^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia, A. Chakraborty	NDS 197,1 (2024)	31-May-2024

Others: 1979AlZY, 1977Ra01, 1973An01, 1970Ha52, 1969Bi11, 1969Cu05, 1967Br01, 1967Li05, 2017Da13 (^{18}O(^{16}O,2p2nγ) – measured $T_{1/2}$ of 1st excited state).

1980Bi14: ^{27}Al(α,pγ) E=12,14.1, and 15 MeV; particle detector, γ-ray detectors at 0°, 20°, 30°, 45°, 55°, 70°, and 90° with respect to the beam direction, Ge(Li) and NaI(Tl) for Compton polarimeter; Measured: Eγ, level lifetime τ, γ-ray correlation coefficients, γ-ray linear polarizations.

1971Sh11: ^{27}Al(α,pγ) E=5.0, 6.3, 8.0 MeV; Ge(Li) and NaI(Tl) detectors placed 90° with respect to the beam direction in a plane opposite to each other; Eγ, γ-ray branching, level lifetime τ.

1972Ga05: ^{27}Al(α,pγ) E=9-10 MeV; Ge(Li); Measured Eγ, Iγ, level lifetime τ.

1987Mi29: ^{27}Al(α,pγ), E=8.2 MeV; Ge(Li), measured Eγ at 90°, 60°, 45°, 30°, and 0°. Deduced levels, half-life by DSAM.

1984Bh03: ^{27}Al(α,p) E=6.3-7.3 MeV; Ge(Li) and NaI(Tl) detectors; Measured lifetime of 3788 keV level.

1974Gr28: ^{27}Al(α,pγ), E=9, 13 MeV; measured pγ-coin, p$\gamma(\theta)$, Eγ, Iγ, p$\gamma(\theta)$, DSA; deduced levels, spin, parity, mean lifetime, γ-branching ratios.

1971Sy01: ^{27}Al(α,pγ) E=8.80 MeV, ^{30}Si(α,$\alpha'\gamma$) E=13.52, 14.50, and 14.57 MeV, ^{30}Si(p,p$'\gamma$) E=8.06 and 9.41 MeV; 96% enriched ^{30}Si target; annular silicon surface barrier detector at 180°, 5 NaI(Tl) at 30°, 120°, 270°, 315°, and 352° with respect to the beam direction, Ge(Li); Measured particle-γ angular relation, deduced level E, J^π, δ. Reported level energies above 7256 keV are consistently lower than the level energies reported by 1980Bi14.

1970Cu02: ^{30}Si produced through ^{27}Al(α,pγ) reaction; protons were detected near 180° by surface barrier detector, γ at 0° in coincidence with protons; NaI(Tl) crystal and Ge(Li) detector; deduced mean-lifetime of excited levels by DSAM.

1970Du03: ^{27}Al(α,pγ), ^{27}Al target (thickness=1.66 mg/cm^2), E$_\alpha$=6.3 MeV; Ge(Li), NaI(Tl) anti-Compton and pair spectrometer; measured level mean lifetime by Doppler Shift Attenuation Method. Also studied ^{30}Si(α,$\alpha'\gamma$).

^{30}Si Levels

E(level)†	J$^\pi$#	$T_{1/2}$&	Comments
0	0$^+$		
2235.3 *2*	2$^+$	223 fs *12*	$T_{1/2}$: from mean lifetime τ=322 fs *17*: weighted average of τ=310 fs *40* (1980Bi14), τ=330 fs *50* (1971Sh11), τ=320 fs *40* (1987Mi29), τ=363 fs *28* (1979AlZY, 1982Al22), τ=460 fs *50* (1967Br01), τ=300 fs *40* (1969Bi11 – DSAM), τ=332 fs *21* (1970Cu02 – their previous data τ=336 fs *25* 1969Cu05 and in 1969Cu11 assumed to be superseded), and τ=290 fs *17* (2017Da13 – τ=290 fs *11* – ~5% uncertainty from the stopping power added as of authors' statement). Other: 180 fs *42* (1967Li05 – from τ=0.26 ps *6* – DSAM). All by DSAM.
3498.3 *3*	2$^+$	63 fs *6*	$T_{1/2}$: from mean lifetime τ=91 fs *9*: Weighted average of τ=63 fs *15* (1970Cu02), τ=110 fs *30* (1987Mi29), τ=89 fs *8* (1979AlZY, 1982Al22); τ=84 fs *24* (1980Bi14), τ=86 fs *20* (1967Li05 – DSAM). τ=150 fs *20* (1967Br01), τ=100 fs *30* (1971Sh11). All by DSAM.
3769.9 *4*	1$^+$	42 fs *9*	$T_{1/2}$: from mean lifetime τ=61 fs *13*: weighted average of τ=52 fs *13* (1980Bi14), τ=100 fs *20* (1967Br01), τ=50 fs *15* (1971Sh11), τ=60 fs *15* (1987Mi29).
3788 *4*	0$^+$	8.9 ps *6*	B(E0) (s.p.)=0.053 *13* (1974Ad09 – deduced using τ=15.6 ps *12*). $T_{1/2}$: from mean lifetime τ=12.8 ps *9*: weighted average of τ=12.0 ps *7* (1984Bh03), τ=15.6 ps *12* (1974Be43), τ=12.5 ps *9* – all by Recoil Distance Method. Others: τ=6.8 ps *20* (1973An01), τ=24.2 ps *20* (1970Ha52), τ> 1.2 ps (1967Br01), τ > 6.0 ps (1971Sh11).
4809.5 *10*	2$^+$	131 fs *14*	$T_{1/2}$: from mean lifetime τ=189 fs *20*: weighted average of τ=150 fs *22* (1980Bi14), τ=200 fs *20* (1971Sh11), τ=210 fs *20* (1987Mi29).
4831.0 *4*	3$^+$	87 fs *17*	$T_{1/2}$: from mean lifetime τ=125 fs *25*: weighted average of τ=120 fs *35* (1980Bi14), τ=125 fs *25* (1971Sh11), τ=125 fs *25* (1987Mi29).
5231.0 *10*	3$^+$	63 fs *14*	$T_{1/2}$: from mean lifetime τ=91 fs *20*: weighted average of τ=62 fs *31* (1980Bi14), τ=100 fs *20* (1971Sh11), τ=95 fs *20* (1987Mi29).
5280.1 *4*	4$^+$	96 fs *10*	E(level),J$^\pi$: 7279 spin 4$^+$ in 1970Du03. $T_{1/2}$: from mean lifetime τ=138 fs *15*: weighted average of τ=120 fs *32* (1980Bi14), τ=140 fs *25* (1971Sh11), τ=142 fs *15* (1970Du03 – DSAM), τ=135 fs *25* (1987Mi29).
5372 *4*	0$^+$	59 fs *21*	$T_{1/2}$: τ=85 fs *30* (1971Sh11).
5487‡ *1*	3$^-$	46 fs *12*	$T_{1/2}$: from mean lifetime τ=66 fs *18*: weighted average of τ=62 fs *18* (1980Bi14), τ=65 fs *30*

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^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05 (continued)

^{30}Si Levels (continued)

E(level)[†]	J$^\pi$[#]	T$_{1/2}$[&]	Comments
			(1971Sh11), τ=70 fs *20* (1987Mi29).
5614 *1*	2$^+$	<14 fs	T$_{1/2}$: from τ < 20 fs (1971Sh11, 1987Mi29). Other T$_{1/2}$: < 21 fs (1980Bi14 − τ < 30 fs).
5951 *4*	4$^+$	16 fs *8*	T$_{1/2}$: from mean lifetime τ=23 fs *12*: weighted average of τ=21 fs *12* (1971Sh11), τ=21 fs *12* (1970Du03), τ=36 fs *20* (1987Mi29). Other: τ < 24 fs (1980Bi14).
6505[‡] *1*	4$^-$	124 fs *31*	J$^\pi$: based on polarization direction correlation measurement of γ rays (1974Gr28). T$_{1/2}$: from mean lifetime τ=179 fs *45*: weighted average of τ=200 fs *50* (1980Bi14), τ=320 fs *50* (1971Sh11), τ=310 fs *45* (1987Mi29).
6537 *4*	2$^+$	33 fs *24*	T$_{1/2}$: from τ=48 fs *35* (1971Sh11). Other T$_{1/2}$: < 14 fs (1987Mi29 − τ < 20 fs), < 17 fs (1980Bi14 − τ < 25 fs).
6640 *2*	2$^-$	25 fs *9*	T$_{1/2}$: from mean lifetime τ=36 fs *13*: weighted average of τ=30 fs *13* (1980Bi14), τ=40 fs *15* (1971Sh11), τ=40 fs *15* (1987Mi29).
6641 *4*	0$^+$		
6744 *1*	1$^-$	<10.4 fs	T$_{1/2}$: from mean lifetime τ < 15 fs (1971Sh11). Others: τ < 20 fs (1980Bi14), τ < 20 fs (1987Mi29).
6865 *2*	3$^+$	23 fs *11*	T$_{1/2}$: from mean lifetime τ=33 fs *16*: weighted average of τ=33 fs *16* (1980Bi14), τ=35 fs *20* (1987Mi29). Other: τ < 35 fs (1971Sh11).
6915 *4*	2$^+$	<24.3 fs	T$_{1/2}$: from τ < 35 fs (1971Sh11). Other: T$_{1/2}$=28 fs *14* (1987Mi29 − τ=40 fs *20*).
7001 *1*	5$^+$	115 fs *17*	T$_{1/2}$: from mean lifetime τ=166 fs *25*: weighted average of τ=150 fs *35* (1980Bi14), τ=175 fs *25* (1971Sh11), τ=165 fs *30* (1987Mi29).
7045 *1*	5$^-$	0.85 ps *+14−10*	J$^\pi$: based on polarization direction correlation measurement of γ rays (1974Gr28). T$_{1/2}$: from mean lifetime τ=1.22 ps *+20−15*: weighted average of τ=1.20 ps *29* (1980Bi14), τ=1.20 fs *+20−15* (1971Sh11), τ=1.4 ps *+5−4* (1974Gr28), τ=1.20 ps *25* (1987Mi29).
7079 *1*	3$^+$	<14 fs	J$^\pi$: Unnatural parity from non-population in (α,α') (1971Sy01). T$_{1/2}$: from τ < 20 fs (1980Bi14, 1971Sh11, 1987Mi29).
7225 *2*	4$^+$[@]	<14 fs	T$_{1/2}$: τ < 20 fs (1980Bi14). Others: τ < 40 fs (1971Sh11), τ=60 fs *25* (1987Mi29).
7255 *4*	2$^+$	35 fs *14*	T$_{1/2}$: from τ=50 fs *20* (1987Mi29). Other T$_{1/2}$: < 55.5 fs (1971Sh11 − τ < 80 fs), < 35 fs (1980Bi14 − τ < 50 fs). Level energy of 7225 keV (would be 7255) mentioned at the footnotes of Table 1 in 1980Bi14 related to this T$_{1/2}$ seems to be a typo, since the 7225 keV level is already quoted in Table 1.
7440 *4*	0$^+$		
7508 *4*	2$^-$	<24 fs	T$_{1/2}$: from τ=35 fs (1980Bi14). Other T$_{1/2}$: 28 fs *14* (1987Mi29 − τ=40 fs *20*).
7613 *1*	4$^-$	13 fs *6*	T$_{1/2}$: from τ=18 fs *9* (1980Bi14). Other T$_{1/2}$: < 17.33 fs (1987Mi29 − τ < 25 fs).
7623 *4*	2$^+$	<17 fs	E(level): 7610 in 1971Sy01. T$_{1/2}$: from τ < 25 fs (1980Bi14). Also same limit in 1987Mi29.
7634 *4*	1,2$^+$		
7668 *2*	1$^+$,2$^+$	<14 fs	T$_{1/2}$: from τ < 20 fs (1980Bi14). Other: τ < 25 fs (1987Mi29).
7810 *2*	4	12 fs *8*	T$_{1/2}$: from τ=17 fs *11* (1980Bi14). Other: τ <25 fs (1987Mi29).
7911 *2*	2$^+$	24 fs *14*	T$_{1/2}$: from mean lifetime τ=35 fs *20*: weighted average of τ=30 fs *21* (1980Bi14), τ=40 fs *20* (1987Mi29).
8103 *4*	2$^+$,3$^-$	25 fs *17*	T$_{1/2}$: from τ=36 fs *25* (1987Mi29). Other T$_{1/2}$: < 24.3 fs (1980Bi14 − τ < 35 fs).
8155 *4*	(1$^-$ to 4$^+$)		
8164 *4*	1$^-$		
8190 *4*	2$^+$	25 fs *17*	T$_{1/2}$: from τ=36 fs *25* (1987Mi29). Other T$_{1/2}$: < 24.3 fs (1980Bi14 − τ < 35 fs).
8196[‡] *2*	5$^-$	38 fs *12*	T$_{1/2}$: from mean lifetime τ=55 fs *18*: weighted average of τ=50 fs *18* (1980Bi14), τ=62 fs *22* (1987Mi29).
8290 *4*	(1 to 3)		
8330 *4*	2$^+$		E(level): doublet? (1980Bi14).
8442 *4*	(1 to 3)		
8537 *3*	3$^+$,4$^+$	38 fs *16*	T$_{1/2}$: from mean lifetime τ=55 fs *23*: weighted average of τ=45 fs *23* (1980Bi14), τ=65 fs *23* (1987Mi29).
8554 *2*	2$^-$,3$^-$	<14 fs	T$_{1/2}$: from τ < 20 fs (1980Bi14). Other T$_{1/2}$: < 17 fs (1987Mi29 − τ < 25 fs).
8596 *4*	4$^-$	<17 fs	T$_{1/2}$: from τ < 25 fs (1987Mi29). Other T$_{1/2}$: < 24 fs (1980Bi14 − τ=35 fs).

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^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05 (continued)

^{30}Si Levels (continued)

E(level)[†]	J$^{\pi}$[#]	$T_{1/2}$[&]	Comments
8640 *4*	(1$^+$ to 4$^+$)	<17 fs	$T_{1/2}$: from τ < 25 fs (1987Mi29). Other $T_{1/2}$: < 24 fs (1980Bi14 − τ=35 fs).
8673 *4*	1$^-$,2$^+$		
8684 *4*	(2$^+$ to 4$^+$)	<17 fs	$T_{1/2}$: from τ < 25 fs (1987Mi29). Other $T_{1/2}$: < 24 fs (1980Bi14 − τ=35 fs).
8735 *4*	(0$^+$ to 3$^+$)		
8799 *4*	(1,2$^+$)		
8887 *4*	(0$^+$ to 4$^+$)		
8900 *4*	1$^-$		
8938 *4*	(0$^+$ to 3$^+$)		
8955 *4*	(1,2$^+$)		
8963 *2*	5$^-$	17 fs *10*	$T_{1/2}$: from τ=24 fs *17* (1980Bi14).
8980 *4*	1,2$^+$		
9035 *4*	(0$^+$ to 3$^+$)		
9045 *4*	3,4	35 fs *14*	$T_{1/2}$: from τ=50 fs *20* (1987Mi29). Other $T_{1/2}$: < 24.3 fs (1980Bi14 − τ < 35 fs).
9103 *4*	(0$^-$ to 2$^-$)	25 fs *17*	$T_{1/2}$: from τ=36 fs *25* (1987Mi29). Other $T_{1/2}$: < 24.3 fs (1980Bi14 − τ < 35 fs).
9111 *1*	6$^-$[@]	24 fs *6*	$T_{1/2}$: from τ=34 fs *9* (1980Bi14). Other $T_{1/2}$: < 16.64 fs (1987Mi29 − τ < 24 fs).
9131 *4*	4$^+$,5$^+$	28 fs *14*	$T_{1/2}$: from τ=40 fs *20* (1987Mi29). Other $T_{1/2}$: < 17.3 fs (1980Bi14 − τ < 25 fs).
9167 *4*	(1$^+$ to 3$^+$)	31 fs *15*	$T_{1/2}$: from τ=45 fs *22* (1987Mi29). Other $T_{1/2}$: < 24.3 fs (1980Bi14 − τ < 35 fs).
9255 *4*	3$^+$,2$^+$		
9309 *4*	(0 to 3$^+$)	<24.3 fs	$T_{1/2}$: from τ < 35 fs (1980Bi14).
9350 *4*	4$^-$	<24.3 fs	$T_{1/2}$: from τ < 35 fs (1980Bi14).
9360 *4*	1,2$^+$		
9371 *4*	6$^+$[@]	<17.3 fs	$T_{1/2}$: from τ < 25 fs (1980Bi14).
9406 *4*	(1$^+$ to 4$^+$)	<24.3 fs	$T_{1/2}$: from τ < 35 fs (1980Bi14).
9440 *4*	1$^-$		
9475 *4*	(2$^+$ to 4$^+$)		
9507 *4*	5$^-$	<17.3 fs	$T_{1/2}$: from τ < 25 fs (1980Bi14).
9576 *4*	(1$^+$ to 3)		
9595 *4*	(0$^+$ to 4$^+$)		
9605 *4*	(2 to 4$^+$)		
9620 *4*	1,2$^{(+)}$		
9648 *4*	(3$^-$,4)	<35 fs	$T_{1/2}$: from τ < 50 fs (1980Bi14).
9689 *4*	(0 to 3$^-$)		
9726 *4*	(0$^+$ to 4$^+$)		
9761 *4*	(2$^+$ to 4$^+$)	<35 fs	$T_{1/2}$: from τ < 50 fs (1980Bi14).
9770 *4*	(1,2$^+$)		
9777[‡] *4*	6$^-$[@]	<24.3 fs	$T_{1/2}$: from τ < 35 fs (1980Bi14).
9790 *4*	1$^-$		
9815 *4*	(0$^+$ to 4$^+$)		
9882 *4*	3,4		
9897 *4*	(0$^+$ to 4$^+$)		
9955 *2*	4,5	<14 fs	$T_{1/2}$: from τ < 20 fs (1980Bi14).
9958 *4*	1,2$^+$		
10027 *4*	(2 to 4$^+$)		
10057 *4*	(3 to 5$^+$)		
10079 *4*	(1$^+$ to 4$^+$)		
10116 *4*	(1$^-$ to 4$^+$)		
10184 *4*	(0$^+$ to 3$^+$)		
10188 *2*	5$^-$	19 fs *14*	$T_{1/2}$: from τ=28 fs *20* (1980Bi14).
10205 *4*	(1$^-$)		
10218 *4*	(0$^+$ to 4$^+$)		
10275 *4*	(0$^+$ to 4$^+$)		
10288 *2*	(4$^+$,5$^+$)	<28 fs	$T_{1/2}$: from τ < 40 fs (1980Bi14).
10305 *4*	3$^-$		
10349 *4*	(3$^+$,4)	<24.3 fs	$T_{1/2}$: from τ < 35 fs (1980Bi14).
10355 *4*	(0$^+$ to 4$^+$)		

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^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05 (continued)

^{30}Si Levels (continued)

E(level)[†]	J$^\pi$[#]	T$_{1/2}$[&]	Comments
10397 *4*	3,5$^{(+)}$	<24.3 fs	T$_{1/2}$: from τ < 35 fs (1980Bi14).
10420 *4*	(2$^+$ to 6$^+$)		
10450 *4*	(0 to 3$^+$)		
10465 *4*	(4,3$^+$)	<35 fs	T$_{1/2}$: from τ < 50 fs (1980Bi14).
10470 *4*	1,2$^{(+)}$		
10508 *4*	(0$^+$ to 3$^+$)		
10561 *4*	6$^-$	<35 fs	T$_{1/2}$: from τ < 50 fs (1980Bi14).
10582 *4*	(0 to 3$^+$)		
10621 *4*	(0 to 4$^+$)		
10669 *4*	(5,4$^-$,3$^-$)	<17.3 fs	T$_{1/2}$: from τ < 25 fs (1980Bi14).
10679 *2*	6$^+$,4	12 fs *8*	T$_{1/2}$: from τ=18 fs *12* (1980Bi14).
10725 *2*	7$^-$[@]	17 fs *9*	J$^\pi$: 5$^-$ assignment was excluded at a 68% confidence level in 1980Bi14, based on the polarization measurements. T$_{1/2}$: from τ=24 fs *13* (1980Bi14).
10732 *3*	(3$^-$,4$^-$,5$^-$)	<28 fs	T$_{1/2}$: from τ < 40 fs (1980Bi14).
10795 *4*	(2 to 4)		
10805 *4*	(0$^+$ to 4$^+$)		
10823 *4*	(4,5$^+$,6$^+$)	<24.3 fs	T$_{1/2}$: from τ < 30 fs (1980Bi14).
10835 *4*	(1$^+$ to 5$^+$)		
10866 *4*	5,4$^+$,3$^-$	<35 fs	T$_{1/2}$: from τ < 50 fs (1980Bi14).
10975 *4*	(0$^+$ to 4$^+$)		
10991 *4*	(5,4,3)		
11015 *4*	(2$^+$ to 4$^+$)		
11038 *4*	(3$^-$ to 6$^+$)	<52 fs	E(level): from Table 1 (1980Bi14). In Fig the value is 11037. T$_{1/2}$: from τ < 75 fs (1980Bi14).
11073 *4*	(3 to 5)	<35 fs	T$_{1/2}$: from τ < 50 fs (1980Bi14).
11084 *2*	(6$^-$,5$^-$,4$^-$)	24 fs *9*	T$_{1/2}$: from τ=35 fs *13* (1980Bi14).
11091 *4*	(3,4,5)	<35 fs	T$_{1/2}$: from τ < 50 fs (1980Bi14).
11205 *4*	(0$^+$ to 4$^+$)		
11210 *4*	(4,5$^+$)		
11250 *4*		<24.3 fs	T$_{1/2}$: from τ < 35 fs (1980Bi14).
11268 *4*	(2$^+$ to 5$^+$)		
11322 *4*	(2$^+$ to 5$^+$)		
11348 *4*	(2$^+$ to 6$^+$)		
11380 *4*	(0$^+$ to 4$^+$)		
11417 *4*	(6$^+$,4$^+$)	<35 fs	T$_{1/2}$: from τ < 50 fs (1980Bi14).
11477 *4*	(6$^-$,5$^-$)	<104 fs	T$_{1/2}$: from τ < 150 fs (1980Bi14).
11493 *4*	(3$^+$ to 6$^+$)		
11512 *4*	(4$^-$,5,6$^+$)		
11544[‡] *2*	7$^-$[@]	12 fs *8*	T$_{1/2}$: from τ=17 fs *11* (1980Bi14).
11564 *4*	(5,3$^+$)	<24.3 fs	T$_{1/2}$: from τ < 35 fs (1980Bi14).
11661 *2*	(4 to 6)	12 fs *9*	T$_{1/2}$: from τ=17 fs *13* (1980Bi14).
11740 *4*	(3$^-$,4,5)		
11782 *2*	(4,5$^+$)	<35 fs	T$_{1/2}$: from τ < 50 fs (1980Bi14) also in Table τ < 60 fs.
11840 *4*	(0$^+$ to 4$^+$)		
11880 *4*	(3$^-$ to 7$^-$)		
12015 *4*	(4,5,6$^+$)		

[†] From 1980Bi14 (Table 1, Fig. 3 and Fig. 4). For levels listed in Fig. 3 and Fig. 4, the authors (1980Bi14) assigned ΔE=4 keV.
[‡] K^π=3$^-$ band; with an absolute value of intrinsic quadrupole moment Q$_o$=350 mb *+250 −70*.
[#] From γ-rays linear polarization measurements, measured angular correlation coefficients and recommended upper limits (RUL) in (α,pγ) (1980Bi14).
[@] Consistent with γ-ray polarization data (1980Bi14).

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^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05 (continued)

^{30}Si Levels (continued)

[&] Level mean-lifetime was measured following the Doppler-shift attenuation method and the $T_{1/2}$ is deduced by the evaluators. 1971Sh11 note 25% systematic uncertainty for mean-lifetime values.

$\gamma(^{30}Si)$

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
2235.3	2^+	2235	100	0	0^+	E2		A_2=+0.70 *4*; A_4=−1.51 *5* (1971Sy01)
3498.3	2^+	1263	100 *9*	2235.3	2^+	M1+E2	+0.18 *6*	A_2=+0.25 *5*; A_4=−0.10 *3* (1980Bi14) A_2=+0.76 *6*; A_4=−0.03 *6* (1971Sy01) δ: other: +0.26 *15* (1980Bi14).
		3498	89 *9*	0	0^+	E2		A_2=+0.72 *5*; A_4=−1.52 *5* (1971Sy01)
3769.9	1^+	1535	100 *9*	2235.3	2^+	M1+E2	−0.09 *4*	A_2=+0.03 *2*; A_4=−0.01 *2* (1971Sy01) δ: weighted average of −0.07 *4* (1964Sm04), −0.10 *4* (1967Br01) and −0.11 *5* (1971Sy01).
		3770	82 *9*	0	0^+	M1		A_2=−0.58 *4*; A_4=+0.02 *3* (1971Sy01)
3788	0^+	1553	100	2235.3	2^+	E2		A_2=−0.03 *2*; A_4=+0.00 *2* (1971Sy01)
4809.5	2^+	1040	10 *3*	3769.9	1^+			
		1311	98 *10*	3498.3	2^+	M1+E2	−0.17 *6*	A_2=+0.24 *5*; A_4=−0.03 *6* (1971Sy01 − for doublet 1311+1263)
		2574	43 *5*	2235.3	2^+	M1+E2	−0.52 *11*	A_2=−0.27 *6*; A_4=−0.08 *7* (1971Sy01)
		4809	100 *10*	0	0^+	E2		A_2=+0.73 *5*; A_4=+1.33 *7* (1971Sy01)
4831.0	3^+	1333	9 *2*	3498.3	2^+	D+Q[@]	+0.7[@] *+6−4*	A_2=−0.17 *4*; A_4=+0.02 *5* (1980Bi14)
		2596	100 *2*	2235.3	2^+	M1+E2	+0.72 *+11−9*	A_2=+0.19 *2*; A_4=−0.11 *3* (1980Bi14) A_2=+0.67 *5*; A_4=+0.19 *5* (1971Sy01) δ: weighted average of 0.65 *11* (1971Sy01) and +0.83 *+20−5* (1980Bi14).
5231.0	3^+	1733	100 *9*	3498.3	2^+	M1+E2	+0.12 *6*	A_2=+0.02 *5*; A_4=−0.09 *7* (1971Sy01)
		2996	13 *2*	2235.3	2^+			A_2=−0.33 *8*; A_4=−0.31 *11* (1971Sy01) δ: +0.09 *12* or −11 *+7−∞* (1971Sy01).
5280.1	4^+	1782	1.0 *3*	3498.3	2^+			
		3045	100.0 *3*	2235.3	2^+	(E2)		A_2=+0.48 *3*; A_4=−0.31 *3* (1971Sy01)
5372	0^+	1602	82 *11*	3769.9	1^+	M1		
		3137	100 *11*	2235.3	2^+	E2		A_2=−0.04 *6*; A_4=+0.01 *6* (1971Sy01)
5487	3^-	1989	92 *8*	3498.3	2^+	(E1+M2)	−0.02 *7*	A_2=−0.29 *5*; A_4=+0.05 *5* (1971Sy01)
		3252	100 *8*	2235.3	2^+	(E1+M2)	−0.04 *5*	A_2=−0.22 *2*; A_4=+0.01 *3* (1971Sy01)
5614	2^+	783	6 *2*	4831.0	3^+	M1+E2[@]	+0.20[@] *11*	A_2=−0.23 *6*; A_4=+0.01 *8* (1980Bi14)
		804	2 *1*	4809.5	2^+			
		1844	100 *8*	3769.9	1^+	M1+E2	+0.11 *5*	A_2=−0.25 *4*; A_4=−0.04 *4* (1971Sy01)
		3379	81 *8*	2235.3	2^+	D+Q	−0.29 *4*	A_2=+0.08 *1*; A_4=−0.06 *2* (1971Sy01)
5951	4^+	671	0.5 *2*	5280.1	4^+			
		720	0.3 *1*	5231.0	3^+			
		1120	1.7 *4*	4831.0	3^+			
		2453	6.7 *17*	3498.3	2^+	(E2)		
		3715	100 *2*	2235.3	2^+	(E2)		A_2=+0.44 *3*; A_4=−0.35 *4* (1971Sy01)
6505	4^-	1018	9 *4*	5487	3^-	D+Q		δ: −0.23 *2* or −1.8 *+3−4* (1980Bi14).
		1274	100 *7*	5231.0	3^+	(E1)		
		1674	62 *7*	4831.0	3^+	(E1)		
6537	2^+	923	13 *4*	5614	2^+			
		1306	16 *7*	5231.0	3^+			
		2767	35 *9*	3769.9	1^+			
		3039	100 *7*	3498.3	2^+			
		4301	27 *7*	2235.3	2^+			
		6536	31 *7*	0	0^+	E2		
6640	2^-	1153	88 *15*	5487	3^-			
		1809	100 *15*	4831.0	3^+			
		1830	47 *12*	4809.5	2^+			

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^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05 (continued)

$\gamma(^{30}Si)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
6640	2^-	2870	59 *12*	3769.9	1^+			
6641	0^+	4405	100	2235.3	2^+			
6744	1^-	2956	100 *5*	3788	0^+			
		4508	3 *2*	2235.3	2^+	(E1)		
		6743	5 *2*	0	0^+	E1		A_2=−1.04 *4*; A_4=+0.05 *5* (1971Sy01)
6865	3^+	914	6 *2*	5951	4^+	D+Q[@]	−0.03[@] *10*	A_2=−0.06 *7*; A_4=+0.03 *10* (1980Bi14)
		1251	4 *2*	5614	2^+			
		1585	4 *2*	5280.1	4^+			
		1634	4 *2*	5231.0	3^+			
		2034	73 *12*	4831.0	3^+	D+Q[@]	+1.2[@] *5*	A_2=+0.22 *3*; A_4=−0.16 *4* (1980Bi14)
		2055	12 *4*	4809.5	2^+			
		4629	100 *16*	2235.3	2^+	D+Q[@]	−0.15[@] *+9−15*	A_2=+0.25 *5*; A_4=−0.10 *3* (1980Bi14)
6915	2^+	1301	4.2 *22*	5614	2^+			
		3145	20 *7*	3769.9	1^+			
		3416	27 *7*	3498.3	2^+			
		4679	100 *20*	2235.3	2^+	M1+E2	−0.63 *14*	A_2=−0.24 *13*; A_4=−0.18 *14*(1971Sy01)
		6914	71 *16*	0	0^+	E2		A_2=+0.70 *5*; A_4=−1.57 *8* (1971Sy01)
7001	5^+	1050	18 *3*	5951	4^+	D+Q[@]	+0.12[@] *2*	A_2=−0.02 *2*; A_4=−0.02 *3* (1980Bi14)
		1721	100 *7*	5280.1	4^+	D+Q[@]	+0.25[@] *5*	A_2=+0.10 *2*; A_4=+0.08 *4* (1980Bi14)
		2170	35 *5*	4831.0	3^+	Q		A_2=+0.38 *2*; A_4=−0.16 *3* (1980Bi14) I_γ: 57 *7* (1971Sy01).
7045	5^-	540	96[‡] *9*	6505	4^-	M1+E2[@]	+0.04[@] *1*	A_2=−0.19 *2*; A_4=+0.0 *2* (1980Bi14) A_2=−0.21 *5*; A_4=−0.02 *5* (1971Sy01) I_γ: other: 121 *15* from branching 40 *5* (1974Gr28). δ: other: +0.5 *3* (1971Sy01).
		1094	100[‡] *8*	5951	4^+	D+Q[@]	−0.02[@] *1*	A_2=−0.26 *1*; A_4=+0.02 *1* (1980Bi14) A_2=−0.22 *4*; A_4=+0.12 *4* (1971Sy01) I_γ: other: 100 *12* from branching 33 *4* (1974Gr28). δ: other: +0.09 *4* (1971Sy01).
		1558	32[‡] *4*	5487	3^-	Q		A_2=+0.35 *2*; A_4=−0.11 *3* (1980Bi14) I_γ: other: 30 *9* from branching 10 *3* (1974Gr28). δ: other: +0.09 *4* (1971Sy01).
		1765	62[‡] *6*	5280.1	4^+	D+Q[@]	+0.06[@] *3*	A_2=−0.14 *2*; A_4=−0.05 *3* (1980Bi14) I_γ: other: 52 *12* from branching 17 *4* (1974Gr28).
7079	3^+	1848	<8	5231.0	3^+			
		2269	45 *8*	4809.5	2^+	D+Q[@]	+0.15[@] *1*	A_2=−0.06 *4*; A_4=+0.0 *6* (1980Bi14)
		3580	22 *5*	3498.3	2^+			
		4843	100 *17*	2235.3	2^+	D+Q[@]	−0.00[@] *+9−3*	A_2=−0.25 *3*; A_4=−0.10 *5* (1980Bi14)
7225	4^+	720	<2	6505	4^-			
		1274	24 *7*	5951	4^+			I_γ: from 1971Sy01. Other: <9 (1980Bi14).
		1738	<9	5487	3^-			
		1945	100[‡] *7*	5280.1	4^+	M1+E2	+0.3 *4*	A_2=+0.32 *1*; A_4=−0.10 *2* (1980Bi14) A_2=+0.57 *8*; A_4=−0.01 *10* (1971Sy01 − for doublet 1943+1993) Pol=+0.36 *+9−7* (1980Bi14). Mult.: from $\gamma(\theta)$ and polarization measurements. δ: Other: −0.10 *10* (1980Bi14).
		1994	30[‡] *7*	5231.0	3^+	M1+E2	+0.6 *1*	A_2=+0.41 *3*; A_4=−0.05 *4* (1980Bi14) δ: weighted average of +0.4 *2* (1971Sy01) and +0.70 *15* (1980Bi14).

Continued on next page (footnotes at end of table)

^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05 (continued)

$\gamma(^{30}Si)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
7225	4^+	2394	23[‡] *4*	4831.0	3^+	D+Q[@]	+0.10[@] *3*	A_2=−0.11 *4*; A_4=+0.06 *8* (1980Bi14)
		3726	25 *5*	3498.3	2^+			A_2=+0.28 *4*; A_4=−0.07 *5* (1980Bi14)
7255	2^+	1768	31 *7*	5487	3^-			
		2024	24 *7*	5231.0	3^+			
		2424	17 *7*	4831.0	3^+			
		2445	45 *10*	4809.5	2^+	D+Q[@]	−1.5[@] *+7−20*	A_2=+0.36 *6*; A_4=+0.06 *8* (1980Bi14)
		3756	66 *14*	3498.3	2^+	D+Q		A_2=−0.13 *5*; A_4=−0.12 *8* (1980Bi14) I_γ: Other: 18 *9* (1971Sy01). δ: −0.17 *+20−10* or +4.4 *24* (1980Bi14).
		5019	100[‡] *10*	2235.3	2^+	M1+E2	+3.7 *15*	A_2=+0.30 *4*; A_4=−0.35 *6* (1971Sy01)
		7254	63[‡] *8*	0	0^+	E2		A_2=+0.83 *10*; A_4=−1.59 *12* (1971Sy01)
7440	0^+	3670	100	3769.9	1^+			
7508	2^-	2021	11 *3*	5487	3^-			
		2277	5 *3*	5231.0	3^+			
		2677	19 *5*	4831.0	3^+			
		3738	15 *5*	3769.9	1^+			
		4009	11 *3*	3498.3	2^+			
		5272	100 *13*	2235.3	2^+			
7613	4^-	1108	7 *2*	6505	4^-			
		2126	98 *12*	5487	3^-	D+Q[@]	+0.25[@] *3*	A_2=+0.10 *2*; A_4=+0.01 *3* (1980Bi14)
		2333	17 *5*	5280.1	4^+			
		2382	17 *5*	5231.0	3^+			
		2782	100 *10*	4831.0	3^+	D+Q[@]	−0.00[@] *5*	A_2=−0.22 *4*; A_4=−0.07 *4* (1980Bi14)
7623	2^+	4124	100 *16*	3498.3	2^+			I_γ: other: 66 *11* (1971Sy01).
		5387	61 *11*	2235.3	2^+	D+Q	+0.38 *6*	A_2=−0.06 *4*; A_4=−0.13 *4* (1971Sy01) I_γ: other: 100 *16* (1971Sy01).
		7622	14 *5*	0	0^+	E2		A_2=+0.63 *3*; A_4=−1.56 *6* (1971Sy01) I_γ: other: 23 *8* (1971Sy01).
7634	$1,2^+$	3846	43 *14*	3788	0^+			
		3864	100 *14*	3769.9	1^+			
7668	$1^+,2^+$	4169	23 *5*	3498.3	2^+			
		5432	100 *10*	2235.3	2^+			
		7667	12 *4*	0	0^+			
7810	4	731	4 *2*	7079	3^+			
		945	12 *4*	6865	3^+			
		1859	46 *8*	5951	4^+			A_2=+0.18 *4*; A_4=−0.05 *6* (1980Bi14) δ: +0.01 *25* or +1.4 *3* (1980Bi14).
		2530	100 *10*	5280.1	4^+			
		2579	18 *4*	5231.0	3^+			A_2=+0.31 *9*; A_4=+0.11 *4* (1980Bi14) δ: +0.15 *+25−15* or +1.0 *15* (1980Bi14).
		2979	20 *4*	4831.0	3^+			
7911	2^+	2424	11 *4*	5487	3^-			
		4141	40 *9*	3769.9	1^+			
		4412	25 *7*	3498.3	2^+			
		5675	100 *18*	2235.3	2^+	D+Q	+0.7 *3*	A_2=+0.31 *7*; A_4=+0.56 *8* (1971Sy01)
8103	$2^+,3^-$	1188	3 *2*	6915	2^+			
		2489	5 *3*	5614	2^+			
		2616	9 *3*	5487	3^-			
		2872	14 *5*	5231.0	3^+			
		3293	17 *5*	4809.5	2^+			
		4333	6 *3*	3769.9	1^+			
		5867	100 *15*	2235.3	2^+			
8155	$(1^-$ to $4^+)$	2668	29 *10*	5487	3^-			
		4656	43 *14*	3498.3	2^+			

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^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05 (continued)

$\gamma(^{30}Si)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
8155	(1$^-$ to 4$^+$)	5919	100 *14*	2235.3	2$^+$			
8164	1$^-$	5928	100 *40*	2235.3	2$^+$			
		8163	100 *40*	0	0$^+$			
8190	2$^+$	2576	18 *6*	5614	2$^+$			
		4691	100 *6*	3498.3	2$^+$			A$_2$=+0.15 *4*; A$_4$=−0.21 *6* (1980Bi14) δ: +2.0 *+30−10* or −4.0 *+22−50* (1980Bi14).
8196	5$^-$	971	34 *3*	7225	4$^+$	D+Q[@]	−0.00[@] *3*	A$_2$=−0.14 *4*; A$_4$=−0.03 *4* (1980Bi14)
		1151	6 *1*	7045	5$^-$	D+Q[@]	−0.15[@] *3*	A$_2$=+0.48 *6*; A$_4$=+0.12 *9* (1980Bi14)
		1195	6 *1*	7001	5$^+$			
		1691	100 *6*	6505	4$^-$			A$_2$=+0.37 *2*; A$_4$=−0.09 *2* (1980Bi14) δ: +0.35 *3* or +2.6 *6* (1980Bi14).
		2245	77 *6*	5951	4$^+$			
		2709	43 *9*	5487	3$^-$			
		2916	20 *3*	5280.1	4$^+$	D+Q[@]	+0.06[@] *3*	A$_2$=−0.15 *5*; A$_4$=+0.06 *7* (1980Bi14)
8290	(1 to 3)	2803	9 *4*	5487	3$^-$			
		4791	16 *5*	3498.3	2$^+$			
		6054	100 *7*	2235.3	2$^+$			
8330	2$^+$	1105	13 *4*	7225	4$^+$			
		1251	30 *7*	7079	3$^+$			
		1329	7 *4*	7001	5$^+$			
		2716	27 *7*	5614	2$^+$			
		2843	20 *4*	5487	3$^-$			
		3050	37 *10*	5280.1	4$^+$			
		3499	100 *17*	4831.0	3$^+$			
		3520	13 *7*	4809.5	2$^+$			
		6094	87 *14*	2235.3	2$^+$			
8442	(1 to 3)	2955	16 *4*	5487	3$^-$			
		4943	100 *11*	3498.3	2$^+$			
		6206	63 *11*	2235.3	2$^+$			
8537	3$^+$,4$^+$	1536	39 *7*	7001	5$^+$			
		3306	23 *5*	5231.0	3$^+$			
		3727	100 *14*	4809.5	2$^+$			
		5038	16 *5*	3498.3	2$^+$			
		6301	50 *9*	2235.3	2$^+$			
8554	2$^-$,3$^-$	1914	6.3 *25*	6640	2$^-$			
		3067	100 *7*	5487	3$^-$			
		3744	19 *7*	4809.5	2$^+$			
8596	4$^-$	1371	16 *5*	7225	4$^+$	D+Q[@]	−0.13[@] *13*	A$_2$=+0.27 *11*; A$_4$=+0.14 *18* (1980Bi14)
		2645	24 *5*	5951	4$^+$			
		3109	82 *12*	5487	3$^-$	D+Q[@]	+0.08[@] *3*	A$_2$=−0.17 *6*; A$_4$=+0.0 *8* (1980Bi14)
		3365	100 *12*	5231.0	3$^+$	D+Q[@]	−0.01[@] *4*	A$_2$=−0.22 *6*; A$_4$=−0.08 *7* (1980Bi14)
8640	(1$^+$ to 4$^+$)	1775	25 *13*	6865	3$^+$			
		3026	25 *13*	5614	2$^+$			
		5141	100 *25*	3498.3	2$^+$			
		6404	100 *25*	2235.3	2$^+$			
8673	1$^-$,2$^+$	3186	100 *20*	5487	3$^-$			
		4903	53 *14*	3769.9	1$^+$			
		5174	87 *17*	3498.3	2$^+$			
		6437	77 *17*	2235.3	2$^+$			
		8672	20 *10*	0	0$^+$			
8684	(2$^+$ to 4$^+$)	1459	11 *4*	7225	4$^+$			
		1605	21 *8*	7079	3$^+$			
		2733	54 *15*	5951	4$^+$			
		3070	21 *8*	5614	2$^+$			

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^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05 (continued)

$\gamma(^{30}Si)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
8684	(2$^+$ to 4$^+$)	3404	100 *18*	5280.1	4$^+$			
		3453	50 *11*	5231.0	3$^+$			
		3853	43 *11*	4831.0	3$^+$			
		3874	57 *15*	4809.5	2$^+$			
8735	(0$^+$ to 3$^+$)	5236	100 *12*	3498.3	2$^+$			
		6499	47 *12*	2235.3	2$^+$			
8799	(1,2$^+$)	5029	100 *30*	3769.9	1$^+$			
		8798	100 *30*	0	0$^+$			
8887	(0$^+$ to 4$^+$)	6651	100	2235.3	2$^+$			
8900	1$^-$	5130	100	3769.9	1$^+$			
8938	(0$^+$ to 3$^+$)	5168	100 *40*	3769.9	1$^+$			
		6702	100 *40*	2235.3	2$^+$			
8955	(1,2$^+$)	8954	100	0	0$^+$			
8963	5$^-$	767	11 *4*	8196	5$^-$	D+Q[@]	−0.04[@] *3*	A_2=+0.43 *7*; A_4=−0.12 *10* (1980Bi14)
		1153	5.6 *19*	7810	4			
		1350	30 *4*	7613	4$^-$	D+Q[@]	+0.22[@] *5*	A_2=+0.11 *5*; A_4=−0.04 *7* (1980Bi14)
		1918	93 *12*	7045	5$^-$	D+Q[@]	−0.03[@] *+20−7*	A_2=+0.31 *3*; A_4=−0.07 *4* (1980Bi14)
		1962	19 *4*	7001	5$^+$			
		2458	52 *8*	6505	4$^-$	D+Q[@]	−0.13[@] *3*	A_2=−0.48 *5*; A_4=−0.11 *6* (1980Bi14)
		3012	15 *4*	5951	4$^+$			
		3476	48 *8*	5487	3$^-$			
		3683	100 *12*	5280.1	4$^+$	D+Q[@]	−0.02[@] *3*	A_2=−0.28 *6*; A_4=−0.08 *5* (1980Bi14)
8980	1,2$^+$	6744	100 *40*	2235.3	2$^+$			
		8979	100 *40*	0	0$^+$			
9035	(0$^+$ to 3$^+$)	5265	100 *20*	3769.9	1$^+$			
		5536	60 *16*	3498.3	2$^+$			
		9034	40 *12*	0	0$^+$			
9045	3,4	2540	48 *17*	6505	4$^-$			
		3094	65 *13*	5951	4$^+$			
		3558	100 *17*	5487	3$^-$			
		3814	29 *10*	5231.0	3$^+$			
		4214	81 *17*	4831.0	3$^+$			
9103	(0$^-$ to 2$^-$)	2359	100	6744	1$^-$			
9111	6$^-$	915	2.6 *6*	8196	5$^-$			
		2066	100.0 *6*	7045	5$^-$	M1+E2[@]	+0.35[@] *4*	A_2=+0.32 *2*; A_4=+0.06 *4* (1980Bi14) Pol=+0.51 *+7−6* (1980Bi14).
9131	4$^+$,5$^+$	1906	43 *9*	7225	4$^+$			A_2=+0.28 *5*; A_4=−0.10 *7* (1980Bi14) δ: −0.39 *9* or +3.8 *+15−10* for a 5$^+$ to 4$^+$ transition OR +0.7 *5* for a 4$^+$ to 4$^+$ transition (1980Bi14).
		2130	100 *11*	7001	5$^+$			A_2=+0.33 *4*; A_4=+0.00 *5* (1980Bi14) δ: −0.00 *+24−12* for a 5$^+$ to 5$^+$ transition OR −1.0 *6* for a 4$^+$ to 5$^+$ transition (1980Bi14).
		3180	62 *11*	5951	4$^+$			A_2=−0.10 *5*; A_4=−0.11 *7* (1980Bi14) δ: +0.06 *2* for a 5$^+$ to 4$^+$ transition OR −0.63 *4* for a 4$^+$ to 4$^+$ transition (1980Bi14).
		4300	65 *9*	4831.0	3$^+$			A_2=+0.23 *6*; A_4=−0.11 *8* (1980Bi14) δ: infinity for a 5$^+$ to 3$^+$ transition OR +0.57 *10* for a 4$^+$ to 3$^+$ transition (1980Bi14).
9167	(1$^+$ to 3$^+$)	2302	40 *12*	6865	3$^+$			
		2630	40 *12*	6537	2$^+$			

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^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05 (continued)

$\gamma(^{30}Si)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
9167	(1$^+$ to 3$^+$)	4336	100 *20*	4831.0	3$^+$			
		4357	40 *20*	4809.5	2$^+$			
		5397	80 *20*	3769.9	1$^+$			
		5668	20 *12*	3498.3	2$^+$			
		6931	80 *24*	2235.3	2$^+$			
9255	3$^+$,2$^+$	3641	24 *6*	5614	2$^+$			
		4024	48 *6*	5231.0	3$^+$			
		4445	13 *4*	4809.5	2$^+$			
		7019	100 *10*	2235.3	2$^+$			
9309	(0 to 3$^+$)	5539	100	3769.9	1$^+$			
9350	4$^-$	754	13 *5*	8596	4$^-$			
		1737	63 *25*	7613	4$^-$			
		2271	10 *5*	7079	3$^+$			
		2845	40 *15*	6505	4$^-$			
		3863	25 *8*	5487	3$^-$			
		4119	100 *25*	5231.0	3$^+$			
9360	1,2$^+$	9358		0	0$^+$			
9371	6$^+$	2370	83 *10*	7001	5$^+$	D+Q[@]	+0.24[@] *3*	A_2=+0.19 *2*; A_4=−0.02 *3* (1980Bi14)
		3420	55 *8*	5951	4$^+$	E2		A_2=+0.43 *5*; A_4=−0.13 *8* (1980Bi14) Pol=+0.70 *+20−28* (1980Bi14). Mult.: from $\gamma(\theta)$ and polarization measurements.
		4091	100 *12*	5280.1	4$^+$	Q		A_2=+0.45 *5*; A_4=−0.22 *5* (1980Bi14)
9406	(1$^+$ to 4$^+$)	4175	66 *11*	5231.0	3$^+$			
		4575	100 *15*	4831.0	3$^+$			
		4596	21 *9*	4809.5	2$^+$			
		5907	26 *7*	3498.3	2$^+$			
9440	1$^-$	5670	100 *40*	3769.9	1$^+$			
		9438	100 *40*	0	0$^+$			
9475	(2$^+$ to 4$^+$)	2396	50 *20*	7079	3$^+$			
		4195	100 *20*	5280.1	4$^+$			
		7239	50 *10*	2235.3	2$^+$			
9507	5$^-$	2462	6 *3*	7045	5$^-$			
		2506	17 *3*	7001	5$^+$	D+Q[@]	−0.00[@] *+1−4*	A_2=+0.43 *6*; A_4=−0.08 *9* (1980Bi14)
		3002	6 *3*	6505	4$^-$			
		4020	14 *5*	5487	3$^-$			
		4227	100 *8*	5280.1	4$^+$	D+Q[@]	−0.00[@] *+4−10*	
9576	(1$^+$ to 3)	4745	54 *16*	4831.0	3$^+$			
		6077	100 *16*	3498.3	2$^+$			
9595	(0$^+$ to 4$^+$)	6096	100 *11*	3498.3	2$^+$			
		7359	43 *11*	2235.3	2$^+$			
9605	(2 to 4$^+$)	4118	43 *12*	5487	3$^-$			
		4374	100 *18*	5231.0	3$^+$			
		6106	71 *15*	3498.3	2$^+$			
		7369	71 *15*	2235.3	2$^+$			
9620	1,2$^{(+)}$	9618		0	0$^+$			
9648	(3$^-$,4)	2603	38 *8*	7045	5$^-$			
		4161	29 *6*	5487	3$^-$			
		4368	25 *8*	5280.1	4$^+$			
		4817	100 *12*	4831.0	3$^+$			
9689	(0 to 3$^-$)	2945	100	6744	1$^-$			
9726	(0$^+$ to 4$^+$)	6227	100 *13*	3498.3	2$^+$			
		7490	54 *13*	2235.3	2$^+$			
9761	(2$^+$ to 4$^+$)	3810	100 *14*	5951	4$^+$			
		4930	78 *12*	4831.0	3$^+$			

Continued on next page (footnotes at end of table)

^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05 (continued)

$\gamma(^{30}Si)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
9761	(2$^+$ to 4$^+$)	6262	22 *7*	3498.3	2$^+$			
		7525	22 *7*	2235.3	2$^+$			
9770	(1,2$^+$)	7534	67 *17*	2235.3	2$^+$			
		9768	100 *17*	0	0$^+$			
9777	6$^-$	1581	79 *6*	8196	5$^-$	D+Q[@]	+0.26[@] *5*	A_2=+0.18 *3*; A_4=+0.12 *6* (1980Bi14)
		2732	100 *9*	7045	5$^-$	D+Q[@]	+0.10[@] *3*	A_2=−0.03 *3*; A_4=−0.06 *5* (1980Bi14)
		2776	30 *6*	7001	5$^+$	D+Q[@]	−0.00[@] *5*	A_2=+0.28 *3*; A_4=−0.09 *5* (1980Bi14)
		3272	94 *9*	6505	4$^-$	E2		A_2=+0.32 *3*; A_4=−0.20 *6* (1980Bi14) Pol=+0.44 *+16−13* (1980Bi14). Mult.: from $\gamma(\theta)$ and polarization measurements.
9790	1$^-$	9788	100	0	0$^+$			
9815	(0$^+$ to 4$^+$)	6316	100	3498.3	2$^+$			
9882	3,4	3377	51 *9*	6505	4$^-$			
		3931	89 *11*	5951	4$^+$			
		4395	30 *6*	5487	3$^-$			
		4651	100 *11*	5231.0	3$^+$			
9897	(0$^+$ to 4$^+$)	2982	83 *24*	6915	2$^+$			
		5087	67 *17*	4809.5	2$^+$			
		6398	100 *20*	3498.3	2$^+$			
		7661	83 *17*	2235.3	2$^+$			
9955	4,5	1418	13 *4*	8537	3$^+$,4$^+$			
		2145	100 *8*	7810	4			A_2=−0.09 *3*; A_4=−0.02 *5* (1980Bi14) δ: +0.11 *+7−1* for a 5$^+$ to 4$^+$ transition OR +0.57 *+5−7* for a 4$^+$ to 4$^+$ transition (1980Bi14).
		2954	25 *4*	7001	5$^+$			
		3090	21 *4*	6865	3$^+$			
		4004	11.5 *20*	5951	4$^+$			
		4675	13 *4*	5280.1	4$^+$			
		4724	7.7 *20*	5231.0	3$^+$			
9958	1,2$^+$	7722	100 *11*	2235.3	2$^+$			
		9956	54 *11*	0	0$^+$			
10027	(2 to 4$^+$)	4540	30 *6*	5487	3$^-$			
		4796	70 *12*	5231.0	3$^+$			
		6528	100 *14*	3498.3	2$^+$			
10057	(3 to 5$^+$)	3552	50 *10*	6505	4$^-$			
		4106	100 *20*	5951	4$^+$			
		4776	100 *20*	5280.1	4$^+$			
		5226	83 *17*	4831.0	3$^+$			
10079	(1$^+$ to 4$^+$)	3164	60 *10*	6915	2$^+$			
		5248	40 *8*	4831.0	3$^+$			
		5269	100 *12*	4809.5	2$^+$			
10116	(1$^-$ to 4$^+$)	4165	75 *13*	5951	4$^+$			
		4629	100 *15*	5487	3$^-$			
		7880	75 *13*	2235.3	2$^+$			
10184	(0$^+$ to 3$^+$)	5374	56 *12*	4809.5	2$^+$			
		6413	100 *18*	3769.9	1$^+$			
		7948	67 *14*	2235.3	2$^+$			
10188	5$^-$	1992	15 *8*	8196	5$^-$			
		2378	50 *10*	7810	4	D+Q[@]	−0.02[@] *8*	A_2=−0.40 *12*; A_4=+0.06 *16* (1980Bi14)
		3143	100 *15*	7045	5$^-$	D+Q[@]	−0.26[@] *6*	A_2=+0.29 *4*; A_4=−0.05 *5* (1980Bi14)

Continued on next page (footnotes at end of table)

^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05 (continued)

$\gamma(^{30}Si)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
10188	5^-	3187	23 *5*	7001	5^+			
		3683	63 *10*	6505	4^-	D+Q[@]	−0.10[@] *5*	A_2=−0.53 *6*; A_4=+0.03 *6* (1980Bi14)
10205	(1^-)	6434	60 *14*	3769.9	1^+			
		7969	40 *10*	2235.3	2^+			
		10203	100 *20*	0	0^+			
10218	$(0^+$ to $4^+)$	5386	100	4831.0	3^+			
10275	$(0^+$ to $4^+)$	5465	20 *4*	4809.5	2^+			
		6776	13 *4*	3498.3	2^+			
		8039	100 *5*	2235.3	2^+			
10288	$(4^+,5^+)$	3287	100 *8*	7001	5^+			A_2=−0.18 *5*; A_4=−0.08 *5* (1980Bi14) δ: −1.1 *2* for a 5^+ to 5^+ transition OR +0.15 *5* for a 4^+ to 5^+ transition (1980Bi14).
		4337	30 *4*	5951	4^+			
		5007	70 *8*	5280.1	4^+			A_2=−0.22 *6*; A_4=+0.03 *6* (1980Bi14) δ: −0.00 *7* for a 5^+ to 4^+ transition OR >−1.1 for a 4^+ to 4^+ transition (1980Bi14).
10305	3^-	2692	100 *18*	7613	4^-			
		3800	83 *14*	6505	4^-			A_2=−0.43 *6*; A_4=−0.05 *7* (1980Bi14) δ: +0.25 *18* or <+0.65 (1980Bi14).
		4691	52 *11*	5614	2^+			
		5024	59 *11*	5280.1	4^+			
		6806	52 *11*	3498.3	2^+			
10349	$(3^+,4)$	3348	100 *14*	7001	5^+			
		4862	30 *6*	5487	3^-			
		5068	40 *10*	5280.1	4^+			
		5517	30 *6*	4831.0	3^+			
10355	$(0^+$ to $4^+)$	5545	100 *20*	4809.5	2^+			
		6856	75 *15*	3498.3	2^+			
		8119	75 *15*	2235.3	2^+			
10397	$3,5^{(+)}$	5116	100 *8*	5280.1	4^+			
		5166	25 *8*	5231.0	3^+			
10420	$(2^+$ to $6^+)$	4469	100	5951	4^+			
10450	$(0$ to $3^+)$	6679	67 *17*	3769.9	1^+			
		8213	100 *17*	2235.3	2^+			
10465	$(4,3^+)$	3464	29 *15*	7001	5^+			
		4514	100 *15*	5951	4^+			
		5234	71 *15*	5231.0	3^+			
		5633	86 *18*	4831.0	3^+			
10470	$1,2^{(+)}$	6971	100 *30*	3498.3	2^+			
		10468	100 *30*	0	0^+			
10508	$(0^+$ to $3^+)$	5698	36 *9*	4809.5	2^+			
		6737	45 *11*	3769.9	1^+			
		8271	100 *15*	2235.3	2^+			
10561	6^-	1054	30.2 *24*	9507	5^-			
		1450	44 *5*	9111	6^-	D+Q[@]	−0.10[@] *5*	A_2=+0.38 *3*; A_4=−0.07 *4* (1980Bi14)
		1598	7.0 *24*	8963	5^-			
		3516	100 *10*	7045	5^-	D+Q[@]	+0.27[@] *2*	A_2=+0.30 *4*; A_4=−0.08 *6* (1980Bi14)
		3560	42 *5*	7001	5^+	D+Q[@]	−0.04[@] *8*	A_2=−0.32 *4*; A_4=+0.01 *6* (1980Bi14)
		4056	9.3 *24*	6505	4^-			
10582	$(0$ to $3^+)$	6811	100	3769.9	1^+			
10621	$(0$ to $4^+)$	7122	100	3498.3	2^+			
10669	$(5,4^-,3^-)$	2859	7 *3*	7810	4			
		3624	14 *5*	7045	5^-			
		4164	100 *8*	6505	4^-			

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^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05 (continued)

$\gamma(^{30}Si)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
10669	(5,4$^-$,3$^-$)	5388	21 *5*	5280.1	4$^+$			
10679	6$^+$,4	3634	100 *4*	7045	5$^-$			
		4174	12.5 *25*	6505	4$^-$			
		5398	12.5 *25*	5280.1	4$^+$			
10725	7$^-$	1614	100 *6*	9111	6$^-$	M1+E2[@]	+0.27[@] *3*	A$_2$=+0.22 *1*; A$_4$=+0.04 *2* (1980Bi14) Pol=−0.53 *+6−5* (1980Bi14).
		3680	92 *6*	7045	5$^-$	E2		A$_2$=+0.39 *1*; A$_4$=−0.15 *2* (1980Bi14) Pol=+0.37 *25* (1980Bi14). Mult.: from $\gamma(\theta)$ and polarization measurements.
10732	(3$^-$,4$^-$,5$^-$)	2536	20 *10*	8196	5$^-$			
		2629	20 *6*	8103	2$^+$,3$^-$			
		4227	100 *10*	6505	4$^-$			
		4781	30 *6*	5951	4$^+$			
		5451	30 *6*	5280.1	4$^+$			
10795	(2 to 4)	3930	100 *25*	6865	3$^+$			
		5308	50 *13*	5487	3$^-$			
		5563	100 *25*	5231.0	3$^+$			
10805	(0$^+$ to 4$^+$)	8568	100	2235.3	2$^+$			
10823	(4,5$^+$,6$^+$)	2627	22 *7*	8196	5$^-$			
		3598	11 *5*	7225	4$^+$			
		3822	11 *5*	7001	5$^+$			
		4872	78 *18*	5951	4$^+$			A$_2$=+0.46 *5*; A$_4$=−0.22 *9* (1980Bi14) δ: ∞ for 6$^+$ to 4$^+$ transition OR +2.2 *+13−10* for a 5$^+$ to 4$^+$ transition OR +0.8 *+2−4* for a 4$^+$ to 4$^+$ transition (1980Bi14).
		5542	100 *20*	5280.1	4$^+$			
10835	(1$^+$ to 5$^+$)	5603	100	5231.0	3$^+$			
10866	5,4$^+$,3$^-$	2670	18 *6*	8196	5$^-$			
		3821	18 *4*	7045	5$^-$			
		4361	27 *6*	6505	4$^-$			
		4915	18 *4*	5951	4$^+$			
		5585	100 *9*	5280.1	4$^+$			
10975	(0$^+$ to 4$^+$)	8738	100	2235.3	2$^+$			
10991	(5,4,3)	2454	100 *25*	8537	3$^+$,4$^+$			
		3990	100 *50*	7001	5$^+$			
		4486	75 *15*	6505	4$^-$			
		5040	100 *25*	5951	4$^+$			
		5710	75 *15*	5280.1	4$^+$			
		6159	50 *10*	4831.0	3$^+$			
11015	(2$^+$ to 4$^+$)	5064	100 *34*	5951	4$^+$			
		5400	67 *34*	5614	2$^+$			
11038	(3$^-$ to 6$^+$)	3993	100 *35*	7045	5$^-$			
		5087	75 *25*	5951	4$^+$			
		5757	75 *25*	5280.1	4$^+$			
11073	(3 to 5)	5122	100	5951	4$^+$			
11084	(6$^-$,5$^-$,4$^-$)	1973	17 *5*	9111	6$^-$			
		2488	25 *5*	8596	4$^-$			
		3471	17 *9*	7613	4$^-$			
		4039	100 *10*	7045	5$^-$			
		4579	8 *4*	6505	4$^-$			
11091	(3,4,5)	5810	100	5280.1	4$^+$			
11205	(0$^+$ to 4$^+$)	7706	54 *16*	3498.3	2$^+$			
		8968	100 *16*	2235.3	2$^+$			

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^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05 (continued)

$\gamma(^{30}Si)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
11210	(4,5$^+$)	1022	43 *15*	10188	5$^-$			
		3400	43 *15*	7810	4			
		5259	100 *29*	5951	4$^+$			
		5978	100 *29*	5231.0	3$^+$			
11250		1473	17 *7*	9777	6$^-$			
		2139	10 *7*	9111	6$^-$			
		2287	23 *7*	8963	5$^-$			
		2920	13 *7*	8330	2$^+$			
		3054	10 *7*	8196	5$^-$			
		3637	67 *7*	7613	4$^-$			
		4205	17 *7*	7045	5$^-$			
		4249	100 *17*	7001	5$^+$			
		4745	17 *7*	6505	4$^-$			
		5762	33 *10*	5487	3$^-$			
		5969	27 *7*	5280.1	4$^+$			
11268	(2$^+$ to 5$^+$)	5987	54 *12*	5280.1	4$^+$			
		6436	100 *12*	4831.0	3$^+$			
11322	(2$^+$ to 5$^+$)	3512	88 *15*	7810	4			
		4097	100 *20*	7225	4$^+$			
		6090	63 *10*	5231.0	3$^+$			
11348	(2$^+$ to 6$^+$)	6067	100	5280.1	4$^+$			
11380	(0$^+$ to 4$^+$)	9143	100	2235.3	2$^+$			
11417	(6$^+$,4$^+$)	4192	21 *4*	7225	4$^+$			
		4416	28 *4*	7001	5$^+$			
		5465	100 *9*	5951	4$^+$			A_2=+0.40 *4*; A_4=−0.33 *7* (1980Bi14) δ: ∞ for a 6$^+$ to 4$^+$ transition OR +1.2 *25* for a 4$^+$ to 4$^+$ transition (1980Bi14).
		6136	26 *4*	5280.1	4$^+$			
11477	(6$^-$,5$^-$)	916	36 *6*	10561	6$^-$			A_2=+0.33 *5*; A_4=+0.06 *8* (1980Bi14) δ: +0.7 *+2−10* for a 6$^-$ to 6$^-$ transition (1980Bi14).
		1700	39 *9*	9777	6$^-$			
		2366	67 *15*	9111	6$^-$			
		4432	100 *12*	7045	5$^-$			
		4476	61 *9*	7001	5$^+$			
11493	(3$^+$ to 6$^+$)	4268	78 *11*	7225	4$^+$			
		4492	100 *22*	7001	5$^+$			
		6212	44 *9*	5280.1	4$^+$			
11512	(4$^-$,5,6$^+$)	2401	100 *17*	9111	6$^-$			
		6231	67 *17*	5280.1	4$^+$			
11544	7$^-$	1767	42 *6*	9777	6$^-$	D+Q[@]	+0.25[@] *3*	A_2=+0.19 *3*; A_4=+0.04 *4* (1980Bi14)
		2173	42 *6*	9371	6$^+$	D+Q	−0.04 *+4−1*	A_2=−0.30 *4*; A_4=+0.04 *5* (1980Bi14)
		2433	86 *6*	9111	6$^-$	M1(+E2)	−0.03 *3*	A_2=−0.25 *2*; A_4=+0.00 *3* (1980Bi14) Pol=−0.41 *+18−23* (1980Bi14). Mult.: from $\gamma(\theta)$ and polarization measurements.
		3348	100 *8*	8196	5$^-$	E2		A_2=+0.36 *2*; A_4=−0.15 *3* (1980Bi14) Pol=+0.50 *+12−10* (1980Bi14). Mult.: from $\gamma(\theta)$ and polarization measurements.
		4499	8 *3*	7045	5$^-$			
11564	(5,3$^+$)	4339	100 *3*	7225	4$^+$	D+Q	0.0 *+1−10*	A_2=−0.38 *4*; A_4=+0.09 *6* (1980Bi14)
		6283	11 *3*	5280.1	4$^+$			
11661	(4 to 6)	3465	100 *6*	8196	5$^-$			
		4616	13 *4*	7045	5$^-$			

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^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05 (continued)

$\gamma(^{30}Si)$ (continued)

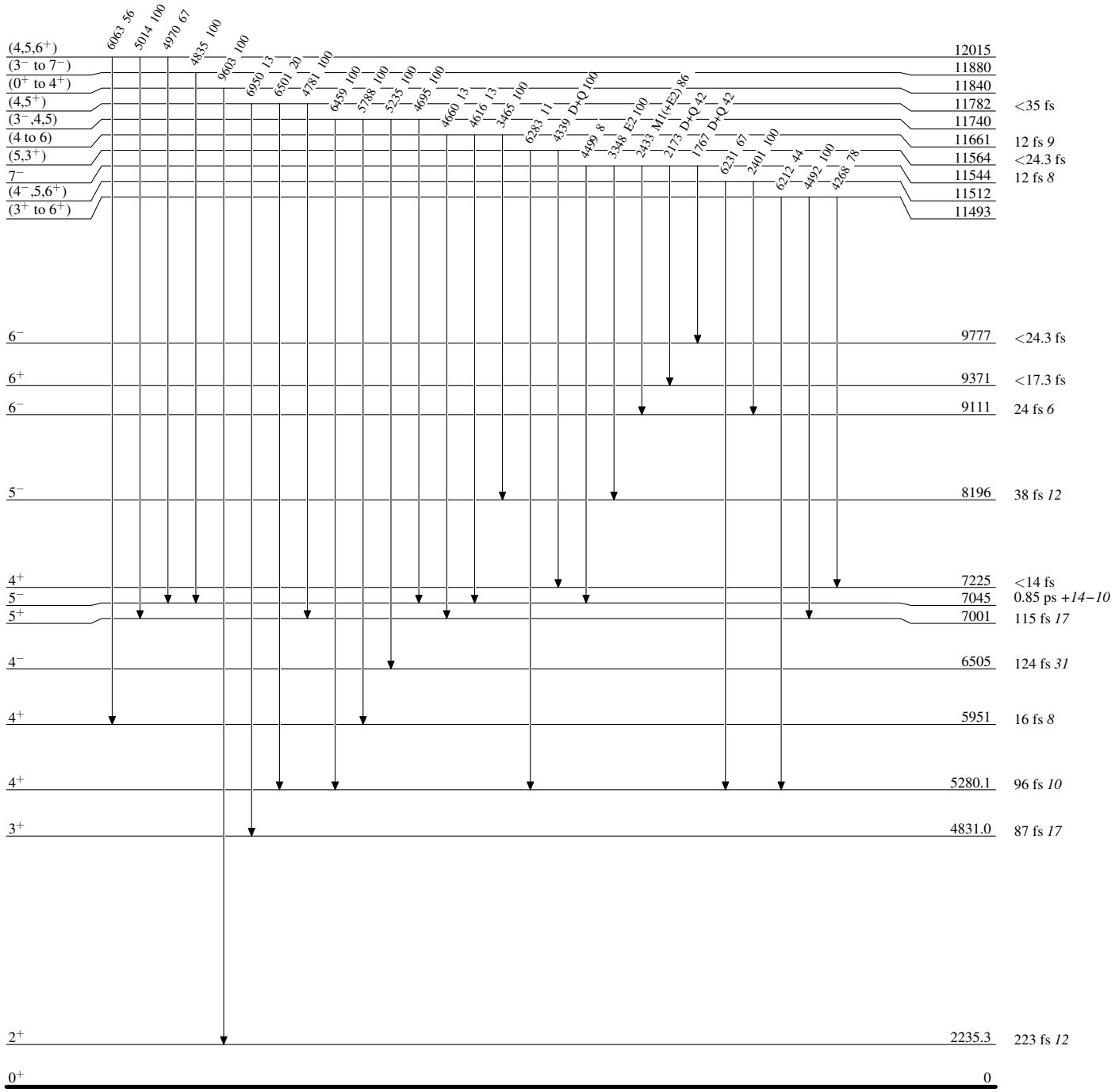
E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π
11661	(4 to 6)	4660	13 *4*	7001	5^+	11782	$(4,5^+)$	6950	13 *4*	4831.0	3^+
11740	$(3^-,4,5)$	4695	100 *20*	7045	5^-	11840	$(0^+$ to $4^+)$	9603	100	2235.3	2^+
		5235	100 *20*	6505	4^-	11880	$(3^-$ to $7^-)$	4835	100	7045	5^-
		5788	100 *20*	5951	4^+	12015	$(4,5,6^+)$	4970	67 *11*	7045	5^-
		6459	100 *20*	5280.1	4^+			5014	100 *18*	7001	5^+
11782	$(4,5^+)$	4781	100 *7*	7001	5^+			6063	56 *11*	5951	4^+
		6501	20 *4*	5280.1	4^+						

[†] From 1980Bi14, Eγ from the level energy difference and recoil energy subtracted and rounded to keV, except otherwise noted.
[‡] Weighted average of data from 1980Bi14 and 1971Sy01.
[#] From 1971Sy01, except otherwise noted. Multipolarities are based on particle-γ correlation measurements. Magnetic/electric characteristics are listed for those transitions whose strengths were calculated and presented in Table 1.
[@] From 1980Bi14, based on γ-ray correlation measurements, polarization data are available for a few transitions.

^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05

Level Scheme

Intensities: Relative photon branching from each level

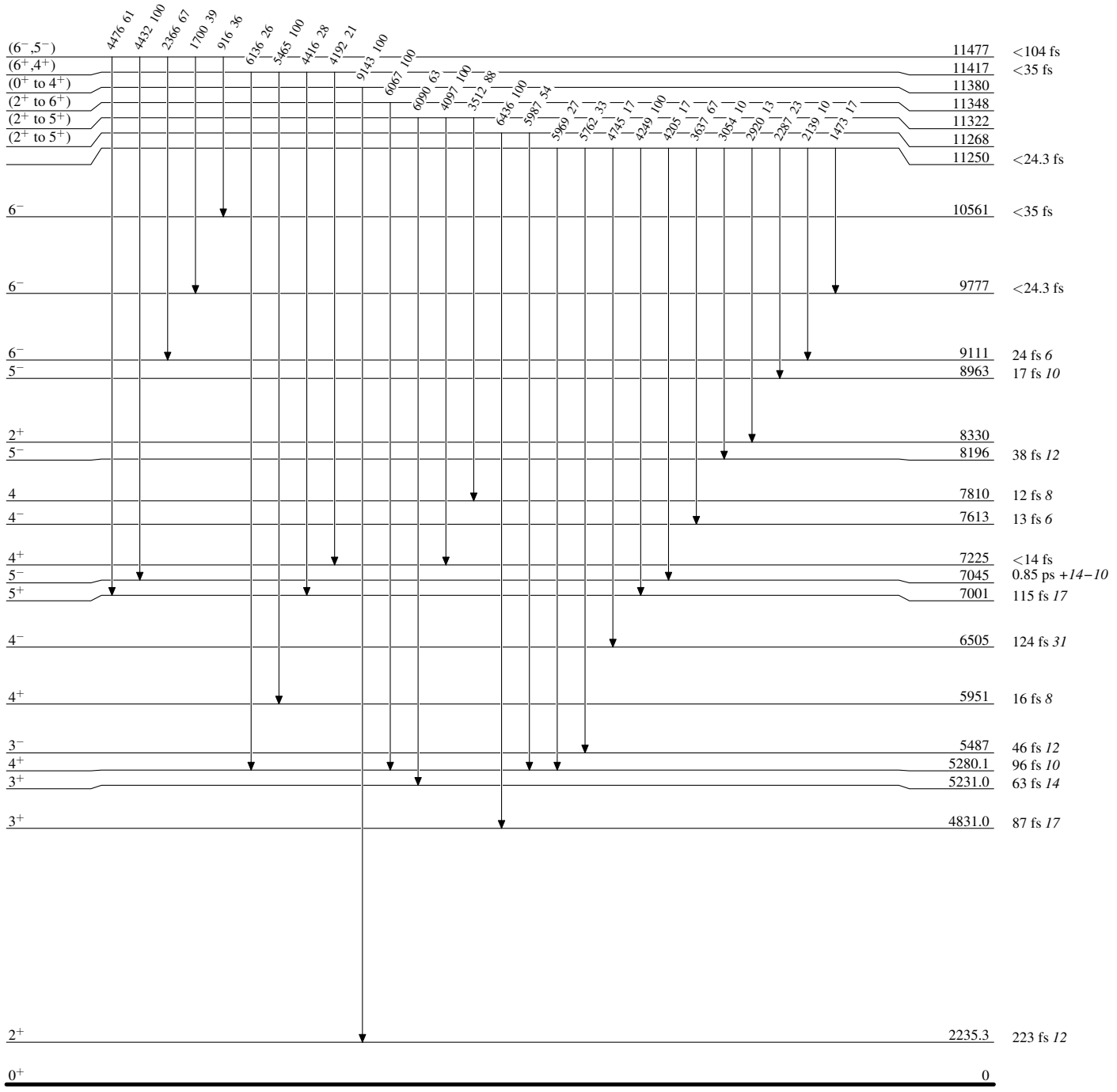


$^{30}_{14}Si_{16}$

^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05

Level Scheme (continued)

Intensities: Relative photon branching from each level

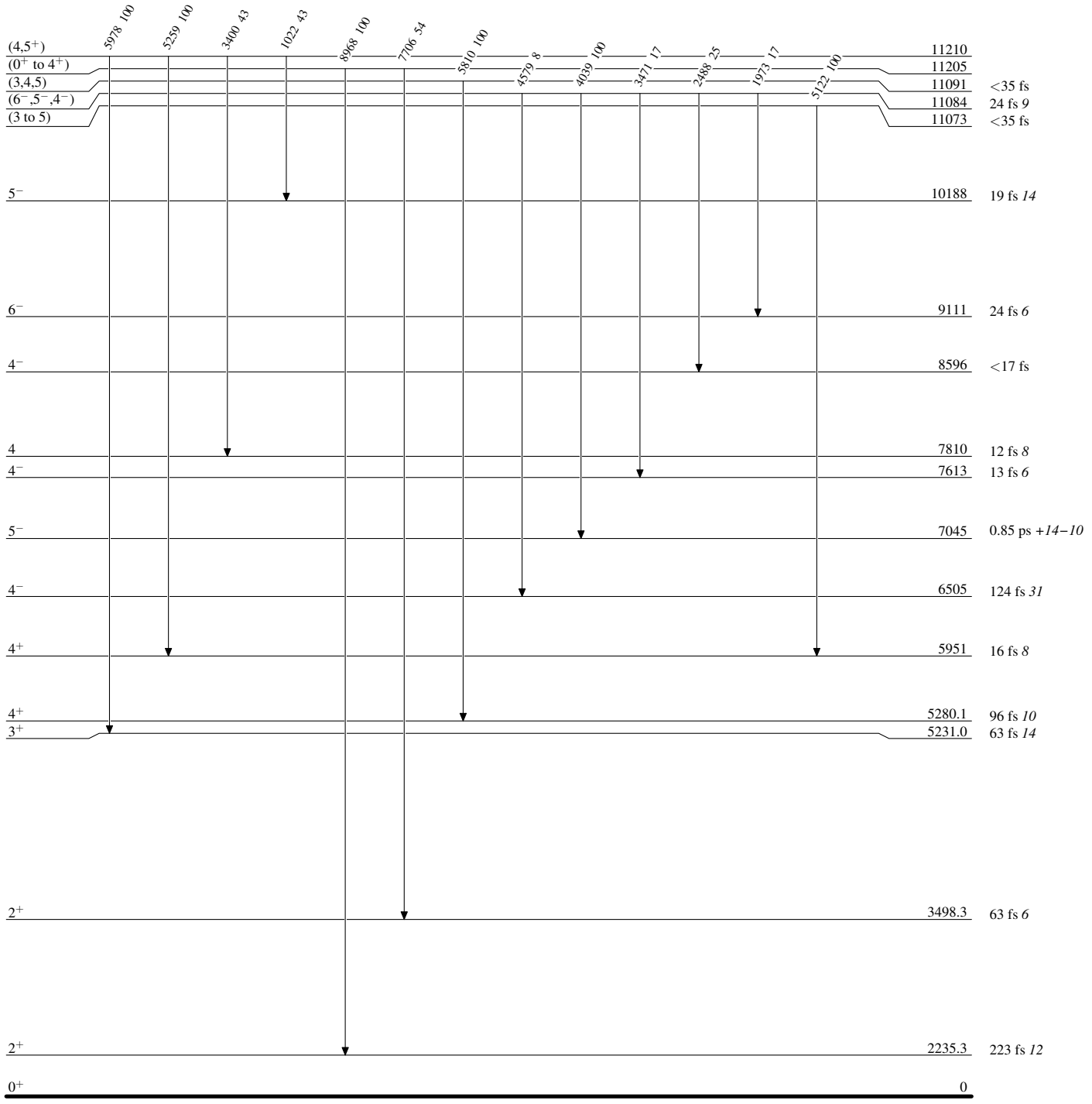


$^{30}_{14}Si_{16}$

^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05

Level Scheme (continued)

Intensities: Relative photon branching from each level

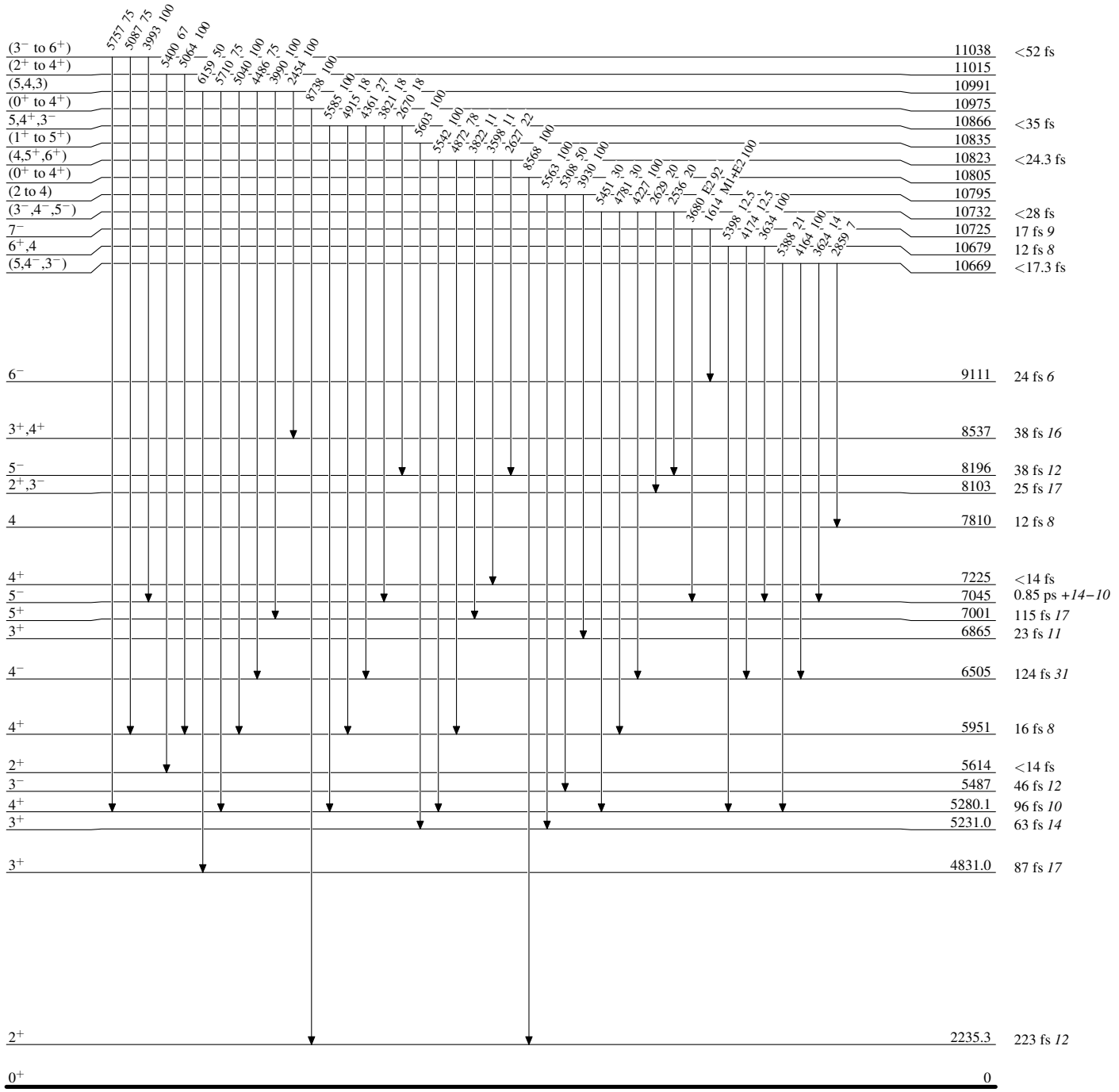


$^{30}_{14}Si_{16}$

^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05

Level Scheme (continued)

Intensities: Relative photon branching from each level

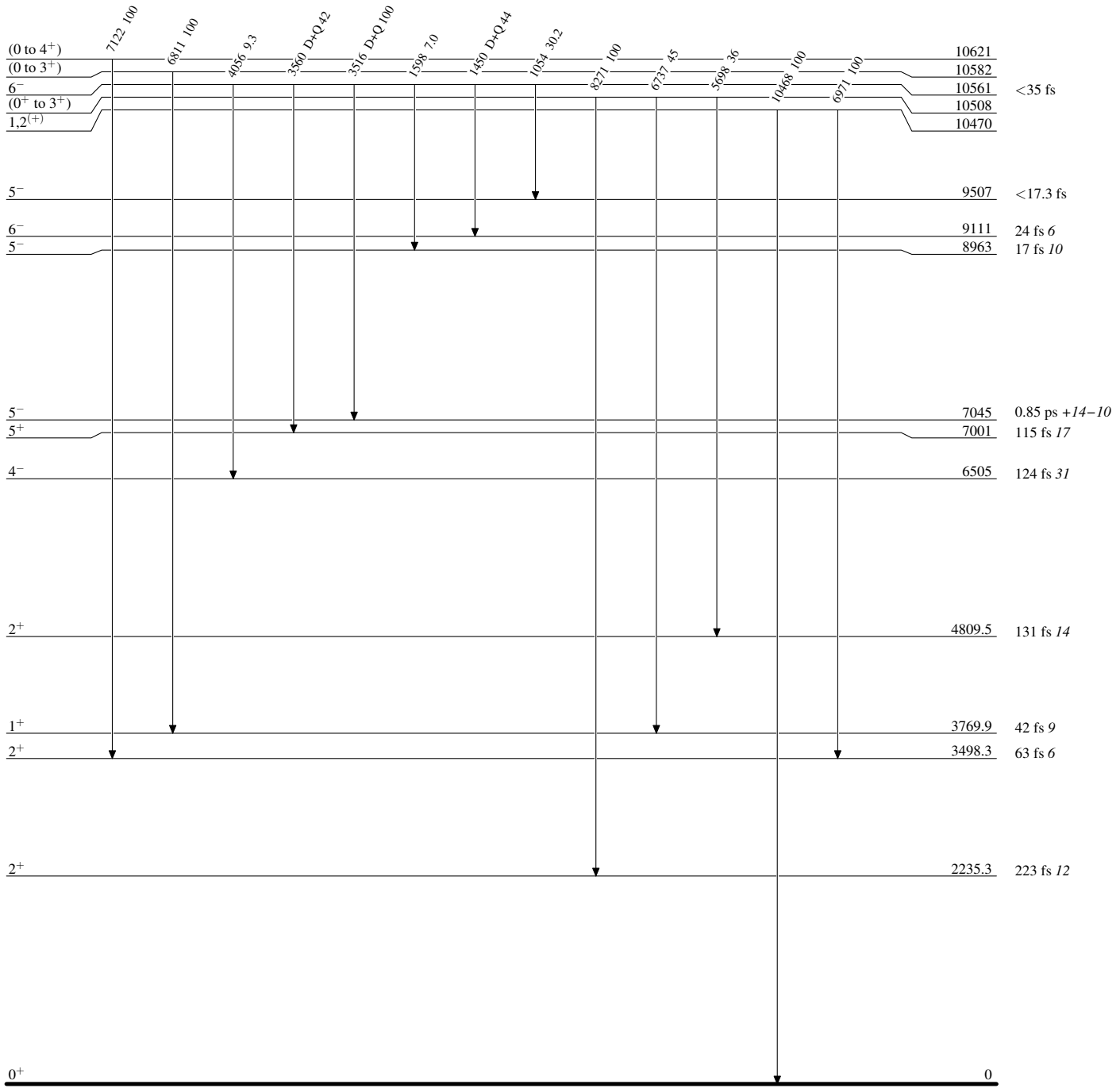


$^{30}_{14}Si_{16}$

^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05

Level Scheme (continued)

Intensities: Relative photon branching from each level

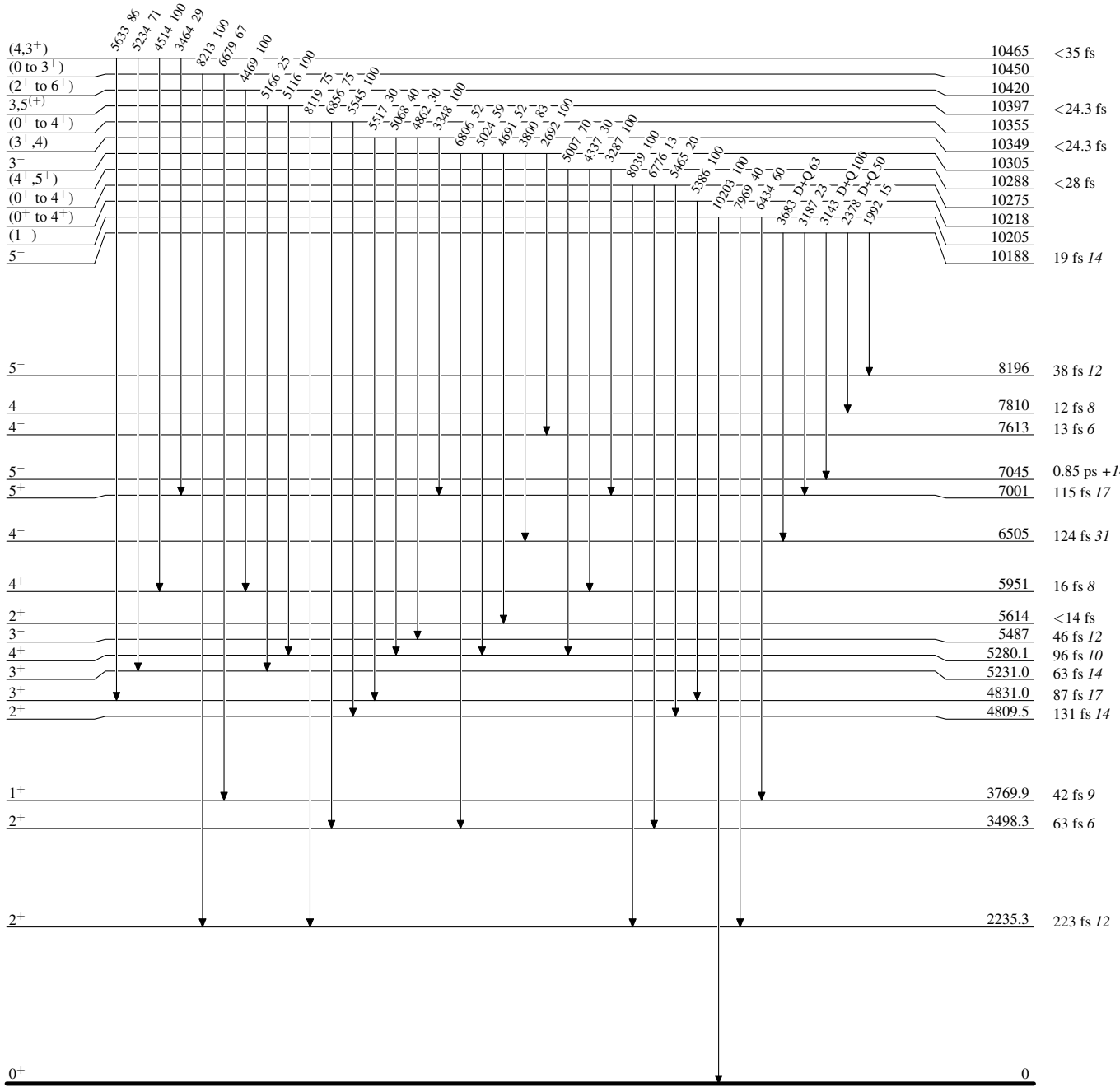


$^{30}_{14}Si_{16}$

^{27}Al(α,pγ) **1980Bi14,1971Sh11,1972Ga05**

Level Scheme (continued)

Intensities: Relative photon branching from each level

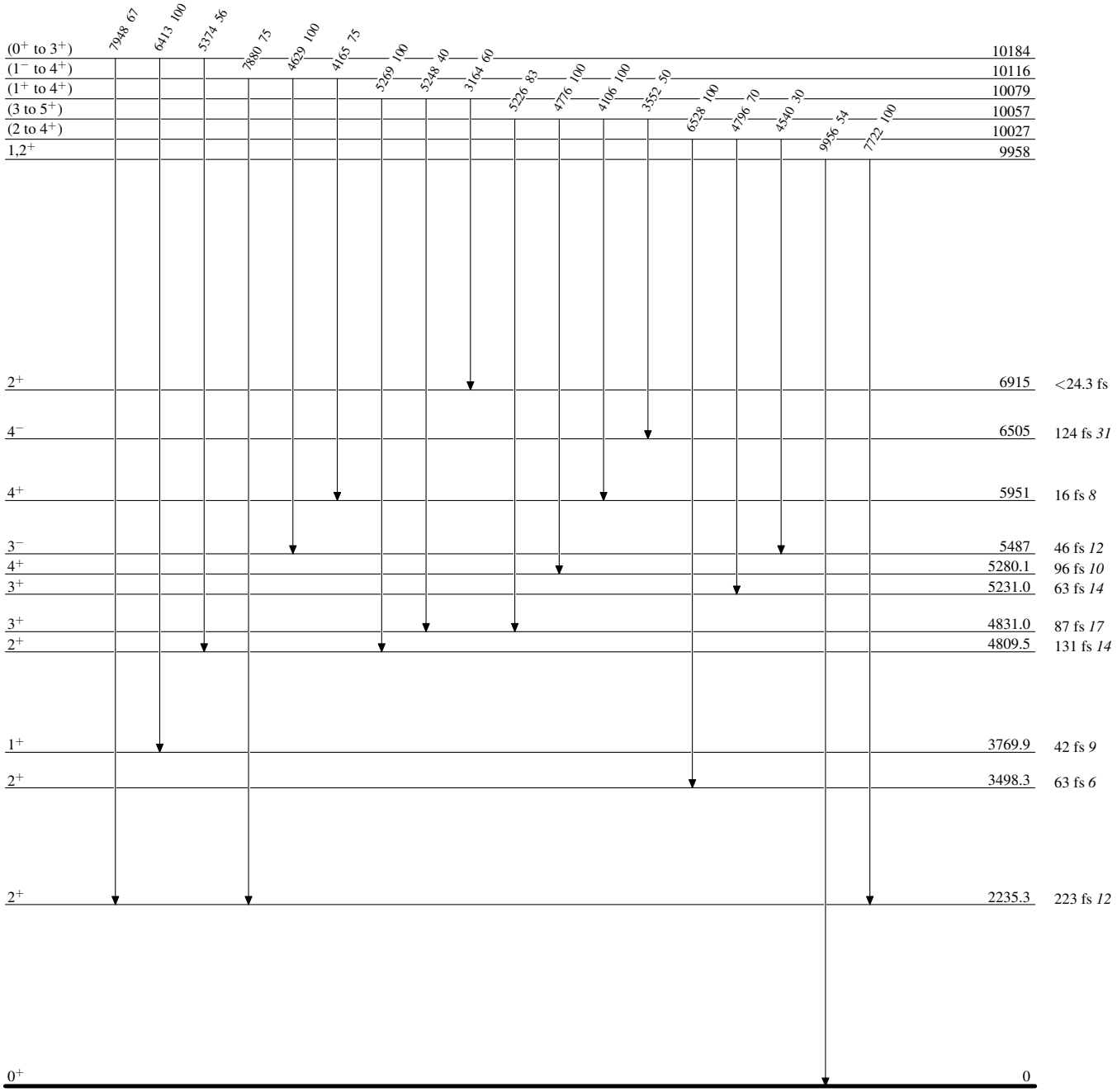


$^{30}_{14}Si_{16}$

^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05

Level Scheme (continued)

Intensities: Relative photon branching from each level

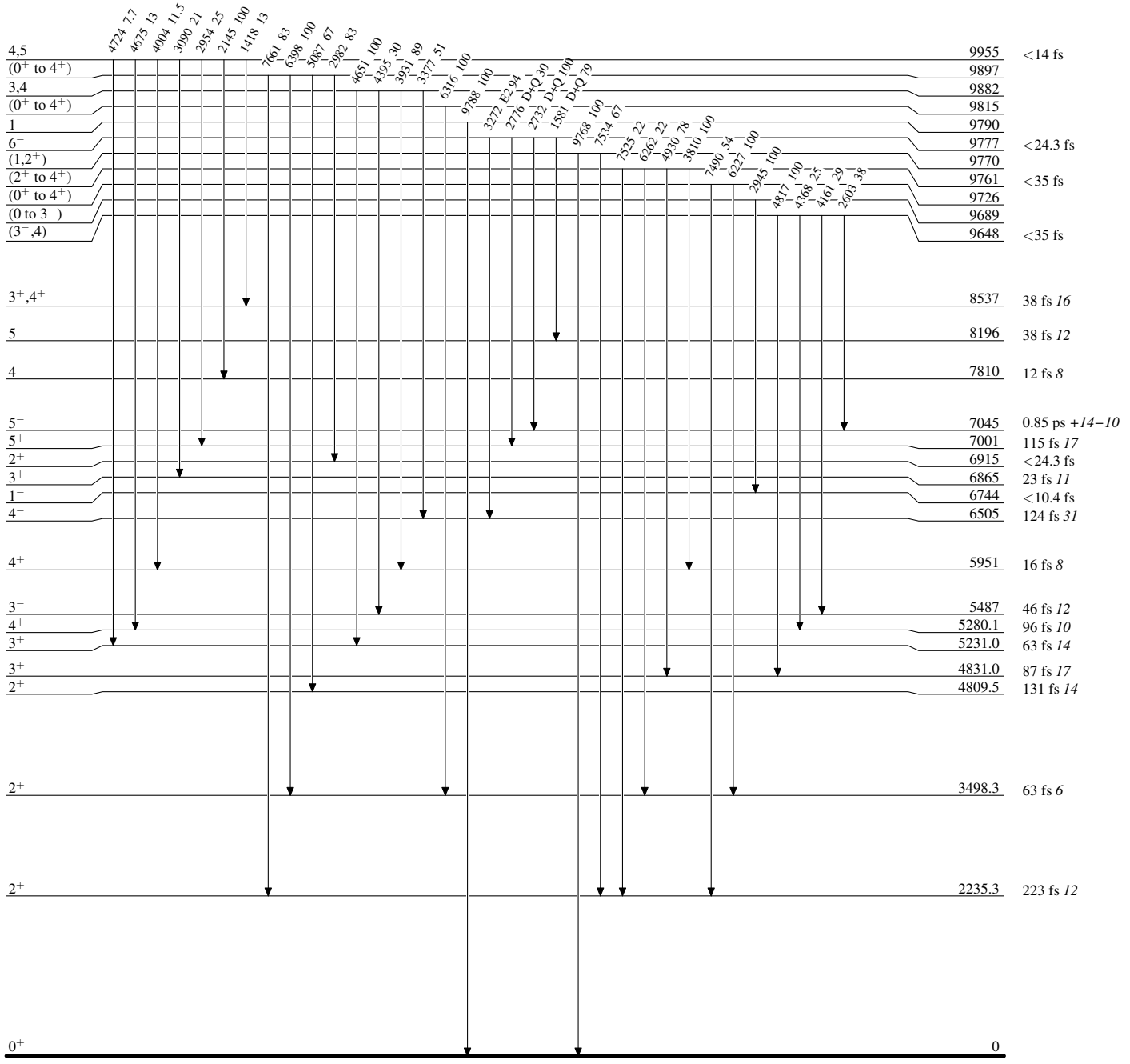


$^{30}_{14}Si_{16}$

^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05

Level Scheme (continued)

Intensities: Relative photon branching from each level

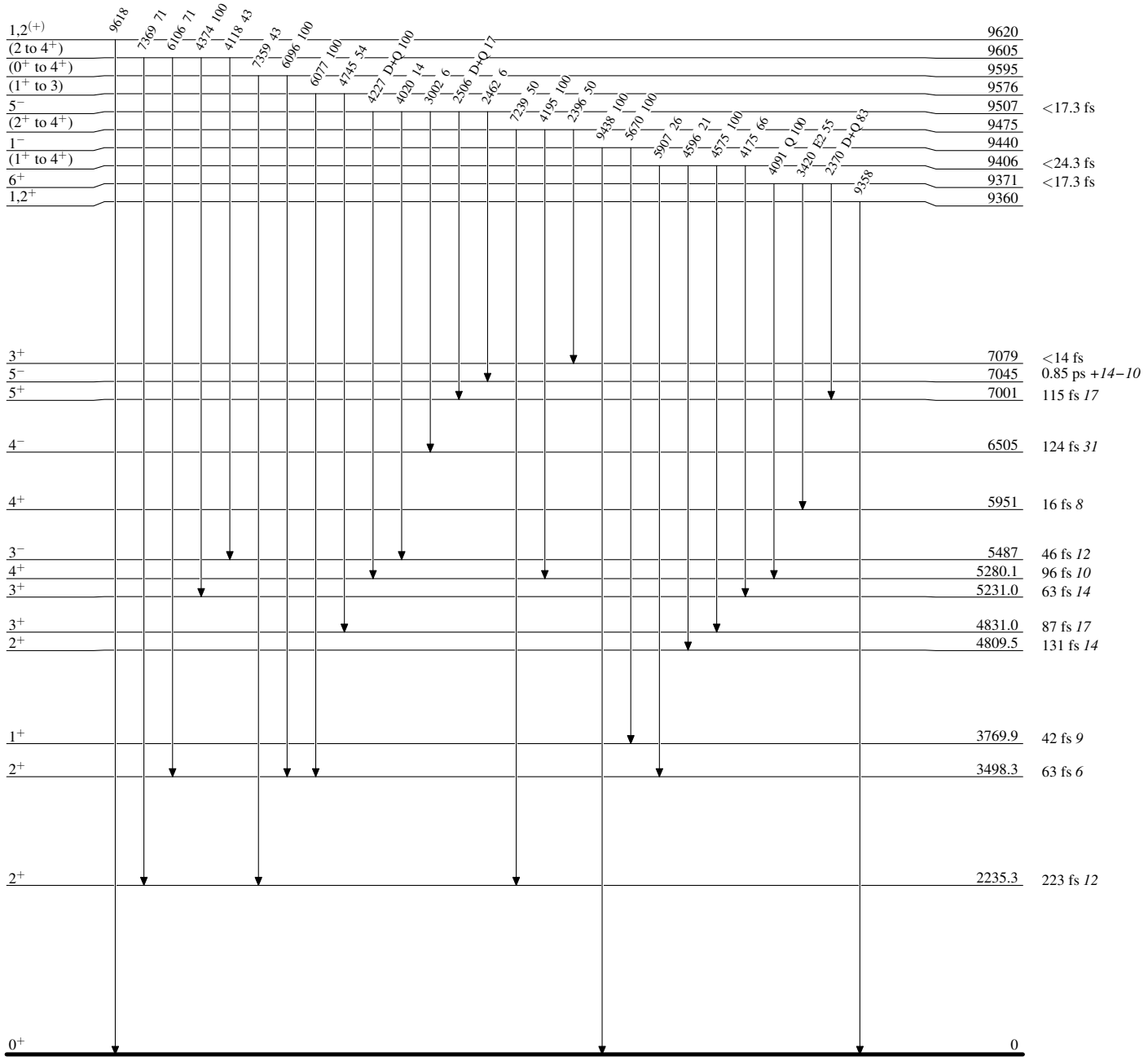


$^{30}_{14}Si_{16}$

^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05

Level Scheme (continued)

Intensities: Relative photon branching from each level

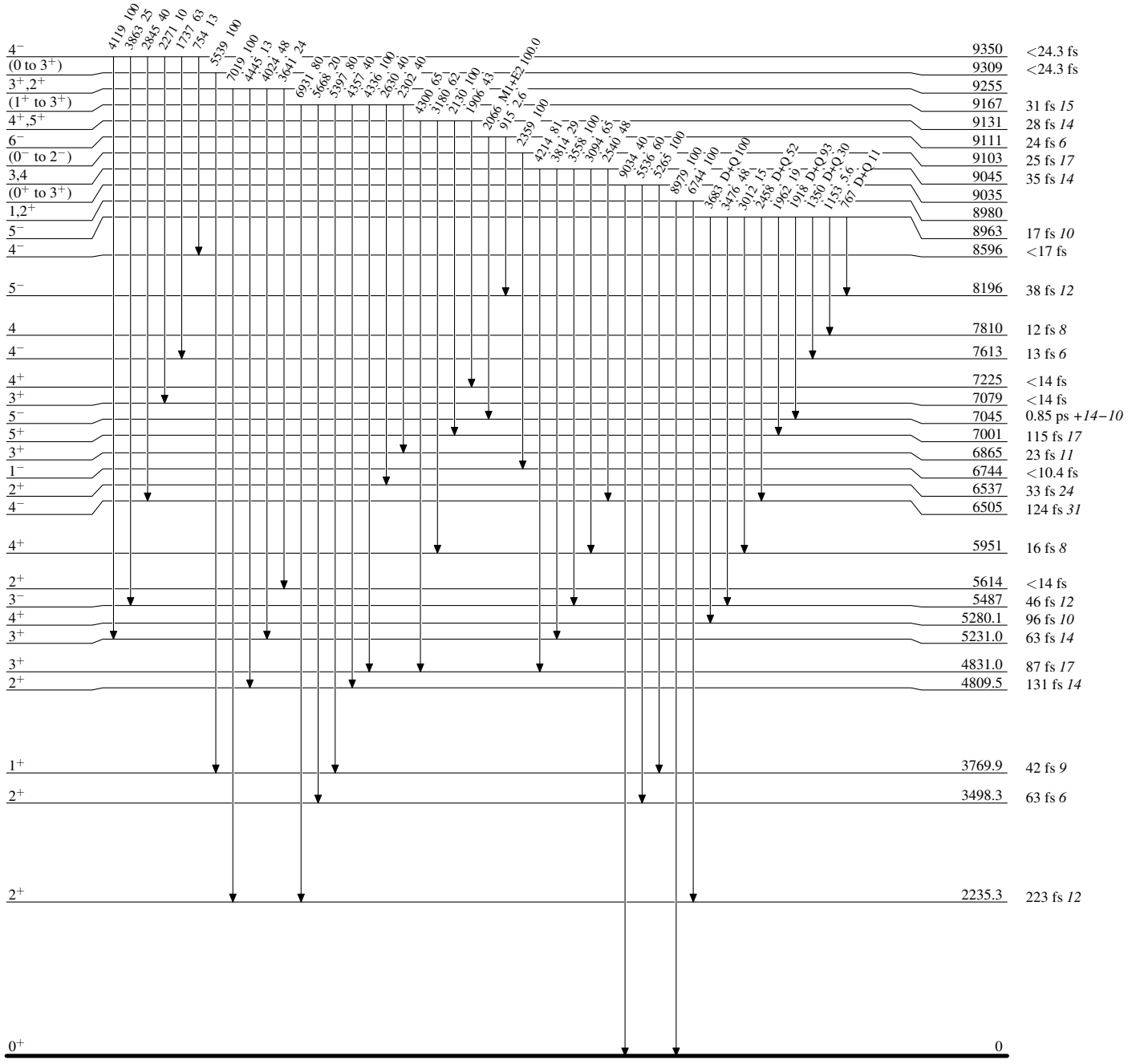


$^{30}_{14}Si_{16}$

^{27}Al(α,pγ) **1980Bi14,1971Sh11,1972Ga05**

Level Scheme (continued)

Intensities: Relative photon branching from each level

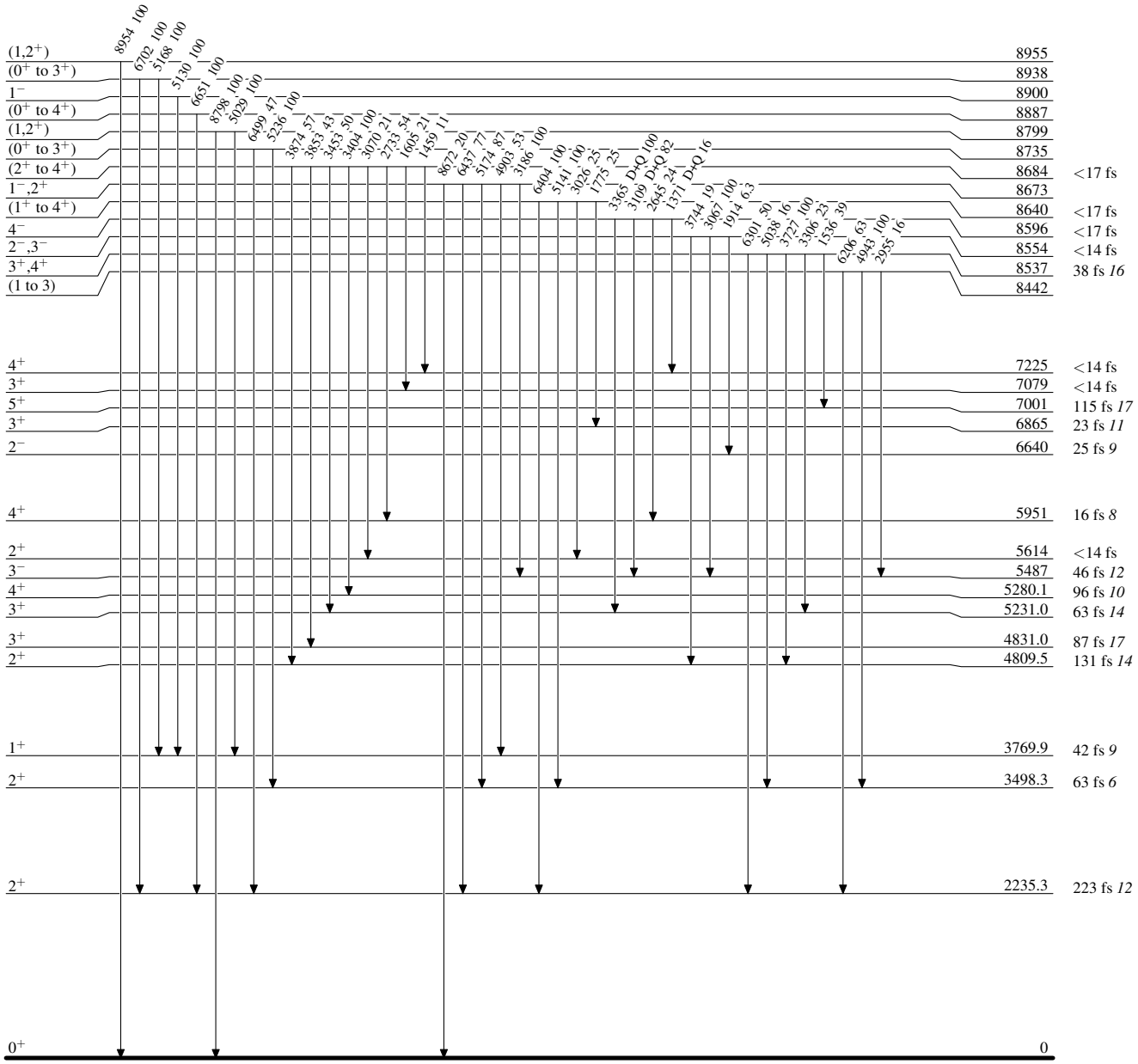


$^{30}_{14}Si_{16}$

^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05

Level Scheme (continued)

Intensities: Relative photon branching from each level

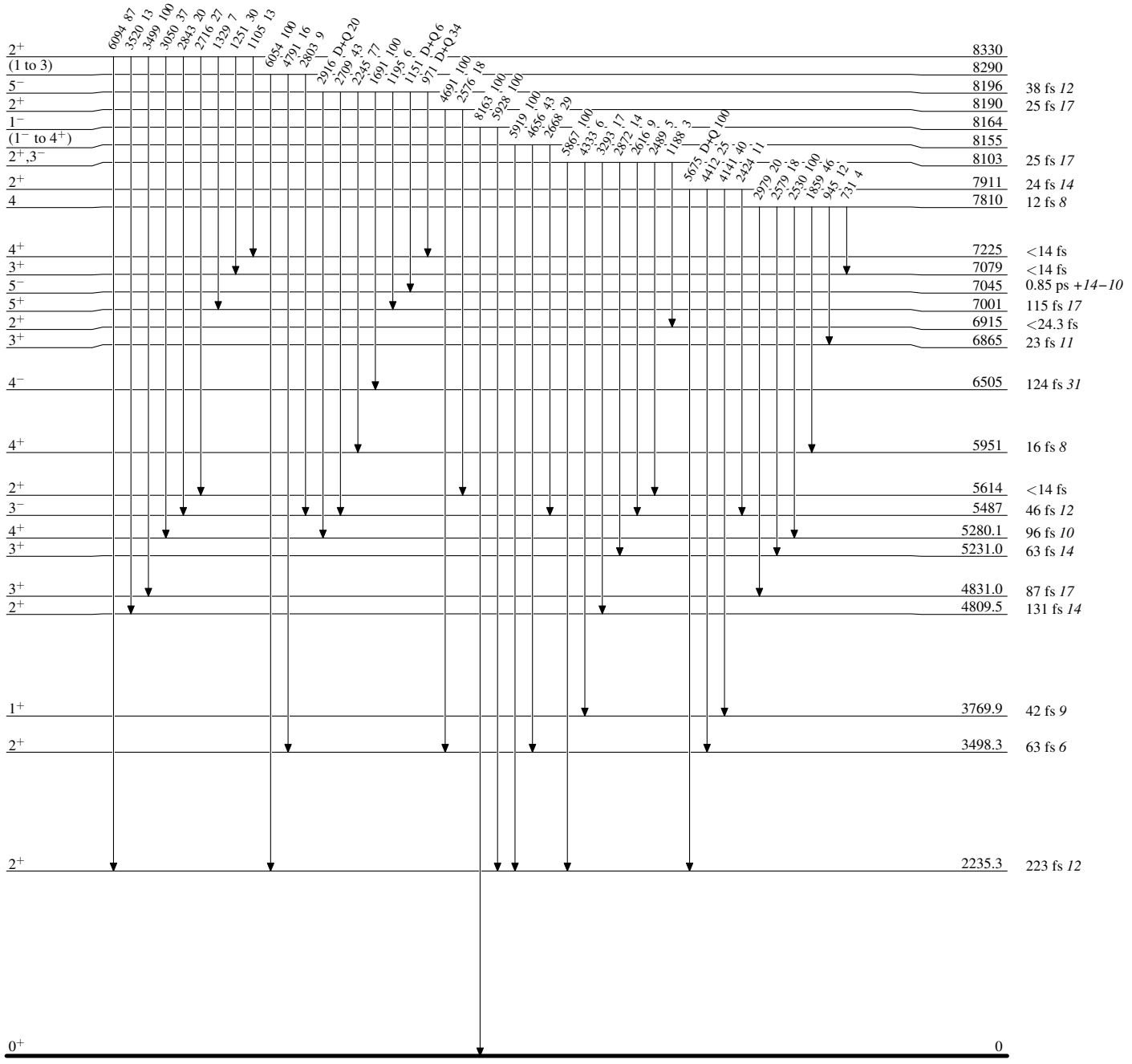


$^{30}_{14}Si_{16}$

^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05

Level Scheme (continued)

Intensities: Relative photon branching from each level

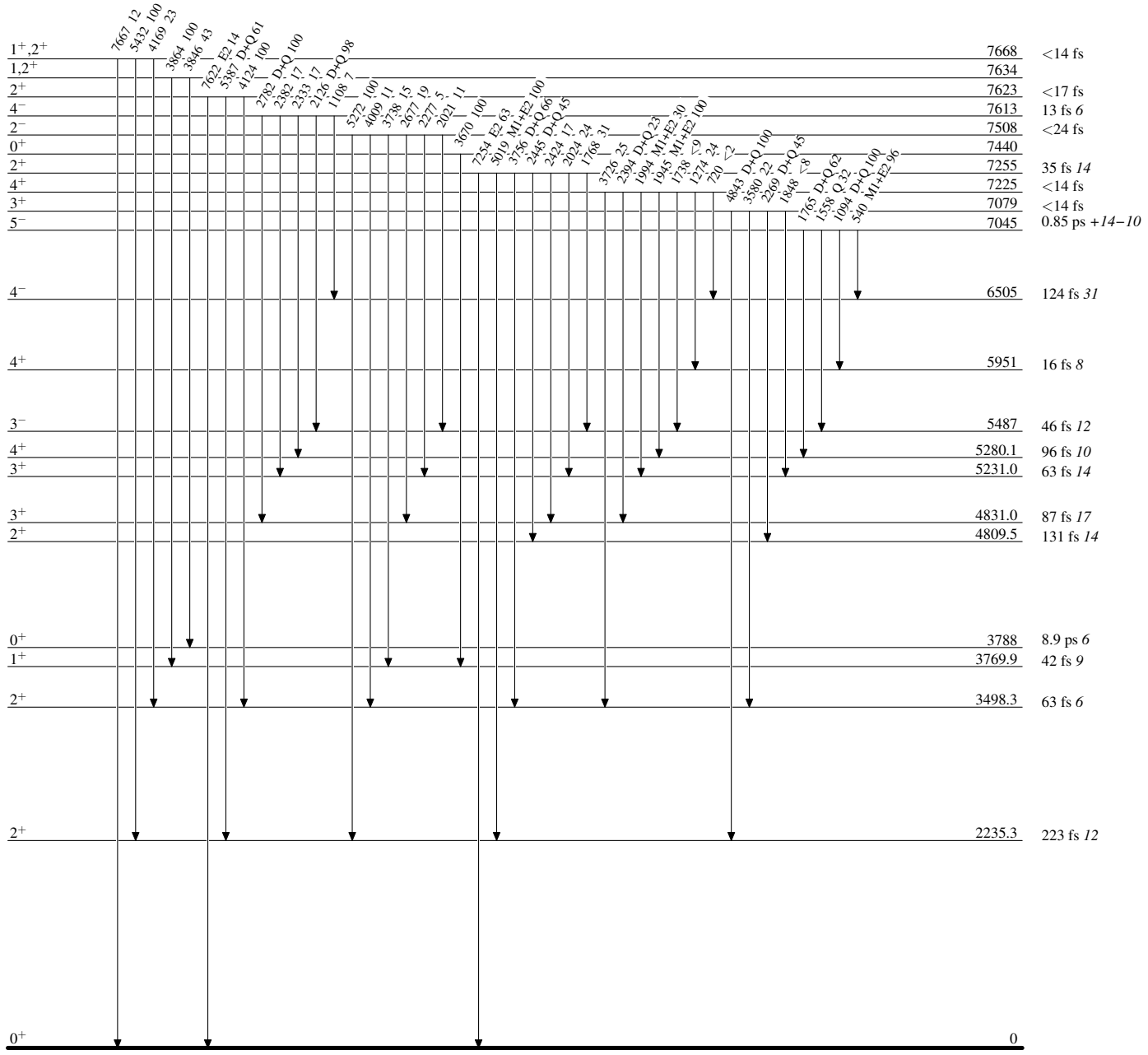


$^{30}_{14}Si_{16}$

^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05

Level Scheme (continued)

Intensities: Relative photon branching from each level

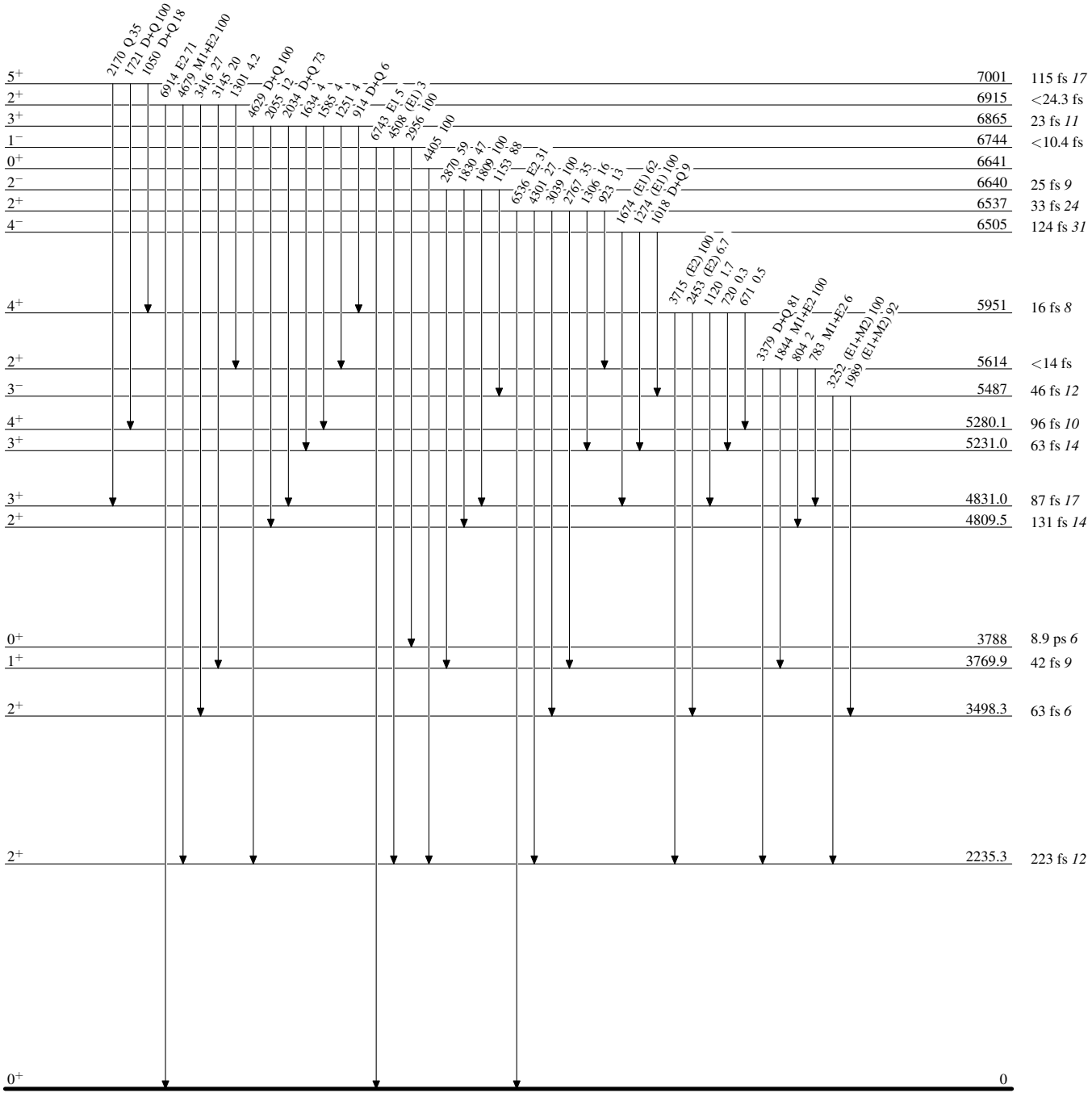


$^{30}_{14}Si_{16}$

^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05

Level Scheme (continued)

Intensities: Relative photon branching from each level

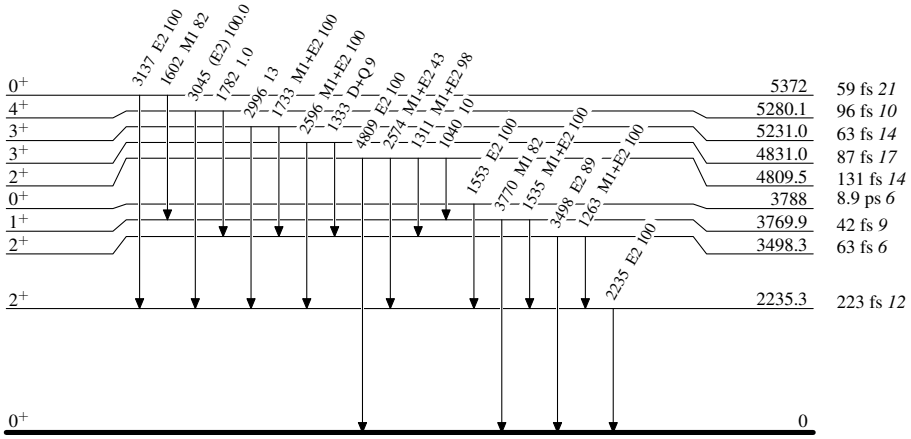


$^{30}_{14}Si_{16}$

^{27}Al(α,pγ) 1980Bi14,1971Sh11,1972Ga05

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{30}_{14}Si_{16}$