

$$\begin{aligned}
\mathbf{H}_{mhf} = & a\mathbf{I}_z\mathbf{L}_z + b_F\left(\mathbf{I}\cdot\mathbf{S} + \frac{\mathbf{I}_z\mathbf{S}_z}{3}\right) + c\mathbf{I}_z\mathbf{S}_z - \frac{d}{2}\left(\mathbf{S}_+\mathbf{I}_+e^{-2i\phi} + \mathbf{S}_-\mathbf{I}_-e^{+2i\phi}\right) \\
& + \frac{b_{FD}}{2}\left\{\mathbf{I}\cdot\mathbf{S} + \frac{\mathbf{I}_z\mathbf{S}_z}{3}, (\mathbf{J} - \mathbf{S})^2\right\} + 5\sqrt{14}b_s \frac{\mathbf{T}^{(1)}(\mathbf{I})\cdot\mathbf{T}^{(1)}\left\{\mathbf{T}^{(2)}(\mathbf{L}^2), \mathbf{T}^{(3)}(\mathbf{S}, \mathbf{S}, \mathbf{S})\right\}}{3\langle\Lambda|\mathbf{T}_0^{(2)}(\mathbf{L}^2)|\Lambda\rangle}
\end{aligned}$$