	XREF: K(3807). Jπ: L(^{3}He,p)=2; L(α,d)=4. L(^{3}He,t)=3,1+3 is inconsistent as it suggests negative parity.
3855 *5*			d I	Jπ: L(^{3}He,d)=(1) from $7/2^-$ suggests $(2 \text{ to } 5)^{(+)}$.
3866 *5*	1^+		d I	Jπ: L(^{3}He,p)=0+2.
3880 *5*			K	
3884.04[&] *17*	$6^{(+)}$		B	Jπ: ΔJ=2 γ to $4^{(+)}$.
3896 *5*	$(3,4,5)^+$		F I	Jπ: L(α,d)=4.
3915 *5*			K	
3933.5 *13*	3^+	<52 fs	DE I K	T=0 Jπ: L(^{3}He,p)=2 and ΔJ=1 γ to 2^+.
4022 *5*			I	
4047.72[‡] *6*	(2,3,4)	<14 fs	HI	T=1 Jπ: γ to 3^+ and RUL.
4062.0[a] *4*	(6^+)		B	Jπ: γ to 4^+.
4070 *4*	$(3,4,5)^+$		F K	Jπ: L(α,d)=4.
4117.30[c] *12*	(10^-)	≈0.5 ns	B	Jπ: ΔJ=(2) γ to (8^-); ΔJ=(3) γ to 7^+. $T_{1/2}$: a crude estimate by 2007Ch40 from transition rates and angular distributions, the value is within an order of magnitude.
4176 *4*	$(3,4,5)^+$		I K	Jπ: L(^{3}He,d)=1.
4204 *5*	$(2 \text{ to } 5)^+$		I	Jπ: L(^{3}He,d)=1+3.
4245.79 *10*	$9^{(-)}$		B	Jπ: ΔJ=2 γ to 7^+; ΔJ=1 γ to (8^-).

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Adopted Levels, Gammas (continued)

^{42}Sc Levels (continued)

E(level)[†]	Jπ[#]	XREF	Comments
4246 *5*		F I	
4262 *5*		I	
4274 *4*		I K	
4289 *5*	(2 to 5)$^+$	I	Jπ: L(^{3}He,d)=1.
4370 *4*		I K	
4391 *10*	(1,2,3)$^+$	F	Jπ: L(α,d)=2.
4410 *5*	(2 to 5)$^+$	I	Jπ: L(^{3}He,d)=1.
4468.8[‡] *4*	(2,3)$^+$	F HI	Jπ: L(^{3}He,d)=1 and L(α,d)=2.
4548 *5*	(2 to 5)$^+$	I K	Jπ: L(^{3}He,d)=1.
4582 *5*	(2 to 5)$^+$	I K	XREF: K(4590). Jπ: L(^{3}He,d)=1.
4604 *5*	(2 to 5)$^{(+)}$	I K	XREF: K(4619). Jπ: L(^{3}He,d)=(1).
4665 *5*	(2 to 5)$^+$	I	Jπ: L(^{3}He,d)=1.
4704 *5*		I	
4725 *5*	(2 to 5)$^+$	D I	Jπ: L(^{3}He,d)=1.
4755 *5*	(3,4,5)$^+$	F I	Jπ: L(α,d)=4.
4786 *5*		f I	
4808 *5*		f I	
4828 *5*	(2 to 5)$^+$	D I K	Jπ: L(^{3}He,d)=1.
4875 *6*	(1,2,3)$^+$	F I K	Jπ: L(α,d)=2.
4883.31 *14*	(8$^+$)	B	Jπ: ΔJ=1 to 7$^+$.
4928 *10*	1$^+$	K	Jπ: L(^{3}He,t)=0, GT state.
4971 *5*		I	
4992.12[b] *11*	9$^{(+)}$	B	Jπ: ΔJ=2 gammas to 7$^+$.
5001 *5*	(1,2,3)$^+$	F I	Jπ: L(α,d)=2.
5028 *5*		I	
5048 *5*	(3,4,5)$^+$	F I	Jπ: L(α,d)=4.
5084 *5*		I K	
5120 *5*	(1,2,3)$^+$	F I	Jπ: L(α,d)=2.
5140 *5*	1$^+$	I K	Jπ: L(^{3}He,t)=0, GT state.
5305 *5*		F I	
5326 *5*		I	
5352 *5*		I	
5370 *5*		I	
5380 *5*		I	
5402.2 *14*	(7$^+$)	B	Jπ: γ to (5$^+$).
5436 *5*		D I	
5451.38[c] *13*	11$^{(-)}$	B	Jπ: ΔJ=(2) to 9$^{(-)}$; ΔJ=1 γ to (10$^-$).
5475 *5*		D I	
5507.26[&] *19*	8$^{(+)}$	B	Jπ: ΔJ=2 γ to 6$^{(+)}$.
5520 *5*		I	
5572 *5*		I	
5635 *5*	(2 to 5)$^+$	D F I	Jπ: L(^{3}He,d)=1.
5651 *5*	(2 to 5)$^+$	I	Jπ: L(^{3}He,d)=1.
5686 *20*	(1$^+$)	K	Jπ: L(^{3}He,t)=(0), possible GT state.
5716 *20*	1$^+$	K	Jπ: L(^{3}He,t)=0, GT state.
5771 *5*		I	
5810 *10*		D K	
5865 *5*	(2 to 5)$^{(+)}$	I	Jπ: L(^{3}He,d)=(1).
5962.60 *21*	(9$^+$)	B	Jπ: ΔJ=(2) γ to 7$^+$.
5966 *5*	(2 to 5)$^{(+)}$	D I K	XREF: K(5958). Jπ: L(^{3}He,d)=(1).
5995.8[‡] *3*	(3,4)$^+$	H	Jπ: gammas to 2$^+$ and 5$^+$.
6011 *13*		F	XREF: F(6050).

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Adopted Levels, Gammas (continued)

^{42}Sc Levels (continued)

E(level)[†]	Jπ[#]	XREF	Comments
6076.41[‡] *8*	(2+,3,4+)	H k	Jπ: gammas to 2+ and 4+.
6090 *10*		D k	
6117.7[a] *8*	(8+)	B	Jπ: γ to (6+).
6174.2[‡] *3*	(3+,4+)	D H K	XREF: D(6180)K(6167). Jπ: gammas to 5+ and 2+.
6253.4[‡] *2*	(3+,4)	H	Jπ: gammas to 3+, 5+ and (1+,2).
6327 *10*	1+	K	Jπ: L(^{3}He,t)=0, GT state.
6364 *10*		K	
6737 *10*		K	
6823.95 *14*	(10+)	B	Jπ: ΔJ=(2) γ to (8+); γ to 9(+).
6921.36[b] *13*	11(+)	B	Jπ: ΔJ=2 γ to 9(+).
7068 *10*		K	
7129 *10*		F K	
7183.9[&] *3*	10(+)	B	Jπ: ΔJ=2 γ to 8(+).
7261 *10*		K	
7295 *10*		K	
7306.90 *15*	(11+)	B	Jπ: ΔJ=(2) γ to 9(+); γ to (10−).
7418 *10*		K	
7491 *10*		K	
7586 *10*		K	
7676.19 *17*	11(+)	B	Jπ: ΔJ=2 γ to 9(+).
7678 *10*		K	
7776 *10*		K	
7884 *10*		K	
7923 *10*		F K	
7974 *10*		K	
8094.12 *13*	(10−)	B	Jπ: ΔJ=1 γ to 11(−); ΔJ=(0) γ to (10+).
8105 *10*	(1+)	K	Jπ: L(^{3}He,t)=(0), possible GT state.
8182 *10*		K	
8204.5 *6*		B	Jπ: γ to (10−) suggests (10,11,12−).
8251 *10*		K	
8292 *10*		K	
8338 *10*		K	
8373 *10*		K	
8400 *10*		K	
8492 *10*		K	
8540 *20*		F K	
8732 *10*	(1+)	K	Jπ: L(^{3}He,t)=(0), possible GT state.
8797.97 *15*	(13+)	B	Jπ: ΔJ=(2) γ to 11(+).
8810 *10*		K	
8854 *10*		K	
8886.5 *6*		B	Jπ: γ to 9(−) suggests (9,10,11−).
8887 *10*		K	
8920.31 *23*		B	Jπ: gammas to (10+) suggests (10,11,12+).
8929 *10*		K	
8981 *10*	(1+)	K	Jπ: L(^{3}He,t)=(0), possible GT state.
9004.1 *6*		B	Jπ: γ to (10+) suggests (10,11,12+).
9068 *20*		K	
9088 *20*		K	
9113 *20*		K	
9156 *10*		K	
9203 *10*		K	
9236 *10*		K	
9280 *20*		K	
9312 *20*		K	

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Adopted Levels, Gammas (continued)

^{42}Sc Levels (continued)

E(level)†	Jπ#	XREF	Comments
9406 *10*		K	
9510.77[b] *16*	(13+)	B	Jπ: ΔJ=(2) gammas to 11(+).
9565 *10*		K	
9611 *10*		K	
9620.29 *23*	(12)	B	Jπ: ΔJ=2 γ to (10−).
9793 *20*		K	
9826 *20*		K	
9874 *10*		K	
9901 *10*		K	
9947 *20*		K	
9978 *20*		K	
10011 *10*	1+	K	Jπ: L(^{3}He,t)=0, GT state.
10012.9 *10*	(13+)	B	Jπ: ΔJ=(2) γ to 11(+).
10118 *20*		K	
10142 *20*		K	
10165 *20*		K	
10195 *20*		K	
10250 *20*	1+	K	Jπ: L(^{3}He,t)=0, GT state.
10271 *20*		K	
10338 *10*	1+	K	Jπ: L(^{3}He,t)=0, GT state.
10395 *10*		K	
10437 *10*	1+	K	Jπ: L(^{3}He,t)=0, GT state.
10450.6 *4*	(13+)	B	Jπ: ΔJ=(2) γ to 11(+).
10536.19 *17*	(12−)	B	Jπ: ΔJ=2 γ to (10−).
10561 *10*	(1+)	K	Jπ: L(^{3}He,t)=(0), possible GT state.
10582.51[c] *24*	13	B	Jπ: ΔJ=2 γ to 11(−).
10695 *10*		K	
10735 *10*		K	
10809 *10*		K	
10938.8 *8*		B	Jπ: γ to 11(+) suggests (11,12,13+).
11070 *20*		K	
11180 *20*		K	
11220 *20*		K	
11260 *20*		K	
11400 *20*		K	
11620 *20*		K	
11810 *20*		K	
11830 *20*	(1+)	K	Jπ: L(^{3}He,t)=(0), possible GT state.
11853.33[b] *18*	(15+)	B	Jπ: ΔJ=2 γ to (13+).
11931.2 *3*		B	Jπ: γ to (12) suggests (12,13,14).
12000 *20*	(1+)	K	Jπ: L(^{3}He,t)=(0), possible GT state.
12400.9 *7*		B	
12420 *20*		K	
12449.4 *6*		B	Jπ: γ to (13+) suggests (13,14,15+).
12700 *20*		K	
13021.8 *5*		B	Jπ: γ to (13+) suggests (13,14,15+).
13025.7 *7*		B	Jπ: γ to (13+) suggests (13,14,15+).
13093.6 *3*	(15)	B	Jπ: ΔJ=(2) γ to 13.
13418.5 *6*		B	Jπ: γ to (13+) suggests (13,14,15+).
13619.9[c] *8*		B	Jπ: γ to (13) suggests (13,14,15).
15966.3 *5*	(17)	B	Jπ: ΔJ=(2) γ to (15).

† From least-squares adjustment to measured Eγ data when such data are available. Otherwise weighted averages of available level

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Adopted Levels, Gammas (continued)

^{42}Sc Levels (continued)

energies are taken.

‡ From (p,γ).

When L-transfer arguments are used, the target is $J^\pi=0^+$, except for ^{41}Ca(^{3}He,d), where target $J^\pi=7/2^-$.

@ From DSAM in (^{3}He,pγ) and (p,γ), weighted average taken when available, unless otherwise noted.

& Band(A): γ sequence based on 2^+.

a Band(B): γ sequence based on 0^+.

b Band(C): γ sequence based on 7^+.

c Band(D): γ sequence based on (8^-).

γ(^{42}Sc)

E_i(level)	J_i^π	E_γ †	I_γ ‡	E_f	J_f^π	Mult.#	δ#	Comments
611.051	1^+	611.046 *6*	100	0.0	0^+	(M1)		B(M1)(W.u.)=3.4 *15*
1490.97	3^+	880.0 *1*	100	611.051	1^+	E2		B(E2)(W.u.)=4.0 *7*
1510.36	5^+	893.9 *1*	100	616.28	7^+	E2		B(E2)(W.u.)=2.6 *5*
1586.32	2^+	975.26 *3*	100 *3*	611.051	1^+	(M1+E2)	+0.05 *3*	B(M1)(W.u.)=0.40 *10*; B(E2)(W.u.)<7
		1586.8 *7*	8.7 *9*	0.0	0^+	E2		B(E2)(W.u.)=9.6 *24*
1844.84	$3^{(+)}$	258.5 *1*	100	1586.32	2^+	D		
		1235		611.051	1^+	Q(+O)	−0.12 *15*	
1873.7	0^+	1262.5 *7*	100	611.051	1^+	(M1)		B(M1)(W.u.)>0.16
1888.4	1^+	1888.4 *2*	100	0.0	0^+	(M1)		B(M1)(W.u.)>0.078
2187.42	3^+	601.1 *1*	100 *2*	1586.32	2^+	M1+E2	−0.23 *4*	B(M1)(W.u.)=0.17 *8*; B(E2)(W.u.)=70 *40*
		1575	5.3 *21*	611.051	1^+	E2		B(E2)(W.u.)=0.6 *4*
2222.8	1^+	636.2 *5*	≈100	1586.32	2^+	[M1+E2]		
		2222.6 *13*	≈100	0.0	0^+	[M1]		
2223.16	3^+	636.833 *9*	100 *2*	1586.32	2^+	(M1)		B(M1)(W.u.)=0.13 *8*
		733	5.3 *21*	1490.97	3^+			
2269.14	2^+	379	12 *6*	1888.4	1^+			
		682.808 *23*	100 *70*	1586.32	2^+	(D)		
		1658	42 *6*	611.051	1^+	D(+Q)	−0.06 *6*	
		2269	38 *8*	0.0	0^+			
2295.73	(1,2)	709.4 *2*	100	1586.32	2^+	D+Q	−2.7 *8*	
2388.66	3^+	878.1 *2*	100 *5*	1510.36	5^+			
		898.6	14 *5*	1490.97	3^+			
2433.62	4^+	922.7 *3*	100 *9*	1510.36	5^+	(M1+E2)	+0.40 *9*	B(M1)(W.u.)<0.096; B(E2)(W.u.)<70
		942.9 *2*	92 *8*	1490.97	3^+	(M1+E2)	−0.48 *11*	B(M1)(W.u.)<0.079; B(E2)(W.u.)<77
2455	1^+	2455@ *2*	100	0.0	0^+	[M1]		B(M1)(W.u.)=0.008 *+13−3*
2486.59	2^+	996.15	30 *7*	1490.97	3^+	(M1(+E2))	−0.02 *4*	B(M1)(W.u.)>0.10
		1875.49	100 *7*	611.051	1^+	[M1]		B(M1)(W.u.)>0.051
2535.1	$(1,2^+)$	2535@ *2*	100	0.0	0^+			
2586.7	(2,4)	1095.7 *16*		1490.97	3^+	D+Q	−0.10 *6*	
2606.93	$4^{(+)}$	762.1 *1*	100	1844.84	$3^{(+)}$	D		
2651.64	(2^+)	760.97	11 *3*	1888.4	1^+			
		1065.4 *2*	100 *3*	1586.32	2^+	(M1)		B(M1)(W.u.)=0.5 *3*
2795.3	$(5^+,6^+)$	2179.0	100	616.28	7^+			
2815.56	4^+	969.36	8 *5*	1844.84	$3^{(+)}$	(M1)		B(M1)(W.u.)=0.029 *22*
		1305.6 *3*	80 *7*	1510.36	5^+	(M1(+E2))	−0.06 *4*	B(M1)(W.u.)=0.12 *5*; B(E2)(W.u.)<1.9
		1325.2	100 *7*	1490.97	3^+	(M1)		B(M1)(W.u.)=0.14 *6*

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Adopted Levels, Gammas (continued)

γ(^{42}Sc) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
2833.2	(2$^+$,3,4$^+$)	1246.6[@] *9*	100	1586.32	2$^+$			
2847.7	3$^+$	1261.2 *11*	100	1586.32	2$^+$			
2910.3	4$^+$	1419.0 *12*		1490.97	3$^+$	D+Q	−0.14 *7*	
2995.53	4$^+$	606.47	25 *13*	2388.66	3$^+$			
		772.6 *1*	100 *5*	2223.16	3$^+$	(M1)		B(M1)(W.u.)<0.27
3022.80	4$^-$	1512.67	100	1510.36	5$^+$	D(+Q)	−0.03 *8*	
3089.1	5$^+$	2472.7	100	616.28	7$^+$	[E2]		B(E2)(W.u.)=3.4 *7*
3174.66	(5)$^+$	1329.8 *1*	100	1844.84	3$^{(+)}$	(Q)		
3224.01	(5$^+$)	408.6 *2*	100 *9*	2815.56	4$^+$	[M1]		B(M1)(W.u.)<0.50
		834.9 *4*	83 *9*	2388.66	3$^+$	[E2]		B(E2)(W.u.)<210
		1000.8 *3*	67 *6*	2223.16	3$^+$	[E2]		B(E2)(W.u.)<68
		1713	55 *6*	1510.36	5$^+$			
3285.35	7$^+$	1775.2 *4*	41 *4*	1510.36	5$^+$			
		2668.4 *2*	100 *12*	616.28	7$^+$	D+Q		
3321.36	(1$^+$,2,3$^+$)	1830.9	100 *20*	1490.97	3$^+$			
		2710.22	100 *20*	611.051	1$^+$			
3323.8	(3$^+$,4,5$^+$)	1813.9 *6*	100 *9*	1510.36	5$^+$			
		1832.6 *4*	82 *9*	1490.97	3$^+$			
3391.4	3$^+$	575.9 *12*		2815.56	4$^+$			
		904.5 *5*	100	2486.59	2$^+$	D+Q	−0.11 *5*	
3546.0	(5$^+$)	1358.6 *6*	100	2187.42	3$^+$			
3603.23	(8$^-$)	2986.4 *1*	100	616.28	7$^+$	D		
3668.7		1235.4		2433.62	4$^+$			
		1445.5		2223.16	3$^+$			
3687.6	1$^+$	1813.5 *11*	≈20	1873.7	0$^+$	[M1]		B(M1)(W.u.)>0.020 E_γ: level-energy difference=1814.2.
		2101.2 *10*	≈100	1586.32	2$^+$	(M1+E2)	−0.07 *4*	B(M1)(W.u.)>0.063
		3689 *2*	≈13	0.0	0$^+$	[M1]		B(M1)(W.u.)>0.0015 E_γ: level-energy difference=3687.6.
3710.3	(5$^+$)	894.7 *2*	100	2815.56	4$^+$	D		
3718.6	(5$^+$)	723.0 *3*		2995.53	4$^+$			E_γ,I_γ: only seen in (^{24}Mg,αpnγ) and (^{24}Ne,apng).
		3102.9		616.28	7$^+$			E_γ,I_γ: only seen in (p,γ).
3752.06	(7$^+$)	2241.5 *1*	100	1510.36	5$^+$	(Q)		
3797.3	3$^+$	473.5 *2*	100 *9*	3323.8	(3$^+$,4,5$^+$)			
		1145.7 *4*	51 *5*	2651.64	(2$^+$)			
3884.04	6$^{(+)}$	1277.1 *1*	100	2606.93	4$^{(+)}$	Q		
3933.5	3$^+$	2347.1 *13*	100	1586.32	2$^+$	(M1+E2)	1.2 *5*	B(M1)(W.u.)>0.0068; B(E2)(W.u.)>6.8
4047.72	(2,3,4)	1658.63	100	2388.66	3$^+$			I_γ: this γ is only about 50%, other 50% branching from 4048 level is unaccounted.
4062.0	(6$^+$)	1628.3 *3*	100	2433.62	4$^+$			
4117.30	(10$^-$)	514.0 *1*	100 *3*	3603.23	(8$^-$)	(E2)		B(E2)(W.u.)≈3.0
		3500.7 *3*	20.8 *11*	616.28	7$^+$	(E3)		B(E3)(W.u.)≈0.62
4245.79	9$^{(-)}$	642.2 *1*	34.2 *16*	3603.23	(8$^-$)	D+Q		
		3629.7 *1*	100 *6*	616.28	7$^+$	Q		
4468.8	(2,3)$^+$	1558.4	100 *20*	2910.3	4$^+$			
		2882.4	100 *8*	1586.32	2$^+$			
4883.31	(8$^+$)	1597.8 *1*	46 *4*	3285.35	7$^+$			
		4267.3 *2*	100 *9*	616.28	7$^+$	D+Q		
4992.12	9$^{(+)}$	1239.8 *2*	4.9 *3*	3752.06	(7$^+$)	Q		
		4375.8 *1*	100 *8*	616.28	7$^+$	(Q)		
5402.2	(7$^+$)	1856.1 *12*	100	3546.0	(5$^+$)			
5451.38	11$^{(-)}$	1206.0 *1*	73.0 *25*	4245.79	9$^{(-)}$	(Q)		

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Adopted Levels, Gammas (continued)

$\gamma(^{42}Sc)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]
5451.38	$11^{(-)}$	1334.1 *1*	100 *3*	4117.30	(10^-)	D+Q
5507.26	$8^{(+)}$	1623.2 *1*	100	3884.04	$6^{(+)}$	Q
5962.60	(9^+)	2209.8 *3*	100 *7*	3752.06	(7^+)	(Q)
		5346.5 *7*	82 *14*	616.28	7^+	
5995.8	$(3,4)^+$	1948.0	38 *13*	4047.72	(2,3,4)	
		2771.9	81 *12*	3224.01	(5^+)	
		2906.6	19 *6*	3089.1	5^+	
		2972.9	≈6	3022.80	4^-	
		3148.1	25 *6*	2847.7	3^+	
		3180.3	19 *6*	2815.56	4^+	
		3344.7	25 *6*	2651.64	(2^+)	
		3509.1	19 *6*	2486.59	2^+	
		3562.3	19 *6*	2433.62	4^+	
		3772.5	38 *13*	2223.16	3^+	
		3808.1	12 *6*	2187.42	3^+	
		4409.2	50 *12*	1586.32	2^+	
		4485.4	100 *12*	1510.36	5^+	
		4505.1	44 *13*	1490.97	3^+	
6076.41	$(2^+,3,4^+)$	2028.6	14 *4*	4047.72	(2,3,4)	
		2407.6	14 *4*	3668.7		
		2755.0	34 *7*	3321.36	$(1^+,2,3^+)$	
		3053.5	24 *7*	3022.80	4^-	
		3165.9	14 *4*	2910.3	4^+	
		3687.2	59 *7*	2388.66	3^+	
		3807.1	72 *7*	2269.14	2^+	
		3853.1	100 *7*	2223.16	3^+	
6117.7	(8^+)	2055.7 *7*	100	4062.0	(6^+)	
6174.2	$(3^+,4^+)$	1705.4	19 *5*	4468.8	$(2,3)^+$	
		2454.8	95 *9*	3718.6	(5^+)	
		2851.3	38 *9*	3323.8	$(3^+,4,5^+)$	
		2950.3	33 *9*	3224.01	(5^+)	
		3085.0	14 *5*	3089.1	5^+	
		3178.5	33 *9*	2995.53	4^+	
		3358.7	43 *9*	2815.56	4^+	
		3378.8	14 *5*	2795.3	$(5^+,6^+)$	
		3904.9	100 *9*	2269.14	2^+	
6253.4	$(3^+,4)$	3164.2	13 *3*	3089.1	5^+	
		3405.7	13 *3*	2847.7	3^+	
		3437.9	10 *3*	2815.56	4^+	
		3602.3	50 *6*	2651.64	(2^+)	
		3819.9	50 *6*	2433.62	4^+	
		4030.0	≈3	2223.16	3^+	
		4065.6	100 *6*	2187.42	3^+	
		4743.0	23 *6*	1510.36	5^+	
		4762.7	23 *6*	1490.97	3^+	
6823.95	(10^+)	1830.3 *5*	11.3 *14*	4992.12	$9^{(+)}$	
		1940.6 *1*	100 *5*	4883.31	(8^+)	(Q)
6921.36	$11^{(+)}$	1929.3 *1*	100	4992.12	$9^{(+)}$	Q
7183.9	$10^{(+)}$	1676.8 *4*	40 *5*	5507.26	$8^{(+)}$	Q
		2300.2 *5*	100 *18*	4883.31	(8^+)	
7306.90	(11^+)	2315.1 *2*	100 *5*	4992.12	$9^{(+)}$	(Q)
		3188.9 *2*	94 *5*	4117.30	(10^-)	
7676.19	$11^{(+)}$	1713.3 *2*	47 *4*	5962.60	(9^+)	
		2684.0 *2*	100 *7*	4992.12	$9^{(+)}$	Q
8094.12	(10^-)	1270.1 *1*	48.0 *18*	6823.95	(10^+)	(D)

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

$\gamma(^{42}Sc)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]
8094.12	(10^-)	2642.7 *1*	100 *3*	5451.38	$11^{(-)}$	D+Q
8204.5		4087.0 *5*	100	4117.30	(10^-)	
8797.97	(13^+)	1491.0 *1*	46.9 *22*	7306.90	(11^+)	
		1876.6 *1*	100 *4*	6921.36	$11^{(+)}$	(Q)
8886.5		4640.4 *6*	100	4245.79	$9^{(-)}$	
8920.31		1736.4 *6*	36 *9*	7183.9	$10^{(+)}$	
		2096.3 *2*	100 *7*	6823.95	(10^+)	
9004.1		2180.1 *5*	100	6823.95	(10^+)	
9510.77	(13^+)	1834.3 *2*	28.2 *17*	7676.19	$11^{(+)}$	(Q)
		2589.4 *1*	100 *4*	6921.36	$11^{(+)}$	(Q)
9620.29	(12)	5502.6 *2*	100	4117.30	(10^-)	Q
10012.9	(13^+)	3091.4 *10*	100	6921.36	$11^{(+)}$	(Q)
10450.6	(13^+)	3529.1 *3*	100	6921.36	$11^{(+)}$	(Q)
10536.19	(12^-)	2442.0 *1*	100	8094.12	(10^-)	Q
10582.51	13	5130.8 *2*	100	5451.38	$11^{(-)}$	Q
10938.8		3262.5 *7*	100	7676.19	$11^{(+)}$	
11853.33	(15^+)	2342.5 *1*	100 *4*	9510.77	(13^+)	Q
		3054.9 *5*	14.5 *20*	8797.97	(13^+)	
11931.2		2310.8 *2*	100	9620.29	(12)	
12400.9		3480.4 *6*	100	8920.31		
12449.4		3651.3 *5*	100	8797.97	(13^+)	
13021.8		3510.9 *4*	100	9510.77	(13^+)	
13025.7		4227.5 *6*	100	8797.97	(13^+)	
13093.6	(15)	2511.0 *2*	100	10582.51	13	(Q)
13418.5		3907.5 *5*	100	9510.77	(13^+)	
13619.9		3037.3 *7*	100	10582.51	13	
15966.3	(17)	2872.6 *3*	100	13093.6	(15)	(Q)

[†] Primarily from (^{3}He,pγ),(p,γ), (^{24}Mg,αpnγ), (^{20}Ne,αpnγ), weighted average taken when available; others from level-energy differences with recoil removed, unless otherwise noted.

[‡] Primarily from (p,γ), (^{24}Mg,αpnγ) and (^{20}Ne,αpnγ), weighted average taken when available, unless otherwise noted.

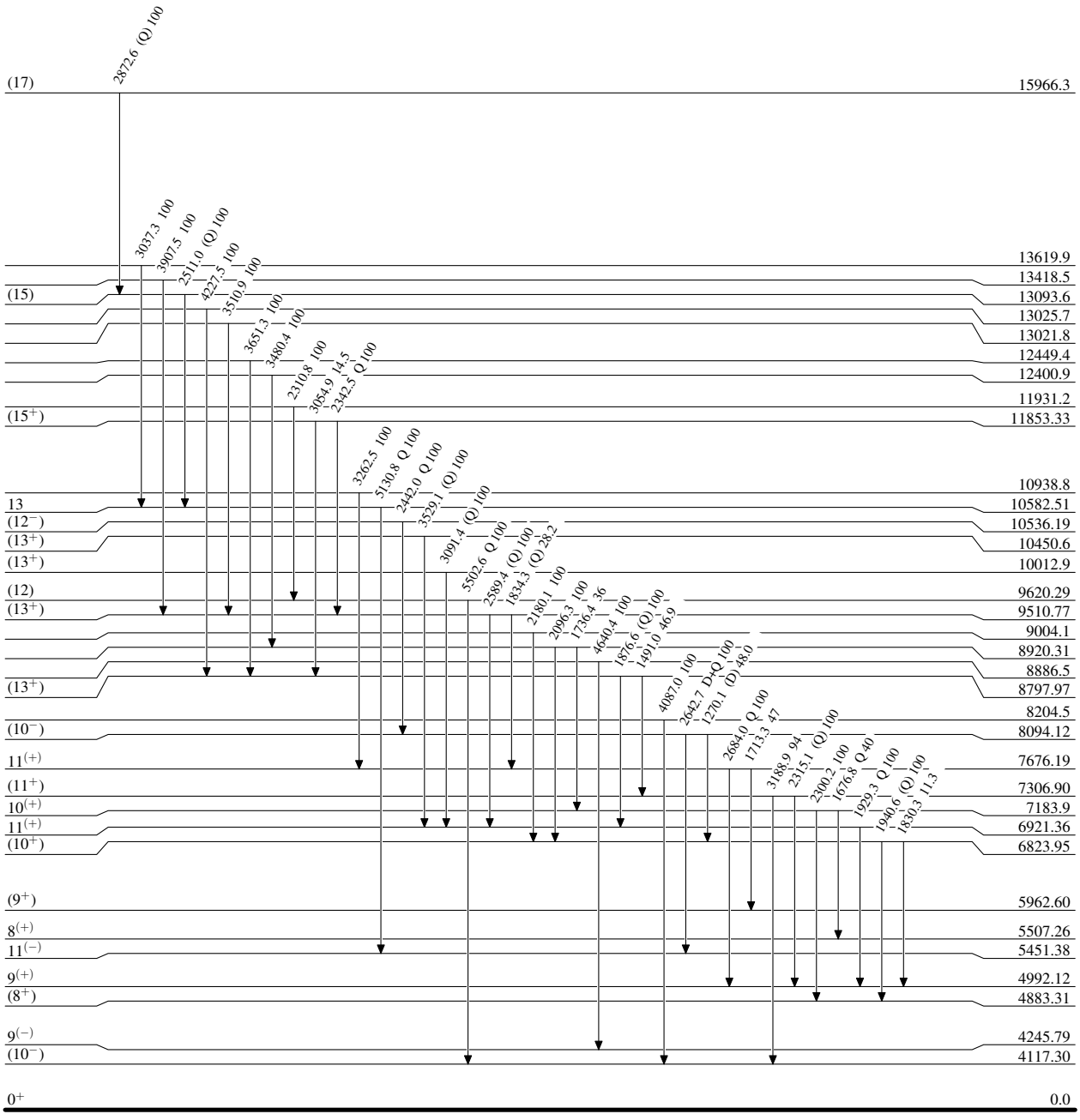
[#] From (^{3}He,pγ).

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

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

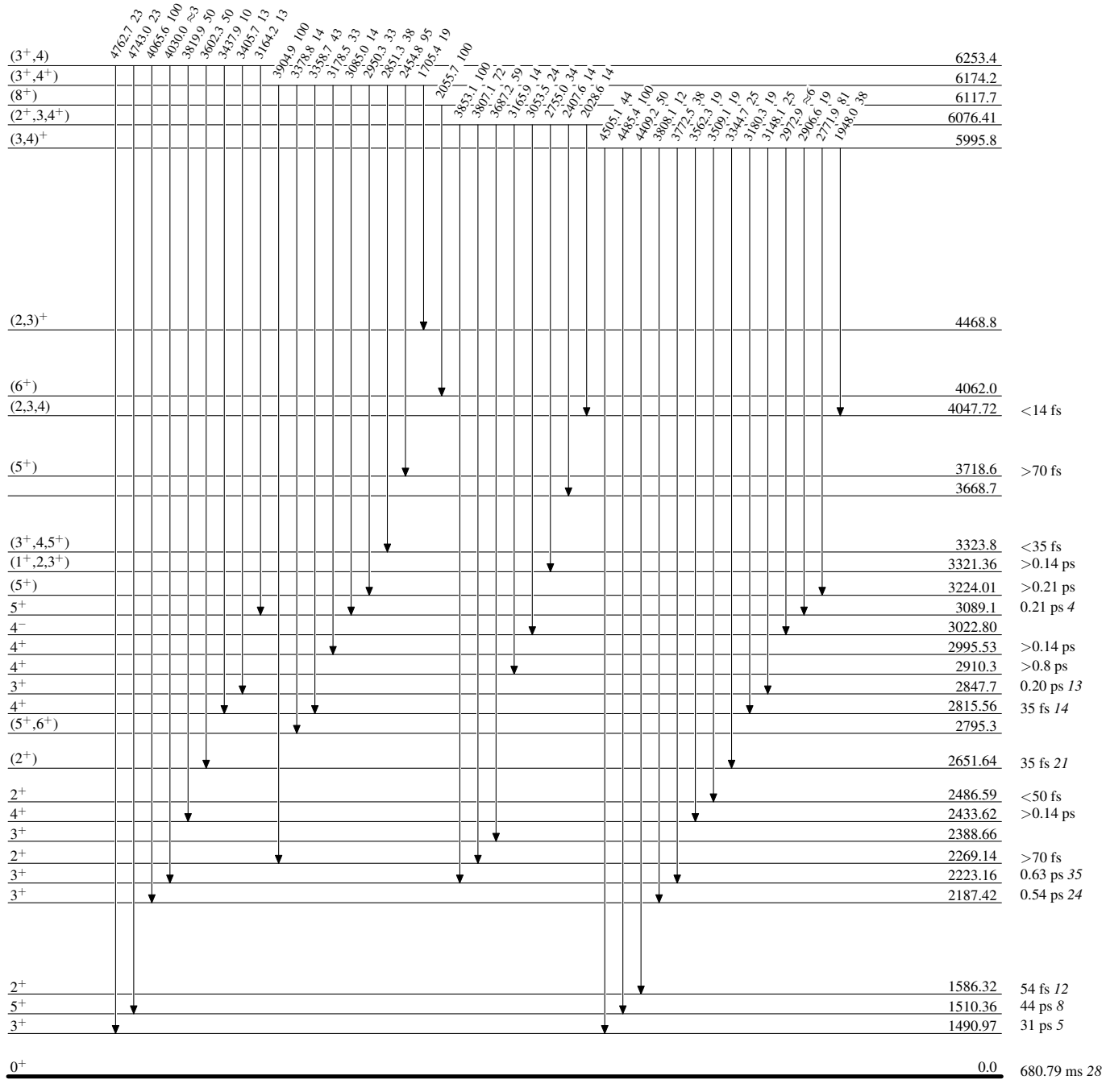


$^{42}_{21}Sc_{21}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

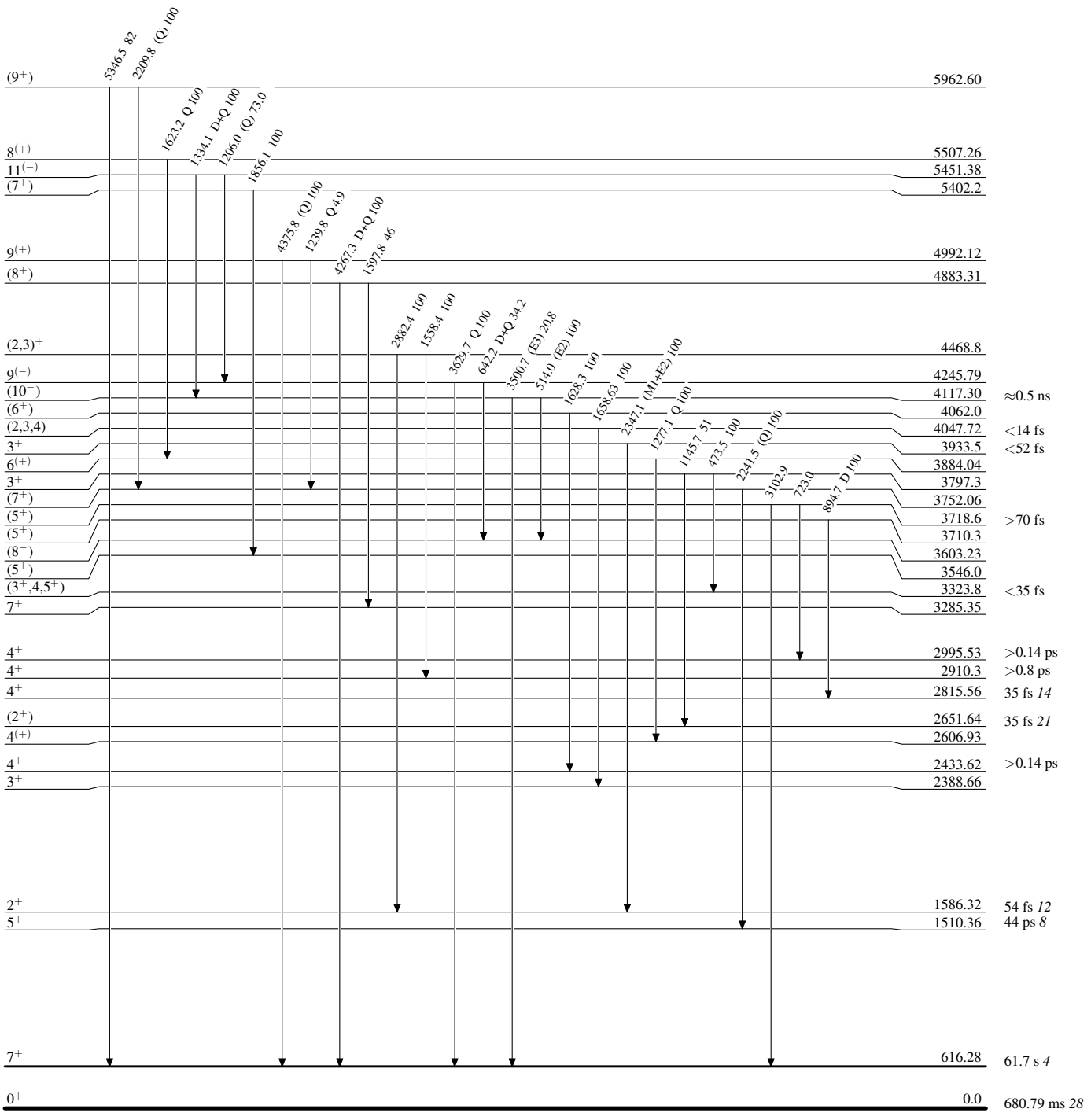


$^{42}_{21}Sc_{21}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{42}_{21}Sc_{21}$

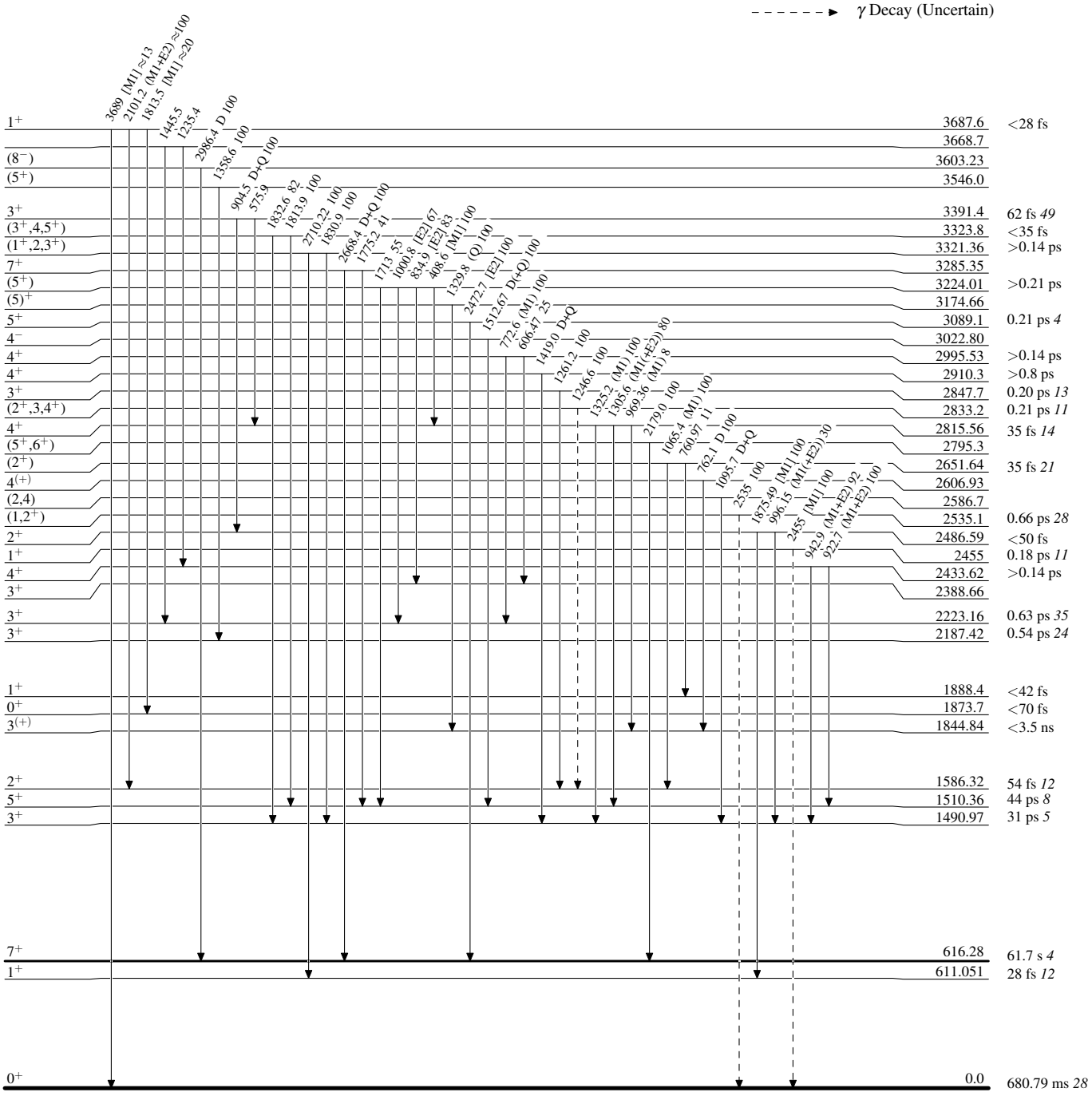
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

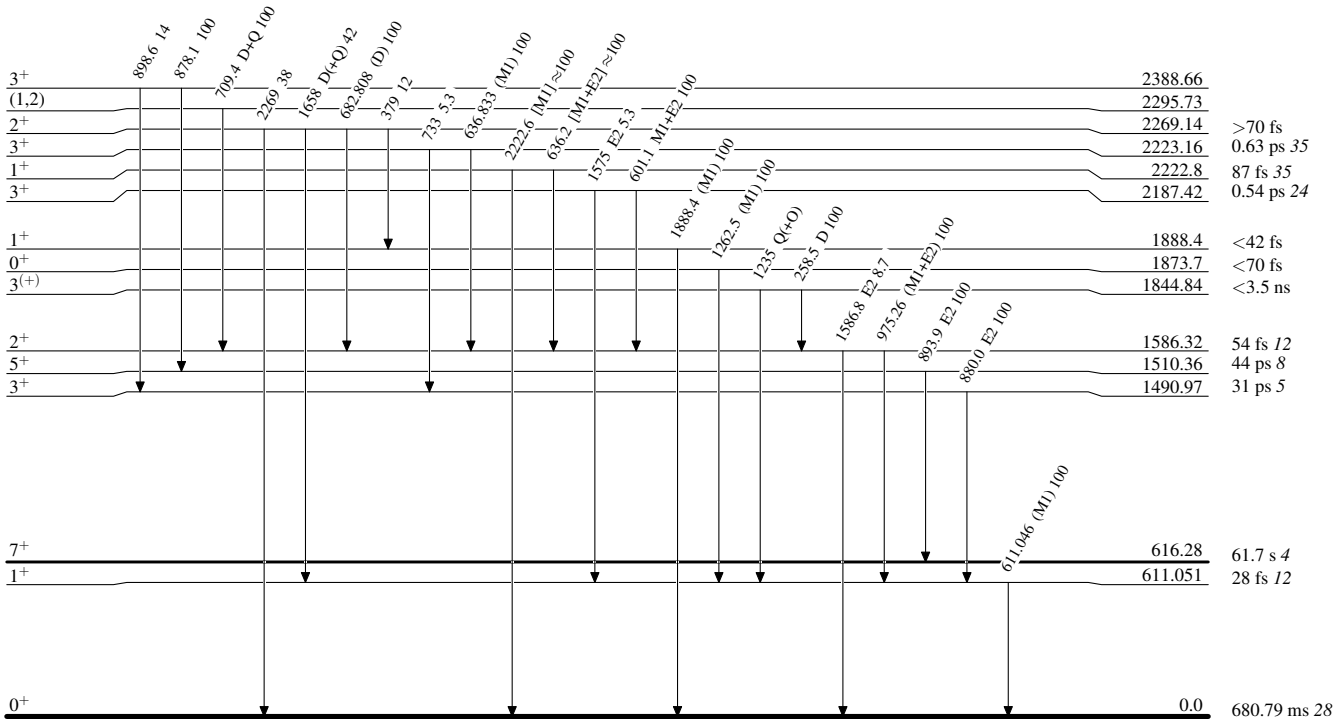


$^{42}_{21}Sc_{21}$

Adopted Levels, Gammas

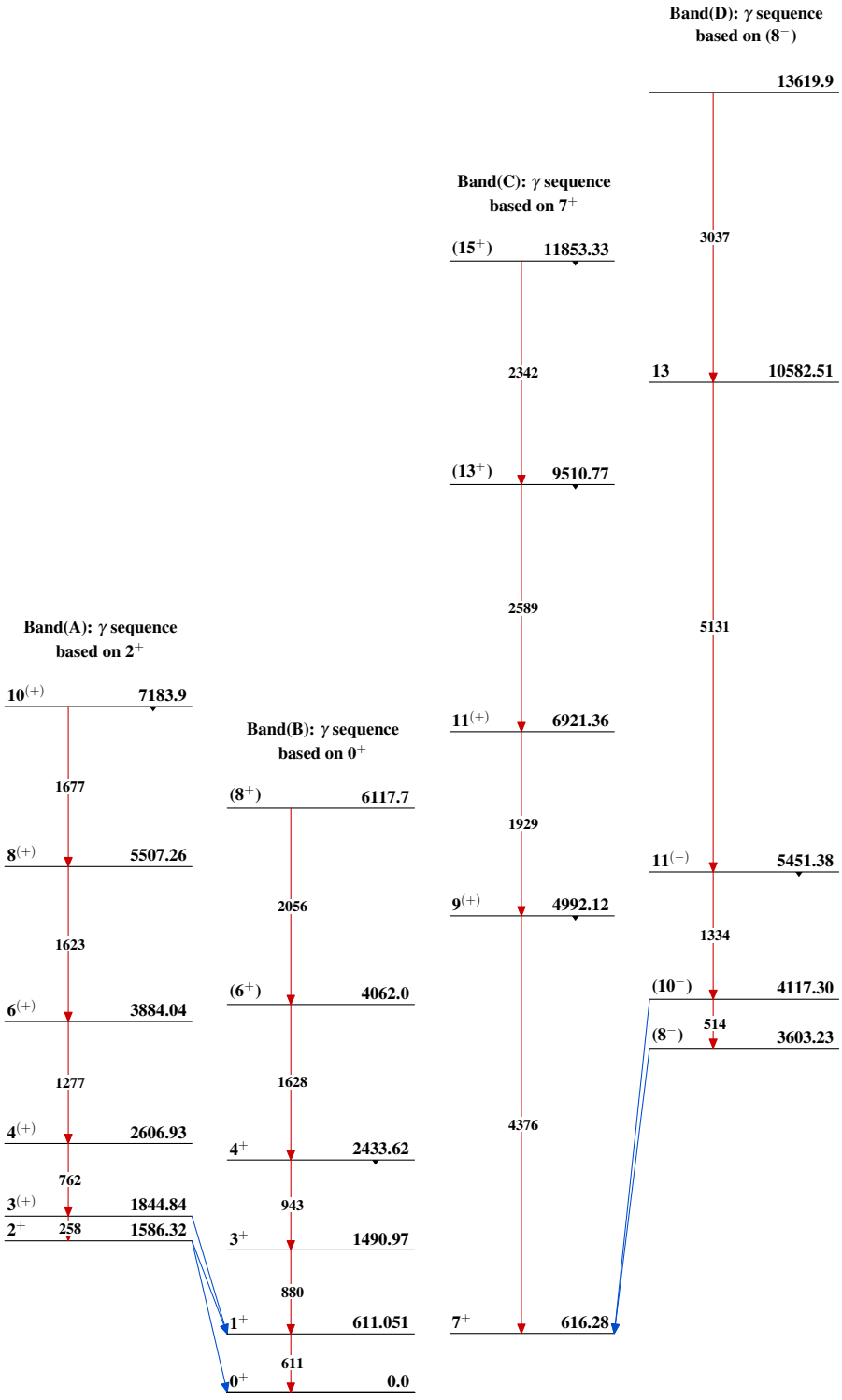
Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{42}_{21}Sc_{21}$

Adopted Levels, Gammas



$^{42}_{21}Sc_{21}$