The interaction between $\vec{\mu}_s$ and $\vec{\mu}_o$ is called "spin-orbit interaction".

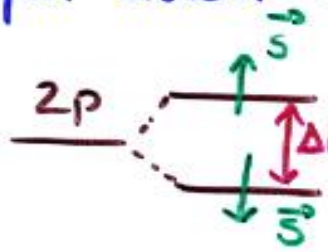
There is no spin-orbit interaction for $\ell = 0$ states (s-states).

The spin moment acquire an energy

$$U = -\vec{\mu}_s \cdot \vec{B}_{int.}$$

↑ due to the orbital motion of the electron.

The spin up electron will have higher energy than the spin down ($\vec{\mu}_s$ and $\vec{s}$ have opposite direction)



$$\Delta E = 2\mu_B B$$

The transition $2p \rightarrow 1s$ is plit into two lines.

The total-angular momentum $\vec{J} = \vec{L} + \vec{S}$

and its component along the z-axis J_z are both quantized

$$|\vec{J}| = \sqrt{j(j+1)}\,\hbar \qquad \begin{cases} j = \frac{1}{2} & (\ell = 0) \\ j = \ell \pm \frac{1}{2} & (\ell > 0) \end{cases}$$

$$J_z = m_j \hbar \qquad -j \le m_j \le j$$