^{40}Ca(α,γ) 1977Di07,1971Si13

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen, Balraj Singh and John A. Cameron	NDS 112, 2357 (2011)	31-Jul-2011

Includes resonances.

1977Di07 (also 1969Si14,1971Si13,1972Si34,1973Di04,1973Si28,1976Di06, 1978Di11,1980Di14,1981Di09,1982Di05): E=3.8-6.0 MeV alpha beam produced from the National Research Council 4-MV Van de Graaff accelerator. A $^{40}CaCO_3$ isotopically enriched target prepared by evaporation on a gold backing. NaI(Tl) and Ge(Li) detectors. Measured Eγ, Iγ, $\gamma(\theta)$, $\gamma\gamma$-coin. Deduced levels, J^π, branching ratios, mixing ratios, resonance strengths, half-lives using Doppler Shift Attenuation Method (DSAM).

1977Co12: E=2.75-4.0 MeV alpha beam produced from the CSULA 4-MV Van de Graaff accelerator. A target of natural calcium metal evaporated on tantalum backings. A 10% efficient coaxial Ge(Li) counter for detecting γ-rays. Measured Eγ, Iγ, $\gamma(\theta)$. Deduced levels, J^π, branching ratios, resonance strengths.

1974Pe13: E=6.5-17.5 MeV alpha beam produced from the MP tandem accelerator of the Wright Nuclear Structure Laboratory (WNSL) at Yale University. 0.75-1.5 mg/cm^2 ^{40}Ca targets prepared by evaporation of natural calcium onto gold foils. A 29.2 cm by 30.5 cm NaI(Tl) crystal for detecting γ-rays. Measured Eγ, Iγ, $\gamma(\theta)$. Deduced levels, J^π.

2007Vo06 (also 2007Vo03 and 2008Vo01): ^{4}He(^{40}Ca,γ), E=0.60-1.15 MeV/nucleon ^{40}Ca beam, covering the energy range of astrophysics interest, produced from the off-line ion source of the ISAC facility at TRIUMF and separated in the recoil mass spectrometer DRAGON. High efficiency BGO detectors. Measured γ-ray yields. Deduced resonance strengths for known resonances.

Yield measurements: 2000Hu16, 2003Pa34, 2005Na30, 2006Na02.

Others: 1967Ve07, 1968Ve10.

^{44}Ti Levels

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[@]	Comments
0[h]	0$^+$[#]		
1082.9[h] *1*	2$^+$	3.1 ps *8*	J$^\pi$: from 1971Si13.
1904.3[i] *3*	0$^+$	>0.5 ps	J$^\pi$: (0,2) from $\gamma(\theta)$ in 1971Si13, but absence of a γ-ray to ground state is consistent with the spin 0 assignment (1971Si13).
2454.1[h] *3*	4$^+$	0.42 ps *7*	
2530.6[i] *2*	2$^+$	0.97 ps *14*	
2886.6[j] *4*	2$^+$	0.35 ps *7*	
3175.7[k] *4*	3$^{(-)}$	>2 ps	J$^\pi$: from $\gamma(\theta)$ data (1981Di09). Parity is required to be the same as that for 3646 level (1981Di09) and the long lifetime favors negative parity over positive parity (1977Di07).
3364[i] *1*	4$^+$	0.36 ps *7*	J$^\pi$: 1977Di07 suggested a band structure for 1904, 2531 and 3364 levels and assigned 4$^+$ to this level. T$_{1/2}$: weighted average of 0.42 ps *14* from DSAM and 0.35 ps *7* from line shape (1977Di07).
3415.3[j] *3*	(2$^+$,3$^+$)	0.49 ps *7*	
3645.8[k] *4*	4$^{(-)}$		J$^\pi$: $\gamma(\theta)$ in 1981Di09. Parity is required to be the same as that for 3176 level (1981Di09).
3755.9 *4*	(2$^+$)	0.17 ps *4*	E(level): from 1977Di07 and 1978Di11. J$^\pi$: The combination of short lifetime, strong branch to the ground state and $\gamma(\theta)$ favors spin 2$^+$ (1977Di07).
3942.7 *3*	3$^-$[#]	0.8 ps *2*	
3980[j] *1*	4$^+$[#]	0.35 ps *14*	
4015.2[h] *4*	6$^+$	0.39 ps *6*	
4060.5[k] *4*	(5$^-$,3$^-$)	1.5 ps *+13−5*	
4116.5 *10*	2$^+$	110 fs *50*	
4227 *1*	(2$^-$,3$^-$)		J$^\pi$: suggested in 1977Di07 from γ decays to 3176 and 3646 levels.
4792.2 *5*		0.35 ps *14*	
5305 *2*		0.35 ps *14*	

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^{40}Ca(α,γ) 1977Di07,1971Si13 (continued)

^{44}Ti Levels (continued)

E(level)[†]	Jπ[‡]	E(α)(lab)(keV)[&]	(2J+1)($\Gamma_\alpha\Gamma_\gamma/\Gamma$) (eV)[a]	Comments
5423 *5*				
6600 *10*				T=(1) E(level): from 1972Si34. T: from 1972Si34.
7216[c] *2*	1^+			T=1 E(level): from 1972Si34. Jπ: possible analog of (1^+;1) state at 669 keV in ^{44}Sc (1972Si34). T: from 1972Si34.
7634[b] *20*			0.013 *3*	
8067[b] *20*			0.022 *4*	
8318[b] *5*			0.12 *2*	
8385[b] *5*	2^+		0.52 *10*	
8416[b] *5*	(0^+,1^-)		0.33 *7*	
8449[b] *5*	2^+		0.28 *6*	
8511[b] *5*	2^+		0.22 *4*	
8534[b] *5*	(2^+,3^-)		0.33 *7*	
8565 *5*	2^+	3790	0.11 *2*	E(level): from 1977Di07 and 1977Co12. Jπ: (0^+) (1977Di07).
8627 *6*	2^+	3860	0.08 *2*	E(level): from 1977Di07 and 1977Co12.
8639[b] *6*	2^+		0.23 *5*	
8754 *3*	2^+	4000	0.33 *7*	E(level): from 1977Di07 and 1977Co12. Jπ: (1^-,2^+) from 1977Di07.
8946 *3*		4210	0.11 *2*	
8954 *3*	1^-	4220	0.22 *4*	(2J+1)($\Gamma_\alpha\Gamma_\gamma/\Gamma$) (eV): from 1981Di09, 0.6 eV *1* from 1977Di07.
8960[e] *3*		4220	0.40 *8*	(2J+1)($\Gamma_\alpha\Gamma_\gamma/\Gamma$) (eV): from 1981Di09.
8987 *2*	2^+	4257	0.30 *6*	
8992 *2*	4^+	4263	0.6 *1*	
9073[g] *5*		4350		
9100[g] *5*		4380		
9120[g] *5*		4400		
9140 *5*		4420		
9180 *5*		4470		
9215[d] *2*	2^+	4510	0.5 *1*	T=0 Jπ: from $\gamma(\theta)$ in 1980Di14. T: from 1980Di14. (2J+1)($\Gamma_\alpha\Gamma_\gamma/\Gamma$) (eV): from 1980Di14.
9227 *2*	2^+	4520	6 *1*	T=1 E(level): from 1977Di07 and 1980Di14. T: from 1980Di14.
9239[d] *2*	2^+		2.0 *4*	T=0 Jπ: from $\gamma(\theta)$ in 1980Di14. T: from 1980Di14. (2J+1)($\Gamma_\alpha\Gamma_\gamma/\Gamma$) (eV): from 1980Di14.
9280[g] *5*				
9290 *5*				
9294[c] *2*				E(level): possible doublet with 9298 keV level.
9298[c] *2*	0^+[#]			T=2 T: from 1978Di11. Isospin-mixed doublet with the 9338 keV level. %α=87 *20*, %p<6 (1978Fr10).

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^{40}Ca(α,γ) 1977Di07,1971Si13 (continued)

^{44}Ti Levels (continued)

E(level)[†]	J$^\pi$[‡]	E(α)(lab)(keV)[&]	(2J+1)($\Gamma_\alpha\Gamma_\gamma/\Gamma$) (eV)[a]	Comments
				T: possible isospin mixture of T=0 and 1. See 1978Fr10 (also 1976Fr01 and 1979Fr04) for measurement of α/γ decay branching ratio in (p,t).
9338 *2*	0$^+$	4640	0.24 *5*	T=2 $\Gamma\alpha/\Gamma$=0.32 *5*; Γ_γ/Γ=0.54 *11* (1978Fr10) E(level): from 1977Di07 and 1978Di11. See 1978Fr10 (also 1976Fr01 and 1979Fr04) for measurement of α/γ decay branching ratio in (p,t). T: possible isospin mixture of T=0 and 1.
9361 *3*	(2$^+$,3$^-$)	4670	1.2 *3*	
9388[g] *5*		4700		
9427[g] *5*	(4$^+$)	4740	0.9 *3*	
9478[g] *5*				
9500[g] *10*		4820		
9542[g] *5*		4870		
9589[g] *5*		4920		
9632[g] *10*		4970		
9668[g] *10*		5000		
9698 *5*	2$^+$	5040		
9713 *3*	(4$^+$)	5060	2.5 *5*	
9737[g] *5*		5080		
9873[g] *10*		5230		
9895[g] *5*		5260		
9908 *3*		5270	1.9 *4*	J$^\pi$: (2$^+$,3$^-$;4$^+$,5$^-$) from 1977Di07.
10014[g] *10*		5380		
10046[g] *10*		5420		
10129[g] *10*	(1,2)	5510		
10166[g] *10*		5550		
10209[g] *5*	(0,1,2)	5600		
10258[g] *10*		5650		
10303[g] *5*		5700		
10327[g] *5*		5730		
10386 *6*	(2$^+$,3$^-$)	5800	5 *1*	
10461[g] *10*		5880		
10520[g] *10*		5940		
12.20×10^3[f] *20*				J$^\pi$: proposed (1974Pe13) J^π=(1$^-$).
13.00×10^3[f] *19*				J$^\pi$: proposed (1974Pe13) J^π=(1$^-$).
14.10×10^3[f] *18*				J$^\pi$: proposed (1974Pe13) J^π=(3$^-$).
14.55×10^3[f] *17*				J$^\pi$: proposed (1974Pe13) J^π=(1$^-$).
15.45×10^3[f] *16*				
15.95×10^3[f] *16*				J$^\pi$: proposed (1974Pe13) J^π=(3$^-$).

[†] Energies of resonances (above 5423) are deduced mainly from γ-transitions from resonance levels or from Eα(C.M.)+S(α) with S(α)=5127.1 *7* from 2011AuZZ and 2003Au03 if primary transitions are not available. Levels up to 5423 correspond to bound states. All data are from 1977Di07 and 1971Si13, unless otherwise noted.

[‡] From $\gamma(\theta)$ in 1971Si13, 1977Co12 and 1977Di07 with parities deduced from experimental γ transition strengths or systematics, unless otherwise noted.

[#] From Adopted Levels.

[@] From 1977Di07 using DSAM, unless otherwise noted.

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^{40}Ca(α,γ) 1977Di07,1971Si13 (continued)

^{44}Ti Levels (continued)

& From 1977Di07, unless otherwise noted.
[a] Resonance strengths, from 1977Co12 for resonances below 8756 and from 1977Di07 for resonances above this energy, unless otherwise noted.
[b] For E(α)=2.75-4.0 MeV (1977Co12).
[c] For E(α)=4.0-10.5 MeV (1978Di11).
[d] For E(α)=4.0-10.5 MeV (1980Di14).
[e] For E(α)=4.0-10.5 MeV (1981Di09).
[f] For E(α)=8.2-11.5 MeV (1974Pe13).
[g] Decay γ not reported.
[h] Band(A): Ground state band (1973Si28).
[i] Band(B): Excited 0^+ band (1973Si28).
[j] Band(C): Excited 2^+ band (1973Si28).
[k] Band(D): 3.18 MeV band (1973Si28).

$\gamma(^{44}Ti)$

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.	δ	Comments
1082.9	2^+	1082.9 *1*	100	0	0^+			B(E2)(W.u.)=13 *4* (1973Di04).
1904.3	0^+	821.3 *8*	100	1082.9	2^+			
2454.1	4^+	1371	100	1082.9	2^+			δ: +0.07 *+20−12* (1971Si13). B(E2)(W.u.)=30 *6* (1973Di04).
2530.6	2^+	626	5 *1*	1904.3	0^+			B(E2)(W.u.)=23 (1971Si13). B(E2)(W.u.)=24 *6* (1973Di04).
		1447.68 *12*	100	1082.9	2^+			Mult.: (M1+E2) (1971Si13). δ: +7.5 *+25−80* or +10 *5* (1971Si13). B(E2)(W.u.)=6.5 (1971Si13). B(E2)(W.u.)=7.0 *13* (1973Di04).
		2531	35 *7*	0	0^+			B(E2)(W.u.)=0.14 (1971Si13). B(E2)(W.u.)=0.15 *+50−20* (1973Di04).
2886.6	2^+	982	5 *3*	1904.3	0^+			B(E2)(W.u.)<28 (1973Di04).
		1803	43 *14*	1082.9	2^+			B(E2)(W.u.)≤3.4 *+20−14* (1973Di04).
		2886.1 *6*	100 *14*	0	0^+			B(E2)(W.u.)=0.75 *+40−20* (1973Di04).
3175.7	$3^{(-)}$	645	<1	2530.6	2^+			
		721	2 *1*	2454.1	4^+			
		2092.9 *8*	100 *2*	1082.9	2^+	(E1+M2)	+0.15 *10*	δ: from 1977Di07. B(E1)(W.u.)<3×10^{-5}, B(M2)(W.u.)<2 (1977Di07).
		3175	1.0 *5*	0	0^+			B(E3)(W.u.)<15 (1977Di07).
3364	4^+	833	5 *2*	2530.6	2^+			
		2281	100 *2*	1082.9	2^+			
3415.3	$(2^+,3^+)$	529	2.2 *5*	2886.6	2^+			
		885	<1.5	2530.6	2^+			
		2332	100.0 *5*	1082.9	2^+			δ: δ=+1.6 *+12−6* for J=2; >+6 or +0.4 *+10−9* for J=3 (1971Si13).
3645.8	$4^{(-)}$	470	100	3175.7	$3^{(-)}$	(M1+E2)	+4.2 *8*	δ: from 1981Di09. Other: 4.4 for $J^\pi=4^-$ (1977Di07).
		1191	4.2 *21*	2454.1	4^+			
		2563	<1	1082.9	2^+			
3755.9	(2^+)	1852	<6	1904.3	0^+			
		2673	39 *7*	1082.9	2^+			
		3756	100 *7*	0	0^+			
3942.7	3^-	767	<2	3175.7	$3^{(-)}$			
		1412	<2.1	2530.6	2^+			

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^{40}Ca(α,γ) 1977Di07,1971Si13 (continued)

γ(^{44}Ti) (continued)

E_i(level)	J_i^π	E_γ †	I_γ ‡	E_f	J_f^π	Mult.	Comments
3942.7	3^-	1489	5 *2*	2454.1	4^+	E1	B(E1)(W.u.)<1×10^{-5} (1977Di07).
		2859	100 *3*	1082.9	2^+	E1	B(E1)(W.u.)<2.6×10^{-5} (1977Di07).
3980	4^+	565	8 *4*	3415.3	$(2^+,3^+)$		
		804	8 *6*	3175.7	$3^{(-)}$		
		1094	48 *10*	2886.6	2^+		
		1526	29 *10*	2454.1	4^+		
		2897	100 *15*	1082.9	2^+		
4015.2	6^+	1561	100	2454.1	4^+		
4060.5	$(5^-,3^-)$	885	100 *10*	3175.7	$3^{(-)}$		δ: −2<δ<2 for J^π= 3^-, 0 for J^π=5^- (1977Di07). B(E2)(W.u.)<40 for J^π=3^- or 5^- (1977Di07).
		1606	100 *10*	2454.1	4^+		δ: +0.15 *10* for J^π= 3^-, −0.1<δ<0.1 for J^π=5^-, δ>0.5 or δ<−0.5 for J^π=4^+ (1977Di07). B(E1)(W.u.)<5×10^{-5}, B(M2)(W.u.)<5 for J^π=3^- or B(M2)(W.u.)<1 for J^π=5^- (1977Di07).
		2978	<4	1082.9	2^+		
4116.5	2^+	1230	11 *11*	2886.6	2^+		
		1585	47 *11*	2530.6	2^+		
		2212	<11	1904.3	0^+		
		3033	100 *16*	1082.9	2^+		
		4117	64 *11*	0	0^+		
4227	$(2^-,3^-)$	581	26 *12*	3645.8	$4^{(-)}$		
		812	15 *9*	3415.3	$(2^+,3^+)$		
		1051	100 *12*	3175.7	$3^{(-)}$		
		1341	85 *12*	2886.6	2^+		
		1696	50 *12*	2530.6	2^+		
		3144	18 *9*	1082.9	2^+		
4792.2		1036	4 *2*	3755.9	(2^+)		
		1617	6 *2*	3175.7	$3^{(-)}$		
		1906	3 *2*	2886.6	2^+		
		3709	100 *3*	1082.9	2^+		
5305		4222	100	1082.9	2^+		
5423		4340	100	1082.9	2^+		
7216	1^+	5312	3[&] *1*	1904.3	0^+		
		6133	1.0[&] *5*	1082.9	2^+		
		7216	100[&] *1*	0	0^+		
7634		5730	61[@] *32*	1904.3	0^+		
		7634	100[@] *32*	0	0^+		
8067		8067	100	0	0^+		
8318		5432	85[@] *19*	2886.6	2^+		
		7235	100[@] *19*	1082.9	2^+		
8385	2^+	5499	100[@] *20*	2886.6	2^+		
		7302	40[@] *20*	1082.9	2^+		
		8385	60[@] *20*	0	0^+		
8416	$(0^+,1^-)$	7333	100	1082.9	2^+		
8449	2^+	5995	27[@] *13*	2454.1	4^+		
		7366	100[@] *13*	1082.9	2^+		
8511	2^+	7428	100	1082.9	2^+		
8534	$(2^+,3^-)$	7451	100	1082.9	2^+		
8565	2^+	5200	32[@] *16*	3364	4^+		
		6034	29[@] *16*	2530.6	2^+		
		7482	100[@] *16*	1082.9	2^+		
8627	2^+	7544	100	1082.9	2^+		

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^{40}Ca(α,γ) 1977Di07,1971Si13 (continued)

γ(^{44}Ti) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Comments
8639	2$^+$	7556	100[@] *13*	1082.9	2$^+$	
		8639	33[@] *13*	0	0$^+$	
8754	2$^+$	6223	18[#]	2530.6	2$^+$	
		7671	64[#]	1082.9	2$^+$	
		8754	100[#]	0	0$^+$	
8946		6415	82[#] *13*	2530.6	2$^+$	I_γ: 92 *14* from 1981Di09.
		7863	100[#] *13*	1082.9	2$^+$	I_γ: 100 *14* from 1981Di09.
8954	1$^-$	4727	20[b] *5*	4227	(2$^-$,3$^-$)	
		6068	24[b] *3*	2886.6	2$^+$	
		7049	100[b] *5*	1904.3	0$^+$	
		8954	8[b] *2*	0	0$^+$	
8960		4899	9[b] *4*	4060.5	(5$^-$,3$^-$)	
		5017	19[b] *4*	3942.7	3$^-$	
		5204	7[b] *4*	3755.9	(2$^+$)	
		5314	100[b] *4*	3645.8	4$^{(-)}$	
		5596	12[b] *2*	3364	4$^+$	
		5784	58[b] *4*	3175.7	3$^{(-)}$	
		6506	22[b] *2*	2454.1	4$^+$	
8987	2$^+$	6456	60[#] *3*	2530.6	2$^+$	δ: 0.29 *11* or +4.0 *+30−4* (1971Si13).
		6533	<16[#]	2454.1	4$^+$	
		7904	<16[#]	1082.9	2$^+$	
		8987	100[#] *3*	0	0$^+$	
8992	4$^+$	6461	<9[#]	2530.6	2$^+$	
		6538	100[#] *6*	2454.1	4$^+$	δ: −0.64 *11* (1971Si13).
		7909	90[#] *6*	1082.9	2$^+$	δ: +0.02 *3* (1971Si13).
		8992	<9[#]	0	0$^+$	
9140		6609		2530.6	2$^+$	
		9140		0	0$^+$	
9180		5238		3942.7	3$^-$	
		5535		3645.8	4$^{(-)}$	
		6005		3175.7	3$^{(-)}$	
		6726		2454.1	4$^+$	
9215	2$^+$	5800	49[a] *5*	3415.3	(2$^+$,3$^+$)	δ: 0.09 *17* for J(3415)=3 (1980Di14).
		6329	27[a] *5*	2886.6	2$^+$	δ: 0.3 *2* or +3.7 *13* (1980Di14).
		6684	100[a] *5*	2530.6	2$^+$	δ: 0.07 *8* (1980Di14).
		7311	2.4[a] *12*	1904.3	0$^+$	
		8132	39[a] *5*	1082.9	2$^+$	δ: 0.84 *25* or 11 *7* (1980Di14).
		9215	24[a] *2*	0	0$^+$	
9227	2$^+$	5812	51[a] *5*	3415.3	(2$^+$,3$^+$)	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	18[a] *5*	2886.6	2$^+$	δ: 0<δ<+1 (1980Di14).
		6696	100[a] *5*	2530.6	2$^+$	δ: +0.02 *4* (1971Si13), +0.03 *4* (1980Di14).
		7323	<2[a]	1904.3	0$^+$	
		8144	51[a] *5*	1082.9	2$^+$	δ: +0.02 *7* (1971Si13), 0.08 *5* (1980Di14).
		9227	1.3[a] *5*	0	0$^+$	
9239	2$^+$	5824	89[a] *7*	3415.3	(2$^+$,3$^+$)	δ: 0.11 *7* for J(3415)=3 (1980Di14).
		6353	39[a] *7*	2886.6	2$^+$	δ: +0.06 *12* (1980Di14).
		6708	100[a] *7*	2530.6	2$^+$	δ: +0.14 *8* (1980Di14).

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^{40}Ca(α,γ) 1977Di07,1971Si13 (continued)

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

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Comments
9239	2$^+$	7335	18[a] *4*	1904.3	0$^+$	
		8156	96[a] *4*	1082.9	2$^+$	δ: 0.45 *6* (1980Di14).
		9239	14[a] *2*	0	0$^+$	
9298	0$^+$	2082	69[&] *14*	7216	1$^+$	B(M1)(W.u.)=0.27 *7* (1978Di11).
		5542	100[&] *14*	3755.9	(2$^+$)	B(M1)(W.u.)=(0.021 *7*), B(E2)(W.u.)=(1.9 *7*) (1978Di11).
9338	0$^+$	2122	100[&] *6*	7216	1$^+$	B(M1)(W.u.)=3.8 *10* (1978Di11).
		5582	2.5[&] *6*	3755.9	(2$^+$)	B(M1)(W.u.)=(0.005 *2*), B(E2)(W.u.)=(0.5 *2*) (1978Di11).
		6452	<0.5[&]	2886.6	2$^+$	B(E2)(W.u.)<0.046 (1978Di11).
		6807	<0.5[&]	2530.6	2$^+$	B(E2)(W.u.)<0.035 (1978Di11).
		8255	<0.2[&]	1082.9	2$^+$	
		9338	<1	0	0$^+$	
9361	(2$^+$,3$^-$)	3938	16 *5*	5423		
		4056	32 *11*	5305		
		4569	63 *11*	4792.2		
		5134	21 *5*	4227	(2$^-$,3$^-$)	
		5245	21 *5*	4116.5	2$^+$	
		5381	32 *5*	3980	4$^+$	
		5418	26 *5*	3942.7	3$^-$	
		5715	21 *5*	3645.8	4$^{(-)}$	
		5946	11 *5*	3415.3	(2$^+$,3$^+$)	
		6185	100 *11*	3175.7	3$^{(-)}$	
		6475	21 *5*	2886.6	2$^+$	
		6830	21 *5*	2530.6	2$^+$	
		6907	16 *5*	2454.1	4$^+$	
		8278	95 *11*	1082.9	2$^+$	
		9361	32 *11*	0	0$^+$	
9698	2$^+$	5582	18 *4*	4116.5	2$^+$	
		6283	100 *4*	3415.3	(2$^+$,3$^+$)	
		6522	6 *2*	3175.7	3$^{(-)}$	
		6812	57 *4*	2886.6	2$^+$	
		7167	12 *4*	2530.6	2$^+$	
		7244	6 *2*	2454.1	4$^+$	
		8615	2.7 *6*	1082.9	2$^+$	
		9698	2.7 *6*	0	0$^+$	
9713	(4$^+$)	4921	26 *7*	4792.2		
		5486	7 *2*	4227	(2$^-$,3$^-$)	
		5957	100 *7*	3755.9	(2$^+$)	
		6298	41 *7*	3415.3	(2$^+$,3$^+$)	
		6827	26 *7*	2886.6	2$^+$	
		8630	17 *4*	1082.9	2$^+$	
9908		5847	100 *9*	4060.5	(5$^-$,3$^-$)	
		6152	23 *6*	3755.9	(2$^+$)	
		6262	66 *6*	3645.8	4$^{(-)}$	
		6732	17 *6*	3175.7	3$^{(-)}$	
		8825	6 *3*	1082.9	2$^+$	
10386	(2$^+$,3$^-$)	6159	17 *9*	4227	(2$^-$,3$^-$)	
		6443	87 *13*	3942.7	3$^-$	
		6740	57 *9*	3645.8	4$^{(-)}$	
		7210	100 *13*	3175.7	3$^{(-)}$	
		7500	70 *9*	2886.6	2$^+$	
		9303	91 *9*	1082.9	2$^+$	
		10386	9 *4*	0	0$^+$	
12.20×10^3		11120		1082.9	2$^+$	

Continued on next page (footnotes at end of table)

^{40}Ca(α,γ) 1977Di07,1971Si13 (continued)

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

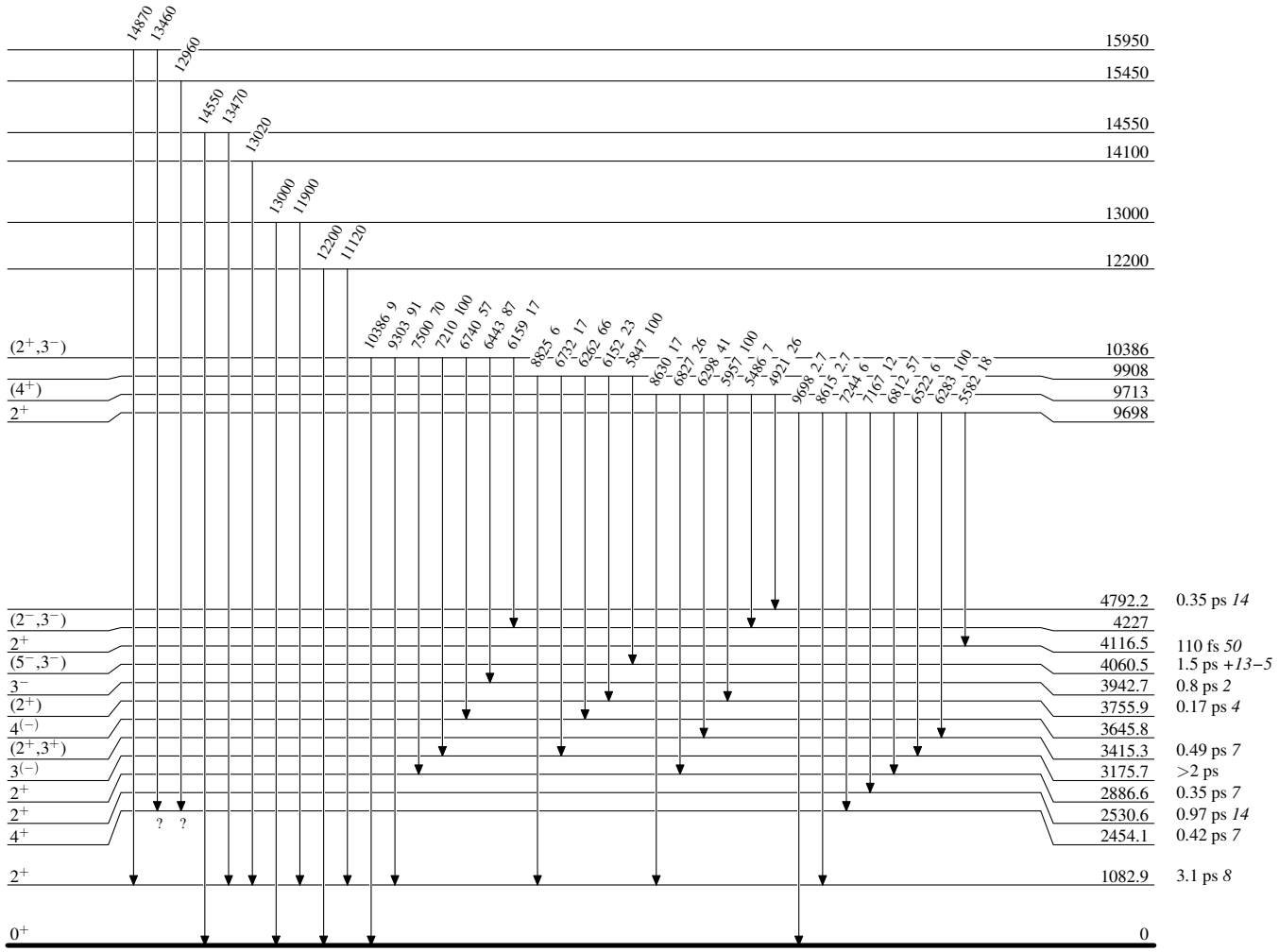
E_i(level)	J_i^π	E_γ [†]	E_f	J_f^π	Comments
12.20×10^3		12200	0	0^+	
13.00×10^3		11900	1082.9	2^+	
		13000	0	0^+	
14.10×10^3		13020	1082.9	2^+	
14.55×10^3		13470	1082.9	2^+	
		14550	0	0^+	
15.45×10^3		12960	2454.1	4^+	Final states: 2454+2531.
15.95×10^3		13460	2454.1	4^+	Final states: 2454+2531.
		14870	1082.9	2^+	

[†] Values with ΔE from 1973Di04 and others from level-energy differences, rounded off to nearest keV.
[‡] From 1977Di07, unless otherwise noted.
[#] From 1971Si13.
[@] From 1977Co12.
[&] From 1978Di11.
[a] From 1980Di14.
[b] From 1981Di09.

^{40}Ca(α,γ) 1977Di07,1971Si13

Level Scheme

Intensities: Relative photon branching from each level

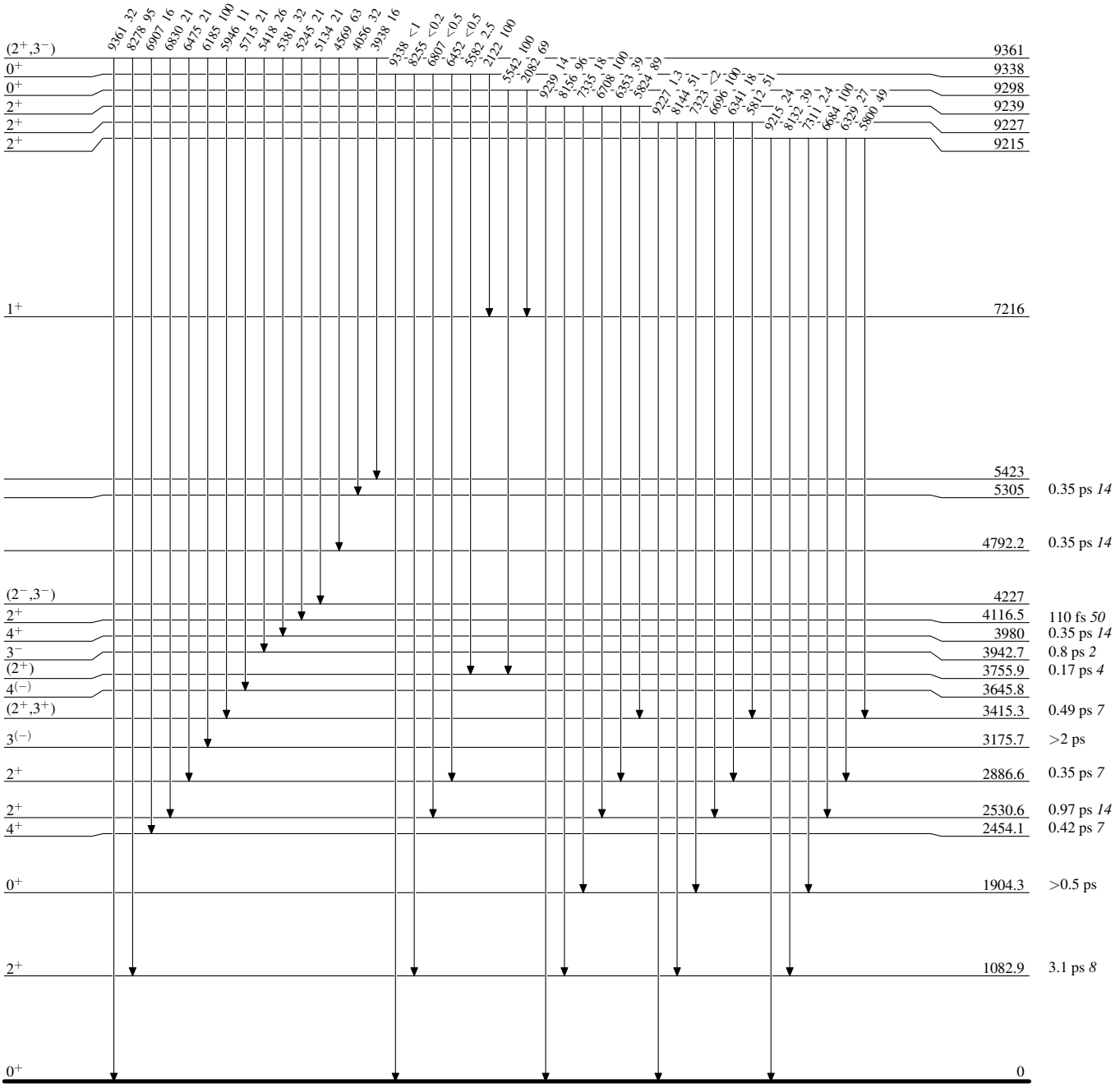


$^{44}_{22}Ti_{22}$

^{40}Ca(α,γ) 1977Di07,1971Si13

Level Scheme (continued)

Intensities: Relative photon branching from each level

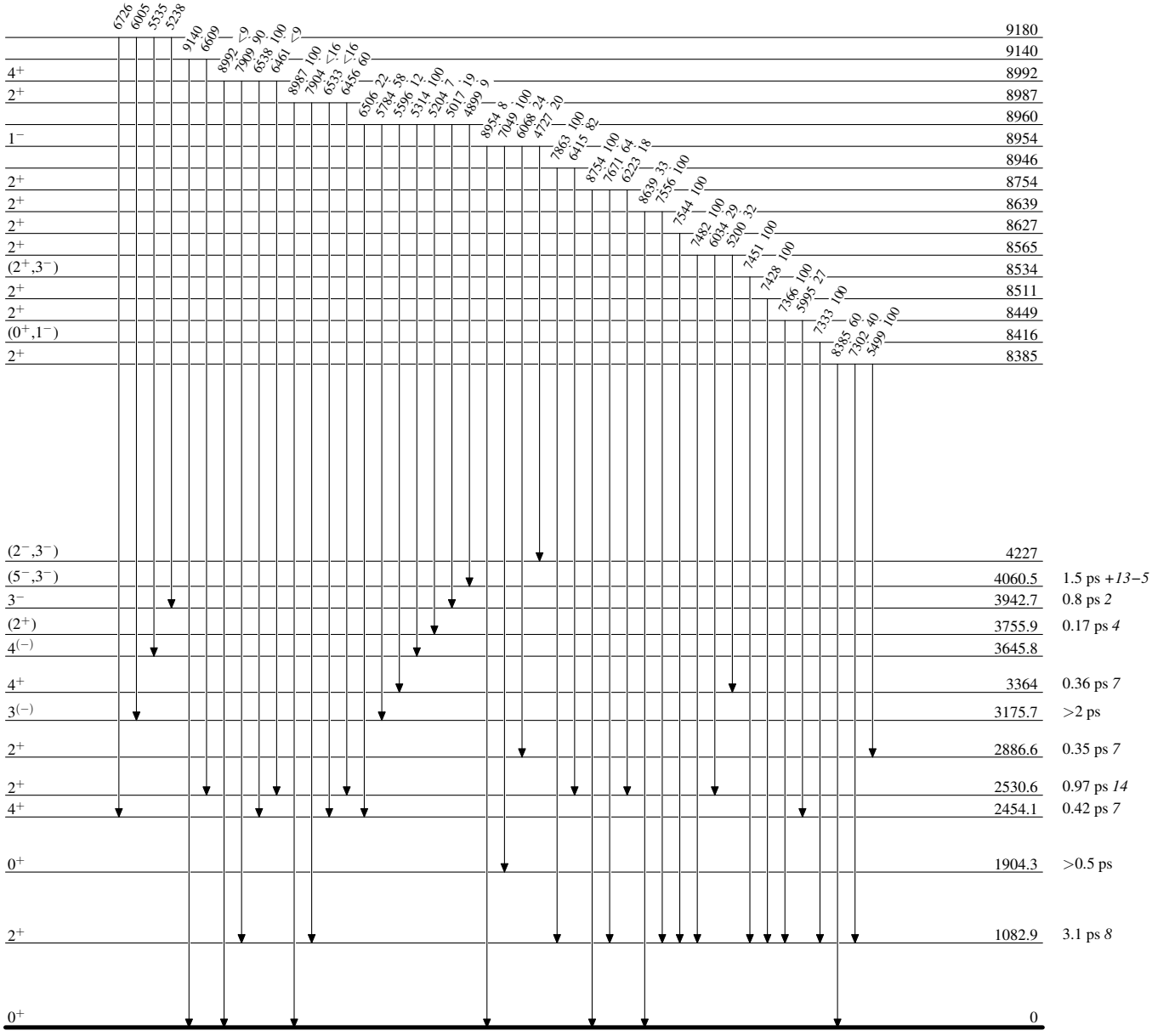


$^{44}_{22}Ti_{22}$

^{40}Ca(α,γ) 1977Di07,1971Si13

Level Scheme (continued)

Intensities: Relative photon branching from each level

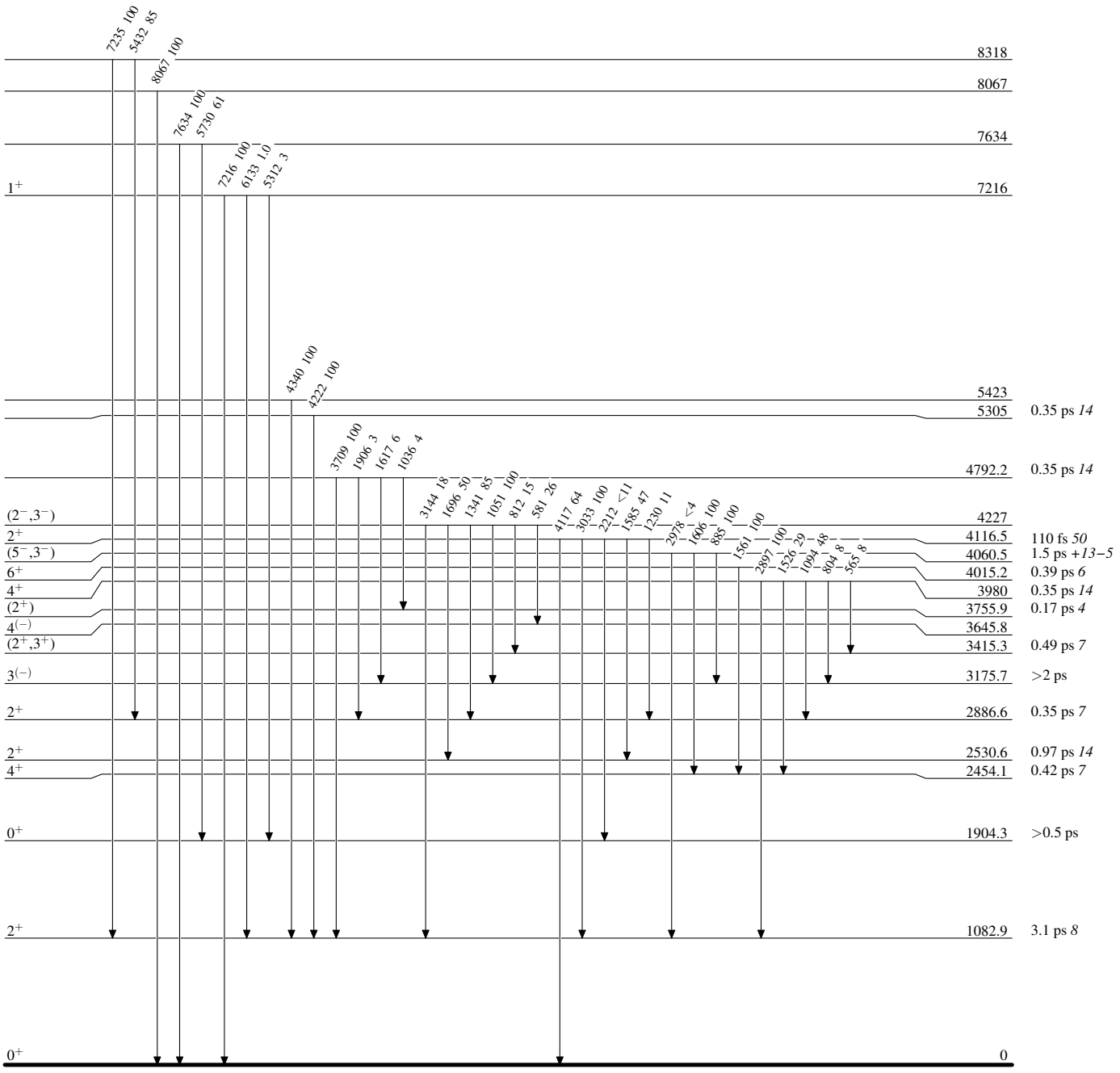


$^{44}_{22}Ti_{22}$

^{40}Ca(α,γ) 1977Di07,1971Si13

Level Scheme (continued)

Intensities: Relative photon branching from each level

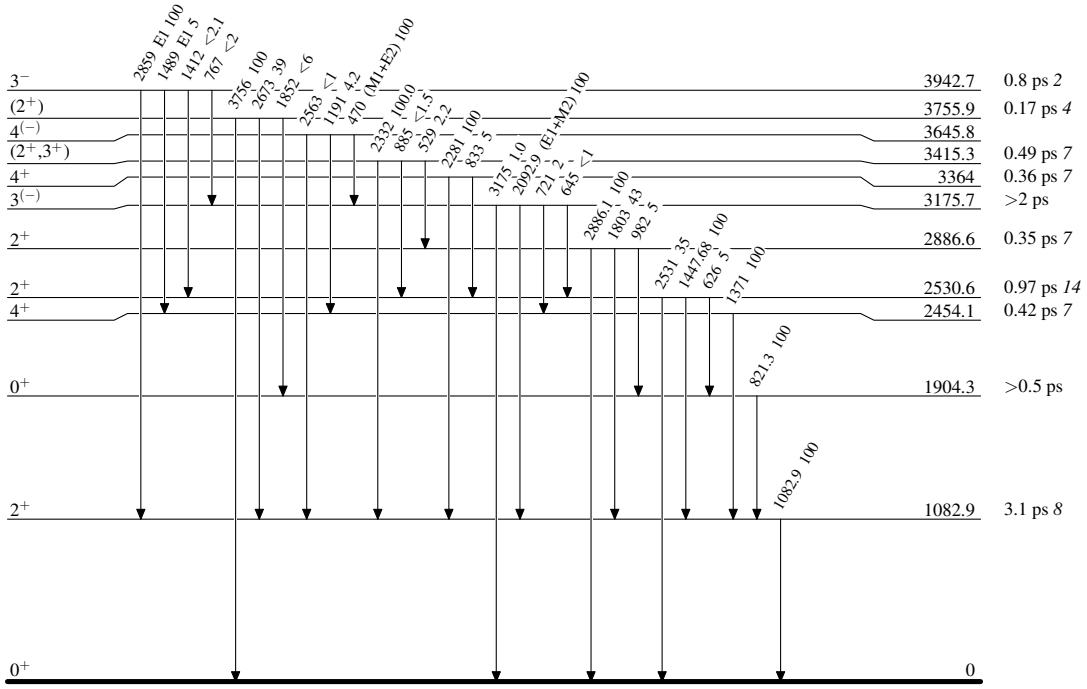


$^{44}_{22}Ti_{22}$

^{40}Ca(α,γ) 1977Di07,1971Si13

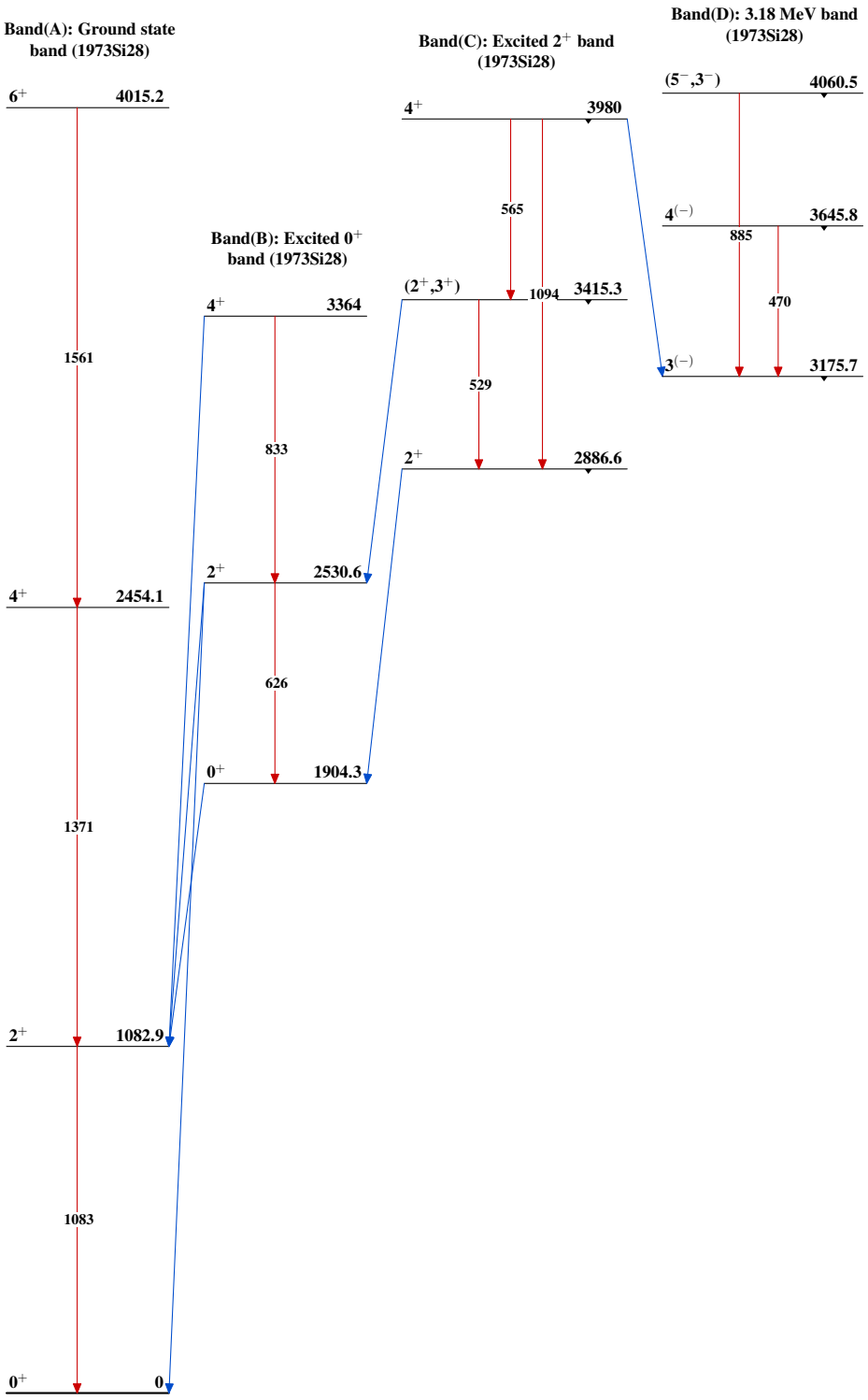
Level Scheme (continued)

Intensities: Relative photon branching from each level



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

^{40}Ca(α,γ) 1977Di07,1971Si13



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