Hamiltonian describing an electron interacting with a nucleus in the presence of a magnetic field $\boldsymbol{B_0}$

$\mathcal{H} = -\frac{\hbar^2}{2m}\nabla^2$		electron kinetic energy
$+$	V_0	electron potential energy in the field of the nucleus and of other electrons
$+$	V_{cryst}	electron potential energy due to charges outside the atom
$+$	$\frac{e\hbar}{2m^2c^2}\boldsymbol{S}\cdot\left[\boldsymbol{E}\times\left(\boldsymbol{p}+\frac{e}{c}A_0\right)\right]$	electron spin-orbit coupling
$+$	$\gamma_e\hbar\boldsymbol{B_0}\cdot\boldsymbol{S}$	electron spin Zeeman energy
$+$	$\frac{e}{2mc}(\boldsymbol{p}\cdot\boldsymbol{A}_0+\boldsymbol{A_0}\cdot\boldsymbol{p})+\frac{e^2}{2mc^2}\boldsymbol{A}_0^2$	coupling of electron orbital motion to $\boldsymbol{B_0}$
$+$	$\frac{e}{2mc}(\boldsymbol{\pi}\cdot\boldsymbol{A}_n+\boldsymbol{A}_n\cdot\boldsymbol{\pi})$	coupling of nuclear momentum to electron orbital motion
$+$	$\frac{\gamma_e\gamma_n\hbar^2}{r^3}\left[\frac{3(\boldsymbol{I}\cdot\boldsymbol{r})(\boldsymbol{S}\cdot\boldsymbol{r})}{r^2}-\boldsymbol{I}\cdot\boldsymbol{S}\right]$	coupling of nuclear moment with electron spin moment for non s-states
$+$	$\frac{8\pi}{3}\gamma_e\gamma_n\hbar^2\boldsymbol{I}\cdot\boldsymbol{S}\delta(\boldsymbol{r})$	coupling of nuclear moment with electron spin moment for s-states
$+$	$\mathcal{H}_Q$	coupling of nuclear quadrupole moment to field gradient due to electron and external charges
$+$	$-\gamma_n\hbar\boldsymbol{B}_0\cdot\boldsymbol{I}$	nuclear Zeeman energy