

For the state

$$|\Psi\rangle = \sqrt{\frac{7}{10}}|2, 1, 0\rangle + \sqrt{\frac{1}{10}}|3, 2, 1\rangle + i\sqrt{\frac{2}{10}}|3, 1, 1\rangle$$

Calculate

- $\mathcal{P}(L_z = \hbar)$

- $\langle L_z \rangle$

Then, if you have time, continue with these calculations:

- $\mathcal{P}(L^2 = 2\hbar^2)$

- $\langle L^2 \rangle$

- $\mathcal{P}(E = -13.6\text{eV}/3^2 = -1.51\text{eV})$

- $\langle E \rangle$

- What measurements can be degenerate on the Hydrogen atom?

- What is the time development of this state?

- What is the probability of finding the particle in the region $0 < \theta < \pi/6$, $\pi/3 < \phi < \pi/2$, and $r_1 < r < r_2$?