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

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen[#]	NDS 126, 1 (2015)	31-Mar-2015

Gamma decay of resonances in ^{43}Sc.

1977Di17: E=2.00-2.75 MeV proton beams were produced from the 4 and 3 MV Van de Graaff accelerators, at the Centre de Recherches Nucleaires, Strasbourg, France and at McMaster University respectively, for E>2 MeV; from the 3 MeV Van de Graaff accelerator at the Accelerator Laboratory at University of Helsinki, Finland, for E<2 MeV. Targets of enriched $CaCO_3$ on tungsten and gold backings. γ-rays were detected by Ge(Li) detectors. Measured Eγ, Iγ, $\gamma(\theta)$. Deduced levels, J, π, γ-branchings ratios.

1969Wa19, 1970Ma13 (also 1974Ma39,1971Po03): E=1.1-2.1 MeV, E=11, 9.5 MeV in 1971Po03 and E=1.796 MeV and 1.822 MeV in 1974Ma39. proton beams were produced from the Aerospace Research Laboratories (ARL) 2 MeV Van de Graaff accelerator, FWHM=1 keV. Targets of enriched $CaCO_3$ on a 10-mil-thick Ag backing. γ-rays were detected by Ge(Li) detectors. Measured Eγ, Iγ, $\gamma(\theta)$, γ(lin pol), $\gamma\gamma$, $\gamma\gamma(\theta)$. Deduced levels, J, π, γ-branchings, mixing ratios, $T_{1/2}$ by DSAM. 1970Ma13 report γ-ray data from five resonances at E(p)=1235, 1242, 1423, 1808 and 2037 keV. Lifetime data by Doppler-shift method reported by 1971Po03.

1965Br31 (also 1966Br21,1964Br29,1963Du11): E=1.013-1.421 MeV resonances. Proton beams were produced from the Van de Graaff generator at the Chalmers University of Technology. Target of enriched ^{42}Ca foil on carbon backing. γ-rays were detected by NaI(Tl) detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin. Deduced levels, γ-branchings.

Others:

1982Mi06: E=0.63-3.01 MeV. Measured yields.

1979Ch29, 1978Vl02: E=0.66-5.39 MeV. Measured cross sections.

1971Ga40: E=1.424 MeV. Measured Eγ, Iγ, $\gamma(\theta)$.

1968So11: measured cross sections for eight resonances.

^{43}Sc Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[#]	Comments
0.0	$7/2^-$		
151.9 *5*	$3/2^+$		
472.3 *4*	$3/2^-$		
845.0 *5*	$5/2^-$	0.146 ps *+7−11*	$T_{1/2}$: or 0.16 ps *+9−5* (1971Po03).
855.3 *4*	$1/2^+$		
880.5 *4*	$5/2^+$		
1158.3 *4*	$3/2^+$		
1179.0 *5*	$3/2^-$	0.23 ps *+9−6*	
1336.3 *5*	$7/2^+$		
1408 *1*	$7/2^-$		
1651.2 *6*	$5/2^+$	0.25 ps *+7−6*	
1810.3 *7*	$3/2^-$	16 fs *6*	$T_{1/2}$: or 14 fs *+12−9* (1971Po03).
1884.6 *6*	$(5/2,9/2)^-$		
1931.2 *6*	$9/2^+$		
1962.5 *5*	$(3/2,5/2)^-$	71 fs *11*	$T_{1/2}$: or 67 fs *+24−18* (1971Po03).
2094.3 *3*	$3/2^-$	0.23 ps *+14−7*	
2106.4 *7*	(3/2,5/2)		
2114.3 *9*			
2141.9 *13*	$(3/2,5/2^+)$	0.17 ps *+6−4*	J$^\pi$: (7/2) from $\gamma\gamma(\theta)$ (1970Ma13), but γ to $1/2^+$ excludes 7/2.
2200?			E(level): from 1965Br31 only.
2289.3 *8*	$5/2^-$		
2335.8 *9*	$5/2^-$		
2382.9 *5*	$3/2^{(+)}$		
2552.0 *15*	$11/2^+$		
2580.4 *8*	(5/2)	100 fs *+35−24*	J$^\pi$: primary transitions from 7/2 and 3/2 resonances.
2670.3 *6*	$3/2^-$		
2796 *2*			
2811.2 *10*			

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

^{43}Sc Levels (continued)

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[#]	Comments
2840.5 *15*	(5/2,7/2)$^+$		
2846.2 *15*			
2859.7 *16*			
2875 *2*	(5/2)$^+$		
2986.7 *12*	(3/2,5/2)	53 fs *11*	
3160 *2*			
3261 *2*	(7/2,9/2)$^-$		
3290.2 *16*	7/2$^-$	<3.5 fs	
3327 *2*			
3331.4 *17*			
3374 *2*	(7/2,9/2)$^-$		
3451.7 *10*	5/2$^+$	7 fs *+7–6*	
3463 *2*	5/2$^-$		
3503 *2*	7/2$^-$		
3645.4 *18*			
3683 *2*			
3733.8 *18*			
3757 *2*			
3807 *1*	7/2$^-$	<3.5 fs	
3843 *2*			
3860 *2*			
4007 *2*	(3/2,5/2)$^+$		
4038 *2*	7/2$^-$		
4272			E(level): from 1969Wa19.
4371 *2*	5/2$^-$,7/2$^-$		J$^\pi$: 7/2$^+$ preferred in p$\gamma(\theta)$.
4430 *2*			
4454.7	(5/2 to 9/2)	<3.5 fs	
5919	3/2		E(level): E(p)(lab)=1013.
5950	(3/2,5/2)		E(level): E(p)(lab)=1045.
6060	(5/2)		E(level): E(p)(lab)=1157.
6103	(3/2$^-$,5/2$^+$)		E(level): E(p)(lab)=1201.
6136	3/2		E(level): E(p)(lab)=1234.8. J$^\pi$: from 1970Ma13.
6143	3/2$^-$		E(level): E(p)(lab)=1241.9. J$^\pi$: from 1970Ma13.
6182	5/2		E(level): E(p)(lab)=1282.
6198	(3/2,5/2$^+$)		E(level): E(p)(lab)=1298.
6217	(3/2$^-$,5/2$^+$)		E(level): E(p)(lab)=1318.
6247	(3/2,5/2)		E(level): E(p)(lab)=1348.
6320	5/2$^+$		E(level): E(p)(lab)=1422.8.
6685	1/2$^-$		E(level): E(p)(lab)=1797. J$^\pi$: from 1974Ma39. 14% γ branching proceeds through unidentified transitions.
6696	5/2		E(level): E(p)(lab)=1808.3.
6709	1/2$^-$		E(level): E(p)(lab)=1821. Very weak resonance (1974Ma39). J$^\pi$: from 1974Ma39.
6777	5/2$^+$		E(level): E(p)(lab)=1891.
6919	7/2		E(level): E(p)(lab)=2036.6. J$^\pi$: from 1970Ma13.
7344	(3/2$^-$,5/2)		E(level): E(p)(lab)=2471.
7394	(3/2$^-$,5/2$^+$)		E(level): E(p)(lab)=2523.
7512	(7/2$^+$)		E(level): E(p)(lab)=2643. J$^\pi$: from Adopted Levels. 9/2$^+$ proposed only by 1977Di17, but γ to 3/2$^+$ rules out this assignment.
7581	(3/2$^-$,5/2,7/2$^+$)		E(level): E(p)(lab)=2714.

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

^{43}Sc Levels (continued)

† Average of values from 1977Di17, 1969Wa19 and 1965Br31. Above 4454, excitation energies for proton resonances are obtained from S(p)+E(p)(c.m.), where S(p)=4929.8 *19* (2012Wa38). Values of E(p)(lab) are given under comments.
‡ From Adopted Levels up to 5919 keV. For resonances, J^π assignments are from 1977Di17, unless otherwise stated.
# From Doppler-shift method (1971Po03).

γ(^{43}Sc)

Data for different resonances are from the following references: from 1977Di17 for E(p)=1045, 1201, 1299, 1319, 2038, 2471, 2523, 2643 and 2714; from 1969Wa19 (also 1970Ma13,1974Ma39) for 1235, 1242, 1423, 1796, 1808, 1822, 1891 and 2037; from 1965Br31 (also 1966Br21,1964Br29) for 1013, 1157 and 1346. Data for 1045, 1235, 1242, 1299, and 1423 resonances are also given by 1965Br31.

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

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

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

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
1962.5	(3/2,5/2)$^-$	783.5	15 *2*	1179.0	3/2$^-$			δ(Q/D)=−0.04 *25* or +(1.5 +∞−*10*).
		804.2	4 *1*	1158.3	3/2$^+$			
		1490.2	100 *2*	472.3	3/2$^-$			
		1962.5		0.0	7/2$^-$			
2094.3	3/2$^-$	915.3	100 *9*	1179.0	3/2$^-$			δ(Q/D)=0.00 *10*, +(3.7 +*25*−*10*) or −10 +*4*−*48*.
		1213.8	30 *6*	880.5	5/2$^+$			
		1239.0	55 *6*	855.3	1/2$^+$			
		1249.3	33 *6*	845.0	5/2$^-$			
		1622.0	33 *9*	472.3	3/2$^-$			
		1942.3	52 *9*	151.9	3/2$^+$			
2106.4	(3/2,5/2)	948.1	30 *4*	1158.3	3/2$^+$			
		1225.9	100 *6*	880.5	5/2$^+$			
2114.3		956.0	79 *9*	1158.3	3/2$^+$			Additional information 1.
		1962.3	100 *13*	151.9	3/2$^+$			
2141.9	(3/2,5/2,2$^+$)	490.7	38	1651.2	5/2$^+$			I_γ: from Fig. 1 of 1977Di17. Additional information 2.
		962.9	6 *3*	1179.0	3/2$^-$			
		983.6	15 *6*	1158.3	3/2$^+$			
		1261.4	100 *9*	880.5	5/2$^+$			δ(Q/D)=+0.27 *10* or −23 +*12*−∞.
		1286.6	12 *6*	855.3	1/2$^+$			
		1669.6	50 *6*	472.3	3/2$^-$			
		1989.9	74 *6*	151.9	3/2$^+$			
		2141.8[@]		0.0	7/2$^-$	D(+Q)	0.00 *4*	I_γ: 102 (1969Wa19). γ not reported by 1977Di17.
2200?		2200[@]		0.0	7/2$^-$			
2289.3	5/2$^-$	2289.2	100	0.0	7/2$^-$			
2335.8	5/2$^-$	2335.7	100	0.0	7/2$^-$			
2382.9	3/2$^{(+)}$	731.7	100	1651.2	5/2$^+$			
2552.0	11/2$^+$	620.8	100 *8*	1931.2	9/2$^+$			
		1215.7	67 *7*	1336.3	7/2$^+$			
2580.4	(5/2)	617.9[@]		1962.5	(3/2,5/2)$^-$			I_γ: 1969Wa19 report only the 617 and 1401 γs from 2580 level, with Iγ(617)/Iγ(1401)=0.33.
		1401.4[@]		1179.0	3/2$^-$			δ(Q/D)=+0.11 *10* or −5.7 +*20*−*80*.
		1422.1	52 *10*	1158.3	3/2$^+$			
		1699.9	40 *8*	880.5	5/2$^+$			
		2428.3	100 *13*	151.9	3/2$^+$			
2670.3	3/2$^-$	1262.3[@]		1408	7/2$^-$			I_γ: 1969Wa19 report 1260 and 1492 γs from 2670 level, with Iγ(1260)/Iγ(1492)=0.33.
		1491.3	16 *4*	1179.0	3/2$^-$			I_γ: other: 100 (1969Wa19).
		1789.8	43 *8*	880.5	5/2$^+$			
		1815.0	100 *4*	855.3	1/2$^+$			
		2197.9	45 *6*	472.3	3/2$^-$			
2796		1951	100 *9*	845.0	5/2$^-$			
		2644	33 *5*	151.9	3/2$^+$			
2811.2		1474.9	100 *10*	1336.3	7/2$^+$			
		2811.1	100 *10*	0.0	7/2$^-$			
2840.5	(5/2,7/2)$^+$	1960.0	43 *9*	880.5	5/2$^+$			
		2840.4	100 *7*	0.0	7/2$^-$			
2846.2		2846.1	100	0.0	7/2$^-$			
2859.7		1208.5	14 *5*	1651.2	5/2$^+$			
		1680.7	16 *5*	1179.0	3/2$^-$			
		1701.4	23 *7*	1158.3	3/2$^+$			
		1979.2	100 *5*	880.5	5/2$^+$			

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

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

E_i(level)	J_i^π	E_γ †	I_γ ‡	E_f	J_f^π	Comments
2859.7		2707.6	75 *7*	151.9	$3/2^+$	
2875	$(5/2)^+$	2723		151.9	$3/2^+$	From intensity balance, this γ-ray accounts for 80% of the total intensity, other 20% intensity is unaccounted for.
2986.7	(3/2,5/2)	1650.4	16	1336.3	$7/2^+$	
		1807.7	34 *8*	1179.0	$3/2^-$	
		2106.1	71 *5*	880.5	$5/2^+$	δ(Q/D)=−0.95 *50* for 5/2; +0.13 *11* or −11 +7−∞ for 3/2.
		2141.6	58 *8*	845.0	$5/2^-$	
		2834.6	100 *8*	151.9	$3/2^+$	δ(Q/D)=+(0.66 +*60*−*30*) for 5/2; 0.00 *9* or +(4.5 +*30*−*13*) for 3/2.
3160		2279		880.5	$5/2^+$	From intensity balance, this γ-ray accounts for 25% of the total intensity, other 75% intensity is unaccounted for.
3261	$(7/2,9/2)^-$	3261		0.0	$7/2^-$	From intensity balance, this γ-ray accounts for 60% of the total intensity, other 40% intensity is unaccounted for.
3290.2	$7/2^-$	1479.9	21 *5*	1810.3	$3/2^-$	
		2111.1	100 *12*	1179.0	$3/2^-$	
		2409.6	21 *7*	880.5	$5/2^+$	
		2445.1	91 *9*	845.0	$5/2^-$	
		3290 @		0.0	$7/2^-$	This is the only γ reported from 3290 level by 1969Wa19.
3327		3327		0.0	$7/2^-$	From intensity balance, this γ-ray accounts for 70% of the total intensity, other 30% intensity is unaccounted for.
3331.4		1368.9	4 *2*	1962.5	$(3/2,5/2)^-$	
		1521.1	13 *4*	1810.3	$3/2^-$	
		2152.3	100 *4*	1179.0	$3/2^-$	
		2173.0	44 *4*	1158.3	$3/2^+$	
		2486.3	29 *6*	845.0	$5/2^-$	
		2859.0	19 *4*	472.3	$3/2^-$	
3374	$(7/2,9/2)^-$	3374		0.0	$7/2^-$	From intensity balance, this γ-ray accounts for 50% of the total intensity, other 50% intensity is unaccounted for.
3451.7	$5/2^+$	2571.1	100 *7*	880.5	$5/2^+$	
		2606.6	45 *7*	845.0	$5/2^-$	
		3299.6	55 *7*	151.9	$3/2^+$	
		3451.6	27 *9*	0.0	$7/2^-$	I_γ: 1969Wa19 report this as the only γ from 3452 level.
3463	$5/2^-$	2582	37 *4*	880.5	$5/2^+$	
		3311	100 *7*	151.9	$3/2^+$	
3503	$7/2^-$	2658	100 *10*	845.0	$5/2^-$	
		3503	100 *10*	0.0	$7/2^-$	
3645.4		1682.9	34 *11*	1962.5	$(3/2,5/2)^-$	
		1994.2	66 *13*	1651.2	$5/2^+$	
		2466.3	100 *16*	1179.0	$3/2^-$	
		2764.8	63 *13*	880.5	$5/2^+$	
3683		2803	25 *4*	880.5	$5/2^+$	
		2838	56 *5*	845.0	$5/2^-$	
		3531	100 *11*	151.9	$3/2^+$	
3733.8		1444.5	31	2289.3	$5/2^-$	
		2325.7	83	1408	$7/2^-$	
		2888.7	100	845.0	$5/2^-$	
3757		3605	100 *10*	151.9	$3/2^+$	
		3757	43 *7*	0.0	$7/2^-$	
3807	$7/2^-$	2471	24 *6*	1336.3	$7/2^+$	
		2926	100 *5*	880.5	$5/2^+$	A_2=−0.36 *9*, A_4=+0.11 *10* (1977Di17). δ(Q/D)=0.00 *10* for 7/2 to 5/2 transition.
		3335	35 *8*	472.3	$3/2^-$	
		3807		0.0	$7/2^-$	This is the only γ reported by 1969Wa19 from the 3807 level.
3843		2998		845.0	$5/2^-$	From intensity balance, this γ-ray accounts for 40% of the total intensity, other 60% intensity is unaccounted for.
3860		3708		151.9	$3/2^+$	From intensity balance, this γ-ray accounts for 80% of the total intensity, other 20% intensity is unaccounted for.

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

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

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Comments
4007	(3/2,5/2)$^+$	3126	83 *20*	880.5	5/2$^+$	
		3152	100 *20*	855.3	1/2$^+$	
		3535	50 *13*	472.3	3/2$^-$	
		3855	100 *17*	151.9	3/2$^+$	
4038	7/2$^-$	2107	100 *13*	1931.2	9/2$^+$	
		3566	67 *15*	472.3	3/2$^-$	
4371	5/2$^-$,7/2$^-$	2265	37 *7*	2106.4	(3/2,5/2)	
		2720	32 *10*	1651.2	5/2$^+$	
		2963	49 *12*	1408	7/2$^-$	
		3035	100 *10*	1336.3	7/2$^+$	
		3490	27 *7*	880.5	5/2$^+$	
4430		3251	100 *15*	1179.0	3/2$^-$	
		3272	75 *13*	1158.3	3/2$^+$	
		3549	75 *10*	880.5	5/2$^+$	
4454.7	(5/2 to 9/2)	4454.5	100	0.0	7/2$^-$	δ(Q/D)=+0.13 *5* for 9/2; −0.05 *5* or −5.7 *+14−35* for 5/2.
5919	3/2	2629	33	3290.2	7/2$^-$	
		3249	33	2670.3	3/2$^-$	
		3338	33	2580.4	(5/2)	
		3536	67	2382.9	3/2$^{(+)}$	
		3719[@]		2200?		
		4268	67	1651.2	5/2$^+$	A_2=−0.25 (1966Br21).
		4740	33	1179.0	3/2$^-$	A_2=−0.43 (1966Br21).
		4760	67	1158.3	3/2$^+$	A_2=−0.33 (1966Br21).
		5038	67	880.5	5/2$^+$	A_2=−0.43 (1966Br21).
		5074	100	845.0	5/2$^-$	A_2=−0.77 (1966Br21).
		5446	67	472.3	3/2$^-$	A_2=−0.15 (1966Br21).
		5767	100	151.9	3/2$^+$	A_2=−0.28 (1966Br21).
5950	(3/2,5/2)	2143[@]		3807	7/2$^-$	
		2619	62	3331.4		
		2660	19	3290.2	7/2$^-$	I_γ: 1965Br31 report this as the strongest γ-ray from this level.
		2964[@]		2986.7	(3/2,5/2)	
		3369	14	2580.4	(5/2)	
		3615	5	2335.8	5/2$^-$	
		3661	5	2289.3	5/2$^-$	
		3808	10	2141.9	(3/2,5/2$^+$)	
		3836	5	2114.3		
		3856	10	2094.3	3/2$^-$	
		3987	33	1962.5	(3/2,5/2)$^-$	
		4139	5	1810.3	3/2$^-$	
		4299	67	1651.2	5/2$^+$	
		4771	100	1179.0	3/2$^-$	
		4791	14	1158.3	3/2$^+$	
		5094	43	855.3	1/2$^+$	E_γ: 5105 from level difference in 1965Br31. I(5105γ)/I(4771γ)=0.33.
		5477	43	472.3	3/2$^-$	
		5798	43	151.9	3/2$^+$	E_γ: 5805 from level difference in 1965Br31. I(5805γ)/I(4771γ)=1.
6060	(5/2)	6060		0.0	7/2$^-$	
6103	(3/2$^-$,5/2$^+$)	2260	1.6	3843		
		2651	10	3451.7	5/2$^+$	
		2943	1.6	3160		
		3116	1.6	2986.7	(3/2,5/2)	
		3257	1.6	2846.2		
		3262	<1.6	2840.5	(5/2,7/2)$^+$	
		3961	13	2141.9	(3/2,5/2$^+$)	

Continued on next page (footnotes at end of table)

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

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

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Comments
6103	(3/2$^-$,5/2$^+$)	3996	5	2106.4	(3/2,5/2)	
		4695	5	1408	7/2$^-$	
		4766	8	1336.3	7/2$^+$	
		4924	3	1179.0	3/2$^-$	
		5247	1.6	855.3	1/2$^+$	
		5258	3	845.0	5/2$^-$	
		5630	1.6	472.3	3/2$^-$	
		5951	100	151.9	3/2$^+$	
		6103	5	0.0	7/2$^-$	
6136	3/2	2329[@]		3807	7/2$^-$	
		2846[@]		3290.2	7/2$^-$	
		3150[@]	30	2986.7	(3/2,5/2)	
		3466[@]	15	2670.3	3/2$^-$	
		3555	35	2580.4	(5/2)	δ(Q/D)=−0.14 *7* or −2.6 *+5−7* for J^π(res)=3/2 (1970Ma13).
		3994	24	2141.9	(3/2,5/2$^+$)	
		4041	71	2094.3	3/2$^-$	δ(Q/D)=+0.07 *5* or +2.7 *+6−10* for J^π(res)=3/2 (1970Ma13).
		4173	100	1962.5	(3/2,5/2)$^-$	δ(Q/D)=+0.14 *10* or −19 *+13−∞* for J^π(res)=3/2 (1970Ma13).
		4485	35	1651.2	5/2$^+$	δ(Q/D)=+0.36 *2* or +7.6 *+48−∞* for J^π(res)=3/2 (1970Ma13).
		4957	65	1179.0	3/2$^-$	δ(Q/D)=−0.36 *6* or −9.5 *+30−70* for J^π(res)=3/2 (1970Ma13).
		4977	53	1158.3	3/2$^+$	δ(Q/D)=−0.05 *3* or +4.7 *+7−20* for J^π(res)=3/2 (1970Ma13).
		5255	41	880.5	5/2$^+$	δ(Q/D)=−0.05 *3* for J^π(res)=3/2 (1970Ma13).
		5280	18	855.3	1/2$^+$	
		5291	24	845.0	5/2$^-$	
		5663	24	472.3	3/2$^-$	δ(Q/D)=−0.36 *2* or −7.6 *+20−38* for J^π(res)=3/2 (1970Ma13).
		5984	100	151.9	3/2$^+$	δ(Q/D)=0.00 *2* or +3.7 *5* for J^π(res)=3/2 (1970Ma13).
6143	3/2$^-$	2336	21	3807	7/2$^-$	
		2853	21	3290.2	7/2$^-$	δ(Q/D)=0.00 *6* or +3.7 *+8−15* for J^π(res)=3/2 and J^π(3290)=3/2; −0.81 *20* for J^π(3290)=5/2 (1970Ma13).
		3156	37	2986.7	(3/2,5/2)	δ(Q/D)=+0.11 *12* or +2.7 *+5−13* for J^π(res)=3/2 and J^π(2987)=3/2; −0.78 *40* for J^π(2987)=5/2 (1970Ma13).
		3473	32	2670.3	3/2$^-$	
		4048	32	2094.3	3/2$^-$	δ(Q/D)=+0.13 *7* or +2.4 *5* for J^π(res)=3/2 (1970Ma13).
		4180	26	1962.5	(3/2,5/2)$^-$	δ(Q/D)=+0.06 *5* for J^π(res)=3/2 (1970Ma13).
		4332	11	1810.3	3/2$^-$	
		4964	68	1179.0	3/2$^-$	δ(Q/D)=−0.17 *4* or +19 *+8−28* for J^π(res)=3/2 (1970Ma13).
		4984	16	1158.3	3/2$^+$	
		5262	11	880.5	5/2$^+$	
		5287	100	855.3	1/2$^+$	
		5298	53	845.0	5/2$^-$	
		5670	16	472.3	3/2$^-$	δ(Q/D)=0.00 *3* or +3.7 *+5−8* for J^π(res)=3/2 (1970Ma13).
		5991	74	151.9	3/2$^+$	δ(Q/D)=−0.10 *3* or +8.8 *+25−65* for J^π(res)=3/2 (1970Ma13).
		6143	11	0.0	7/2$^-$	
6182	5/2	6032		151.9	3/2$^+$	
6198	(3/2,5/2$^+$)	2464	16	3733.8		
		3862	20	2335.8	5/2$^-$	
		4056	16	2141.9	(3/2,5/2$^+$)	
		4103	52	2094.3	3/2$^-$	
		4235	12	1962.5	(3/2,5/2)$^-$	
		4547	48	1651.2	5/2$^+$	
		5317	100	880.5	5/2$^+$	
		5342	60	855.3	1/2$^+$	
		5353	12	845.0	5/2$^-$	
		6046	64	151.9	3/2$^+$	
6217	(3/2$^-$,5/2$^+$)	2357	2	3860		
		2572	6	3645.4		

Continued on next page (footnotes at end of table)

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

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

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
6217	(3/2$^-$,5/2$^+$)	2765	6	3451.7	5/2$^+$			
		3230	8	2986.7	(3/2,5/2)			
		3357	12	2859.7				
		3547	10	2670.3	3/2$^-$			
		4075	4	2141.9	(3/2,5/2$^+$)			
		4110	2	2106.4	(3/2,5/2)			
		4122	4	2094.3	3/2$^-$			
		4406	6	1810.3	3/2$^-$			
		4809	2	1408	7/2$^-$			
		4880	<2	1336.3	7/2$^+$			
		5336	6	880.5	5/2$^+$			
		5361	100	855.3	1/2$^+$			
		5744	16	472.3	3/2$^-$			
		6065	8	151.9	3/2$^+$			
		6217	8	0.0	7/2$^-$			
6247	(3/2,5/2)	2957[@]		3290.2	7/2$^-$			
		4047[@]		2200?				
		4105	50	2141.9	(3/2,5/2$^+$)			
		4152	17	2094.3	3/2$^-$			
		4284	33	1962.5	(3/2,5/2)$^-$			
		4596[@]		1651.2	5/2$^+$			
		5068	17	1179.0	3/2$^-$			
		5366	33	880.5	5/2$^+$			
		5402	83	845.0	5/2$^-$			
		6095	100	151.9	3/2$^+$			
6320	5/2$^+$	2513	11	3807	7/2$^-$			
		2868	5	3451.7	5/2$^+$			
		3333	11	2986.7	(3/2,5/2)			δ(Q/D)=−0.02 *4* for J^π(2987)=3/2 and −0.81 *12* for J^π(2987)=5/2 (1970Ma13).
		3739	3	2580.4	(5/2)			
		3937	2	2382.9	3/2$^{(+)}$			δ(Q/D)=+0.45 *8* or +2.7 *+5−8* for J^π(2383)=7/2 and −0.18 *8* for J^π(2383)=3/2 (1970Ma13).
		4178	10	2141.9	(3/2,5/2$^+$)	D+Q	+0.07 *6*	
		4669	2	1651.2	5/2$^+$			
		4983	3	1336.3	7/2$^+$			
		5141	6	1179.0	3/2$^-$	D+Q	0.00 *3*	
		5439	10	880.5	5/2$^+$	D+Q	+0.14 *5*	
		5464	10	855.3	1/2$^+$			δ(Q/D)=+0.01 *3* or −3.1 *5*.
		5475	8	845.0	5/2$^-$			
		6168	100	151.9	3/2$^+$	D+Q	+0.03 *3*	
6685	1/2$^-$	4104	13	2580.4	(5/2)			
		4590	79	2094.3	3/2$^-$			
		4722	42	1962.5	(3/2,5/2)$^-$			
		5506	38	1179.0	3/2$^-$			
		5804	33	880.5	5/2$^+$			
		5829	25	855.3	1/2$^+$			
		6212	29	472.3	3/2$^-$			
		6533	100	151.9	3/2$^+$			
6696	5/2	3013	5	3683				
		3369[@]	5	3327				
		4313	9	2382.9	3/2$^{(+)}$			δ(Q/D)=−0.13 *10* or −4.2 *+10−15* for J^π(2383)=7/2 and +0.20 *10* for J^π(2383)=3/2.
		4733	5	1962.5	(3/2,5/2)$^-$	D+Q	−0.47 *8*	
		5044	11	1651.2	5/2$^+$	D+Q	−0.07 *7*	
		5359	11	1336.3	7/2$^+$			δ(Q/D)=−0.14 *6* or −23 *+∞−12*.

Continued on next page (footnotes at end of table)

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

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

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
6696	5/2	5517	7	1179.0	$3/2^-$			
		5537	7	1158.3	$3/2^+$			
		5815	32	880.5	$5/2^+$	D+Q	+0.03 *3*	
		5851	7	845.0	$5/2^-$	D+Q	−0.27 *10*	
		6223	2	472.3	$3/2^-$	D+Q	+0.22 *5*	
		6544	100	151.9	$3/2^+$	D+Q	−0.14 *4*	
		6695	27	0.0	$7/2^-$	D+Q	+0.02 *4*	
6709	$1/2^-$	3722[@]	25	2986.7	(3/2,5/2)			
		4614[@]	100	2094.3	$3/2^-$			
		4747[@]	19	1962.5	$(3/2,5/2)^-$			
		6236[@]	8	472.3	$3/2^-$			
		6557[@]	17	151.9	$3/2^+$			
6777	$5/2^+$	2322	64	4454.7	(5/2 to 9/2)			
		3790	45	2986.7	(3/2,5/2)			
		4196	55	2580.4	(5/2)			
		4394	36	2382.9	$3/2^{(+)}$			
		4635	82	2141.9	$(3/2,5/2^+)$			
		5125	91	1651.2	$5/2^+$			
		5369	18	1408	$7/2^-$			
		5440	27	1336.3	$7/2^+$			
		5598	100	1179.0	$3/2^-$			
		5896	91	880.5	$5/2^+$			
		5921	45	855.3	$1/2^+$			
		5932	82	845.0	$5/2^-$			
		6304	91	472.3	$3/2^-$			
		6625	82	151.9	$3/2^+$			
6919	7/2	2464	13	4454.7	(5/2 to 9/2)			δ(Q/D)=+0.18 *6* for J^π(res)=7/2 and J^π(4455)=9/2; −0.04 *6* for J^π(4455)=5/2 (1970Ma13).
		2647[@]	5	4272				γ from 1969Wa19 only.
		3076	3	3843				
		3592	6	3327				
		3658	6	3261	$(7/2,9/2)^-$			
		4044	3	2875	$(5/2)^+$			
		4123	3	2796				
		4338[@]	3	2580.4	(5/2)			δ(Q/D)=+0.32 *10* for J^π(res)=7/2 (1970Ma13).
		5034	5	1884.6	$(5/2,9/2)^-$			δ(Q/D)=−0.18 *16* or −5.7 *+20−60* for J^π(res)=7/2 and J^π(1885)=9/2; +0.22 *16* for J^π(1885)=5/2 (1970Ma13).
		5511	5	1408	$7/2^-$			δ(Q/D)=−0.04 *4* for J^π(res)=7/2 (1970Ma13).
		6037	3	880.5	$5/2^+$			
		6074	100	845.0	$5/2^-$			δ(Q/D)=0.00 *2* for J^π(res)=7/2 (1970Ma13).
		6446[@]	3	472.3	$3/2^-$			δ(Q/D)=+0.04 *4* for J^π(res)=7/2 (1970Ma13).
		6917	11	0.0	$7/2^-$			δ(Q/D)=−0.29 *8* for J^π(res)=7/2 (1970Ma13).
7344	$(3/2^-,5/2)$	3484	13	3860				
		3537	39	3807	$7/2^-$			
		3661	10	3683				
		3698	10	3645.4				
		4184	19	3160				
		5229	6	2114.3				
		5692	19	1651.2	$5/2^+$			
		6007	6	1336.3	$7/2^+$			
		6165	6	1179.0	$3/2^-$			

Continued on next page (footnotes at end of table)

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

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

E_i(level)	J_i^π	E_γ †	I_γ ‡	E_f	J_f^π	Comments
7344	$(3/2^-,5/2)$	6185	6	1158.3	$3/2^+$	
		6463	100	880.5	$5/2^+$	
		7191	55	151.9	$3/2^+$	
		7343	32	0.0	$7/2^-$	
7394	$(3/2^-,5/2^+)$	2964	20	4430		
		3387	28	4007	$(3/2,5/2)^+$	
		3637	8	3757		
		3931	12	3463	$5/2^-$	
		3942	12	3451.7	$5/2^+$	
		4519	8	2875	$(5/2)^+$	
		4534	8	2859.7		
		4598	4	2796		
		4813	4	2580.4	(5/2)	
		5011	4	2382.9	$3/2^{(+)}$	
		5252	4	2141.9	$(3/2,5/2^+)$	
		5279	28	2114.3		
		5583	8	1810.3	$3/2^-$	
		5742	8	1651.2	$5/2^+$	
		5986	4	1408	$7/2^-$	
		6057	4	1336.3	$7/2^+$	
		6215	16	1179.0	$3/2^-$	
		6235	40	1158.3	$3/2^+$	
		6513	32	880.5	$5/2^+$	
		6538	20	855.3	$1/2^+$	
		6548	16	845.0	$5/2^-$	
		6921	8	472.3	$3/2^-$	
		7241	100	151.9	$3/2^+$	
		7393	4	0.0	$7/2^-$	
7512	$(7/2^+)$	3141	12	4371	$5/2^-,7/2^-$	A_2=+0.28 *5*, A_4=−0.02 *5* (1977Di17). δ(Q/D)=+0.31 *6* for 9/2 to 7/2 transition.
		3474	3	4038	$7/2^-$	A_2=−0.22 *12*, A_4=+0.04 *13* (1977Di17). δ(Q/D)=+0.05 *8* for 9/2 to 7/2; −0.70 *22* for 9/2 to 9/2; and +0.02 *11* for 9/2 to 11/2.
		3705	10	3807	$7/2^-$	A_2=−0.31 *10*, A_4=−0.18 *10* (1977Di17). δ(Q/D)=−0.05 *6* for 9/2 to 7/2 transition.
		4671	3	2840.5	$(5/2,7/2)^+$	
		4701	3	2811.2		
		4960	3	2552.0	$11/2^+$	
		5580	100	1931.2	$9/2^+$	A_2=+0.38 *4*, A_4=−0.14 *4* (1977Di17). δ(Q/D)=+0.90 *14* or −0.20 *7* for 9/2 to 9/2 transition.
		5627	3	1884.6	$(5/2,9/2)^-$	
		6353	5	1158.3	$3/2^+$	
		6666	3	845.0	$5/2^-$	
		7511	22	0.0	$7/2^-$	A_2=−0.20 *9*, A_4=+0.01 *9* (1977Di17). δ(Q/D)=+0.05 *7* for 9/2 to 7/2 transition.
7581	$(3/2^-,5/2,7/2^+)$	3151	3	4430		
		3898	18	3683		
		4078	5	3503	$7/2^-$	
		4129	8	3451.7	$5/2^+$	
		4207	5	3374	$(7/2,9/2)^-$	
		4721	3	2859.7		
		5439	13	2141.9	$(3/2,5/2^+)$	
		6700	100	880.5	$5/2^+$	
		7428	93	151.9	$3/2^+$	
		7580	5	0.0	$7/2^-$	

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

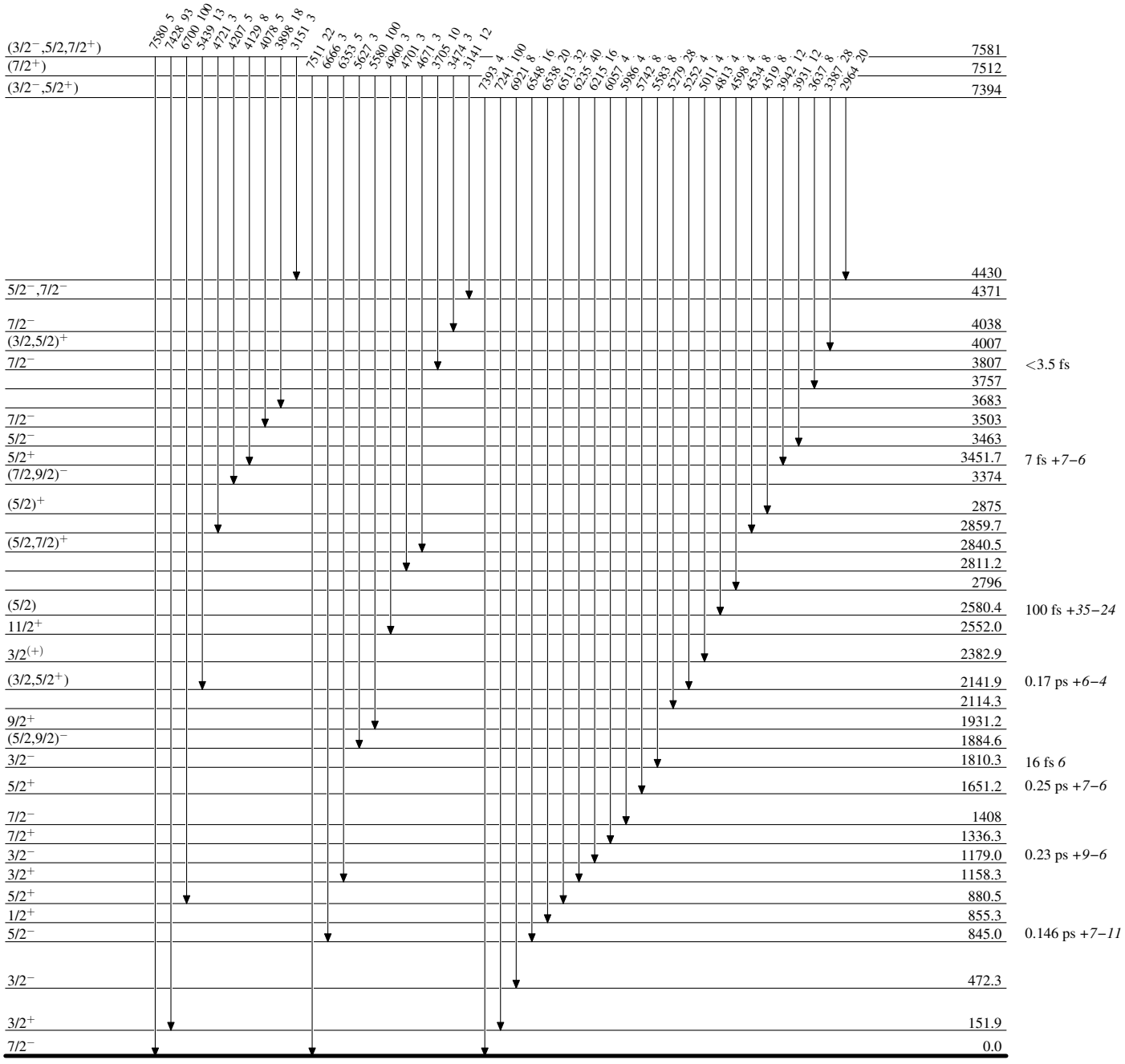
$\gamma(^{43}Sc)$ (continued)

† Level-energy differences.
‡ From average of data from 1977Di17, 1969Wa19 and 1965Br31.
# From $\gamma(\theta)$, $\gamma\gamma(\theta)$, γ(lin pol) data of 1970Ma13, unless otherwise stated.
@ Placement of transition in the level scheme is uncertain.

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

Level Scheme

Intensities: Relative photon branching from each level



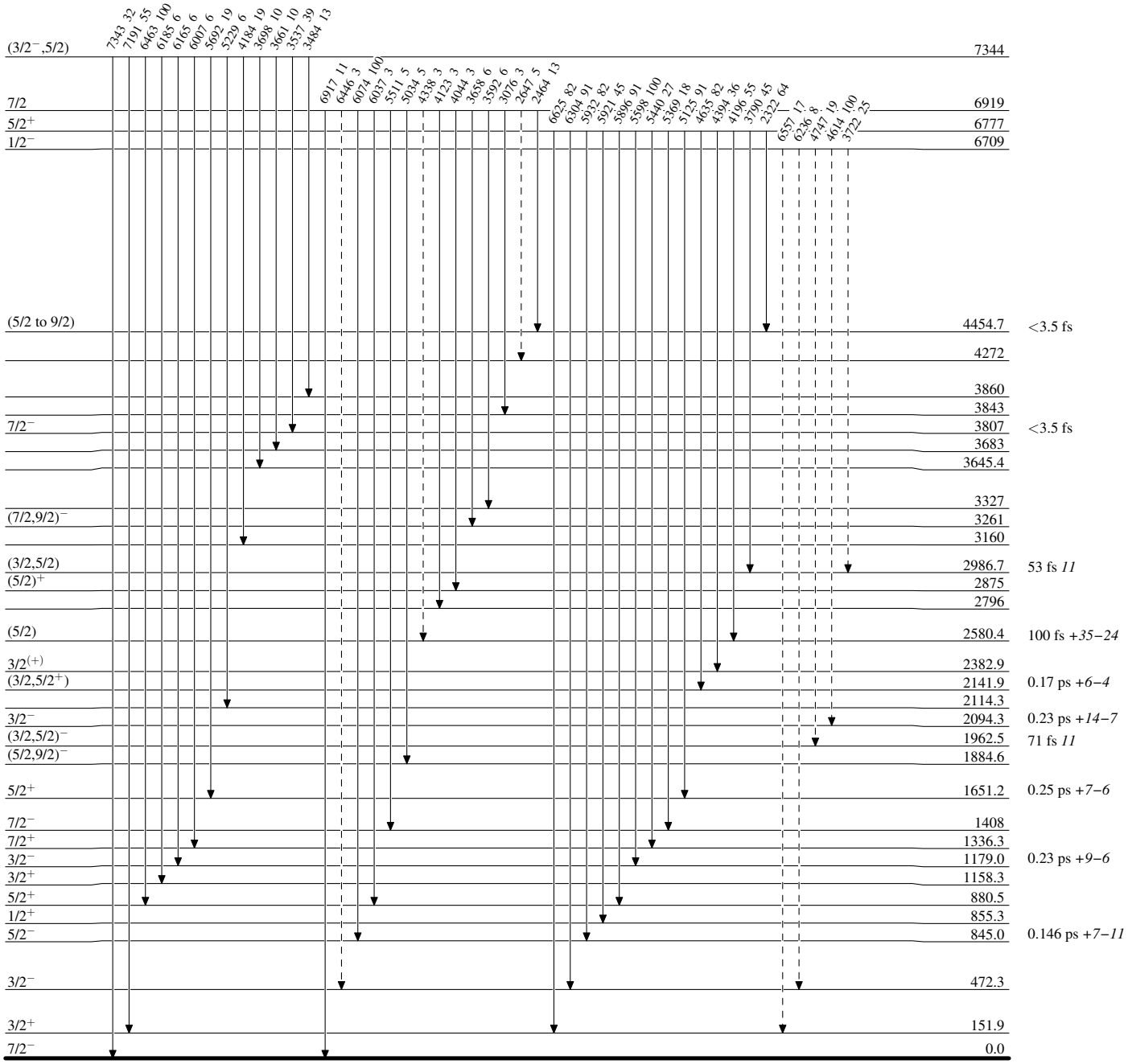
$^{43}_{21}Sc_{22}$

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

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



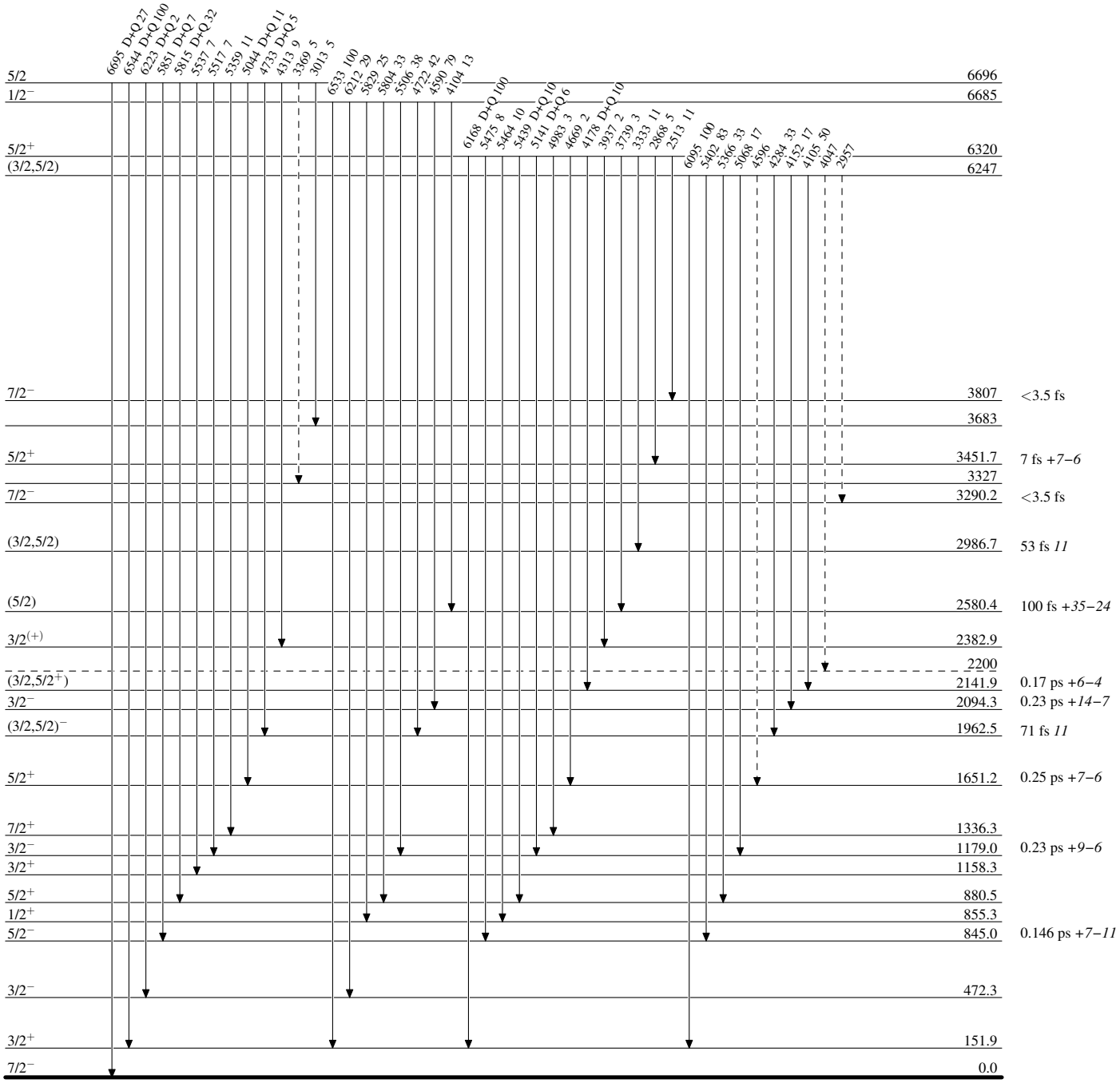
$^{43}_{21}Sc_{22}$

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

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

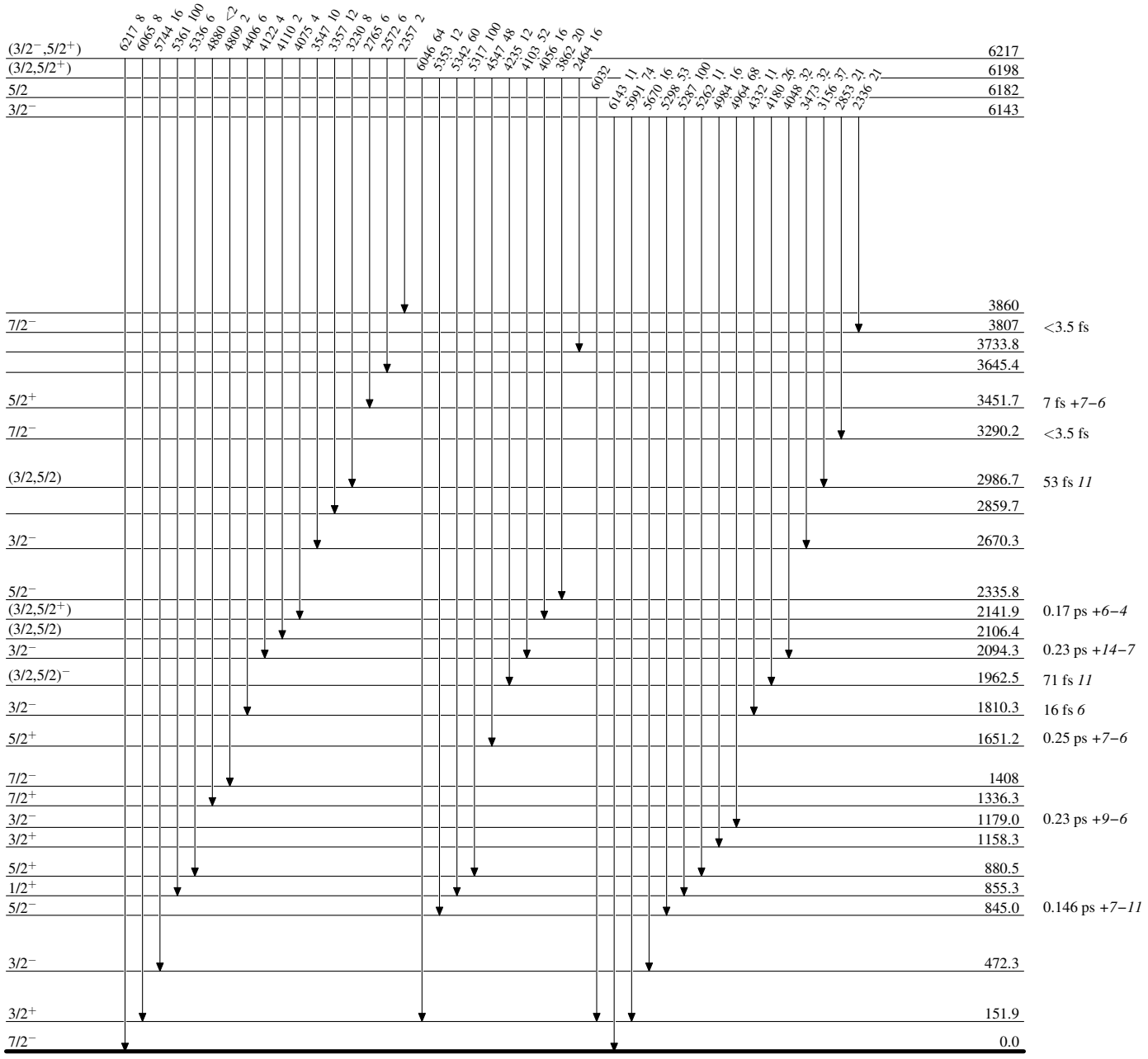


$^{43}_{21}Sc_{22}$

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

Level Scheme (continued)

Intensities: Relative photon branching from each level



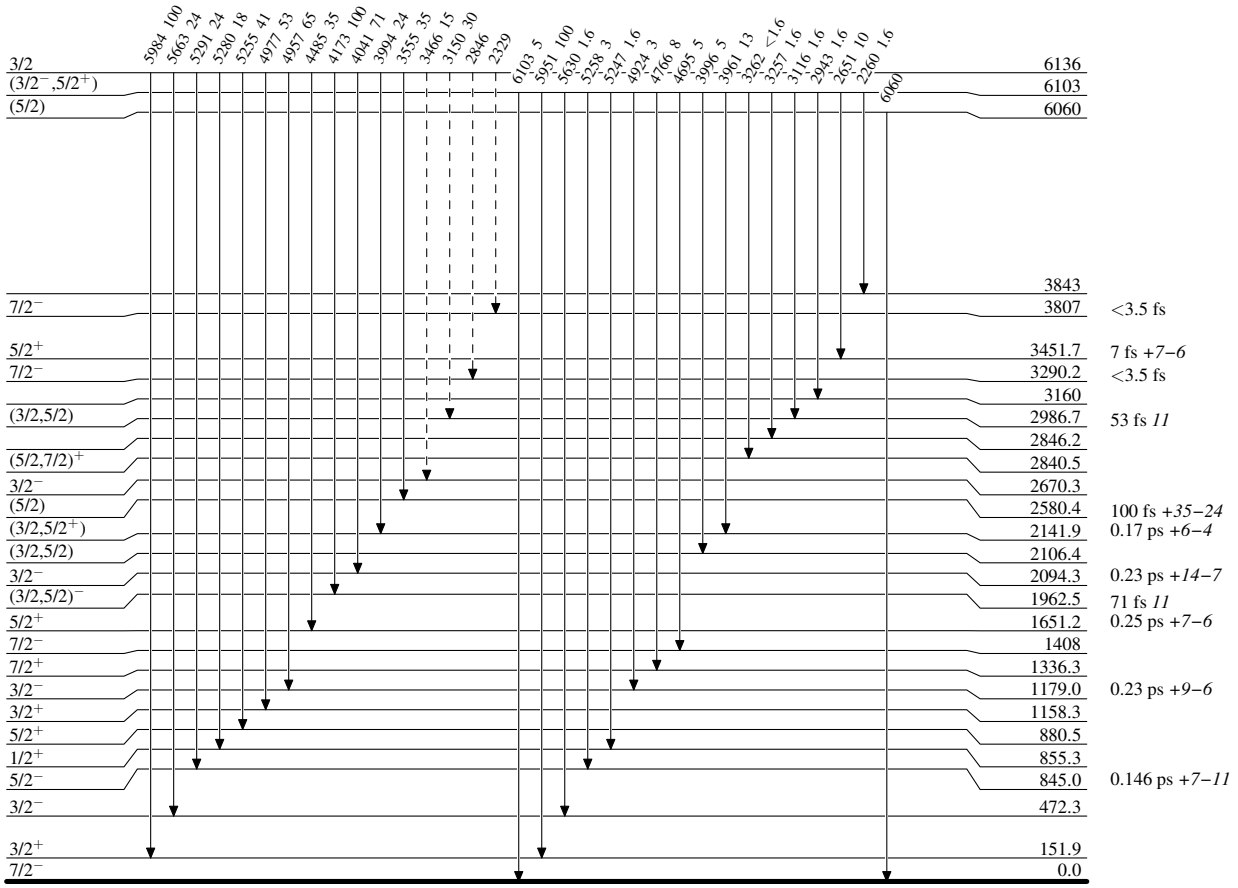
$^{43}_{21}Sc_{22}$

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

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



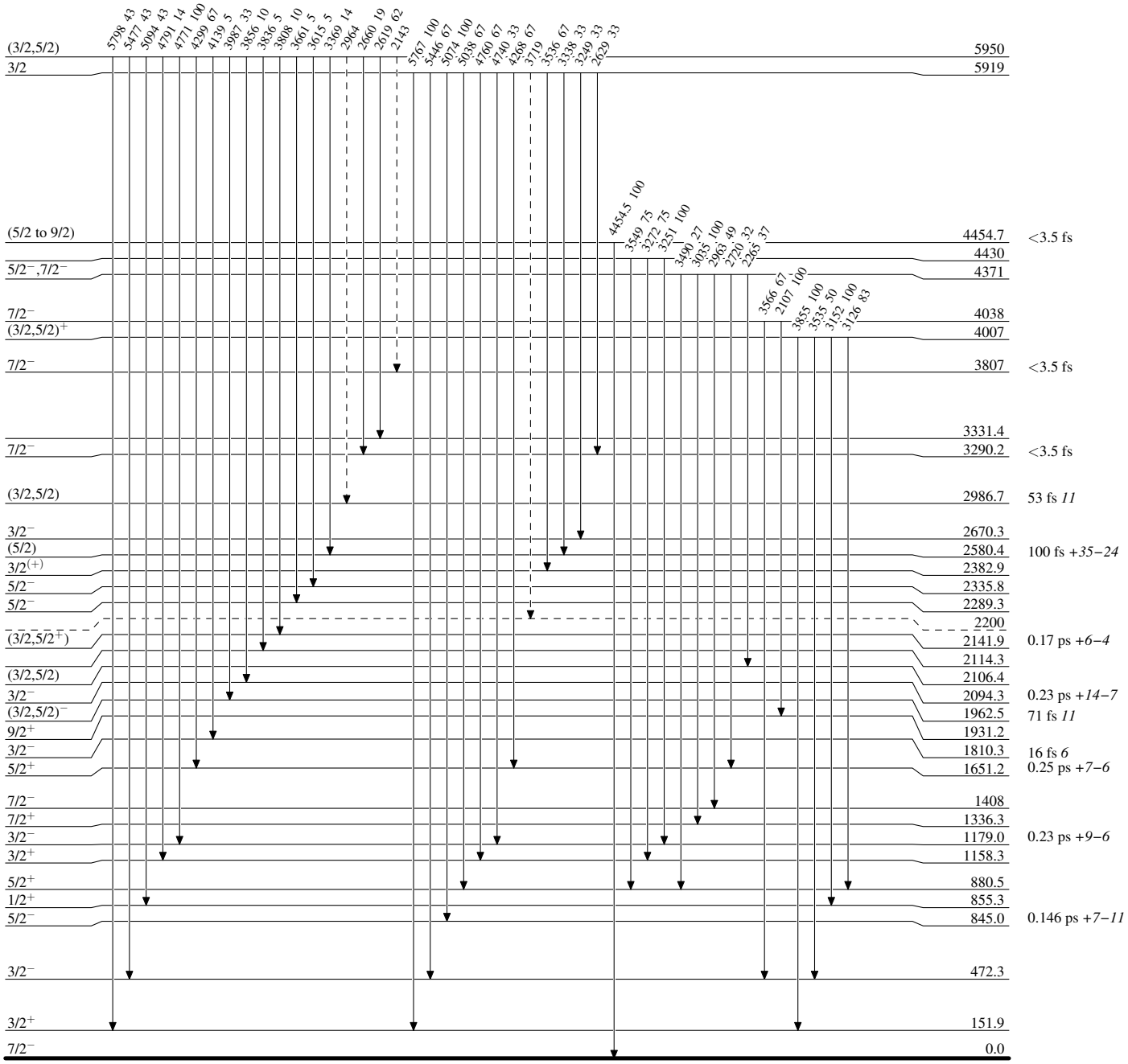
$^{43}_{21}Sc_{22}$

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

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



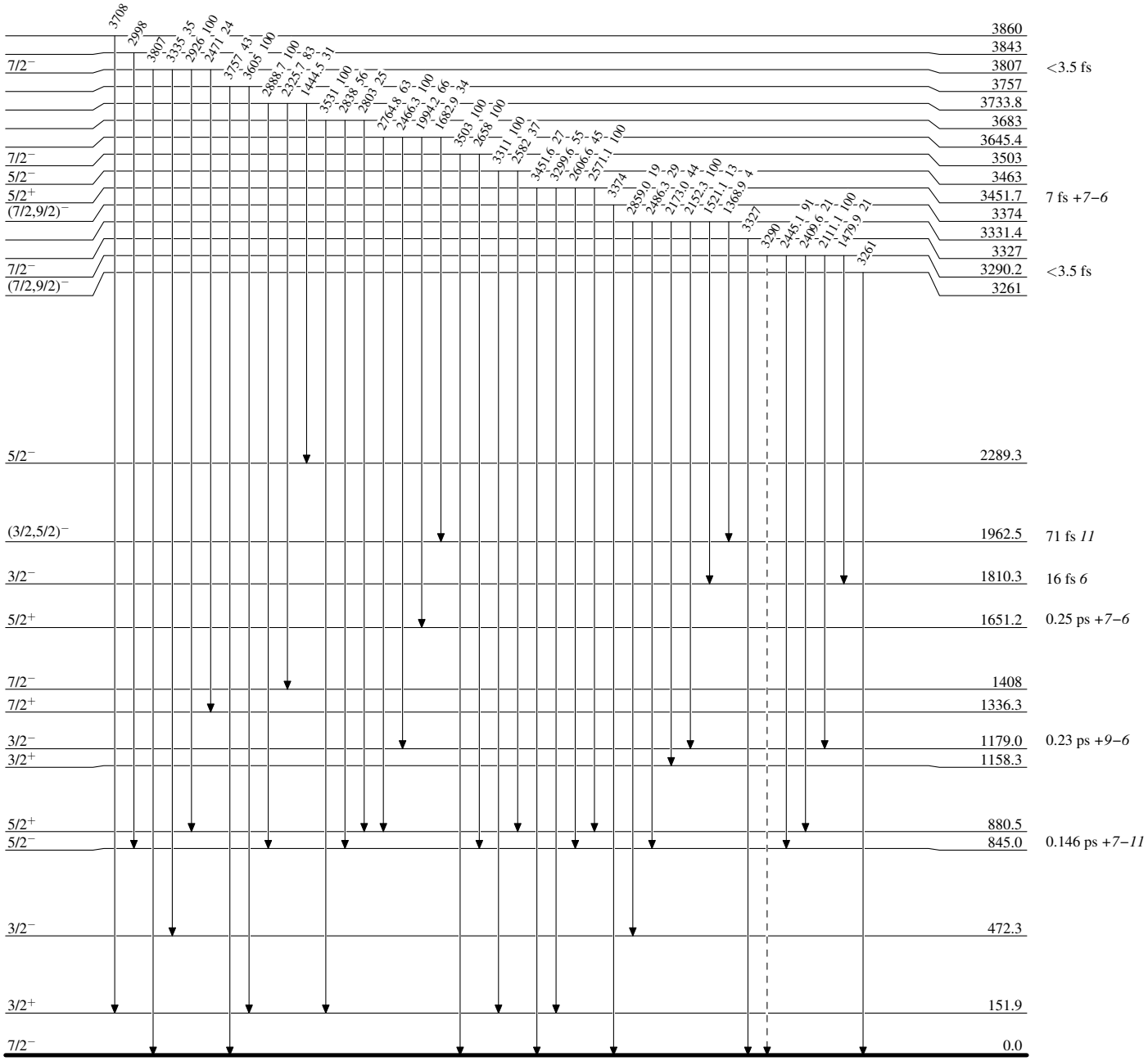
$^{43}_{21}Sc_{22}$

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

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



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

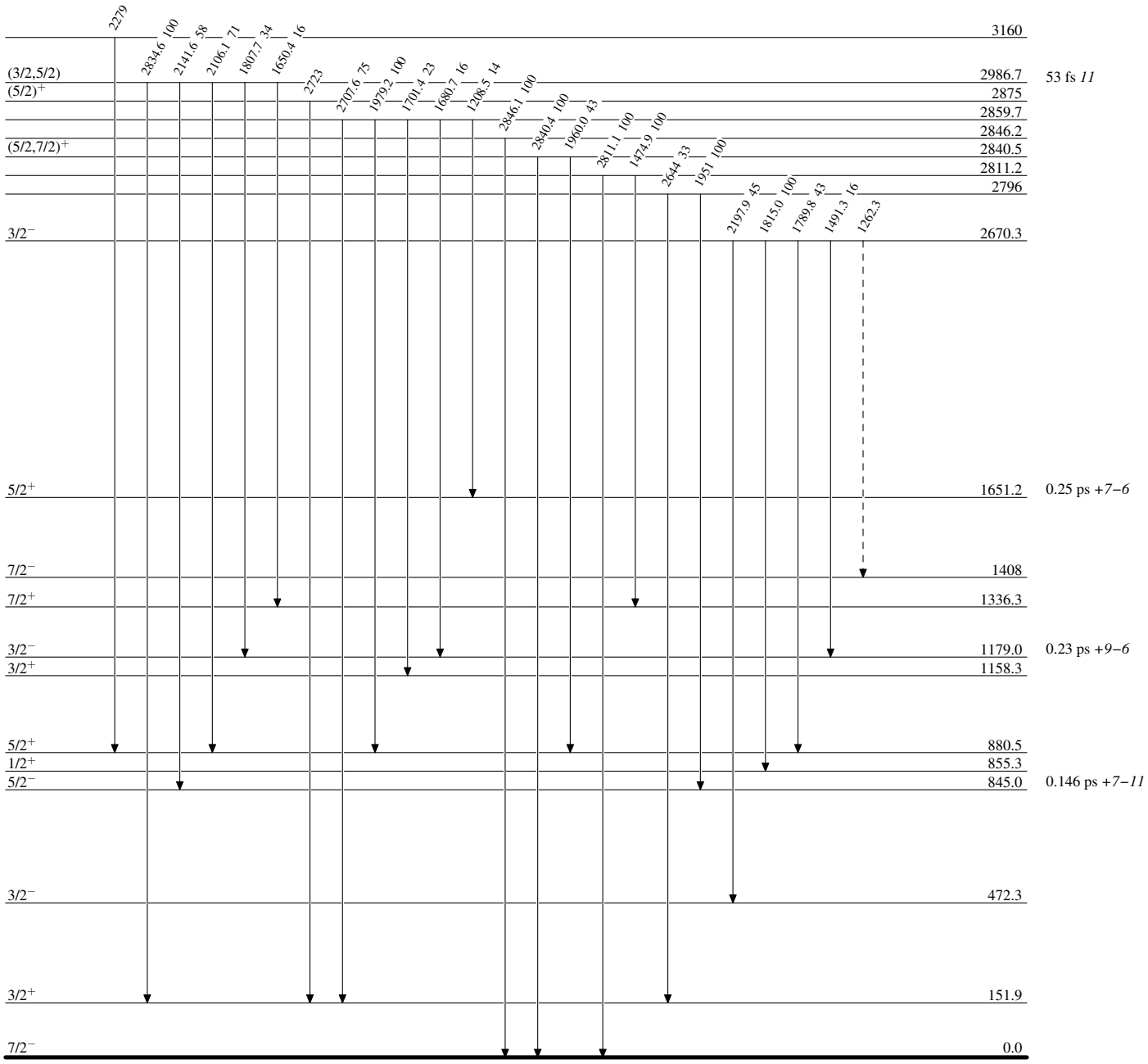
^{42}Ca(p,γ) E=res 1977Di17,1969Wa19,1965Br31

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



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

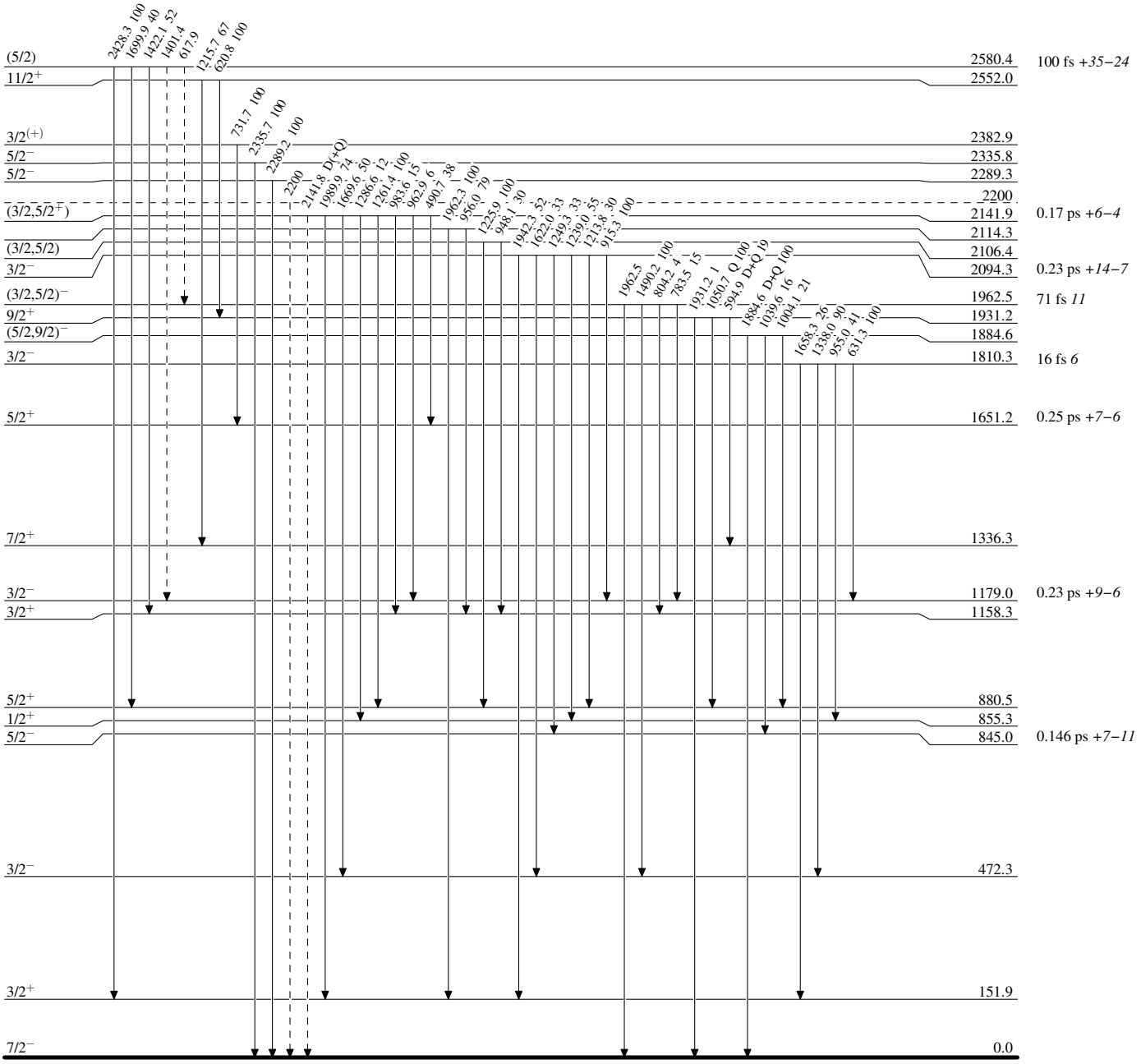
^{42}Ca(p,γ) E=res 1977Di17,1969Wa19,1965Br31

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

- - - - - - ► γ Decay (Uncertain)



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

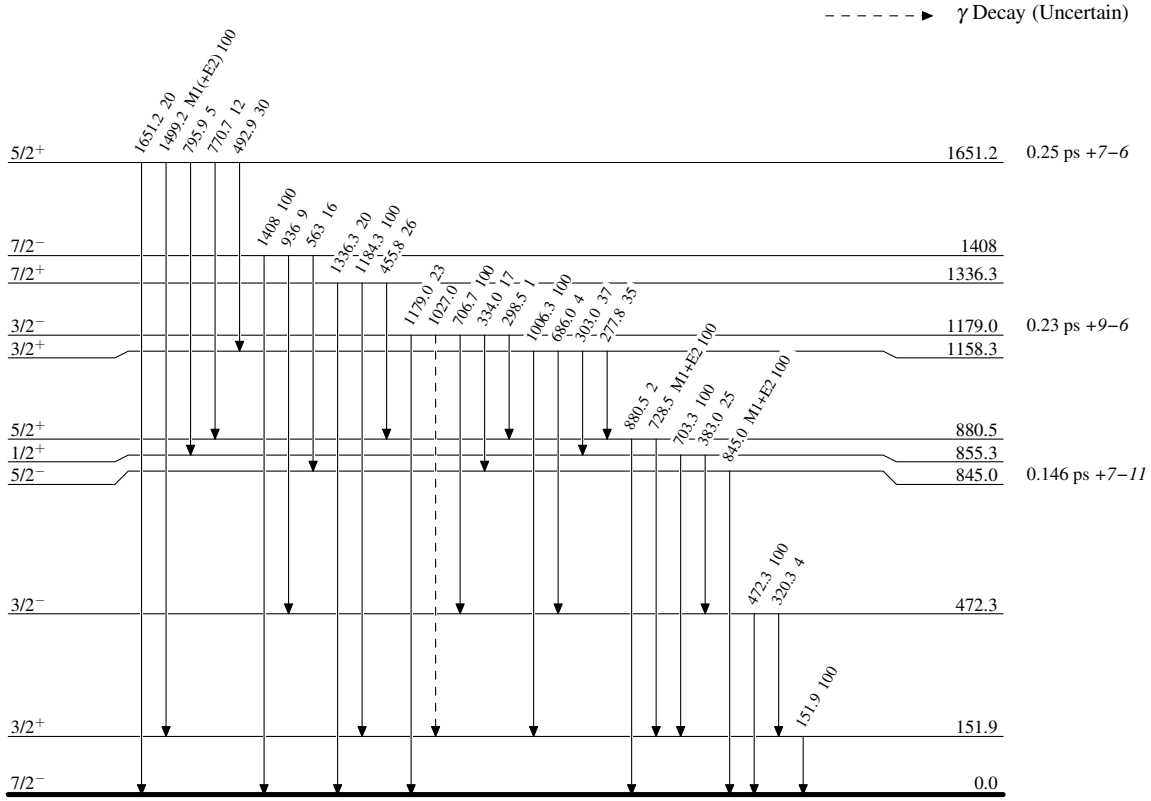
^{42}Ca(p,γ) E=res 1977Di17,1969Wa19,1965Br31

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



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