PHYSICS 232 – CHAPTER 39: WAVE NATURE OF PARTICLES

de Broglie wavelength

$$\lambda = \frac{h}{p} = \frac{h}{mv}$$

Heisenberg uncertainty principle:

$$\Delta p_x \Delta x \geq \hbar \ , \quad \Delta E \Delta t \geq \hbar \ , \quad \hbar = \frac{h}{2\pi}$$

A particle of energy E is described by a wavefunction

$$\Psi(x, y, z, t) = \psi(x, y, z) e^{-iEt/\hbar}$$

where $|\Psi(x, y, z, t)|^2$ is the probability distribution function.

Schrödinger equation: the wavefunction of a particle moving in the x-direction in the presence of a potential energy function $U(x)$ obeys

$$-\frac{\hbar^2}{2m}\frac{d^2\psi(x)}{dx^2} + U(x)\psi(x) = E\psi(x)$$