

# 44 Lecture - PHY101

## Important Subjective

**What is the de Broglie wavelength of a particle of mass  $m$  and velocity  $v$ ?**

**Answer:** The de Broglie wavelength is given by  $\lambda = h/mv$ , where  $h$  is Planck's constant.

**What is the significance of the de Broglie wavelength?**

**Answer:** The de Broglie wavelength is significant because it shows that matter has wave-like properties, just like light. This wave-particle duality is a fundamental concept in quantum mechanics.

**What is the Heisenberg uncertainty principle?**

**Answer:** The Heisenberg uncertainty principle states that it is impossible to simultaneously determine the exact position and momentum of a particle. The more accurately we know one of these properties, the less accurately we can know the other.

**What is wave function collapse?**

**Answer:** Wave function collapse is the phenomenon where a quantum system that is in a superposition of states collapses into a definite state when it is measured or observed.

**What is the double-slit experiment?**

**Answer:** The double-slit experiment is a classic experiment in physics that demonstrates the wave-like nature of matter. In this experiment, a beam of particles, such as electrons, is directed at a screen with two slits. The resulting interference pattern on a detector behind the slits shows that the particles exhibit wave-like behavior.

**What is the Schrödinger equation?**

**Answer:** The Schrödinger equation is the fundamental equation of quantum mechanics that describes the time evolution of a quantum state. It is a differential equation that relates the wave function of a system to its energy.

**What is the wave function of a particle?**

**Answer:** The wave function of a particle is a mathematical function that describes the probability amplitude of finding the particle in a particular state or location.

**What is a probability density function?**

**Answer:** A probability density function is a mathematical function that describes the probability density of a particle being found in a particular region of space. It is related to the square of the wave function.

**What is quantum tunneling?**

**Answer:** Quantum tunneling is the phenomenon where a particle can pass through a barrier that it would not be able to pass through according to classical physics. This is due to the wave-like nature of matter, which allows it to "tunnel" through the barrier.

**What is an electron microscope?**

**Answer:** An electron microscope is a type of microscope that uses a beam of electrons instead of light to image samples. Since electrons have a much smaller wavelength than visible light, electron microscopes can achieve much higher resolution than optical microscopes.