

Table 19.7 from (1983AJ01): Radiative transitions in  $^{19}\text{F}$  †

| $E_i$ (MeV)           | $J_i^\pi$        | $E_f$ (MeV) | Branching ratio (%)          | $\delta$                              |
|-----------------------|------------------|-------------|------------------------------|---------------------------------------|
| 0.110                 | $\frac{1}{2}^-$  | 0           | 100 <sup>a</sup>             |                                       |
| 0.197                 | $\frac{5}{2}^+$  | 0           | 100 <sup>a</sup>             |                                       |
|                       |                  | 0.110       | < 0.06                       |                                       |
| 1.35                  | $\frac{5}{2}^-$  | 0.110       | $96.8 \pm 1$                 | $0.0 \pm 0.7$                         |
|                       |                  | 0.197       | $3.2 \pm 1$                  |                                       |
| 1.46 <sup>b</sup>     | $\frac{3}{2}^-$  | 0           | $20.5 \pm 0.7$ <sup>c</sup>  | $0.01 \pm 0.03$ <sup>d</sup>          |
|                       |                  | 0.110       | $68.8 \pm 0.9$ <sup>c</sup>  | $0.248 \pm 0.020$ <sup>d</sup>        |
|                       |                  | 0.197       | $10.7 \pm 0.5$ <sup>c</sup>  |                                       |
| 1.55 <sup>b</sup>     | $\frac{3}{2}^+$  | 0           | $2.55 \pm 0.10$ <sup>a</sup> |                                       |
|                       |                  | 0.110       | $4.85 \pm 0.12$ <sup>a</sup> |                                       |
|                       |                  | 0.197       | $92.6 \pm 0.2$ <sup>a</sup>  |                                       |
| 2.78 <sup>b</sup>     | $\frac{9}{2}^+$  | 0.197       | 100 <sup>a</sup>             |                                       |
| 3.91 <sup>b,e</sup>   | $\frac{3}{2}^+$  | 0           | $48 \pm 2$ <sup>a</sup>      |                                       |
|                       |                  | 0.110       | $17 \pm 2$ <sup>a</sup>      |                                       |
|                       |                  | 0.197       | $14 \pm 2$ <sup>a</sup>      |                                       |
|                       |                  | 1.55        | $21 \pm 3$ <sup>a</sup>      |                                       |
| 4.00 <sup>b</sup>     | $\frac{7}{2}^-$  | 0.197       | $18 \pm 4$                   |                                       |
|                       |                  | 1.35        | $70 \pm 4$                   |                                       |
|                       |                  | 1.46        | $12 \pm 6$                   |                                       |
| 4.03 <sup>b</sup>     | $\frac{9}{2}^-$  | 1.35        | 100                          |                                       |
| 4.38 <sup>f,g</sup>   | $\frac{7}{2}^+$  | 0           | < 5                          |                                       |
|                       |                  | 0.110       | < 2                          |                                       |
|                       |                  | 0.197       | $80.5 \pm 2.0$ <sup>a</sup>  | $0.155 \pm 0.022$                     |
|                       |                  | 2.78        | $19.5 \pm 1.0$ <sup>a</sup>  | $-0.16 \pm 0.07$                      |
| 4.55 <sup>b,h,i</sup> | $\frac{5}{2}^+$  | 0.197       | $69 \pm 7$                   |                                       |
|                       |                  | 1.35        | $5 \pm 3$                    |                                       |
|                       |                  | 1.46        | $8 \pm 3$                    |                                       |
|                       |                  | 1.55        | $18 \pm 4$                   |                                       |
| 4.56 <sup>b</sup>     | $\frac{3}{2}^-$  | 0           | $36 \pm 4$                   |                                       |
|                       |                  | 0.110       | $45 \pm 5$                   |                                       |
|                       |                  | 0.197       | $9 \pm 3$                    |                                       |
|                       |                  | 1.35        | $4 \pm 3$                    |                                       |
|                       |                  | 1.46        | < 4                          |                                       |
|                       |                  | 1.55        | $6 \pm 3$                    |                                       |
| 4.65                  | $\frac{13}{2}^+$ | 2.78        | 100                          | $ M ^2 = 5.5 \pm 1.8$ W.u.            |
| 4.68 <sup>b,c,j</sup> | $\frac{5}{2}^-$  | 0.197       | $5.6 \pm 0.9$                | $0 < \delta < 2.0$                    |
|                       |                  | 1.35        | $63.1 \pm 3.8$               | $-0.22^{+0.14}_{-0.24}$               |
|                       |                  | 1.46        | $31.3 \pm 2.2$               | $0.0 \pm 0.24$ or $2.0^{+1.5}_{-0.6}$ |

Table 19.7 from (1983AJ01): Radiative transitions in  $^{19}\text{F}^\dagger$  (continued)

| $E_i$ (MeV)       | $J_i^\pi$           | $E_f$ (MeV) | Branching ratio (%) | $\delta$                               |
|-------------------|---------------------|-------------|---------------------|--|
| 5.11              | $\frac{5}{2}^+$     | 0.197       | 80                  | $\Gamma_\gamma/\Gamma = 0.83 \pm 0.10$ |
|                   |                     | 1.46        | 20                  |  |
| 5.34              | $\frac{1}{2}^{(+)}$ | 0           | $37 \pm 4$          |  |
|                   |                     | 0.110       | $42 \pm 4$          |  |
|                   |                     | 1.46        | $20 \pm 2$          |  |
| 5.42              | $\frac{7}{2}^-$     | 1.35        | 70                  |  |
|                   |                     | 1.46        | 13                  |  |
|                   |                     | 4.00        | 10                  |  |
|                   |                     | 4.03        | 6                   |  |
| 5.46              | $\frac{7}{2}^+$     | 0.197       | 4                   |  |
|                   |                     | 1.35        | 32                  |  |
|                   |                     | 1.55        | 5                   |  |
|                   |                     | 2.78        | 59                  |  |
| 5.50              | $\frac{3}{2}^+$     | 0.110       | 25                  |  |
|                   |                     | 0.197       | 49                  |  |
|                   |                     | 1.35        | 16                  |  |
|                   |                     | 1.55        | 11                  |  |
| 5.54              | $\frac{5}{2}^+$     | 0           | 7                   |  |
|                   |                     | 0.197       | 47                  |  |
|                   |                     | 1.46        | 45                  |  |
| 5.62 <sup>l</sup> | $\frac{3}{2}^-$     | 0.197       | $39 \pm 4$          |  |
|                   |                     | 1.35        | $61 \pm 4$          |  |
| 5.94              | $\frac{1}{2}^+$     | 0           | $7 \pm 4$           |  |
|                   |                     | 0.110       | $20 \pm 6$          |  |
|                   |                     | 0.197       | $2 \pm 1$           |  |
|                   |                     | 1.46        | $63 \pm 6$          | $0.25 \pm 0.02$                        |
|                   |                     | 1.55        | $< 2$               |  |
| 6.07 <sup>m</sup> | $\frac{7}{2}^+$     | 3.91        | $8 \pm 3$           | $0.28 \pm 0.09$                        |
|                   |                     | 0.197       | $54 \pm 5$          | $-0.26 \pm 0.02$                       |
|                   |                     | 1.35        | $19 \pm 2$          |  |
|                   |                     | 1.55        | $1_{-0.5}^{+1}$     | $0.035 \pm 0.023$                      |
|                   |                     | 2.78        | $23 \pm 3$          | $0.06 \pm 0.08$                        |
|                   |                     | 4.38        | $4 \pm 1$           |  |
| 6.09 <sup>n</sup> | $\frac{3}{2}^-$     | 0           | $25 \pm 4$          | $-0.021 \pm 0.014$                     |
|                   |                     | 0.110       | $61 \pm 5$          | $0.045 \pm 0.021$                      |
|                   |                     | 0.197       | $14 \pm 3$          | $0.014 \pm 0.043$                      |
| 6.16 <sup>o</sup> | $\frac{7}{2}^-$     | 0.197       | $31 \pm 3$          | $-0.045 \pm 0.025$                     |
|                   |                     | 1.35        | $65 \pm 4$          | $0.077 \pm 0.007$                      |

Table 19.7 from (1983AJ01): Radiative transitions in  $^{19}\text{F}^\dagger$  (continued)

| $E_i$ (MeV)        | $J_i^\pi$        | $E_f$ (MeV) | Branching ratio (%) | $\delta$                            |
|--------------------|------------------|-------------|---------------------|-------------------------------------|
| 6.28               | $\frac{5}{2}^+$  | 1.46        | $1.3 \pm 0.6$       | $-0.05 \pm 0.07$                    |
|                    |                  | 4.00        | $1.6 \pm 0.6$       |                                     |
|                    |                  | 4.03        | $2.3 \pm 0.3$       |                                     |
|                    |                  | 0           | $14 \pm 2$          |                                     |
|                    |                  | 0.197       | $4.2 \pm 1.0$       |                                     |
|                    |                  | 1.35        | $36 \pm 2$          |                                     |
| 6.33               | $\frac{7}{2}^+$  | 1.46        | $26 \pm 2$          | $-0.01 \pm 0.09$                    |
|                    |                  | 1.55        | $20 \pm 2$          | $-0.02 \pm 0.04$                    |
|                    |                  | 0.197       | $56 \pm 3$          | $0.11 \pm 0.06$                     |
|                    |                  | 1.35        | $17 \pm 2$          | $-0.27 \pm 0.24$                    |
| 6.497              | $\frac{3}{2}^+$  | 1.55        | $8.5 \pm 1.5$       | $-0.02 \pm 0.03$                    |
|                    |                  | 4.38        | $18 \pm 2$          | $0.00 \pm 0.14$                     |
|                    |                  | 0           | $38 \pm 2$          | $0.04 \pm 0.20$                     |
|                    |                  | 0.110       | $14 \pm 2$          | $-0.06 \pm 0.04$ or $2.00 \pm 0.17$ |
|                    |                  | 0.197       | $9 \pm 2$           | $0.00 \pm 0.03$                     |
|                    |                  | 1.35        | $14 \pm 2$          | $0.3 \rightarrow 1.8$               |
| 6.500 <sup>p</sup> | $\frac{11}{2}^+$ | 1.46        | $25 \pm 2$          | $-0.11 \pm 0.09$                    |
|                    |                  | 2.78        | 55                  | $0.00 \pm 0.07$                     |
|                    |                  | 4.65        | 45                  |                                     |
|                    |                  | 4.65        | 45                  |                                     |
| 6.53               | $\frac{3}{2}^+$  | 0           | $29 \pm 2$          | $0.32 \pm 0.04$ or $0.90 \pm 0.06$  |
|                    |                  | 0.110       | $59 \pm 3$          | $0.00 \pm 0.02$                     |
|                    |                  | 4.55        | $12 \pm 2$          | $-0.23 \pm 0.13$                    |
| 6.55               | $\frac{7}{2}$    | 0.197       | $19 \pm 2$          | $-0.03 \pm 0.05$                    |
|                    |                  | 1.35        | $55 \pm 4$          | $0.01 \pm 0.03$                     |
|                    |                  | 2.78        | $26 \pm 3$          | $0.05 \pm 0.07$                     |
| 6.59 <sup>q</sup>  | $\frac{9}{2}^+$  | 0.197       | $13 \pm 2$          | $-0.13 \pm 0.13$                    |
|                    |                  | 2.78        | $63 \pm 3$          | $-0.20 \pm 0.20$                    |
|                    |                  | 4.38        | $24 \pm 2$          | $0.02 \pm 0.07$                     |
| 6.79               | $\frac{3}{2}^-$  | 0           | $15 \pm 2$          | $-0.08 \pm 0.03$                    |
|                    |                  | 0.110       | $39 \pm 2$          | $0.11 \pm 0.02$                     |
|                    |                  | 0.197       | $13 \pm 2$          | $0.05 \pm 0.06$                     |
|                    |                  | 1.35        | $5.3 \pm 0.8$       |                                     |
|                    |                  | 1.46        | $25 \pm 2$          | $-0.13 \pm 0.08$                    |
|                    |                  | 3.91        | $2.6 \pm 1.0$       |                                     |
| 6.84               | $\frac{5}{2}^+$  | 0           | $9 \pm 5$           |                                     |
|                    |                  | 0.110       | $9 \pm 5$           |                                     |
|                    |                  | 0.197       | $27 \pm 6$          | $-0.5 \pm 0.5$                      |
|                    |                  | 0.197       | $27 \pm 6$          |                                     |
|                    |                  | 1.35        | $10 \pm 7$          |                                     |

Table 19.7 from (1983AJ01): Radiative transitions in  $^{19}\text{F}^\dagger$  (continued)

| $E_i$ (MeV)         | $J_i^\pi$                        | $E_f$ (MeV) | Branching ratio (%) | $\delta$                         |
|---------------------|----------------------------------|-------------|---------------------|----------------------------------|
| 6.89 <sup>r</sup>   | $\frac{3}{2}^-$                  | 1.46        | $45 \pm 8$          | $-0.02 \pm 0.11$                 |
|                     |                                  | 0           | $9 \pm 2$           |                                  |
|                     |                                  | 1.35        | $61 \pm 5$          | $0.22 \rightarrow 2.2$           |
| 6.93                | $\frac{7}{2}^-$                  | 1.46        | $30 \pm 5$          | $0.15 \pm 0.12$                  |
|                     |                                  | 0.197       | $73 \pm 3$          | $-0.01 \pm 0.03$                 |
|                     |                                  | 1.35        | $22 \pm 2$          | $0.01 \pm 0.02$                  |
|                     |                                  | 2.78        | $2.4 \pm 0.5$       | $0.00 \pm 0.16$                  |
|                     |                                  | 4.00        | $1.3 \pm 0.5$       |                                  |
| 7.17                | $\frac{11}{2}^-$                 | 4.03        | $1.3 \pm 0.5$       |                                  |
|                     |                                  | 4.00        | $5 \pm 1$           |                                  |
|                     |                                  | 4.03        | $91 \pm 1$          |                                  |
| 7.54                | $\frac{5}{2}^+; T = \frac{3}{2}$ | 4.65        | $4 \pm 1$           |                                  |
|                     |                                  | 0.197       | $29 \pm 3$          | $0.09 \pm 0.04$                  |
|                     |                                  | 1.35        | $1.2 \pm 0.4$       |                                  |
|                     |                                  | 1.55        | $41 \pm 3$          | $0.017 \pm 0.015$                |
|                     |                                  | 4.38        | $27 \pm 3$          | $0.042 \pm 0.030$                |
| 7.66 <sup>b,t</sup> | $\frac{3}{2}^+; T = \frac{3}{2}$ | 5.11        | $1.7 \pm 0.4$       |                                  |
|                     |                                  | 0           | $38 \pm 4$          | $0.06 \pm 0.02$                  |
|                     |                                  | 0.197       | $13 \pm 2$          | $0.06 \pm 0.07$ or $3.5 \pm 1.1$ |
|                     |                                  | 1.55        | $36 \pm 2$          | $0.06 \pm 0.04$                  |
|                     |                                  | 3.91        | $(3_{-2}^{+3})$     |                                  |
|                     |                                  | 4.55        | $5.1 \pm 0.3$       | $-0.11 \pm 0.13$                 |
|                     |                                  | 5.11        | $5.9 \pm 0.5$       | $-0.04 \pm 0.16$                 |
| 7.93                | $\frac{7}{2}^+, \frac{9}{2}$     | 0.197       | 4                   |                                  |
|                     |                                  | 2.78        | 96                  |                                  |
| 7.94 <sup>u</sup>   | $\frac{11}{2}^+$                 | 2.78        | 10                  |                                  |
|                     |                                  | 4.65        | 90                  |                                  |
| 8.14 <sup>v</sup>   | $\frac{1}{2}^+$                  | 0           | $8 \pm 1$           |                                  |
|                     |                                  | 0.11        | $24 \pm 2$          |                                  |
|                     |                                  | 0.197       | $8 \pm 1$           |                                  |
|                     |                                  | 1.55        | $2 \pm 1$           |                                  |
|                     |                                  | 3.91        | $54 \pm 2$          | $\Gamma_\gamma = 1.3 \text{ eV}$ |
|                     |                                  | 5.94        | $1.0 \pm 0.5$       |                                  |
|                     |                                  | 6.26        | $3 \pm 1$           |                                  |
| 8.25 <sup>v</sup>   | $(\frac{5}{2}^+)$                | 0.197       | $18 \pm 7$          |                                  |
|                     |                                  | 1.35        | $33 \pm 10$         |                                  |
|                     |                                  | 1.46        | $24 \pm 8$          |                                  |
|                     |                                  | 3.91        | $25 \pm 8$          |                                  |

Table 19.7 from (1983AJ01): Radiative transitions in  $^{19}\text{F}^\dagger$  (continued)

| $E_i$ (MeV)         | $J_i^\pi$                    | $E_f$ (MeV) | Branching ratio (%) | $\delta$   |
|---------------------|------------------------------|-------------|---------------------|--|
| 8.29 <sup>w</sup>   | $\frac{13}{2}^-$             | 4.03        | $93 \pm 4$          | $\Gamma_\gamma = 72 \pm 8 \text{ meV}$           |
|                     |                              | 4.65        | $7 \pm 4$           |  |
| 8.31 <sup>x</sup>   | $\frac{5}{2}^+$              | 0           | $9 \pm 3$           | $\Gamma_\gamma = 0.71 \pm 0.17 \text{ eV}$       |
|                     |                              |             | $12 \pm 1^A$        |  |
|                     |                              | 1.55        | $48 \pm 6$          |  |
|                     |                              |             | $48 \pm 2^A$        |  |
|                     |                              | 4.38        | $43 \pm 6$          |  |
| 8.37 <sup>w</sup>   | $\frac{7}{2}, \frac{5}{2}^+$ | 0.197       | $13 \pm 2$          | $\delta = 0.02 \pm 0.05 \text{ or } 2.2 \pm 0.6$ |
|                     |                              | 1.35        | $39 \pm 3$          |  |
|                     |                              | 2.78        | $30 \pm 3$          |  |
|                     |                              | 4.00        | $18 \pm 3$          |  |
|                     |                              |             | $40 \pm 2^A$        |  |
| 8.58                | $\frac{5}{2}^+$              | 0           | $4 \pm 1^A$         | $\delta = -0.14 \pm 0.07$                        |
|                     |                              | 0.197       | $44 \pm 2$          |  |
|                     |                              |             | $38 \pm 5^A$        |  |
|                     |                              | 1.35        | $24 \pm 2$          |  |
|                     |                              |             | $23 \pm 3^A$        |  |
|                     |                              | 1.55        | $20 \pm 2$          |  |
|                     |                              |             | $20 \pm 3^A$        |  |
|                     |                              | 4.00        | $4 \pm 1^w$         |  |
|                     |                              | 4.55        | $2.0 \pm 0.7^A$     |  |
|                     |                              | 5.42        | $6 \pm 1$           |  |
|                     |                              |             | $4 \pm 1^A$         |  |
|                     |                              | 5.46        | $2.0 \pm 0.5^A$     |  |
|                     |                              | 5.62        | $2.2 \pm 0.5^A$     |  |
|                     |                              | 5.94        | $1.8 \pm 0.5^A$     |  |
|                     |                              | 6.16        | $2.5 \pm 0.5^A$     |  |
| 8.59 <sup>b,x</sup> | $\frac{3}{2}^-$              | 6.93        | $0.5 \pm 0.3^A$     | $\Gamma_\gamma = 0.85 \pm 0.17 \text{ eV}$       |
|                     |                              | 0           | $5 \pm 2^A$         |  |
|                     |                              | 0.11        | $3 \pm 1^A$         |  |
|                     |                              | 0.197       | $59 \pm 2$          |  |
|                     |                              |             | $42 \pm 2^A$        |  |
|                     |                              | 1.35        | $7 \pm 1^A$         |  |
|                     |                              | 1.55        | $34 \pm 2$          |  |
|                     |                              |             | $28 \pm 3^A$        |  |
|                     |                              | 3.91        | $7 \pm 1$           |  |
|                     |                              |             | $8 \pm 1^A$         |  |
|                     | $3.6 \pm 0.6^A$              |             |                     |  |

Table 19.7 from (1983AJ01): Radiative transitions in  $^{19}\text{F}^\dagger$  (continued)

| $E_i$ (MeV)         | $J_i^\pi$                        | $E_f$ (MeV)       | Branching ratio (%) | $\delta$                    |                   |  |                                  |
|---------------------|----------------------------------|-------------------|---------------------|-----------------------------|-------------------|--|----------------------------------|
| 8.63 <sup>w</sup>   | $\frac{7}{2}^-$                  | 5.11              | $1.0 \pm 0.5^A$     |                             |                   |  |                                  |
|                     |                                  | 5.50              | $1.5 \pm 0.5^A$     |                             |                   |  |                                  |
|                     |                                  | 6.28              | $0.6 \pm 0.2^A$     |                             |                   |  |                                  |
|                     |                                  | 6.79              | $0.3 \pm 0.1^A$     |                             |                   |  |                                  |
|                     |                                  | 0.197             | $34 \pm 2$          |                             |                   |  |                                  |
|                     |                                  | 1.35              | $6 \pm 1$           |                             |                   |  |                                  |
|                     |                                  | 1.46              | $6 \pm 1$           |                             |                   |  |                                  |
|                     |                                  | 2.78              | $38 \pm 2$          |                             |                   |  |                                  |
|                     |                                  | 4.00              | $13 \pm 1$          |                             |                   |  |                                  |
|                     |                                  | 4.03              | $3 \pm 1$           |                             |                   |  |                                  |
| 8.65 <sup>v</sup>   | $\frac{1}{2}^+$                  | 0.11              | $53 \pm 6$          |                             |                   |  |                                  |
|                     |                                  | 1.46              | $23 \pm 6$          |                             |                   |  |                                  |
|                     |                                  | 3.91              | $24 \pm 6$          |                             |                   |  |                                  |
| 8.79 <sup>b,v</sup> | $\frac{1}{2}^+; T = \frac{3}{2}$ | 0                 | $1.2 \pm 0.4$       |                             |                   |  |                                  |
|                     |                                  | 0.11              | $30 \pm 1$          |                             |                   |  |                                  |
|                     |                                  | 0.197             | $0.3 \pm 0.2$       |                             |                   |  |                                  |
|                     |                                  | 1.46              | $22 \pm 1$          |                             |                   |  |                                  |
|                     |                                  | 1.55              | $8 \pm 1$           |                             |                   |  |                                  |
|                     |                                  | 3.91              | $22 \pm 1$          |                             |                   |  |                                  |
|                     |                                  | 5.34              | $0.5 \pm 0.1$       |                             |                   |  |                                  |
|                     |                                  | 5.94              | $1.8 \pm 0.2$       |                             |                   |  |                                  |
|                     |                                  | 6.09              | $1.7 \pm 0.2$       |                             |                   |  |                                  |
|                     |                                  | 6.26              | $0.2 \pm 0.1$       |                             |                   |  |                                  |
|                     |                                  | 6.49              | $6 \pm 1$           |                             |                   |  |                                  |
|                     |                                  | 6.53              | $2.1 \pm 0.2$       |                             |                   |  |                                  |
|                     |                                  | 6.79              | $1.2 \pm 0.3$       |                             |                   |  |                                  |
|                     |                                  | 6.99              | $0.5 \pm 0.1$       |                             |                   |  |                                  |
|                     |                                  | 7.26              | $1.7 \pm 0.2$       |                             |                   |  |                                  |
|                     |                                  | 7.36              | $0.6 \pm 0.1$       |                             |                   |  |                                  |
|                     |                                  | 7.66              | $0.2 \pm 0.1$       |                             |                   |  |                                  |
|                     |                                  | 8.86 <sup>w</sup> | $\frac{3}{2}$       |                             | 1.35              | 100  |                                  |
|                     |                                  |                   |                     |                             | 8.92 <sup>v</sup> | $\frac{3}{2}$  |                                  |
|                     |                                  | 8.92 <sup>v</sup> | $\frac{3}{2}$       |                             | 0.11              | $10 \pm 2$   | $0.20 \pm 0.04$ or $2.9 \pm 0.4$ |
| 0.197               | $24 \pm 7$                       |                   |                     | $1.0 \pm 0.8$               |                   |  |                                  |
| 1.46                | $25 \pm 7$                       |                   |                     | $3.0 \pm 2.5$               |                   |  |                                  |
| 1.55                | $23 \pm 7$                       |                   |                     | $0.30 \pm 0.06$ or $\infty$ |                   |  |                                  |
| 3.91                | $13 \pm 7$                       |                   |                     |                             |                   |  |                                  |
| 8.95 <sup>w</sup>   | $\frac{11}{2}^-$                 |                   |                     | 2.78                        | $50 \pm 2$        | $\Gamma_\gamma(\text{tot}) = 230 \pm 30 \text{ meV}$ |                                  |
| 2.78                |                                  |                   |                     | $50 \pm 2$                  |                   |  |                                  |

Table 19.7 from (1983AJ01): Radiative transitions in  $^{19}\text{F}^\dagger$  (continued)

| $E_i$ (MeV)        | $J_i^\pi$                       | $E_f$ (MeV)       | Branching ratio (%) | $\delta$                                |
|--------------------|---------------------------------|-------------------|---------------------|---|
| 9.03 <sup>w</sup>  | $\frac{5}{2}, \frac{7}{2}$      | 4.00              | $26 \pm 2$          |   |
|                    |                                 | 4.03              | $9 \pm 1$           |   |
|                    |                                 | 4.65              | $10 \pm 2$          |   |
|                    |                                 | 5.42              | $5 \pm 1$           |   |
|                    |                                 | 0.197             | $44 \pm 5$          |   |
|                    |                                 | 4.38              | $30 \pm 5$          |   |
|                    |                                 | 6.07              | $26 \pm 4$          |   |
| 9.098 <sup>x</sup> | $\frac{7}{2}^-$                 | 0.197             | $2.0 \pm 0.3^A$     | $\delta = 0.0 \pm 0.2$ or $2.5 \pm 0.6$ |
|                    |                                 | 1.35              | $2.7 \pm 0.3^A$     | $-0.1 \pm 0.3$ or $\infty$              |
|                    |                                 | 2.78              | $71 \pm 2$          |   |
|                    |                                 |                   | $47 \pm 2^A$        | $-0.09 \pm 0.10$                        |
|                    |                                 | 4.00              | $2.5 \pm 0.3^A$     | $0.3 \pm 0.3$ or $-2.2 \pm 0.9$         |
|                    |                                 | 4.03              | $9 \pm 1$           |   |
|                    |                                 |                   | $7.0 \pm 0.5^A$     | $-0.08 \pm 0.01$ or $\infty$            |
|                    |                                 | 4.68              | $2.0 \pm 0.3^A$     | $-0.09 \pm 0.34$ or $\infty$            |
|                    |                                 | 5.11              | $1.2 \pm 0.2^A$     | $0.0 \pm 0.2$ or $3.0 \pm 1.6$          |
|                    |                                 | 5.42              | $20 \pm 2$          |   |
| 9.101 <sup>w</sup> | $\frac{7}{2}^+, \frac{9}{2}^+$  |                   | $19 \pm 2^A$        | $0.25 \pm 0.10$ or $-6.0 \pm 5.5$       |
|                    |                                 | 5.54              | $1.3 \pm 0.7^A$     | $0.1 \pm 0.3$                           |
|                    |                                 | 5.62              | $3.3 \pm 0.3^A$     | $0.17 \pm 0.10$                         |
|                    |                                 | 6.10              | $12 \pm 1^A$        | $0.0 \pm 0.3$                           |
|                    |                                 | 2.78              | $11 \pm 2$          |   |
|                    |                                 | 4.00              | $24 \pm 2$          |   |
|                    |                                 | 4.38              | $24 \pm 2$          |   |
|                    |                                 | 6.07              | $15 \pm 2$          |   |
|                    |                                 | 6.33              | $10 \pm 2$          |   |
|                    |                                 | 9.17 <sup>w</sup> | $\frac{1}{2}^+$     | 0.197                                   |
| 9.20 <sup>w</sup>  | $\frac{3}{2}$                   | 1.55              | $30 \pm 2$          |   |
|                    |                                 | 4.56              | $19 \pm 2$          |   |
|                    |                                 | 0                 | $18 \pm 2$          |   |
|                    |                                 | 0.110             | $46 \pm 3$          |   |
| 9.27 <sup>w</sup>  | $\frac{11}{2}^+, \frac{9}{2}^+$ | 0.197             | $10 \pm 4$          |   |
|                    |                                 | 1.35              | $26 \pm 3$          |   |
|                    |                                 | 2.78              | $27 \pm 2$          |   |
|                    |                                 | 4.38              | $18 \pm 2$          |   |
|                    |                                 | 4.65              | $55 \pm 3$          |   |
| 9.28 <sup>w</sup>  | $\frac{7}{2}, \frac{9}{2}$      | 4.00              | $58 \pm 3$          |   |
|                    |                                 | 4.03              | $42 \pm 3$          |   |

Table 19.7 from (1983AJ01): Radiative transitions in  $^{19}\text{F}^\dagger$  (continued)

| $E_i$ (MeV)         | $J_i^\pi$       | $E_f$ (MeV)       | Branching ratio (%)        | $\delta$                         |      |            |  |
|---------------------|-----------------|-------------------|----------------------------|----------------------------------|------|------------|--|
| 9.32 <sup>b,x</sup> | $\frac{1}{2}^+$ | 0                 | $29 \pm 2$<br>$30 \pm 1^A$ | $0.10 \pm 0.08$ or $1.4 \pm 0.3$ |      |            |  |
|                     |                 | 0.197             | $9 \pm 1$<br>$12 \pm 1^A$  | $0.1 \pm 0.4$ or $\geq 0.6$      |      |            |  |
|                     |                 | 1.46              | $41 \pm 3$<br>$28 \pm 1^A$ | $0.1 \pm 0.2$                    |      |            |  |
|                     |                 | 1.55              | $21 \pm 3$<br>$17 \pm 1^A$ | $-0.2 \pm 0.3$ or $\leq 0.9$     |      |            |  |
|                     |                 | 3.91              | $3.0 \pm 0.3^A$            | $0.40 \pm 0.05$ or $\geq 2.3$    |      |            |  |
|                     |                 | 4.56              | $3.2 \pm 0.3^A$            | $0.2 \pm 0.3$                    |      |            |  |
|                     |                 | 4.68              | $6.8 \pm 0.5^A$            | $0.1 \pm 0.2$                    |      |            |  |
|                     |                 | 9.33 <sup>w</sup> | $< \frac{5}{2}^+$          | 1.55                             | 100  |            |  |
|                     |                 | 9.51 <sup>w</sup> |                            | $\frac{5}{2}^+, \frac{7}{2}^+$   | 1.35 | $14 \pm 2$ |  |
|                     |                 |                   |                            |                                  | 1.55 | $14 \pm 2$ |  |
| 9.54 <sup>v</sup>   | $\frac{5}{2}^+$ | 2.78              | $72 \pm 3$                 |                                  |      |            |  |
|                     |                 | 1.35              | $100^w$                    |                                  |      |            |  |
|                     |                 |                   | $26 \pm 2^A$               | $0.3 \pm 1.1$                    |      |            |  |
|                     |                 | 4.56              | $15 \pm 1$                 | $0.7 \pm 0.4$                    |      |            |  |
|                     |                 | 4.68              | $12 \pm 1$                 | $0.3 \pm 0.3$                    |      |            |  |
|                     |                 | 5.11              | $29 \pm 2$                 | $0.3 \pm 0.2$                    |      |            |  |
|                     |                 | 7.54              | $10 \pm 1$                 | $0.7 \pm 0.3$                    |      |            |  |
|                     |                 | 7.66              | $6 \pm 1$                  | $0.4 \pm 0.3$ or $1.0 \pm 0.4$   |      |            |  |
| 9.565 <sup>v</sup>  | $\frac{3}{2}^-$ | 8.02              | $2 \pm 1$                  |                                  |      |            |  |
|                     |                 | 0.197             | $77 \pm 10$                |                                  |      |            |  |
| 9.574 <sup>v</sup>  | $\frac{3}{2}^-$ | 6.26              | $23 \pm 6$                 |                                  |      |            |  |
|                     |                 | 1.46              | $26 \pm 2$                 | $-0.1 \pm 0.2$                   |      |            |  |
|                     |                 | 3.91              | $4 \pm 1$                  | $-6 \pm 7$                       |      |            |  |
|                     |                 | 4.55              | $17 \pm 2$                 |                                  |      |            |  |
|                     |                 | 6.09              | $38 \pm 2$                 | $1.8 \pm 1.0$                    |      |            |  |
|                     |                 | 7.54              | $11 \pm 2$                 | $-0.3 \pm 0.8$                   |      |            |  |
| 9.59 <sup>x</sup>   | $\frac{7}{2}$   | 7.66              | $4 \pm 1$                  | $-0.1 \pm 1.3$                   |      |            |  |
|                     |                 | 0.197             | $24 \pm 2^w$               |                                  |      |            |  |
|                     |                 | 1.35              | $17 \pm 2$<br>$32 \pm 4^A$ | $0.0 \pm 0.5$ or $3.7 \pm 2.5$   |      |            |  |
|                     |                 | 2.78              | $33 \pm 3$<br>$30 \pm 2^A$ | $0.1 \pm 0.2$ or $11 \pm 5$      |      |            |  |
|                     |                 | 4.00              | $15 \pm 2$<br>$17 \pm 2^A$ | $-0.7 \pm 1.1$                   |      |            |  |



Table 19.7 from (1983AJ01): Radiative transitions in  $^{19}\text{F}^\dagger$  (continued)

| $E_i$ (MeV)         | $J_i^\pi$                  | $E_f$ (MeV)         | Branching ratio (%)             | $\delta$                          |                 |                 |
|---------------------|----------------------------|---------------------|---------------------------------|-----------------------------------|-----------------|-----------------|
| 9.64 <sup>w</sup>   | $\frac{3}{2}, \frac{5}{2}$ | 4.03                | $11 \pm 1^w$                    |                                   |                 |                 |
|                     |                            | 4.55                | $21 \pm 2^A$                    |                                   |                 |                 |
|                     |                            | 0.197               | $13 \pm 3$                      |                                   |                 |                 |
|                     |                            | 1.35                | $61 \pm 7$                      |                                   |                 |                 |
|                     |                            | 4.55                | $26 \pm 6$                      |                                   |                 |                 |
| 9.65 <sup>w</sup>   | $\frac{3}{2}, \frac{5}{2}$ | 1.35                | $41 \pm 9$                      |                                   |                 |                 |
|                     |                            | 1.55                | $59 \pm 9$                      |                                   |                 |                 |
|                     |                            | 0                   | $34 \pm 5$                      |                                   |                 |                 |
| 9.67 <sup>b,x</sup> | $\frac{3}{2}^+$            | 0                   | $22 \pm 2^A$                    | $-0.72 \pm 0.04$ or $-10 \pm 4$   |                 |                 |
|                     |                            | 0.11                | $36 \pm 5$                      |                                   |                 |                 |
|                     |                            |                     | $20 \pm 2^A$                    | $0.00 \pm 0.05$                   |                 |                 |
|                     |                            | 0.197               | $9 \pm 1^A$                     | $0.30 \pm 0.03$ or $1.7 \pm 0.3$  |                 |                 |
|                     |                            | 1.35                | $9 \pm 1^A$                     | $0.00 \pm 0.03$                   |                 |                 |
|                     |                            | 1.46                | $5 \pm 1^A$                     | $0.00 \pm 0.07$                   |                 |                 |
|                     |                            | 1.55                | $30 \pm 6$                      |                                   |                 |                 |
|                     |                            |                     | $10 \pm 1^A$                    | $0.00 \pm 0.06$ or $-4.2 \pm 1.3$ |                 |                 |
|                     |                            | 3.91                | $5.5 \pm 0.5^A$                 | $0.12 \pm 0.03$ or $-7.5 \pm 2.0$ |                 |                 |
|                     |                            | 4.38                | $0.5 \pm 0.2^A$                 |                                   |                 |                 |
|                     |                            | 4.55                | $8 \pm 1^A$                     | $0.00 \pm 0.03$ or $4.7 \pm 0.5$  |                 |                 |
|                     |                            | 5.11                | $1.5 \pm 0.3^A$                 | $0.00 \pm 0.05$                   |                 |                 |
|                     |                            | 5.34                | $1.0 \pm 0.2^A$                 | $-0.22 \pm 0.03$ or $3.3 \pm 0.2$ |                 |                 |
|                     |                            | 6.84                | $1.0 \pm 0.3^A$                 | $0.05 \pm 0.02$ or $3.3 \pm 0.2$  |                 |                 |
|                     |                            | 7.54                | $4.0 \pm 0.3^A$                 | $0.02 \pm 0.03$                   |                 |                 |
|                     |                            | 7.66                | $3.5 \pm 0.3^A$                 | $0.14 \pm 0.04$                   |                 |                 |
|                     |                            | 9.71 <sup>w</sup>   | $\frac{9}{2}^+, \frac{11}{2}^-$ | 2.78                              | $19 \pm 3$      |                 |
|                     |                            |                     |                                 | 4.03                              | $80 \pm 4$      |                 |
|                     |                            |                     |                                 | 4.65                              | $1 \pm 1$       |                 |
|                     |                            |                     |                                 | 0.11                              | $0.7 \pm 0.2^A$ |                 |
|                     |                            | 9.82 <sup>b,x</sup> | $\frac{5}{2}^-$                 | 0.197                             | $41 \pm 2$      |                 |
|                     |                            |                     |                                 |                                   | $41 \pm 2^A$    | $0.00 \pm 0.05$ |
| 1.35                | $2.4 \pm 0.5^A$            |                     |                                 | $-0.6 \pm 0.2$                    |                 |                 |
| 1.46                | $10 \pm 1$                 |                     |                                 |                                   |                 |                 |
|                     | $8 \pm 1^A$                |                     |                                 | $-0.07 \pm 0.05$ or $2.7 \pm 0.7$ |                 |                 |
| 1.55                | $34 \pm 2$                 |                     |                                 |                                   |                 |                 |
|                     | $30 \pm 2^A$               |                     |                                 | $0.01 \pm 0.04$                   |                 |                 |
| 4.00                | $1.0 \pm 0.2^A$            |                     |                                 | $0.0 \pm 0.2$ or $\infty$         |                 |                 |
| 4.55                | $0.5 \pm 0.1^A$            |                     |                                 | $0.30 \pm 0.15$                   |                 |                 |
| 4.68                | $4 \pm 1$                  |                     |                                 |                                   |                 |                 |

Table 19.7 from (1983AJ01): Radiative transitions in  $^{19}\text{F}^\dagger$  (continued)

| $E_i$ (MeV)                            | $J_i^\pi$                                   | $E_f$ (MeV)        | Branching ratio (%)            | $\delta$                          |
|--|---|--------------------|--------------------------------|-----------------------------------|
| 9.83 <sup>w</sup><br>9.87 <sup>x</sup> | $\frac{11}{2}^- \rightarrow \frac{15}{2}^-$ |                    | $4.8 \pm 0.3^A$                | $0.0 \pm 0.1$ or $-1.7 \pm 0.4$   |
|  |   | 5.11               | $0.3 \pm 0.2^A$                | $0.4 \pm 0.5$ or $\infty$         |
|  |   | 5.42               | $11 \pm 1$                     |                                   |
|  |   |                    | $10 \pm 1^A$                   | $-0.04 \pm 0.05$ or $\infty$      |
|  |   | 5.54               | $0.6 \pm 0.2^A$                | $0.0 \pm 0.2$                     |
|  |   | 5.62               | $0.7 \pm 0.2^A$                | $0.33 \pm 0.15$ or $-3.4 \pm 1.2$ |
|  |   | 4.65               | 100                            |                                   |
|  |   | 2.78               | $68 \pm 4$                     |                                   |
|  |   |                    | $63 \pm 3^A$                   | $0.0 \pm 0.2$                     |
|  |   | 4.00               | $5 \pm 1$                      |                                   |
|  |   |                    | $4.2 \pm 1.0^A$                |                                   |
|  |   | 4.03               | $24 \pm 3$                     |                                   |
|  |   |                    | $24 \pm 2^A$                   | $-0.43 \pm 0.05$ or $2.2 \pm 0.2$ |
|  |   | 4.65               | $3 \pm 1$                      |                                   |
|  |   |                    | $2.1 \pm 0.8^A$                |                                   |
| 9.89 <sup>v</sup>                      | $\frac{1}{2}^+$                             | 6.10               | $3.8 \pm 0.8^A$                | $0.2 \pm 0.1$ or $2.7 \pm 1.0$    |
|  |   | 6.50               | $1.9 \pm 0.7^A$                | $-0.4 \pm 0.7$                    |
|  |   | 8.29               | $1.0 \pm 0.3^A$                |                                   |
|  |   | 0.197              | $15 \pm 8$                     |                                   |
|  |   | 1.46               | $15 \pm 5$                     |                                   |
|  |   | 3.91               | $32 \pm 2$                     |                                   |
|  |   | 5.94               | $4 \pm 1$                      |                                   |
|  |   | 6.09               | $13 \pm 3$                     |                                   |
|  |   | 6.53               | $16 \pm 2$                     |                                   |
|  |   | 7.66               | $5 \pm 1$                      |                                   |
| 9.93 <sup>w</sup>                      | $\frac{9}{2}^+$                             | 0.197              | $1 \pm 1$                      |                                   |
|  |   | 2.78               | $19 \pm 1$                     |                                   |
|  |   | 5.46               | $10 \pm 1$                     |                                   |
|  |   | 6.07               | $7 \pm 1$                      |                                   |
|  |   | 6.33               | $8 \pm 1$                      |                                   |
|  |   | 6.50               | $54 \pm 2$                     |                                   |
|  |   | 10.09 <sup>w</sup> | $\frac{5}{2}^-, \frac{7}{2}^-$ | 0.197                             |
| 1.35                                   | $35 \pm 2$                                  |                    |                                |                                   |
| 4.00                                   | $19 \pm 2$                                  |                    |                                |                                   |
| 5.42                                   | $26 \pm 2$                                  |                    |                                |                                   |
| 6.07                                   | $10 \pm 1$                                  |                    |                                |                                   |
| 10.14 <sup>w</sup>                     | $\frac{3}{2}^-$                             | 1.35               | $29 \pm 4$                     |                                   |
|  |   | 1.46               | $71 \pm 4$                     |                                   |

Table 19.7 from (1983AJ01): Radiative transitions in  $^{19}\text{F}^\dagger$  (continued)

| $E_i$ (MeV)        | $J_i^\pi$                              | $E_f$ (MeV) | Branching ratio (%) | $\delta$ |
|--------------------|--|-------------|---------------------|----------|
| 10.37 <sup>w</sup> | $\frac{7}{2} \rightarrow \frac{11}{2}$ | 4.03        | 100                 |          |
| 10.41 <sup>w</sup> | $\frac{13}{2}^+$                       | 2.78        | $3 \pm 1$           |          |
|                    |  | 4.68        | $88 \pm 1$          |          |
|                    |  | 6.50        | $9 \pm 1$           |          |

A = adopted.

<sup>†</sup> For references see [Table 19.7 in \(1978AJ03\)](#). See also [Tables 19.9, 19.15 and 19.16](#).

<sup>a</sup> [\(1982OL02\)](#).

<sup>b</sup> See also [\(1978DI13\)](#).

<sup>c</sup> Revised to sum to 100%: see [\(1978AJ03\)](#).

<sup>d</sup> [\(1980DI12\)](#).

<sup>e</sup> Transitions to  $^{19}\text{F}^*(1.35, 1.46, 2.78)$  are  $< 4$ ,  $< 4$  and  $< 2\%$ .

<sup>f</sup>  $\Gamma_\gamma/\Gamma = 0.91 \pm 0.05$  [\(1976RO07\)](#).

<sup>g</sup> Transitions to  $^{19}\text{F}^*(1.35 + 1.46, 1.55)$  are each  $< 0.8\%$ .

<sup>h</sup>  $\Gamma_\gamma/\Gamma = 0.76 + 0.15$  [\(1976RO07\)](#).

<sup>i</sup> Transitions to  $^{19}\text{F}^*(0, 0.11)$  are each  $< 5\%$ .

<sup>j</sup> Transitions to  $^{19}\text{F}^*(0, 0.11, 1.55, 2.78)$  are  $< 0.5$ ,  $< 1.5$ ,  $< 5$  and  $< 2\%$ .

<sup>k</sup> Transitions to  $^{19}\text{F}^*(0.197, 1.35, 1.55)$  are  $< 1$ ,  $< 1.5$  and  $< 2\%$ .

<sup>l</sup> Transitions to  $^{19}\text{F}^*(0, 0.11, 1.46, 1.55)$  are  $< 5$ ,  $< 2$ ,  $< 25$  and  $< 25\%$ .

<sup>m</sup> Transitions to  $^{19}\text{F}^*(4.00, 4.03)$  are  $< 2$  and  $< 1\%$ .

<sup>n</sup> Transitions to  $^{19}\text{F}^*(1.35, 1.46, 1.55)$  are  $< 0.5$ ,  $< 1.5$  and  $< 1\%$ .

<sup>o</sup> Transitions to  $^{19}\text{F}^*(2.78, 4.38, 4.68)$  are  $< 1$ ,  $< 1$  and  $< 2\%$ .

<sup>p</sup> Transitions to  $^{19}\text{F}^*(4.00, 4.03, 4.38, 5.47)$  are  $< 3$ ,  $< 3$ ,  $< 3$  and  $< 2\%$ .

<sup>q</sup> Transitions to  $^{19}\text{F}^*(4.00, 4.03, 4.55, 4.65, 5.43, 5.47)$  are  $< 2$  to  $< 8\%$ : see [\(1978AJ03\)](#).

<sup>r</sup> Transitions to  $^{19}\text{F}^*(0.11, 0.197)$  are  $< 8$  and  $< 5\%$ .

<sup>s</sup> Transitions to other states are  $< 0.2$  to  $< 2\%$ : see [\(1978AJ03\)](#).

<sup>t</sup>  $\Gamma_\gamma = 4.7$  eV,  $\Gamma_\gamma/\Gamma = 0.65 \pm 0.10$ ; see [Table 19.9 in \(1972AJ02\)](#). Transitions to  $^{19}\text{F}^*(0.11, 1.35, 1.46, 4.38)$  are  $< 0.4$ ,  $< 1.3$ ,  $< 1$  and  $< 1.3\%$ .

<sup>u</sup> Transitions to other states are  $< 7$  to  $< 10\%$ .

<sup>v</sup> [\(1980WI17\)](#).

<sup>w</sup> [\(1978SY01\)](#): branching ratios are relative intensities at  $\theta = 55^\circ$ .

<sup>x</sup> First branching ratio value shown for each transition is from [\(1978SY01\)](#); second is from [\(1980WI17\)](#).

Where only one value is shown it is from [\(1980WI17\)](#), except when footnoted.