Table 11.4 from (1980AJ01): Electromagnetic transitions in ^{11}B [a]

Initial state	$J^\pi; T$	Γ_γ (total) [b] (eV)	Branching ratios (%) to final states						Refs. [a]
			g.s. $\frac{3}{2}^-; \frac{1}{2}$	2.12 $\frac{1}{2}^-; \frac{1}{2}$	4.45 $\frac{5}{2}^-; \frac{1}{2}$	5.02 $\frac{3}{2}^-; \frac{1}{2}$	6.74 $\frac{7}{2}^-; \frac{1}{2}$	6.79 $(\frac{1}{2}, \frac{3}{2})^+; \frac{1}{2}$	
2.12	$\frac{1}{2}^-; \frac{1}{2}$	0.128 ± 0.010	100						
4.45	$\frac{5}{2}^-; \frac{1}{2}$	0.61 ± 0.04	100 [f]	< 0.5					
5.02	$\frac{3}{2}^-; \frac{1}{2}$	2.16 ± 0.10	85 ± 2	15 ± 2	0.3				
			88 ± 2	12 ± 2					(1968EA03)
			88 ± 2.5 [g]	12 ± 2.5 [h]					(1968BE30)
			83 ± 5	17 ± 5					(1971AL07)
6.74	$\frac{7}{2}^-; \frac{1}{2}$	0.043 ± 0.007	70 ± 2 [c]	< 3	30 ± 2	< 1			
6.79	$\frac{1}{2}^+; \frac{1}{2}$	0.47 ± 0.06	66.0 ± 1.5	30.0 ± 1.5	< 0.5	4.1 ± 0.9			(1971AL07)
7.29	$(\frac{3}{2}, \frac{5}{2})^+; \frac{1}{2}$	1.46 ± 0.20 [i]	87 ± 2	< 1	5.5 ± 1	7.5 ± 1			
7.98	$\frac{3}{2}^+; \frac{1}{2}$	1.46 ± 0.22	47 ± 2	53 ± 2	< 1	< 1			
			45 ± 2	55 ± 2	< 1.6	< 1.6	< 1.5	< 1.4	(1971AL07)
8.56	$\leq \frac{5}{2}^-; \frac{1}{2}$	[b]	56 ± 2	30 ± 2	5 ± 1	9 ± 1			
8.92	$\frac{5}{2}^-; \frac{1}{2}$	4.78 ± 0.29	95 ± 1 [d]	< 1	4.5 ± 0.5	< 1	< 1	< 1	
9.19	$\frac{7}{2}^+; \frac{1}{2}$	0.3 ± 0.1 [a]	0.9 ± 0.3		82.8 ± 2.0		12.8 ± 0.4	< 1.3	(1962GR07)
9.27 [e]	$\frac{5}{2}^+; \frac{1}{2}$		19.7 ± 1.0		67.5 ± 2.0		12.8 ± 0.7	< 0.6	(1962GR07)

[a] (1965OL03) except where shown. See also Table 11.4 in (1975AJ02).

[b] From Table 11.16, corrected for branching to other states.

[c] $\delta = -0.45 \pm 0.18$ (1968CO09). This value leads to too large a value of Γ_γ for an M3 transition (P.M. Endt, private communication).

[d] $\delta = -0.11 \pm 0.04$ (1968CO09).

[e] See Tables 11.6, 11.11 and 11.16 for higher states.

[f] $\delta = -0.19 \pm 0.03$ (1968BE30).

[g] $\delta = 0.03 \pm 0.05$ (1968BE30).

[h] $\delta = -0.05 \pm 0.2$ (1968BE30).

[i] Assuming $J^\pi = \frac{5}{2}^+$.

Comments [mainly from (1962GR07, 1965OL03)]:

(1) *4.45 MeV.* $9.28 \rightarrow 4.45 \rightarrow 0$ angular distribution fixes $J = \frac{5}{2}$. Odd parity determined from direct interaction assignments.

(2) *5.02 MeV.* Internal pair correlation permit M1, E2 for the g.s. transition: $J^\pi \leq \frac{7}{2}^-$ (parity from l-assignments). $\tau_{\rm m}$ excludes $\frac{7}{2}$, branch to 2.12, $\frac{5}{2}$. Angular correlation (1968BE30) fixes $\frac{5}{2}^-$.

(3) *6.74 MeV.* Internal pairs indicate practically pure E2 g.s. radiation. Angular distributions and branching ratios (and l-assignments) all lead to $\frac{7}{2}^-$.

(4) *6.79 MeV.* The allowed β-decay from ^{11}Be indicates $J^\pi \leq \frac{7}{2}^+$. The relatively strong γ-branch to ^{11}B*(2.12) favors $\frac{1}{2}^+$, $\frac{3}{2}^+$. (1968EA03) finds that all γ's from this level are isotropic, suggesting $J^\pi = \frac{1}{2}^+$, but not excluding $\frac{3}{2}^+$.

(5) *7.29 MeV.* The g.s. transition is mainly E1, so $J^\pi \leq \frac{5}{2}^+$. The assignment $\frac{1}{2}^+$ is excluded by the strength of $(7.29 \rightarrow 4.45)$.

(6) *7.98 MeV.* Transitions to $^{11}\mathrm{B}_{(\mathrm{g.s.})}$ and (2.12) are predominantly E1; thus ^{11}B*(7.98) has even parity, and odd parity of ^{11}B*(2.12) is confirmed. The transition to ^{11}B*(2.12) is not isotropic, so $J^\pi = \frac{3}{2}^+$.

(7) *8.56 MeV.* Correlation of internal pairs indicate the the g.s. transition is M1 + E2 or E1 + M2, $J^\pi \leq \frac{5}{2}^+$ or $\leq \frac{7}{2}^-$; the lifetime to ^{11}B*(2.12) excludes $\frac{7}{2}^-$. If the level has even parity, the required M2 admixture is excessive. $J^\pi \leq \frac{5}{2}^-$ is favored.

(8) *8.92 MeV.* From ^{7}Li$(\alpha,\gamma)^{11}$B, $J^\pi = \frac{3}{2}^+, \frac{5}{2}^+, \frac{5}{2}^-$. The internal pair correlation confirms $\frac{5}{2}^-$. For higher states see comments under individual reactions and (1968AJ02).