

$$\begin{aligned} H_{\text{hyperfine}} = & a_F \hat{\mathbf{I}} \cdot \hat{\mathbf{S}} + \hat{\mathbf{S}} \cdot \mathbf{T} \cdot \hat{\mathbf{I}} + 1/2 \sum C_{\alpha\beta} (N_\alpha \mathbf{I}_\beta + \mathbf{I}_\beta N_\alpha) \\ & + \mathbf{T}^2(\mathbf{Q}) \cdot \mathbf{T}^2(\nabla E) \end{aligned}$$