

Answer on Question #37531 – Physics - Quantum Mechanics

Question: the wave function for the hydrogen atom depends upon three quantum numbers n, l, m . Name these quantum numbers.

Answer:

- 1) n ($n = 1, 2, 3 \dots$) is the **total quantum number**, which arises from the solution of the radial part of the Schrödinger equation for the hydrogen atom. It determines the possible values of the energy for the electron in the hydrogen atom $E_n = -\frac{13,6}{n^2} \text{ eV}$.
- 2) l ($l = 0, 1, \dots, n - 1$) is the **orbital quantum number**, which determines the magnitude of the orbital angular momentum $L^2 = \hbar^2 l(l + 1)$.
- 3) m ($m = -l, -l + 1, \dots, l - 1, l$) is the **magnetic quantum number**, that comes from the azimuthal equation of the hydrogen Schrödinger equation. It determines the possible values of the z –component of the angular momentum $L_z = m\hbar$.