

PHY 472 - 2020

Quiz 8 - Solution

The state with $j = \frac{3}{2}$ can come from the states $l=1$ and $l=2$, in the absence of a magnetic field.

The electron energy in a magnetic field B is $H = \frac{1}{\hbar} \mu_B (\vec{L} + 2\vec{S}) \cdot \vec{B}$. For a strong field the good quantum numbers are m_l and $m_s \Rightarrow$ projections on the \vec{B} -direction.

$$E = E(m_l, m_s) = \mu_B (m_l + 2m_s) B$$

1. $l=1 \Rightarrow E = \mu_B B (-2, -1, 0, 0, 1, 2)$

2. $l=2 \Rightarrow E = \mu_B B (-3, -2, -1, -1, 0, 0, 1, 1, 2, 3)$