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

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