## $^{38}$Ar(p,$\gamma$):resonances 1984Ha27,1986Zi02,1970Ma31

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Also includes $^{38}$Ar(p,p) and $^{38}$Ar(p,p′$\gamma$).

1984Ha27: E=0.7-2.4 MeV proton beams were produced from the Helsinki University 2.5-MV Van de Graaff accelerator. Targets were prepared 2.4 and 17 $\mu$g/cm$^2$ dose of $^{38}$Ar ions at 20 and 60 keV, respectively, into 0.4 mm thick Ta sheets. $\gamma$ rays were detected with a Ge(Li) detector (FWHM=3 keV at 2.6 MeV) and a NaI(Tl) detector. Measured E$\gamma$, I$\gamma$, $\gamma$ yields. Deduced levels, J, $\pi$, resonance strengths, $\gamma$-ray branching ratios. Comparisons with available data. Implications of astrophysical nuclear reaction rates of $^{38}$Ar(p,$\gamma$).

1986Zi02: E=1.39-1.98 MeV protons were produced from the Utrecht 3-MV Van de Graaff accelerator. Targets were argon gas. $\gamma$ rays were detected with three Ge(Li) detectors and a large-angle Compton-suppression spectrometer (LACSS) consisting of a Ge detector placed in a NaI Compton suppression shield. Measured E$\gamma$, I$\gamma$, $\gamma(\theta)$, $\gamma$ yields, Doppler-shift attenuation. Deduced levels, J, $\pi$, lifetimes, $\gamma$-ray branching ratios, multipolarities and mixing ratios. Comparisons with available data and shell-model calculations. Decay schemes of 16 resonances.

1970Ma31: E=1.25-2.35 MeV proton beams were produced from the Utrecht 3-MV Van de Graaff accelerator. Target was argon gas (25% in $^{38}$Ar). $\gamma$ rays were detected with a NaI crystal and a Ge(Li) detector. Measured E$\gamma$, I$\gamma$, $\gamma$ yields, $\gamma(\theta)$, Doppler-shift attenuation (DSA). Deduced levels, J, $\pi$, lifetimes, resonance strengths, $\gamma$-ray branching ratios, multipolarities and mixing ratios. Comparisons with available data and shell-model calculations.

Others:

2008Ka10: E=0.8-2.8 MeV; measured E$\gamma$, I$\gamma$; deduced total MDR strength functions.

1974Ke10: (p,$\gamma$), (p,p) E=1390, 1398 keV; measured E$\gamma$, I$\gamma$, $\gamma(\theta)$. Deduced widths, J, $\pi$, $\gamma$ branchings for 7740 level.

1970An19: E=1.393 MeV; measured E$\gamma$, I$\gamma$, lifetimes by DSAM.

1966Sk02: (p,p′$\gamma$): resonances.

1964Ar12: E=0.900-1.400 MeV; measured E$\gamma$, I$\gamma$, $\gamma(\theta)$ for 8 resonances.

### $^{39}$K Levels

Values of E(p) given under comments are proton energies in lab frame from 1984Ha27, unless otherwise noted.

| E(level)[†] | J$^\pi$[#] | T$_{1/2}$[‡] | Comments |
|---|---|---|---|
| 0 | 3/2$^+$ | | |
| 2522.7[&] *3* | 1/2$^+$ | 59 fs *14* | E(level): other: 2522.6 *7* (1970An19).<br>T$_{1/2}$: others: 22 fs *8* (1970An19), >35 fs (1970Ma31). |
| 2813.6[&] *4* | 7/2$^-$ | | |
| 3019.3[&] *2* | 3/2$^-$ | 15.2 fs *35* | E(level): other: 3019.5 *5* (1970An19).<br>T$_{1/2}$: others: 15 fs *4* (1970An19), 10 fs *4* (1970Ma31, tentative). |
| 3598 | 9/2$^-$ | | |
| 3883[&] *2* | 5/2$^-$ | 6.2 fs *14* | J$^\pi$: 5/2 from $\gamma(\theta)$ in 1986Zi02. |
| 3938[&] *2* | 3/2$^+$ | | |
| 3944 | 11/2$^-$ | | |
| 4082.9 *4* | 3/2$^-$ | 13 fs *+26−9* | E(level): weighted average of 4083.0 *4* (1970Ma31) and 4082.1 *11* (1970An19).<br>J$^\pi$: 3/2 from 3655$\gamma(\theta)$ from the level at 7739, $J^\pi$=3/2$^-$ in 1970Ma31.<br>T$_{1/2}$: from 1970Ma31 (tentative result). |
| 4095 | 1/2$^+$ | | |
| 4126 | 7/2$^-$ | | J$^\pi$: 7/2 and 11/2 from $\gamma(\theta)$ of 3973$\gamma$ from the level at 8099, $J^\pi$=9/2$^{(+)}$ in 1986Zi02; 11/2 is excluded by the primary transition of 3976$\gamma$ from the level at 8093, $J^\pi$=3/2$^-$. |
| 4475 | 1/2$^-$,3/2$^-$ | | |
| 4514 | 5/2$^+$ | | E(level): 4516 *3* from 1970Ma31. |
| 4520 | 9/2$^-$ | | Reported together with 4514 only at resonance E(p)=1764 (1986Zi02). |
| 4678.6 | 7/2$^-$ | | |

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## $^{38}$Ar(p,$\gamma$):resonances 1984Ha27,1986Zi02,1970Ma31 (continued)

### $^{39}$K Levels (continued)

| E(level)[†] | J$^\pi$[#] | T$_{1/2}$[‡] | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV)[@] | Comments |
|---|---|---|---|---|
| 4737.5 | 5/2$^-$,7/2$^-$,9/2$^-$ | | | |
| 4737.9 | 5/2$^+$ | | | E(level): several resonances decay exclusively to one of the two levels known near this energy (1984Ha27). |
| 4930 | 3/2$^+$ | | | |
| 5009 | 7/2$^-$ | | | |
| 5011 | (3/2,5/2$^-$,7/2$^-$) | | | |
| 5164 | 9/2$^-$ | | | |
| 5173 | (1/2,3/2,5/2) | | | |
| 5263 | 5/2$^+$ | <3.5 fs | | E(level): 5266 *3* (1970Ma31). |
| 5318 | 3/2$^+$ | | | E(level): 5319 *3* (1970Ma31). |
| 5354 | 11/2$^-$ | | | |
| 5502 | 7/2$^-$ | | | |
| 5598 | 5/2$^+$ | | | |
| 5643 | 7/2$^-$ | | | |
| 5712 | 3/2$^+$ | | | |
| 5788 | (5/2,7/2)$^+$ | | | |
| 5802 | 7/2$^-$ | | | |
| 5827.0[&] *10* | 1/2$^-$,3/2$^-$ | | | |
| 5891 | (5/2,7/2)$^-$ | | | J$^\pi$: 7/2$^-$ from 1986Zi02. |
| 5938 | 5/2$^+$ | | | |
| 6042 | | | | |
| 6093 | 5/2$^-$,7/2$^-$ | | | |
| 6192 | (7/2$^-$) | | | |
| 6246 *2* | (1/2$^+$) | | | E(level): from 1984Ha27. |
| 6331 | 3/2$^+$ | | | |
| 6410 *2* | | | | E(level): from 1984Ha27. |
| 6528 | | | | |
| 6546 | 7/2$^-$ | | | |
| 7170 | | | | |
| 7254.7 *8* | | | 0.17 *5* | E(p)=896.5 *8*. |
| 7278.8 *6* | | | 0.33 *10* | E(p)=921.3 *6*. |
| 7286.7 *8* | | | 0.04 *2* | E(p)=929.4 *8*. |
| 7336.5 *8* | | | 0.06 *2* | E(p)=980.5 *8*. |
| 7381.5 *6* | | | 0.10 *4* | E(p)=1026.7 *6*. |
| 7439.1 *7* | | | 0.35 *10* | E(p)=1085.8 *7*. |
| 7448.5 *8* | | | 0.06 *2* | E(p)=1095.5 *8*. |
| 7461.5 *7* | (3/2$^-$,5/2,7/2$^+$) | | 0.74 *19* | E(p)=1108.8 *7*. |
| 7481.9 *7* | | | 0.23 *6* | E(p)=1129.8 *7*. |
| 7535.8 *8* | (1/2,3/2,5/2$^+$) | | 1.0 *4* | E(p)=1185.1 *8*. |
| 7540.6 *8* | | | 0.12 *4* | E(p)=1190.0 *8*. |
| 7551.9 *8* | | | 0.08 *4* | E(p)=1201.6 *8*. |
| 7560.4 *8* | | | 0.04 *2* | E(p)=1210.4 *8*. |
| 7602.4 *8* | (3/2$^-$,5/2,7/2$^+$) | | 0.12 *4* | E(p)=1253.5 *8*. |
| 7605.1 *8* | | | 0.14 *5* | E(p)=1256.2 *8*. |
| 7633.3 *6* | (3/2$^-$,5/2$^+$) | | 0.54 *17* | E(p)=1285.2 *6*; also 1284 *2* (1970Ma31).<br>(2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.6 eV *3* (1970Ma31). |
| 7699.7 *8* | (3/2$^-$,5/2,7/2$^-$) | | 0.12 *4* | E(p)=1353.4 *8*. |
| 7714.4 *8* | (5/2$^-$) | | 0.29 *10* | E(p)=1368.5 *8*, possible doublet; also 1368 *2* (1970Ma31).<br>(2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.6 eV *3* (1970Ma31). |
| 7738.8 *5* | 3/2$^-$ | 1.1 keV *2* | 2.6 *5* | E(level): weighted average of 7739.1 *5* from $\gamma$ cascade in 1970Ma31, and 7738.1 *7* from 1970An19.<br>E(p)=1393.4 *6*; also 1392.6 *7* (1970An19), 1394.3 *10* (1970Ma31), 1394 *2* (1974Ke10).<br>J$^\pi$: 3/2$^-$ from $\sigma(\theta)$ in (p,p) for 1394 proton resonance (1974Ke10); J=3/2 from $\gamma(\theta)$ in 1970Ma31. |

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## $^{38}$Ar(p,$\gamma$):resonances 1984Ha27,1986Zi02,1970Ma31 (continued)

### $^{39}$K Levels (continued)

| E(level)† | Jπ# | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV)@ | Comments |
|---|---|---|---|
| | | | $T_{1/2}$: $\Gamma=\Gamma_p$ from 1974Ke10. Other: $T_{1/2}$<2.8 fs (1970An19). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 2.7 eV *8* (1970Ma31). |
| 7755.8 *8* | (3/2$^-$,5/2$^+$) | 0.27 *6* | E(p)=1411.0 *8*; also 1411 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.6 eV *3* (1970Ma31). |
| 7766.2 *8* | | 0.10 *4* | E(p)=1421.6 *8*. |
| 7773.0 *8* | (3/2$^-$,5/2$^+$) | 0.29 *8* | E(p)=1428.6 *8*; also 1427 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.40 eV *20* (1970Ma31). |
| 7784.8 *8* | (1/2,3/2,5/2$^+$) | 0.16 *6* | E(p)=1440.7 *8*. |
| 7797.4 *8* | (3/2$^-$,5/2$^+$) | 0.87 *23* | E(p)=1453.7 *8*; also 1453 *2* (1970Ma31), who suggests a possible doublet. |
| | | | Jπ: 5/2$^-$ from 1984Ha27 is inconsistent. |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.8 eV *4* (1970Ma31). |
| 7802.0 *8* | (5/2$^-$) | 0.43 *10* | Jπ: (5/2$^-$,7/2$^+$) from 1984Ha27. |
| | | | E(p)=1458.4 *8*. |
| 7804.8 *8* | (5/2$^-$) | 0.20 *6* | Jπ: (5/2$^-$,7/2$^+$) from 1984Ha27. |
| | | | E(p)=1461.3 *8*. |
| 7820.7 *8* | (1/2$^-$,3/2,5/2$^+$) | 0.41 *10* | E(p)=1477.6 *8*; also 1477 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.40 eV *20* (1970Ma31). |
| 7846.8 *12* | (3/2,5/2$^+$) | 0.60 *19* | E(p)=1504.4 *12*, possible doublet; also 1504 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.6 eV *3* (1970Ma31). |
| 7868.2 *10* | 5/2$^+$ | 0.76 *20* | E(p)=1526.3 *10*; also 1527 *2* (1970Ma31). |
| | | | Jπ: from $\gamma(\theta)$ in 1986Zi02; 3/2$^-$,5/2,(7/2$^+$) in 1984Ha27; negative parity is ruled out by RUL. |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.80 eV *24* (1970Ma31). |
| 7957.9 *8* | (1/2,3/2,5/2$^+$) | 0.78 *20* | E(p)=1618.4 *8*; also 1620 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.11 eV *3* (1970Ma31). |
| 7978.6 *8* | (3/2$^-$,5/2) | 0.50 *12* | E(p)=1639.7 *8*; also 1640 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.6 eV *3* (1970Ma31). |
| 7981.7 *10* | | 0.14 *6* | E(p)=1642.8 *10*. |
| 7983.4 *8* | (5/2$^+$) | 1.0 *4* | Jπ: (3/2,5/2) from 1984Ha27. |
| | | | E(p)=1644.6 *8*; also 1644 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 1.0 eV *5* (1970Ma31). |
| 7986.3 *8* | | 0.12 *4* | E(p)=1647.6 *8*. |
| 7992.4 *8* | 3/2$^{(-)}$ | 0.93 *21* | E(p)=1653.8 *8*; also 1654 *2* (1970Ma31). |
| | | | Jπ: 3/2 from $\gamma(\theta)$ in 1986Zi02; 3/2$^-$,5/2$^+$ in 1984Ha27. |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.9 eV *3* (1970Ma31). |
| 7995.5 *8* | | 0.14 *4* | E(p)=1657.0 *8*. |
| 7998.5 *8* | | 0.12 *4* | E(p)=1660.1 *8*. |
| 8031.0 *8* | (1/2,3/2,5/2) | 0.50 *12* | E(p)=1693.5 *8*; 1695 *2* (1970Ma31), probably 1693.5+1696.5 (evaluator). |
| 8034.0 *10* | (1/2,3/2,5/2) | 0.21 *6* | E(p)=1696.5 *10*; also 1695 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.7 eV *2* (1970Ma31) probably 1693.5+1696.5 (evaluators). |
| 8038.5 *8* | (3/2$^-$,5/2) | 1.3 *4* | E(p)=1701.2 *8*; also 1701 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 1.9 eV *6* (1970Ma31). |
| 8079.6 *12* | (1/2$^-$,3/2,5/2$^+$) | 0.35 *14* | E(p)=1743.4 *12*. |
| 8081.5 *12* | (1/2$^-$,3/2,5/2$^+$) | 0.52 *25* | Jπ: (3/2$^-$,5/2) from 1984Ha27. |
| | | | E(p)=1745.3 *12*; also 1745 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 1.9 eV *6* (1970Ma31) probably 1743.4+1745.3 (evaluators). |
| 8087.1 *10* | | 0.06 *2* | E(p)=1751.0 *10*. |
| 8093.3 *10* | 3/2$^-$ | 0.54 *14* | E(p)=1757.4 *10*; also 1757 *2* (1970Ma31). |
| | | | Jπ: 3/2 from $\gamma(\theta)$ in 1986Zi02, positive parity would require an unreasonably large B(M2) for the 1547$\gamma$ to 7/2$^-$. Other: 3/2$^-$,5/2$^+$ in 1984Ha27. |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.6 eV *3* (1970Ma31). |
| 8099.2 *10* | 9/2$^+$ | 0.35 *12* | E(p)=1763.5 *10*; also 1763 *2* (1970Ma31). |
| | | | Jπ: 3/2 and 9/2 from $\gamma(\theta)$ in 1986Zi02; 4155$\gamma$ to 11/2$^-$ rules out 3/2; |

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## $^{38}$Ar(p,$\gamma$):resonances 1984Ha27,1986Zi02,1970Ma31 (continued)

### $^{39}$K Levels (continued)

| E(level)[†] | J$^{\pi}$[#] | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV)[@] | Comments |
|---|---|---|---|
| | | | J=9/2 implies $l_p$=4 or 5 proton capture with $l_p$=4 favored due to an improbably high value of reduced proton width for $l_p$=5 deduced using the resonance strength in 1970Ma31; negative parity would require an unreasonably large B(M2) for the 3355$\gamma$ to 5/2$^+$. Other: 7/2$^-$,(9/2$^+$) in 1984Ha27. |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.40 eV *20* (1970Ma31). |
| 8107.8 *10* | (3/2,5/2$^+$) | 0.27 *14* | E(p)=1772.3 *10*, possible doublet; also 1773 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.40 eV *20* (1970Ma31). |
| | | | J$^{\pi}$: (1/2$^-$,3/2,5/3$^+$) in 1984Ha27. |
| 8118.0 *8* | (3/2$^-$,5/2$^+$) | 0.87 *21* | E(p)=1782.8 *8*; also 1782 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 1.1 eV *3* (1970Ma31). |
| 8128.7 *10* | | 0.18 *6* | E(p)=1793.7 *10*. |
| 8138.4 *10* | (3/2$^-$,5/2) | 0.19 *6* | E(p)=1803.7 *10*; also 1802 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.40 eV *20* (1970Ma31). |
| 8170.2 *10* | | 0.31 *12* | E(p)=1836.4 *10*. |
| 8185.0 *10* | | 0.56 *19* | E(p)=1851.5 *10*. |
| 8189.2 *10* | | 0.52 *17* | E(p)=1855.9 *10*; also 1857 *2* (1970Ma31), a triplet of 1854.7 *3*, 1855.8 *3* and 1857.3 *3* is reported in 1986Zi02. |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 1.0 eV *3* (1970Ma31) probably 1855.9+1858.0 (evaluators). |
| 8191.3 *10* | | 0.56 *19* | E(p)=1858.0 *10*. |
| 8198.3 *10* | (3/2$^-$,5/2,7/2$^+$) | 1.2 *4* | E(p)=1865.2 *10*; also 1865 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 1.4 eV *5* (1970Ma31). |
| 8203.1 *12* | | 0.20 *6* | E(p)=1870.2 *12*. |
| 8252.9 *8* | | 2.7 *9* | E(p)=1921.2 *8*; also 1921 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 3.0 eV *10* (1970Ma31). |
| 8262.4 *10* | | 1.4 *5* | E(p)=1931.0 *10*; also 1930 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 1.2 eV *6* (1970Ma31). |
| 8271.0 *10* | | 0.25 *8* | E(p)=1939.8 *10*. |
| 8279.7 *10* | | 0.37 *12* | E(p)=1948.8 *10*; also 1949 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.6 eV *3* (1970Ma31). |
| 8285.2 *10* | | 0.19 *8* | E(p)=1954.4 *10*. |
| 8294.3 *10* | | 0.47 *16* | E(p)=1963.7 *10*; also 1964 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.40 eV *20* (1970Ma31). |
| 8305.0 *10* | (3/2$^-$,5/2$^+$) | 0.9 *3* | E(p)=1974.7 *10*; also 1974 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 1.2 eV *6* (1970Ma31). |
| 8314.7 *10* | | 0.29 *10* | E(p)=1984.7 *10*. |
| 8326.0 *10* | | 0.14 *6* | E(p)=1996.3 *10*. |
| 8340.9 *10* | | 0.62 *21* | E(p)=2011.6 *10*; also 2011 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.6 eV *3* (1970Ma31). |
| 8347.1 *10* | | 0.37 *12* | E(p)=2017.9 *10*; also 2017 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.6 eV *3* (1970Ma31). |
| 8379.8 *10* | | 0.39 *12* | E(p)=2051.5 *10*; also 2051 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.40 eV *20* (1970Ma31). |
| 8386.4 *10* | | 1.1 *4* | E(p)=2058.3 *10*, also 2057 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 1.2 eV *6* (1970Ma31). |
| 8395.3 *15* | | 0.52 *17* | E(p)=2067.5 *15*, possible doublet; also 2064 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.8 eV *4* (1970Ma31). |
| 8414.0 *12* | | 1.2 *4* | E(p)=2086.7 *12*; also 2087 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 1.2 eV *6* (1970Ma31). |
| 8427.0 *12* | | 0.37 *12* | E(p)=2100.0 *12*; also 2100 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 1.0 eV *5* (1970Ma31) probably 2100.0+2102.8 (evaluators). |
| 8429.7 *12* | | 1.0 *3* | E(p)=2102.8 *12*. |
| 8465.6 *12* | | 0.47 *17* | E(p)=2139.6 *12*; also 2140 *2* (1970Ma31). |
| | | | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.40 eV *20* (1970Ma31). |
| 8476.2 *15* | | 0.54 *19* | E(p)=2150.5 *15*, possible doublet. |

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## $^{38}$Ar(p,$\gamma$):resonances 1984Ha27,1986Zi02,1970Ma31 (continued)

### $^{39}$K Levels (continued)

| E(level)[†] | J$^{\pi}$[#] | (2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV)[@] | Comments |
|---|---|---|---|
| 8484.3 *12* | | 1.0 *4* | E(p)=2158.8 *12*. |
| 8509.4 *12* | | 0.27 *8* | E(p)=2184.6 *12*. |
| 8513.8 *12* | | 0.37 *12* | E(p)=2189.1 *12*. |
| 8524.4 *12* | | 0.39 *12* | E(p)=2200.0 *12*. |
| 8530.6 *12* | (3/2$^-$,5/2) | 1.1 *4* | E(p)=2206.4 *12*; also 2205 *2* (1970Ma31).<br>(2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.8 eV *4* (1970Ma31). |
| 8547.7 *12* | | 0.66 *23* | E(p)=2223.9 *12*. |
| 8559.5 *15* | | 0.21 *6* | E(p)=2236.0 *15*. |
| 8567.3 *13* | | 0.27 *8* | E(p)=2244.0 *13*. |
| 8583.8 *13* | (3/2$^-$,5/2,7/2$^+$) | 1.6 *5* | E(p)=2261.0 *13*; also 2259 *2* (1970Ma31).<br>(2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 1.6 eV *8* (1970Ma31). |
| 8592.4 *15* | | 0.41 *14* | E(p)=2269.8 *15*, possible doublet. |
| 8598.2 *15* | | 0.21 *10* | E(p)=2275.8 *15*. |
| 8611 | | 0.40 *20* | E(p)=2289 (1970Ma31).<br>E(level),$T_{1/2}$,(2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): from 1970Ma31. |
| 8625.0 *15* | (3/2,5/2,7/2$^+$) | 0.62 *21* | E(p)=2303.3 *15*, possible doublet; also 2303 *2* (1970Ma31).<br>(2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 2.0 eV *10* (1970Ma31) probably 2303.3+2305.4 (evaluators). |
| 8627.1 *15* | (3/2$^-$,5/2) | 1.7 *6* | E(p)=2305.4 *15*. |
| 8638.5 *15* | | 0.58 *20* | E(p)=2317.1 *15*; also 2316 *2* (1970Ma31).<br>(2J+1)$\Gamma_p\Gamma_\gamma/\Gamma$ (eV): other: 0.8 eV *4* (1970Ma31). |
| 8655.1 *15* | | 0.41 *15* | E(p)=2334.2 *15*. |
| 8666.9 *15* | | 0.25 *8* | E(p)=2346.3 *15*. |
| 8672.4 *15* | | 0.37 *12* | E(p)=2351.9 *15*. |
| 8674.4 *15* | | 0.31 *10* | E(p)=2354.0 *15*. |
| 8683.5 *15* | | 0.8 *3* | E(p)=2363.3 *15*. |
| 8688.1 *15* | | 0.8 *3* | E(p)=2368.0 *15*. |
| 8693.3 *15* | | 0.52 *17* | E(p)=2373.4 *15*. |
| 8704.0 *15* | | 0.62 *21* | E(p)=2384.4 *15*. |
| 8709.2 *15* | | 1.2 *4* | E(p)=2389.7 *15*. |
| 8714.4 *15* | | 0.62 *21* | E(p)=2395.0 *15*. |
| 8719.8 *15* | | 0.58 *21* | E(p)=2400.6 *15*. |
| 9616[a] *20* | | | E(p)=3320 *20* (1966Sk02). |
| 9665[a] *20* | | | E(p)=3370 *20* (1966Sk02). |
| 9694[a] *20* | | | E(p)=3400 *20* (1966Sk02). |
| 9704[a] *20* | | | E(p)=3410 *20* (1966Sk02). |
| 9772[a] *20* | | | E(p)=3480 *20* (1966Sk02). |
| 9928[a] *20* | | | E(p)=3640 *20* (1966Sk02). |
| 9987[ab] *20* | | | E(p)=3700 *20* (1966Sk02). |
| 9996[ab] *20* | | | E(p)=3710 *20* (1966Sk02). |

[†] Deduced from E(p)(lab) of 1984Ha27 (and in some cases from 1970Ma31) and S(p)=6381.34 *19* (2017Wa10) for proton-unbound levels, using E(level)=E(p)(c.m.)+S(p), with E(p)(c.m.)=E(p)(lab)×M($^{38}$Ar)/[$m_p$+M($^{38}$Ar)]=E(p)(lab)×37.963/38.971. Note that 1984Ha27 have used S(p)=6381.0 *6*. For bound levels, values with uncertainties are from 1970Ma31 and those without uncertainties are rounded-off values from Adopted Levels, unless otherwise noted.

[‡] Values of half-lives are from DSAM in 1986Zi02, unless otherwise stated.

[#] From Adopted Levels. Assignments by 1984Ha27 for resonance states are based on transition strengths (deduced from measured resonance strengths) compared with RUL and $\gamma$ decay modes, and assignments by 1986Zi02 and 1970Ma31 are based on $\gamma(\theta)$; they are given under comments if different.

[@] Resonance strengths from 1984Ha27, unless otherwise noted.

[&] From 1970Ma31.

Continued on next page (footnotes at end of table)

## $^{38}$Ar(p,$\gamma$):resonances 1984Ha27,1986Zi02,1970Ma31 (continued)

### $^{39}$K Levels (continued)

[a] From 1966Sk02.
[b] Possible doublet (1966Sk02).

### $\gamma(^{39}K)$

| $E_i$(level) | $J_i^\pi$ | $E_\gamma$ [†] | $I_\gamma$ [‡] | $E_f$ | $J_f^\pi$ | Mult.[#] | $\delta$[#] | Comments |
|---|---|---|---|---|---|---|---|---|
| 2522.7 | $1/2^+$ | 2523 | | 0 | $3/2^+$ | | | |
| 2813.6 | $7/2^-$ | 2813 | | 0 | $3/2^+$ | | | |
| 3019.3 | $3/2^-$ | 3019 | | 0 | $3/2^+$ | D(+Q) | +0.02 *4* | Mult.,$\delta$: from 1970Ma31. |
| 3883 | $5/2^-$ | 3883 | | 0 | $3/2^+$ | D(+Q) | −0.02 *2* | $\delta$: from decay of resonance at E(p)=1654 (1986Zi02). |
| 3938 | $3/2^+$ | 3938 | | 0 | $3/2^+$ | | | |
| 4082.9 | $3/2^-$ | 1064 | 13 *3* | 3019.3 | $3/2^-$ | | | $I_\gamma$: other: 15 (1970Ma31). |
| | | 1560 | 16 *3* | 2522.7 | $1/2^+$ | | | $I_\gamma$: other: 20 (1970Ma31). |
| | | 4083 | 71 *4* | 0 | $3/2^+$ | D(+Q) | −0.01 *2* | $I_\gamma$: other: 65 (1970Ma31). Mult.,$\delta$: from 1970Ma31. |
| 4095 | $1/2^+$ | 1076 | 17 *4* | 3019.3 | $3/2^-$ | | | |
| | | 1572 | 83 *4* | 2522.7 | $1/2^+$ | | | |
| 5164 | $9/2^-$ | 644 | 27 *8* | 4520 | $9/2^-$ | | | |
| | | 1038 | 18 *8* | 4126 | $7/2^-$ | | | |
| | | 1220 | 55 *8* | 3944 | $11/2^-$ | | | |
| 5827.0 | $1/2^-,3/2^-$ | 5827 | | 0 | $3/2^+$ | | | |
| 6042 | | 1528 | 48 *10* | 4514 | $5/2^+$ | | | |
| | | 6041 | 52 *10* | 0 | $3/2^+$ | | | |
| 6246 | $(1/2^+)$ | 1567 | <7 | 4678.6 | $7/2^-$ | | | |
| | | 3432 | <14 | 2813.6 | $7/2^-$ | | | |
| | | 6245 | 100 | 0 | $3/2^+$ | | | |
| 6410 | | 1896 | 7 *4* | 4514 | $5/2^+$ | | | |
| | | 6409 | 93 *4* | 0 | $3/2^+$ | | | |
| 7461.5 | $(3/2^-,5/2,7/2^+)$ | 2198 | 2.9 | 5263 | $5/2^+$ | | | |
| | | 2783 | 1.1 | 4678.6 | $7/2^-$ | | | |
| | | 3523 | 1.7 | 3938 | $3/2^+$ | | | |
| | | 3578 | 1.5 | 3883 | $5/2^-$ | | | |
| | | 7461 | 93 | 0 | $3/2^+$ | | | |
| 7535.8 | $(1/2,3/2,5/2^+)$ | 1824 | 3.8 | 5712 | $3/2^+$ | | | |
| | | 2218 | 1.5 | 5318 | $3/2^+$ | | | |
| | | 2363 | 1.4 | 5173 | (1/2,3/2,5/2) | | | |
| | | 3441 | 4.0 | 4095 | $1/2^+$ | | | |
| | | 3453 | 4.8 | 4082.9 | $3/2^-$ | | | |
| | | 3598 | 2.8 | 3938 | $3/2^+$ | | | |
| | | 4516 | 2.4 | 3019.3 | $3/2^-$ | | | |
| | | 5013 | 4.1 | 2522.7 | $1/2^+$ | | | |
| | | 7535 | 75 | 0 | $3/2^+$ | | | |
| 7602.4 | $(3/2^-,5/2,7/2^+)$ | 2004 | 4 | 5598 | $5/2^+$ | | | |
| | | 2864 | 10 | 4737.9 | $5/2^+$ | | | |
| | | 2865 | 3 | 4737.5 | $5/2^-,7/2^-,9/2^-$ | | | |
| | | 3088 | 23 | 4514 | $5/2^+$ | | | |
| | | 3476 | 5 | 4126 | $7/2^-$ | | | |
| | | 3664 | 5 | 3938 | $3/2^+$ | | | |
| | | 4788 | 6 | 2813.6 | $7/2^-$ | | | |
| | | 7602 | 44 | 0 | $3/2^+$ | | | |
| 7633.3 | $(3/2^-,5/2^+)$ | 1806 | 2.6 | 5827.0 | $1/2^-,3/2^-$ | | | |
| | | 2035 | 2.1 | 5598 | $5/2^+$ | | | |
| | | 2315 | 6.0 | 5318 | $3/2^+$ | | | |
| | | 2370 | 2.8 | 5263 | $5/2^+$ | | | |
| | | 3158 | 3.1 | 4475 | $1/2^-,3/2^-$ | | | |

Continued on next page (footnotes at end of table)

## $^{38}$Ar(p,$\gamma$):resonances 1984Ha27,1986Zi02,1970Ma31 (continued)

### $\gamma(^{39}K)$ (continued)

| $E_i$(level) | $J_i^\pi$ | $E_\gamma$[†] | $I_\gamma$[‡] | $E_f$ | $J_f^\pi$ | Mult.[#] | $\delta$[#] | Comments |
|---|---|---|---|---|---|---|---|---|
| 7633.3 | $(3/2^-,5/2^+)$ | 3550 | 11 | 4082.9 | $3/2^-$ | | | |
| | | 3750 | 2.0 | 3883 | $5/2^-$ | | | |
| | | 4614 | 12 | 3019.3 | $3/2^-$ | | | |
| | | 4819 | 3.5 | 2813.6 | $7/2^-$ | | | |
| | | 5110 | 3.1 | 2522.7 | $1/2^+$ | | | |
| | | 7632 | 52 | 0 | $3/2^+$ | | | |
| 7699.7 | $(3/2^-,5/2,7/2^-)$ | 2962 | 5 | 4737.5 | $5/2^-,7/2^-,9/2^-$ | | | |
| | | 3021 | 8 | 4678.6 | $7/2^-$ | | | |
| | | 3574 | 26 | 4126 | $7/2^-$ | | | |
| | | 3816 | 9 | 3883 | $5/2^-$ | | | |
| | | 4680 | 8 | 3019.3 | $3/2^-$ | | | |
| | | 4886 | 44 | 2813.6 | $7/2^-$ | | | |
| 7714.4 | $(5/2^-)$ | 2002 | 2.1 | 5712 | $3/2^+$ | | | |
| | | 2396 | 9.2 | 5318 | $3/2^+$ | | | |
| | | 2451 | 4.6 | 5263 | $5/2^+$ | | | |
| | | 2541 | 5.2 | 5173 | (1/2,3/2,5/2) | | | |
| | | 2550 | 3.5 | 5164 | $9/2^-$ | | | |
| | | 2703 | 1.5 | 5011 | $(3/2,5/2^-,7/2^-)$ | | | |
| | | 3036 | 2.0 | 4678.6 | $7/2^-$ | | | |
| | | 3200 | 22 | 4514 | $5/2^+$ | | | |
| | | 3619 | 8.5 | 4095 | $1/2^+$ | | | |
| | | 3776 | 2.7 | 3938 | $3/2^+$ | | | |
| | | 3831 | 2.5 | 3883 | $5/2^-$ | | | |
| | | 4116 | 2.6 | 3598 | $9/2^-$ | | | |
| | | 4695 | 4.2 | 3019.3 | $3/2^-$ | | | |
| | | 7714 | 29 | 0 | $3/2^+$ | | | |
| 7738.8 | $3/2^-$ | 1912 | 2.5 | 5827.0 | $1/2^-,3/2^-$ | | | $I_\gamma$: others: 2 (1970Ma31), 3 *1* (1986Zi02), 2.5 (1974Ke10). |
| | | 2141 | 0.5 | 5598 | $5/2^+$ | | | |
| | | 2421 | 1.0 | 5318 | $3/2^+$ | | | $I_\gamma$: other: 0.5 (1974Ke10). |
| | | 2476 | 1.0 | 5263 | $5/2^+$ | | | $I_\gamma$: other: 0.5 (1974Ke10). |
| | | 3264 | 0.6 | 4475 | $1/2^-,3/2^-$ | | | $I_\gamma$: other: 1.0 (1974Ke10). |
| | | 3655.9 *10* | 13 | 4082.9 | $3/2^-$ | D(+Q) | +0.06 *9* | $I_\gamma$: others: 12 (1970Ma31), 13 *2* (1986Zi02), 11 (1974Ke10), 13 (1970An19). Mult.,$\delta$: from 1970Ma31. $A_2$=+0.47 *13*, $A_4$=−0.09 *13* (1970Ma31). |
| | | 3856 | 1.0 | 3883 | $5/2^-$ | | | $I_\gamma$: other: 0.5 (1974Ke10). |
| | | 4718.8 *5* | 48 | 3019.3 | $3/2^-$ | D+Q | +0.06 *2* | $E_\gamma$: from 1970An19. $I_\gamma$: others: 48 (1970Ma31), 51 *4* (1986Zi02), 47 (1974Ke10), 48 (1970An19). $\delta$: from 1970Ma31. $A_2$=+0.45 *5*, $A_4$=−0.02 *5* (1970Ma31). Additional information 1. |
| | | 5215.2 *7* | 16 | 2522.7 | $1/2^+$ | D+Q | | $E_\gamma$: from 1970An19. $I_\gamma$: others: 23 (1970Ma31), 17 *2* (1986Zi02), 17 (1974Ke10), 21 (1970An19). $\delta$: −0.16 *6* or −1.23 *15* from 1970Ma31. $A_2$=−0.68 *8*, $A_4$=+0.02 *9* (1970Ma31). |

Continued on next page (footnotes at end of table)

## $^{38}$Ar(p,$\gamma$):resonances 1984Ha27,1986Zi02,1970Ma31 (continued)

### $\gamma(^{39}K)$ (continued)

| $E_i$(level) | $J_i^\pi$ | $E_\gamma$[†] | $I_\gamma$[‡] | $E_f$ | $J_f^\pi$ | Mult.[#] | $\delta$[#] | Comments |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Additional information 2. |
| 7738.8 | $3/2^-$ | 7738 | 16 | 0 | $3/2^+$ | D+Q | −0.08 *3* | $I_\gamma$: others: 15 (1970Ma31), 16 *2* (1986Zi02), 20 (1974Ke10), 18 (1970An19). Mult.,$\delta$: from 1970Ma31. $A_2$=+0.24 *5*, $A_4$=+0.04 *5* (1970Ma31). Additional information 3. |
| 7755.8 | $(3/2^-,5/2^+)$ | 1929 | 2.3 | 5827.0 | $1/2^-,3/2^-$ | | | |
| | | 1968 | 2.4 | 5788 | $(5/2,7/2)^+$ | | | |
| | | 3018 | 4.6 | 4737.5 | $5/2^-,7/2^-,9/2^-$ | | | |
| | | 3281 | 1.4 | 4475 | $1/2^-,3/2^-$ | | | |
| | | 3673 | 6.0 | 4082.9 | $3/2^-$ | | | |
| | | 4736 | 20 | 3019.3 | $3/2^-$ | | | |
| | | 4942 | 3.1 | 2813.6 | $7/2^-$ | | | |
| | | 5233 | 60 | 2522.7 | $1/2^+$ | | | |
| 7773.0 | $(3/2^-,5/2^+)$ | 1731 | 3.1 | 6042 | | | | |
| | | 1835 | 2.2 | 5938 | $5/2^+$ | | | |
| | | 2175 | 2.6 | 5598 | $5/2^+$ | | | |
| | | 2455 | 6.2 | 5318 | $3/2^+$ | | | |
| | | 3035 | 1.6 | 4737.5 | $5/2^-,7/2^-,9/2^-$ | | | |
| | | 3259 | 6.4 | 4514 | $5/2^+$ | | | |
| | | 3647 | 3.8 | 4126 | $7/2^-$ | | | |
| | | 3678 | 2.6 | 4095 | $1/2^+$ | | | |
| | | 3890 | 9.2 | 3883 | $5/2^-$ | | | |
| | | 5250 | 19 | 2522.7 | $1/2^+$ | | | |
| | | 7772 | 44 | 0 | $3/2^+$ | | | |
| 7784.8 | $(1/2,3/2,5/2^+)$ | 1958 | 4 | 5827.0 | $1/2^-,3/2^-$ | | | |
| | | 3690 | 46 | 4095 | $1/2^+$ | | | |
| | | 3847 | 11 | 3938 | $3/2^+$ | | | |
| | | 4765 | 16 | 3019.3 | $3/2^-$ | | | |
| | | 7784 | 23 | 0 | $3/2^+$ | | | |
| 7797.4 | $(3/2^-,5/2^+)$ | 2009 | 1.7 | 5788 | $(5/2,7/2)^+$ | | | |
| | | 2085 | 2.0 | 5712 | $3/2^+$ | | | |
| | | 2479 | 2.1 | 5318 | $3/2^+$ | | | |
| | | 2786 | 1.0 | 5011 | $(3/2,5/2^-,7/2^-)$ | | | |
| | | 3119 | 1.0 | 4678.6 | $7/2^-$ | | | |
| | | 3277 | 0.8 | 4520 | $9/2^-$ | | | |
| | | 3283 | 5.4 | 4514 | $5/2^+$ | | | |
| | | 3671 | 6.8 | 4126 | $7/2^-$ | | | |
| | | 3714 | 1.7 | 4082.9 | $3/2^-$ | | | |
| | | 3859 | 1.2 | 3938 | $3/2^+$ | | | |
| | | 4983 | 19 | 2813.6 | $7/2^-$ | | | |
| | | 5274 | 2.1 | 2522.7 | $1/2^+$ | | | |
| | | 7797 | 55 | 0 | $3/2^+$ | | | |
| 7802.0 | $(5/2^-)$ | 1256 | 1.4 | 6546 | $7/2^-$ | | | |
| | | 1975 | 1.4 | 5827.0 | $1/2^-,3/2^-$ | | | |
| | | 2484 | 3.2 | 5318 | $3/2^+$ | | | |
| | | 2638 | 1.8 | 5164 | $9/2^-$ | | | |
| | | 3123 | 3.3 | 4678.6 | $7/2^-$ | | | |
| | | 3282 | 7.3 | 4520 | $9/2^-$ | | | |
| | | 3288 | 2.9 | 4514 | $5/2^+$ | | | |
| | | 3676 | 13.8 | 4126 | $7/2^-$ | | | |
| | | 3919 | 5.2 | 3883 | $5/2^-$ | | | |
| | | 4204 | 7.6 | 3598 | $9/2^-$ | | | |
| | | 4782 | 2.7 | 3019.3 | $3/2^-$ | | | |
| | | 4988 | 18 | 2813.6 | $7/2^-$ | | | |

Continued on next page (footnotes at end of table)

## $^{38}$Ar(p,$\gamma$):resonances 1984Ha27,1986Zi02,1970Ma31 (continued)

### $\gamma(^{39}K)$ (continued)

| $E_i$(level) | $J_i^\pi$ | $E_\gamma$[†] | $I_\gamma$[‡] | $E_f$ | $J_f^\pi$ | Mult.[#] | $\delta$[#] | Comments |
|---|---|---|---|---|---|---|---|---|
| 7802.0 | (5/2$^-$) | 7801 | 31 | 0 | 3/2$^+$ | | | |
| 7804.8 | (5/2$^-$) | 1259 | 1.5 | 6546 | 7/2$^-$ | | | |
| | | 1978 | 5.4 | 5827.0 | 1/2$^-$,3/2$^-$ | | | |
| | | 2487 | 1.7 | 5318 | 3/2$^+$ | | | |
| | | 2641 | 2.6 | 5164 | 9/2$^-$ | | | |
| | | 3126 | 4.8 | 4678.6 | 7/2$^-$ | | | |
| | | 3285 | 8.6 | 4520 | 9/2$^-$ | | | |
| | | 3291 | 1.0 | 4514 | 5/2$^+$ | | | |
| | | 3679 | 9.7 | 4126 | 7/2$^-$ | | | |
| | | 3922 | 3.1 | 3883 | 5/2$^-$ | | | |
| | | 4207 | 8.4 | 3598 | 9/2$^-$ | | | |
| | | 4785 | 29 | 3019.3 | 3/2$^-$ | | | |
| | | 4991 | 9.9 | 2813.6 | 7/2$^-$ | | | |
| | | 5282 | 2.8 | 2522.7 | 1/2$^+$ | | | |
| | | 7804 | 11 | 0 | 3/2$^+$ | | | |
| 7820.7 | (1/2$^-$,3/2,5/2$^+$) | 1994 | 2.4 | 5827.0 | 1/2$^-$,3/2$^-$ | | | |
| | | 3346 | 11 | 4475 | 1/2$^-$,3/2$^-$ | | | |
| | | 3726 | 5.6 | 4095 | 1/2$^+$ | | | |
| | | 3738 | 8.9 | 4082.9 | 3/2$^-$ | | | |
| | | 3882 | 5.2 | 3938 | 3/2$^+$ | | | I$_\gamma$: with 3937. |
| | | 3937 | | 3883 | 5/2$^-$ | | | I$_\gamma$: with 3881. |
| | | 7820 | 67 | 0 | 3/2$^+$ | | | |
| 7846.8 | (3/2,5/2$^+$) | 3109 | 8.1 | 4737.9 | 5/2$^+$ | | | |
| | | 3109 | 8.2 | 4737.5 | 5/2$^-$,7/2$^-$,9/2$^-$ | | | |
| | | 3333 | 8.3 | 4514 | 5/2$^+$ | | | |
| | | 3372 | 22 | 4475 | 1/2$^-$,3/2$^-$ | | | I$_\gamma$: other: 37 *5* (1986Zi02). |
| | | 3752 | 2.5 | 4095 | 1/2$^+$ | | | |
| | | 3764 | 3.0 | 4082.9 | 3/2$^-$ | | | |
| | | 3964 | 11 | 3883 | 5/2$^-$ | | | I$_\gamma$: other: 29 *6* (1986Zi02). |
| | | 4827 | 19 | 3019.3 | 3/2$^-$ | | | I$_\gamma$: other: 34 *6* (1986Zi02). |
| | | 5324 | 6.4 | 2522.7 | 1/2$^+$ | | | |
| | | 7846 | 10 | 0 | 3/2$^+$ | | | |
| 7868.2 | 5/2$^+$ | 1930 | 2.3 | 5938 | 5/2$^+$ | | | |
| | | 2270 | 1.1 | 5598 | 5/2$^+$ | | | |
| | | 2550 | 0.7 | 5318 | 3/2$^+$ | | | |
| | | 2605 | 16 | 5263 | 5/2$^+$ | D(+Q) | −0.05 *5* | I$_\gamma$: other: 20 (1970Ma31), 14 *1* (1986Zi02). 1986Zi02 also report I$\gamma$=8 for additional unknown transitions. |
| | | 3130 | 1.0 | 4737.9 | 5/2$^+$ | | | |
| | | 3131 | 0.8 | 4737.5 | 5/2$^-$,7/2$^-$,9/2$^-$ | | | |
| | | 3189 | 1.1 | 4678.6 | 7/2$^-$ | | | I$_\gamma$: other: 2 *1* (1986Zi02). |
| | | 3930 | 6.3 | 3938 | 3/2$^+$ | | | I$_\gamma$: others: 7 (1970Ma31), 4 *1* (1986Zi02). |
| | | 3985 | 17 | 3883 | 5/2$^-$ | D(+Q) | −0.04 *5* | I$_\gamma$: others: 20 (1970Ma31), 16 *2* (1986Zi02). |
| | | 5054 | 6.3 | 2813.6 | 7/2$^-$ | | | I$_\gamma$: others: 7 (1970Ma31), 6 *1* (1986Zi02). |
| | | 7867 | 47 | 0 | 3/2$^+$ | D+Q | −1.95 *8* | I$_\gamma$: others: 46 (1970Ma31), 50 *4* (1986Zi02). |
| 7957.9 | (1/2,3/2,5/2$^+$) | 2640 | 9.6 | 5318 | 3/2$^+$ | | | I$_\gamma$: other: 7 (1970Ma31). |
| | | 4938 | 4.4 | 3019.3 | 3/2$^-$ | | | I$_\gamma$: other: 7 (1970Ma31). |
| | | 5435 | 63 | 2522.7 | 1/2$^+$ | | | I$_\gamma$: others: 63 (1970Ma31), 56 *5* (1986Zi02). 1986Zi02 also report I$\gamma$=25 for additional unknown transitions. |
| | | 7957 | 23 | 0 | 3/2$^+$ | | | I$_\gamma$: others: 23 (1970Ma31), 19 *4* (1986Zi02). |
| 7978.6 | (3/2$^-$,5/2) | 1433 | 1.6 | 6546 | 7/2$^-$ | | | |
| | | 2336 | 1.5 | 5643 | 7/2$^-$ | | | |

Continued on next page (footnotes at end of table)

## $^{38}$Ar(p,$\gamma$):resonances 1984Ha27,1986Zi02,1970Ma31 (continued)

### $\gamma(^{39}K)$ (continued)

| $E_i$(level) | $J_i^\pi$ | $E_\gamma$[†] | $I_\gamma$[‡] | $E_f$ | $J_f^\pi$ | Mult.[#] | $\delta$[#] | Comments |
|---|---|---|---|---|---|---|---|---|
| 7978.6 | (3/2$^-$,5/2) | 2381 | 1.7 | 5598 | 5/2$^+$ | | | |
| | | 2477 | 2.9 | 5502 | 7/2$^-$ | | | |
| | | 2967 | 1.8 | 5011 | (3/2,5/2$^-$,7/2$^-$) | | | |
| | | 2969 | 2.6 | 5009 | 7/2$^-$ | | | |
| | | 3241 | 1.3 | 4737.5 | 5/2$^-$,7/2$^-$,9/2$^-$ | | | |
| | | 3300 | 3.8 | 4678.6 | 7/2$^-$ | | | |
| | | 3852 | 1.6 | 4126 | 7/2$^-$ | | | |
| | | 4095 | 1.9 | 3883 | 5/2$^-$ | | | |
| | | 4959 | 5.7 | 3019.3 | 3/2$^-$ | | | |
| | | 5165 | 26 | 2813.6 | 7/2$^-$ | | | $I_\gamma$: others: 29 *8* (1986Zi02). 1986Zi02 also report I$\gamma$=19 for additional unknown transitions. |
| | | 7978 | 48 | 0 | 3/2$^+$ | | | $I_\gamma$: other: 52 *12* (1986Zi02). |
| 7981.7 | | 5168 | 29[@] *8* | 2813.6 | 7/2$^-$ | | | |
| | | 7981 | 52[@] *12* | 0 | 3/2$^+$ | | | $I_\gamma$: 19% is unaccounted. |
| 7983.4 | (5/2$^+$) | 1455 | 9.1 | 6528 | | | | |
| | | 1573 | 15 | 6410 | | | | |
| | | 1652 | 11 | 6331 | 3/2$^+$ | | | |
| | | 1737 | 11 | 6246 | (1/2$^+$) | | | |
| | | 2045 | 7.7 | 5938 | 5/2$^+$ | | | |
| | | 2385 | 10 | 5598 | 5/2$^+$ | | | |
| | | 2720 | 9.1 | 5263 | 5/2$^+$ | | | |
| | | 2810 | 3.5 | 5173 | (1/2,3/2,5/2) | | | |
| | | 3469 | 7.6 | 4514 | 5/2$^+$ | | | |
| | | 4100 | 5.1 | 3883 | 5/2$^-$ | | | |
| | | 4964 | 2.9 | 3019.3 | 3/2$^-$ | | | |
| | | 7983 | 7.5 | 0 | 3/2$^+$ | | | |
| 7992.4 | 3/2$^{(-)}$ | 3478[&] | 9 | 4514 | 5/2$^+$ | | | $I_\gamma$: from 1970Ma31 only; branch not in 1984Ha27. |
| | | 3866 | 2.1 | 4126 | 7/2$^-$ | | | |
| | | 4109 | 23 | 3883 | 5/2$^-$ | D+Q | +0.17 *2* | $I_\gamma$: others: 21 (1970Ma31), 23 *2* (1986Zi02). 1986Zi02 also report I$\gamma$=7 for additional unknown transitions. |
| | | 4973 | 56 | 3019.3 | 3/2$^-$ | D+Q | | $I_\gamma$: others: 53 (1970Ma31), 52 *3* (1986Zi02). $\delta$: +0.09 *1* or +2.8 *10* (1986Zi02). |
| | | 5469 | 13 | 2522.7 | 1/2$^+$ | | | $I_\gamma$: others: 13 (1970Ma31), 13 *1* (1986Zi02). |
| | | 7992 | 6.0 | 0 | 3/2$^+$ | | | $I_\gamma$: others: 4 (1970Ma31), 5 *1* (1986Zi02). |
| 8031.0 | (1/2,3/2,5/2) | 1700 | 6 | 6331 | 3/2$^+$ | | | $I_\gamma$: branch not reported in 1970Ma31, but they report I$\gamma$=10 for additional transitions. |
| | | 3517[&] | | 4514 | 5/2$^+$ | | | $I_\gamma$: 35 from 1970Ma31 only; branch not in 1984Ha27. |
| | | 5011 | 12 | 3019.3 | 3/2$^-$ | | | $I_\gamma$: others: 10 (1970Ma31), 25 *6* (1986Zi02). |
| | | 8030 | 82 | 0 | 3/2$^+$ | | | $I_\gamma$: others: 45 (1970Ma31), 75 *6* (1986Zi02). |
| 8034.0 | (1/2,3/2,5/2) | 1703 | 2 | 6331 | 3/2$^+$ | | | |
| | | 5014 | 3 | 3019.3 | 3/2$^-$ | | | |
| | | 8033 | 95 | 0 | 3/2$^+$ | | | |
| 8038.5 | (3/2$^-$,5/2) | 2440 | 2.0 | 5598 | 5/2$^+$ | | | |

Continued on next page (footnotes at end of table)

## $^{38}$Ar(p,$\gamma$):resonances 1984Ha27,1986Zi02,1970Ma31 (continued)

### $\gamma(^{39}K)$ (continued)

| $E_i$(level) | $J_i^\pi$ | $E_\gamma$[†] | $I_\gamma$[‡] | $E_f$ | $J_f^\pi$ | Mult.[#] | $\delta$[#] | Comments |
|---|---|---|---|---|---|---|---|---|
| 8038.5 | (3/2$^-$,5/2) | 3524[&] | | 4514 | 5/2$^+$ | | | $I_\gamma$: 7 from 1970Ma31 only; branch not in 1984Ha27. |
| | | 3955 | 7.7 | 4082.9 | 3/2$^-$ | | | $I_\gamma$: other: 10 (1970Ma31). |
| | | 4155 | 3.4 | 3883 | 5/2$^-$ | | | |
| | | 5019 | 25 | 3019.3 | 3/2$^-$ | | | $I_\gamma$: others: 22 (1970Ma31), 30 *4* (1986Zi02). |
| | | 5225 | 12 | 2813.6 | 7/2$^-$ | | | $I_\gamma$: others: 11 (1970Ma31), 16 *4* (1986Zi02). |
| | | 8038 | 50 | 0 | 3/2$^+$ | | | $I_\gamma$: others: 50 (1970Ma31), 54 *6* (1986Zi02). |
| 8079.6 | (1/2$^-$,3/2,5/2$^+$) | 910 | 4 | 7170 | | | | |
| | | 2253 | 6 | 5827.0 | 1/2$^-$,3/2$^-$ | | | |
| | | 4196 | 25 | 3883 | 5/2$^-$ | | | |
| | | 5060 | 44 | 3019.3 | 3/2$^-$ | | | |
| | | 5556 | 6 | 2522.7 | 1/2$^+$ | | | |
| | | 8079 | 15 | 0 | 3/2$^+$ | | | |
| 8081.5 | (1/2$^-$,3/2,5/2$^+$) | 4198 | 6 | 3883 | 5/2$^-$ | | | $I_\gamma$: others: 10 *3* (1986Zi02); branch not reported in 1970Ma31, but they report I$\gamma$=10 for additional transitions. |
| | | 5062 | 22 | 3019.3 | 3/2$^-$ | | | $I_\gamma$: other: 20 (1970Ma31), 25 *5* (1986Zi02). |
| | | 5558 | 49 | 2522.7 | 1/2$^+$ | | | $I_\gamma$: other: 50 (1970Ma31), 40 *6* (1986Zi02). |
| | | 8081 | 23 | 0 | 3/2$^+$ | | | $I_\gamma$: other: 20 (1970Ma31), 25 *5* (1986Zi02). |
| 8093.3 | 3/2$^-$ | 1547 | 3[@] *1* | 6546 | 7/2$^-$ | | | $I_\gamma$: other: 4 (1984Ha27). |
| | | 2000 | 1.7[@] *4* | 6093 | 5/2$^-$,7/2$^-$ | | | |
| | | 2202 | 8[@] *3* | 5891 | (5/2,7/2)$^-$ | | | $I_\gamma$: other: 10 (1984Ha27). |
| | | 2291 | 3.5[@] *6* | 5802 | 7/2$^-$ | | | $I_\gamma$: other: 6 (1984Ha27). |
| | | 2495 | 2.3[@] *5* | 5598 | 5/2$^+$ | | | $I_\gamma$: other: 7 (1984Ha27). |
| | | 2591 | 2.4[@] *5* | 5502 | 7/2$^-$ | | | |
| | | 2775 | 1.0[@] *5* | 5318 | 3/2$^+$ | | | |
| | | 2830 | 0.9[@] *4* | 5263 | 5/2$^+$ | | | |
| | | 3082 | 6[@] *2* | 5011 | (3/2,5/2$^-$,7/2$^-$) | | | $I_\gamma$: other: 7 (1984Ha27). |
| | | 3084 | 6[@] *2* | 5009 | 7/2$^-$ | | | $I_\gamma$: other: 4 (1984Ha27). |
| | | 3355 | 1.7[@] *5* | 4737.9 | 5/2$^+$ | | | |
| | | 3579 | 2.2[@] *5* | 4514 | 5/2$^+$ | | | |
| | | 3618 | 1.3[@] *5* | 4475 | 1/2$^-$,3/2$^-$ | | | |
| | | 3967 | 1.5[@] *5* | 4126 | 7/2$^-$ | | | |
| | | 3998 | 2.2[@] *5* | 4095 | 1/2$^+$ | | | |
| | | 4010 | 2.1[@] *3* | 4082.9 | 3/2$^-$ | | | |
| | | 4155 | 12[@] *1* | 3938 | 3/2$^+$ | D(+Q) | +0.07 *4* | $I_\gamma$: other: 16 (1984Ha27). |
| | | 4210 | 6[@] *1* | 3883 | 5/2$^-$ | | | $I_\gamma$: other: 7 (1984Ha27). |
| | | 5074 | 2.7[@] *7* | 3019.3 | 3/2$^-$ | | | |
| | | 5279 | 3.7[@] *8* | 2813.6 | 7/2$^-$ | | | |
| | | 5570 | 6[@] *1* | 2522.7 | 1/2$^+$ | | | $I_\gamma$: other: 7 (1984Ha27). |
| | | 8092 | 22[@] *2* | 0 | 3/2$^+$ | D+Q | | $I_\gamma$: other: 32 (1984Ha27). $\delta$: +0.26 *3* or +1.80 *13* (1986Zi02). |
| 8099.2 | 9/2$^+$ | 1907 | 1[@] *1* | 6192 | (7/2$^-$) | | | |

Continued on next page (footnotes at end of table)

## $^{38}$Ar(p,$\gamma$):resonances 1984Ha27,1986Zi02,1970Ma31 (continued)

### $\gamma(^{39}K)$ (continued)

| $E_i$(level) | $J_i^\pi$ | $E_\gamma$[†] | $I_\gamma$[‡] | $E_f$ | $J_f^\pi$ | Mult.[#] | $\delta$[#] | Comments |
|---|---|---|---|---|---|---|---|---|
| 8099.2 | $9/2^+$ | 2311 | 8[@] *1* | 5788 | $(5/2,7/2)^+$ | | | |
| | | 2456 | 5[@] *1* | 5643 | $7/2^-$ | | | |
| | | 2745 | 1[@] *1* | 5354 | $11/2^-$ | | | |
| | | 2935 | 9[@] *1* | 5164 | $9/2^-$ | | | $I_\gamma$: other: 9 (1984Ha27). |
| | | 3361 | 6[@] *1* | 4737.9 | $5/2^+$ | | | $I_\gamma$: other: 5 (1984Ha27). |
| | | 3420 | 2.8[@] *5* | 4678.6 | $7/2^-$ | | | $I_\gamma$: other: 5 (1984Ha27). |
| | | 3579 | 15[@] *1* | 4520 | $9/2^-$ | D+Q | −0.18 *5* | $I_\gamma$: other: 25 (1984Ha27), could be for 3580+3586 (evaluators). |
| | | 3585 | 2.7[@] *6* | 4514 | $5/2^+$ | | | |
| | | 3973 | 28[@] *2* | 4126 | $7/2^-$ | D+Q | +0.05 *2* | $I_\gamma$: other: 27 (1984Ha27). |
| | | 4155 | 4[@] *1* | 3944 | $11/2^-$ | | | $I_\gamma$: other: 5 (1984Ha27). |
| | | 4501 | 6[@] *1* | 3598 | $9/2^-$ | | | $I_\gamma$: other: 3 (1984Ha27). |
| | | 5285 | 14[@] *1* | 2813.6 | $7/2^-$ | D(+Q) | +0.01 *1* | $I_\gamma$: other: 21 (1984Ha27). |
| 8107.8 | $(3/2,5/2^+)$ | 2170 | 10 | 5938 | $5/2^+$ | | | |
| | | 2935 | 3 | 5173 | (1/2,3/2,5/2) | | | |
| | | 3178 | 8 | 4930 | $3/2^+$ | | | |
| | | 4025 | 4 | 4082.9 | $3/2^-$ | | | |
| | | 4170 | 11 | 3938 | $3/2^+$ | | | |
| | | 4225 | 14 | 3883 | $5/2^-$ | | | |
| | | 5088 | 27 | 3019.3 | $3/2^-$ | | | |
| | | 5585 | 17 | 2522.7 | $1/2^+$ | | | |
| | | 8107 | 6 | 0 | $3/2^+$ | | | |
| 8118.0 | $(3/2^-,5/2^+)$ | 2180 | 0.3 | 5938 | $5/2^+$ | | | |
| | | 2406 | 1.1 | 5712 | $3/2^+$ | | | |
| | | 3439 | 2.6 | 4678.6 | $7/2^-$ | | | |
| | | 3604 | 3.0 | 4514 | $5/2^+$ | | | $I_\gamma$: other: 6 (1970Ma31). |
| | | 4235 | 6.3 | 3883 | $5/2^-$ | | | $I_\gamma$: other: 7 (1970Ma31). |
| | | 5098 | 8.1 | 3019.3 | $3/2^-$ | | | $I_\gamma$: other: 8 (1970Ma31). |
| | | 5304 | 32 | 2813.6 | $7/2^-$ | | | $I_\gamma$: other: 38 (1970Ma31). |
| | | 5595 | 4.2 | 2522.7 | $1/2^+$ | | | $I_\gamma$: other: 4 (1970Ma31). |
| | | 8117 | 42 | 0 | $3/2^+$ | | | $I_\gamma$: other: 37 (1970Ma31). |
| 8138.4 | $(3/2^-,5/2)$ | 2200 | 5 | 5938 | $5/2^+$ | | | |
| | | 2875 | 6 | 5263 | $5/2^+$ | | | |
| | | 3127 | 3 | 5011 | $(3/2,5/2^-,7/2^-)$ | | | |
| | | 3129 | 3 | 5009 | $7/2^-$ | | | |
| | | 3208 | 10 | 4930 | $3/2^+$ | | | |
| | | 3400 | 8 | 4737.9 | $5/2^+$ | | | |
| | | 3624 | 12 | 4514 | $5/2^+$ | | | |
| | | 4055 | 6 | 4082.9 | $3/2^-$ | | | |
| | | 4200 | 19 | 3938 | $3/2^+$ | | | |
| | | 5119 | 22 | 3019.3 | $3/2^-$ | | | |
| | | 8137 | 6 | 0 | $3/2^+$ | | | |
| 8198.3 | $(3/2^-,5/2,7/2^+)$ | 3684 | | 4514 | $5/2^+$ | | | $E_\gamma$: from 1970Ma31 only. $I_\gamma$: 5 (1970Ma31). 1970Ma31 report Iγ=10 for additional transitions. |
| | | 4260 | 12[@] *2* | 3938 | $3/2^+$ | | | $I_\gamma$: other: 10 (1970Ma31). |
| | | 5384 | 9[@] *2* | 2813.6 | $7/2^-$ | | | $I_\gamma$: other: 10 (1970Ma31). |
| | | 8197 | 79[@] *3* | 0 | $3/2^+$ | | | $I_\gamma$: other: 65 (1970Ma31). |
| 8252.9 | | 8252 | 100[@] | 0 | $3/2^+$ | | | |
| 8262.4 | | 8261 | 100[@] | 0 | $3/2^+$ | | | |
| 8279.7 | | 8279 | 100[@] | 0 | $3/2^+$ | | | |

Continued on next page (footnotes at end of table)

## $^{38}$Ar(p,$\gamma$):resonances 1984Ha27,1986Zi02,1970Ma31 (continued)

### $\gamma(^{39}K)$ (continued)

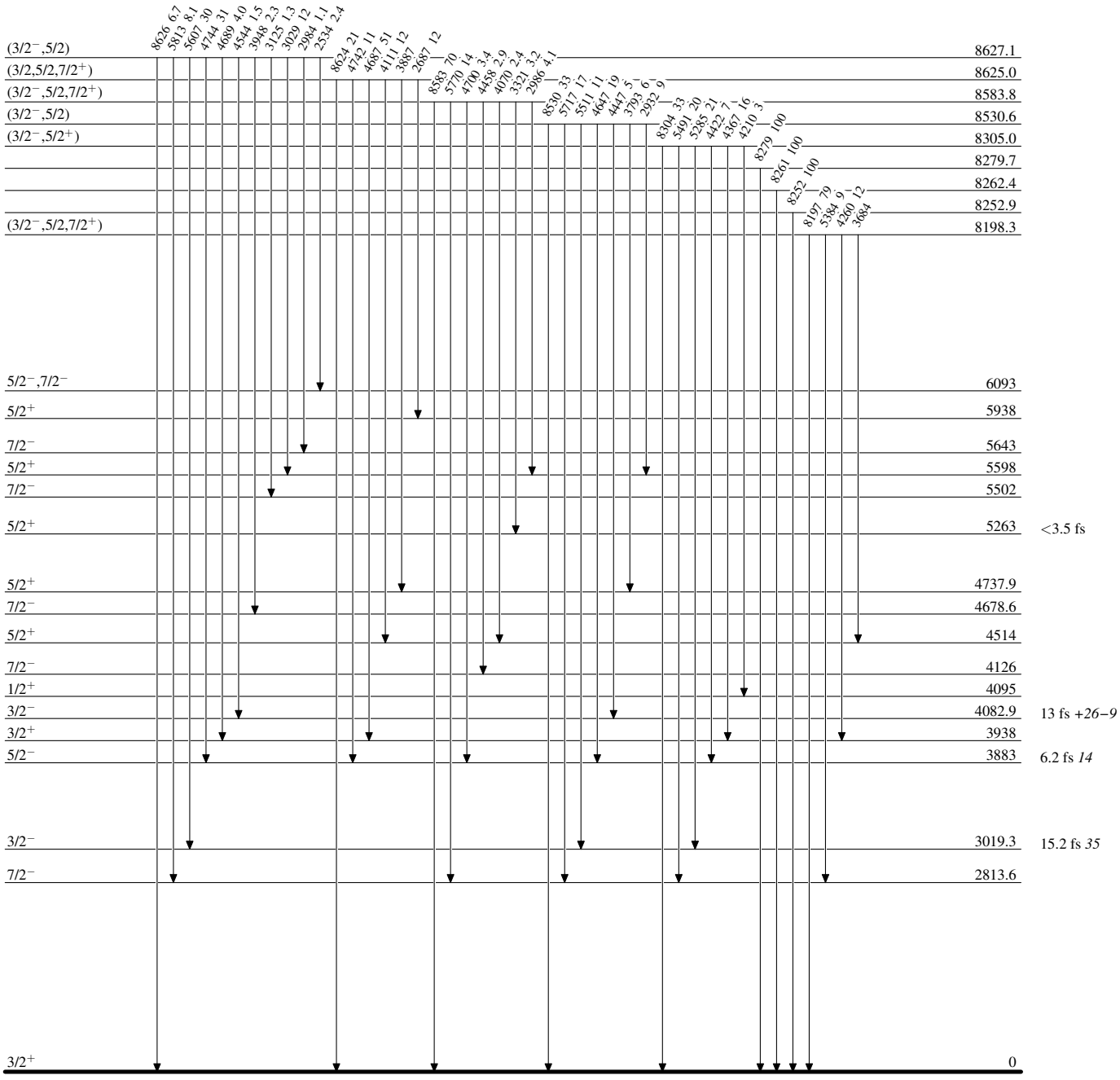
| $E_i$(level) | $J_i^\pi$ | $E_\gamma$[†] | $I_\gamma$[‡] | $E_f$ | $J_f^\pi$ | Comments |
|---|---|---|---|---|---|---|
| 8305.0 | (3/2$^-$,5/2$^+$) | 4210 | 3[@] *1* | 4095 | 1/2$^+$ | |
| | | 4367 | 16[@] *2* | 3938 | 3/2$^+$ | |
| | | 4422 | 7[@] *2* | 3883 | 5/2$^-$ | |
| | | 5285 | 21[@] *3* | 3019.3 | 3/2$^-$ | |
| | | 5491 | 20[@] *3* | 2813.6 | 7/2$^-$ | |
| | | 8304 | 33[@] *3* | 0 | 3/2$^+$ | |
| 8530.6 | (3/2$^-$,5/2) | 2932 | 9 | 5598 | 5/2$^+$ | |
| | | 3793 | 6 | 4737.9 | 5/2$^+$ | |
| | | 4447 | 5 | 4082.9 | 3/2$^-$ | |
| | | 4647 | 19 | 3883 | 5/2$^-$ | |
| | | 5511 | 11 | 3019.3 | 3/2$^-$ | |
| | | 5717 | 17 | 2813.6 | 7/2$^-$ | |
| | | 8530 | 33 | 0 | 3/2$^+$ | |
| 8583.8 | (3/2$^-$,5/2,7/2$^+$) | 2986 | 4.1 | 5598 | 5/2$^+$ | |
| | | 3321 | 3.2 | 5263 | 5/2$^+$ | |
| | | 4070 | 2.4 | 4514 | 5/2$^+$ | |
| | | 4458 | 2.9 | 4126 | 7/2$^-$ | |
| | | 4700 | 3.4 | 3883 | 5/2$^-$ | |
| | | 5770 | 14 | 2813.6 | 7/2$^-$ | |
| | | 8583 | 70 | 0 | 3/2$^+$ | |
| 8625.0 | (3/2,5/2,7/2$^+$) | 2687 | 12 | 5938 | 5/2$^+$ | |
| | | 3887 | | 4737.9 | 5/2$^+$ | |
| | | 4111 | 12 | 4514 | 5/2$^+$ | |
| | | 4687 | 51 | 3938 | 3/2$^+$ | |
| | | 4742 | 11 | 3883 | 5/2$^-$ | $I_\gamma$: combined for 4742$\gamma$+3887$\gamma$. |
| | | 8624 | 21 | 0 | 3/2$^+$ | |
| 8627.1 | (3/2$^-$,5/2) | 2534 | 2.4 | 6093 | 5/2$^-$,7/2$^-$ | |
| | | 2984 | 1.1 | 5643 | 7/2$^-$ | |
| | | 3029 | 12 | 5598 | 5/2$^+$ | |
| | | 3125 | 1.3 | 5502 | 7/2$^-$ | |
| | | 3948 | 2.3 | 4678.6 | 7/2$^-$ | |
| | | 4544 | 1.5 | 4082.9 | 3/2$^-$ | |
| | | 4689 | 4.0 | 3938 | 3/2$^+$ | |
| | | 4744 | 31 | 3883 | 5/2$^-$ | |
| | | 5607 | 30 | 3019.3 | 3/2$^-$ | |
| | | 5813 | 8.1 | 2813.6 | 7/2$^-$ | |
| | | 8626 | 6.7 | 0 | 3/2$^+$ | |

[†] From level-energy differences, unless otherwise noted. Secondary gammas are given for only a few levels.
[‡] From 1984Ha27, unless otherwise stated. It is stated in 1984Ha27 that the uncertainties in the intensities range from 5% for strong transitions to about 40% for very weak ones; it is from 10% to 50% in 1970Ma31.
[#] From $\gamma(\theta)$ data of 1986Zi02, unless otherwise stated.
[@] From 1986Zi02.
[&] Placement of transition in the level scheme is uncertain.

## $^{38}$Ar(p,$\gamma$):resonances 1984Ha27,1986Zi02,1970Ma31

### Level Scheme

Intensities: % photon branching from each level

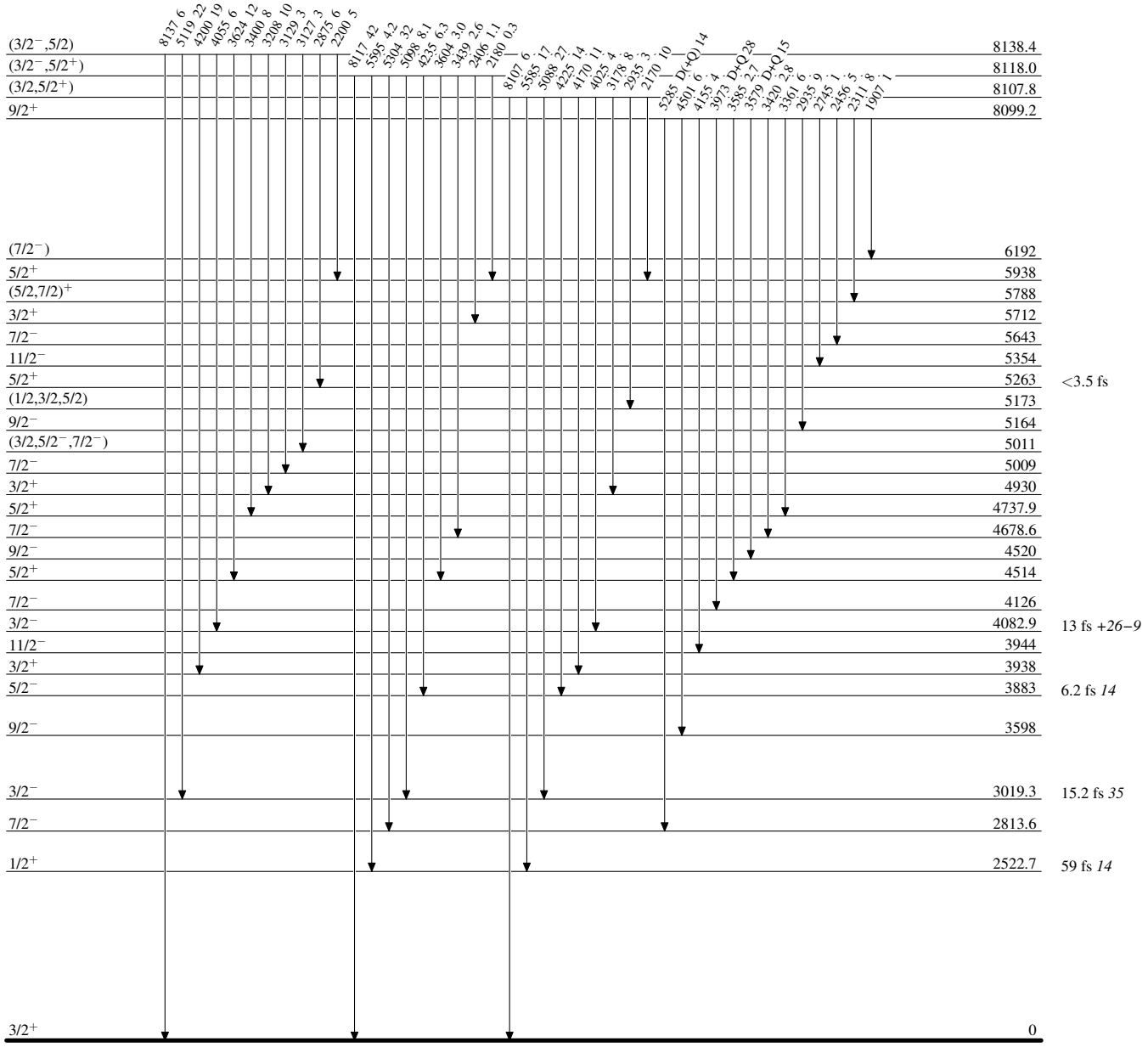



$^{39}_{19}K_{20}$

## $^{38}$Ar(p,γ):resonances 1984Ha27,1986Zi02,1970Ma31

### Level Scheme (continued)

Intensities: % photon branching from each level




$^{39}_{19}K_{20}$

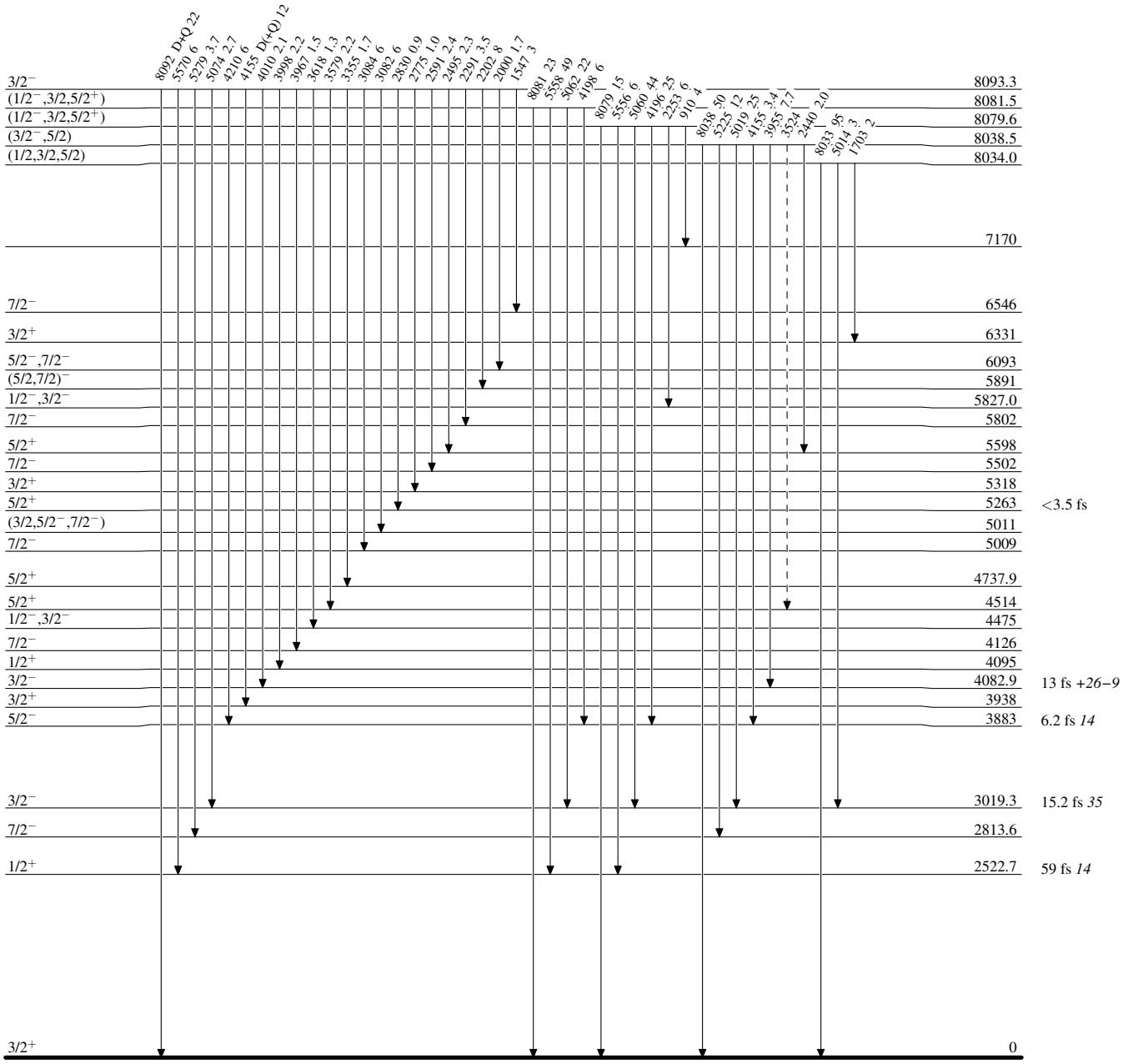
## $^{38}$Ar(p,$\gamma$):resonances 1984Ha27,1986Zi02,1970Ma31

Legend

### Level Scheme (continued)

Intensities: % photon branching from each level

$\gamma$ Decay (Uncertain)




$^{39}_{19}K_{20}$

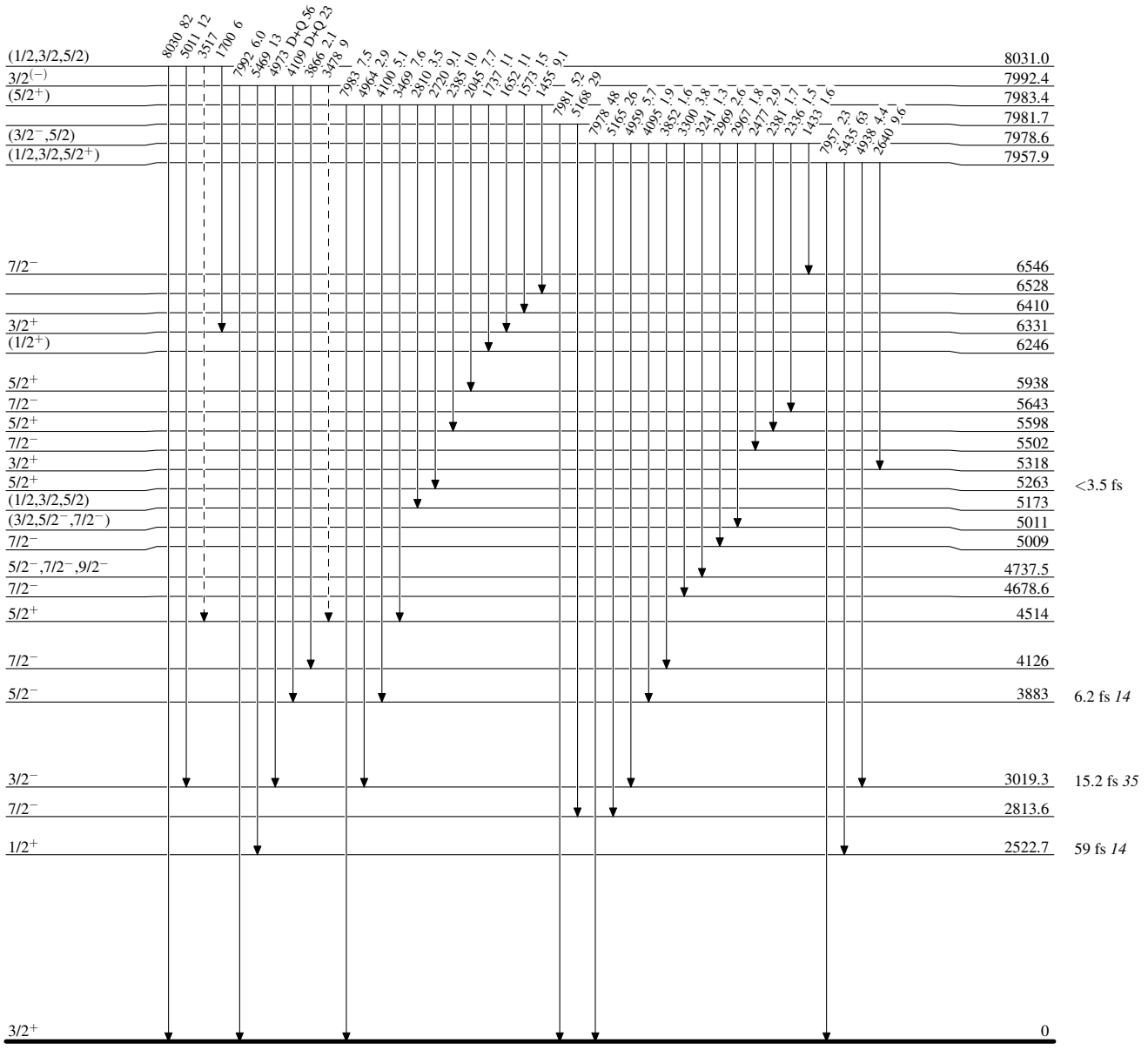
## $^{38}$Ar(p,$\gamma$):resonances 1984Ha27,1986Zi02,1970Ma31

Legend

### Level Scheme (continued)

Intensities: % photon branching from each level

$\gamma$ Decay (Uncertain)

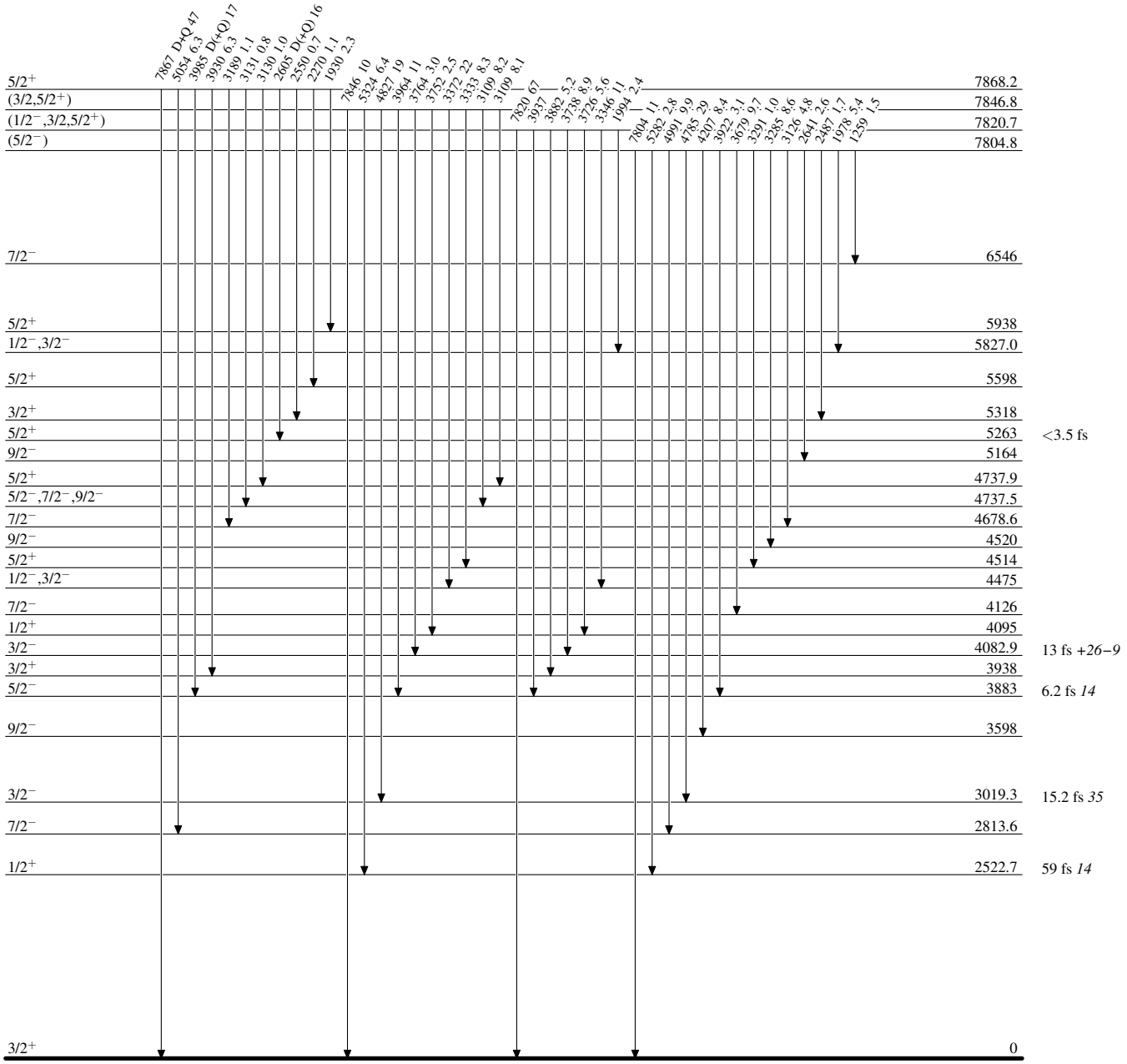



$^{39}_{19}K_{20}$

## $^{38}$Ar(p,$\gamma$):resonances 1984Ha27,1986Zi02,1970Ma31

### Level Scheme (continued)

Intensities: % photon branching from each level

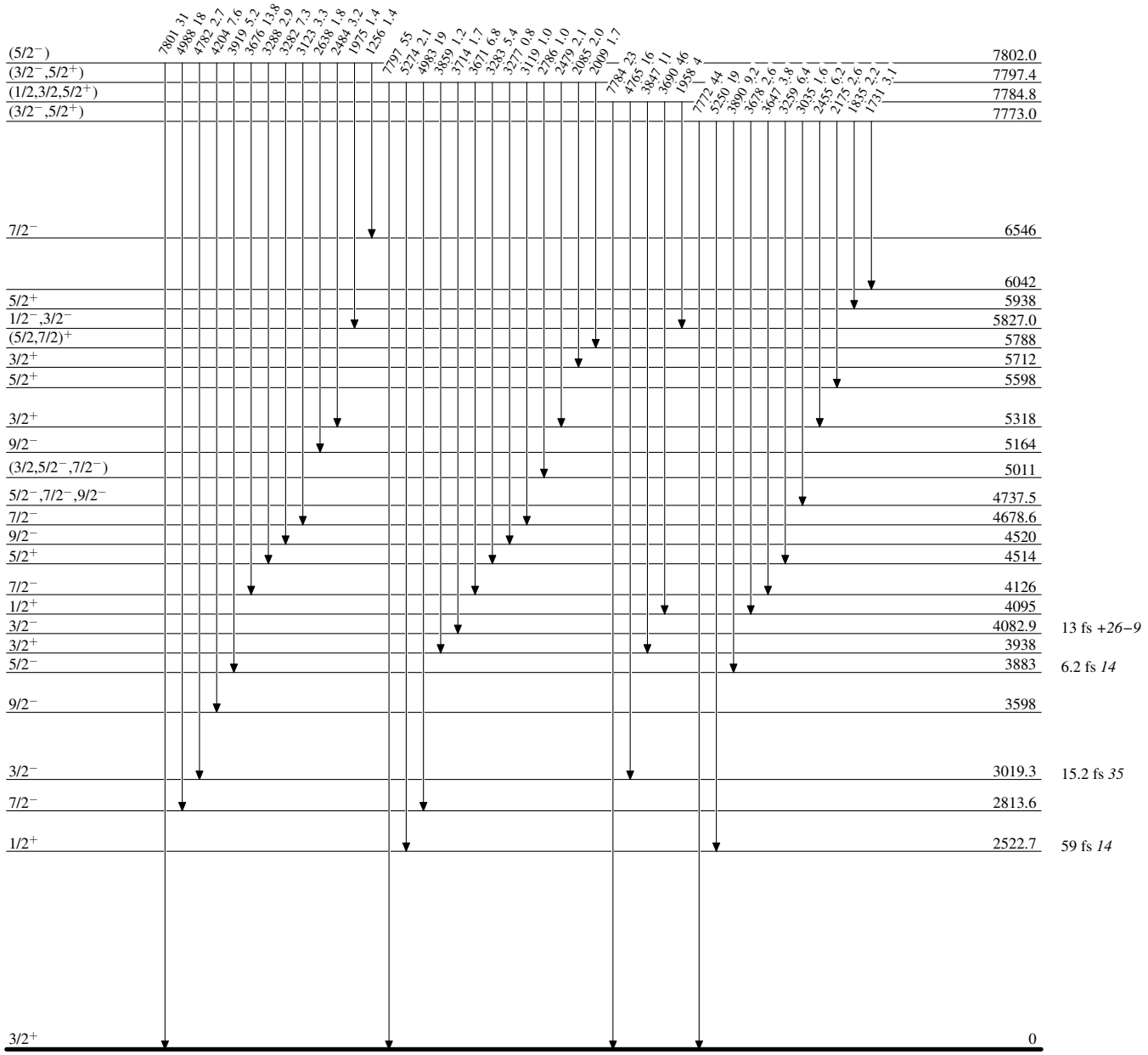



$^{39}_{19}K_{20}$

## $^{38}$Ar(p,γ):resonances 1984Ha27,1986Zi02,1970Ma31

### Level Scheme (continued)

Intensities: % photon branching from each level

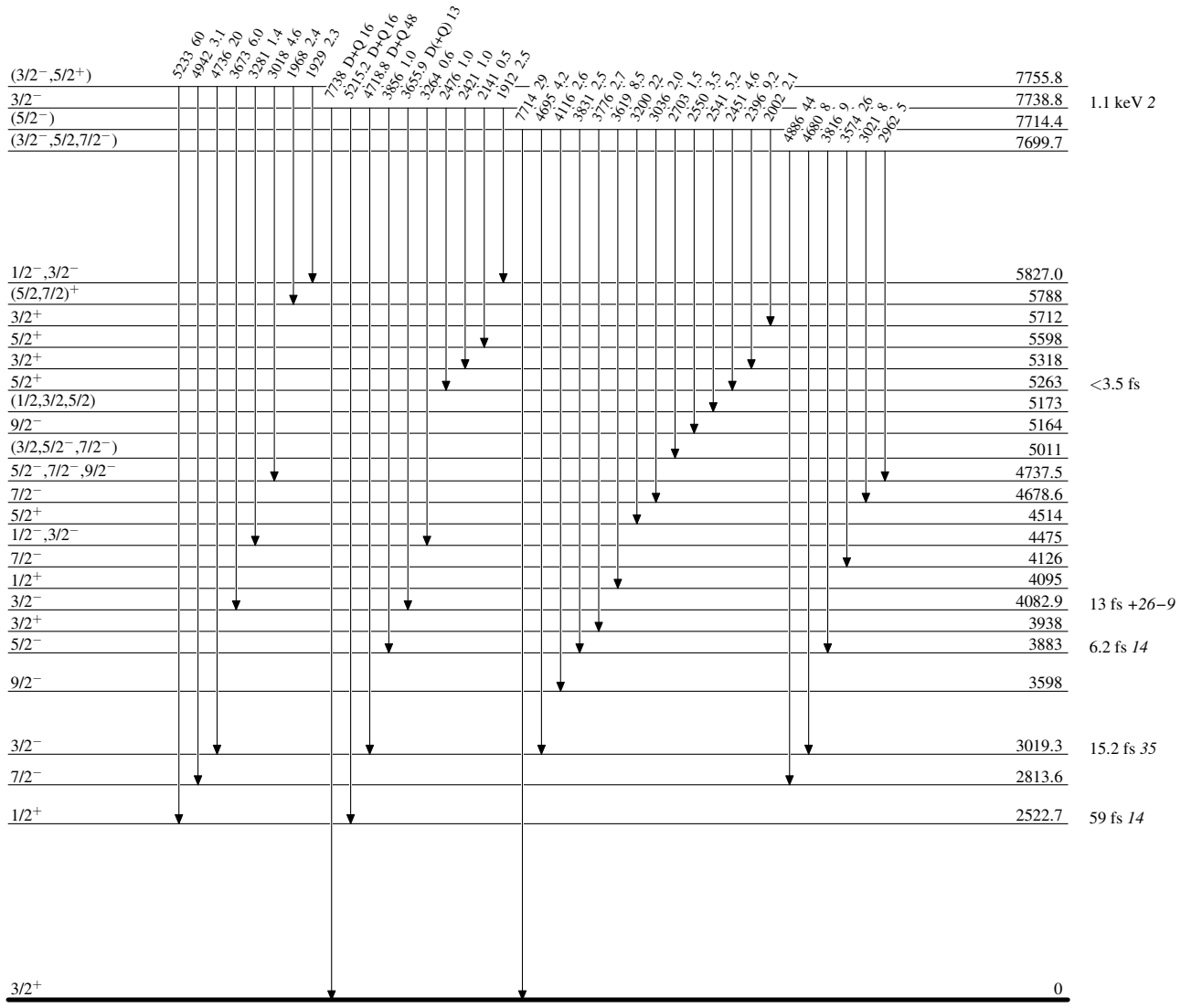



$^{39}_{19}K_{20}$

## $^{38}$Ar(p,γ):resonances 1984Ha27,1986Zi02,1970Ma31

### Level Scheme (continued)

Intensities: % photon branching from each level

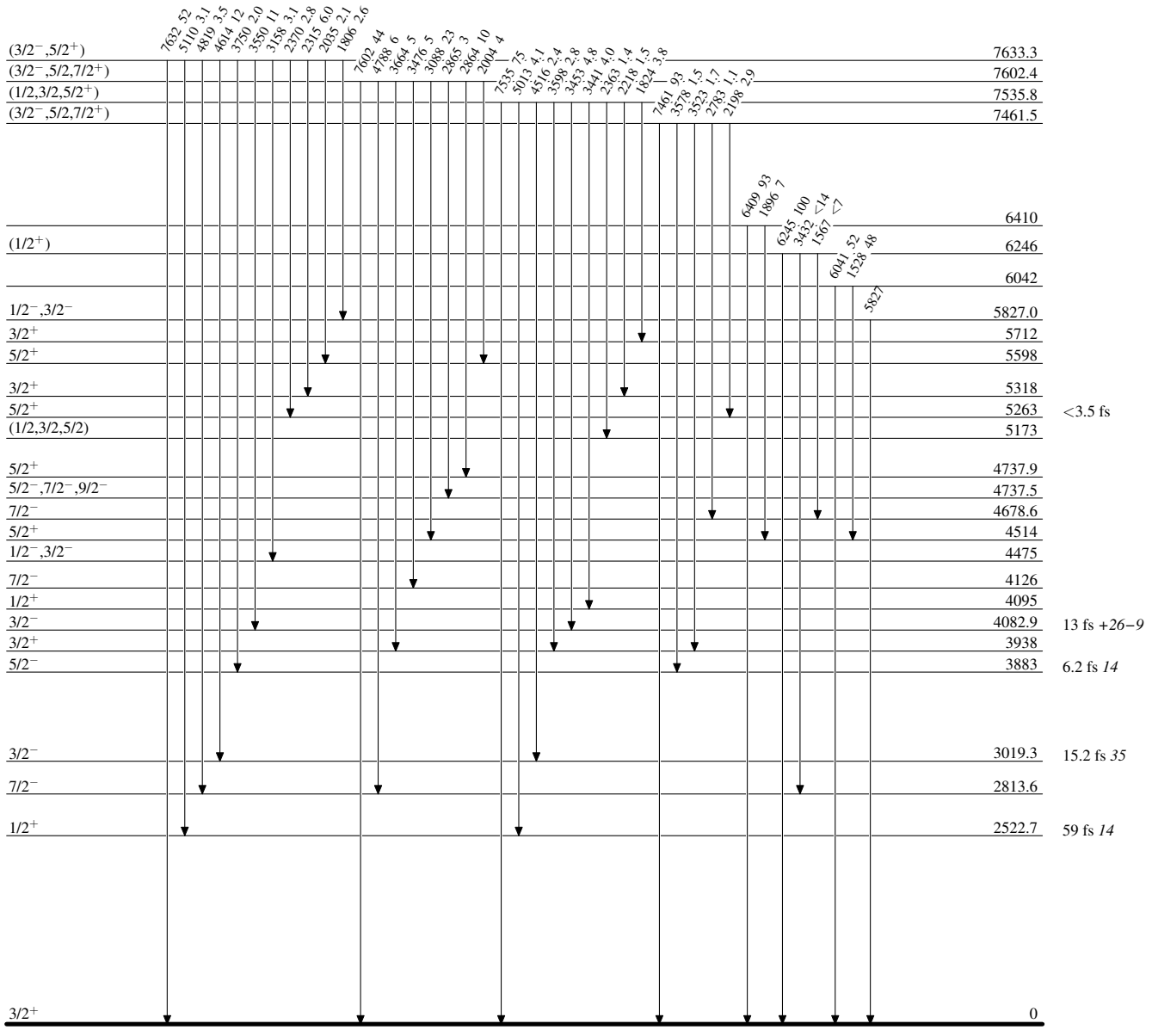



$^{39}_{19}K_{20}$

## $^{38}$Ar(p,$\gamma$):resonances 1984Ha27,1986Zi02,1970Ma31

Level Scheme (continued)

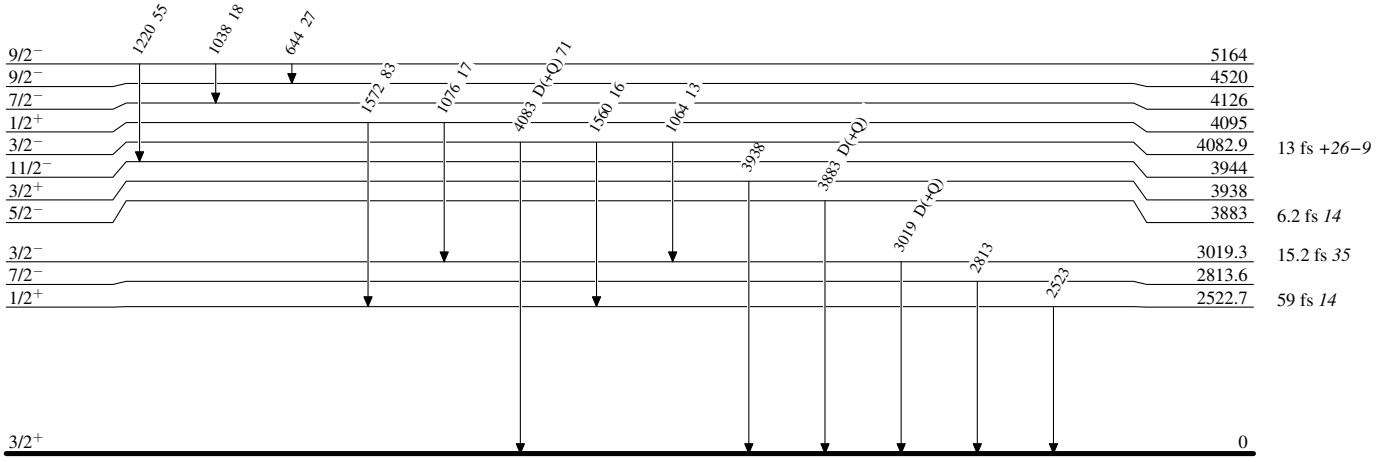
Intensities: % photon branching from each level



**$^{38}$Ar(p,γ):resonances 1984Ha27,1986Zi02,1970Ma31**

Level Scheme (continued)

Intensities: % photon branching from each level




$^{39}_{19}K_{20}$