

Homework Solution #3(PH312)

1.

$n = 3$ and $l = 1$, so $m_l = 0$ or ± 1 . Thus $L_z = 0$ or $\pm \hbar$

$$L = \sqrt{l(l+1)}\hbar = \sqrt{2}\hbar$$

L_y and L_x are unrestricted except for the constraint $L_x^2 + L_y^2 = L^2 - L_z^2$.

2.

It is required that $l < 6$ and $|m_l| \leq l$.

$$l = 5: m_l = 0, \pm 1, \pm 2, \pm 3, \pm 4, \pm 5 \quad l = 4: m_l = 0, \pm 1, \pm 2, \pm 3, \pm 4$$

$$l = 3: m_l = 0, \pm 1, \pm 2, \pm 3 \quad l = 2: m_l = 0, \pm 1, \pm 2 \quad l = 1: m_l = 0, \pm 1 \quad l = 0: m_l = 0$$

3.

the degeneracy is $n^2 = 36$.