

Notes on Atomic Physics

Zeeman Effect

Weak field $B_{\text{ext}} \ll B_{\text{int}}$

Good quantum #s

$$n, l, j, m_j \quad (\vec{J} = \vec{L} + \vec{S})$$

↳ both cases

$$\text{Energy: } E_z = \mu_B g_j B_{\text{ext}} m_j$$

$$\mu_B = \text{Bohr magneton} = \frac{e\hbar}{2m_e}$$

 g_j = Landé g factor

$$= 1 + \frac{j(j+1) - l(l+1) + 3/4}{2j(j+1)}$$

Strong field $B_{\text{ext}} \gg B_{\text{int}}$

Good quantum #s

$$n, l, m_l, m_s$$

Energy (sans fine-structure)

$$E_z = \mu_B B_{\text{ext}} (m_l + 2m_s)$$