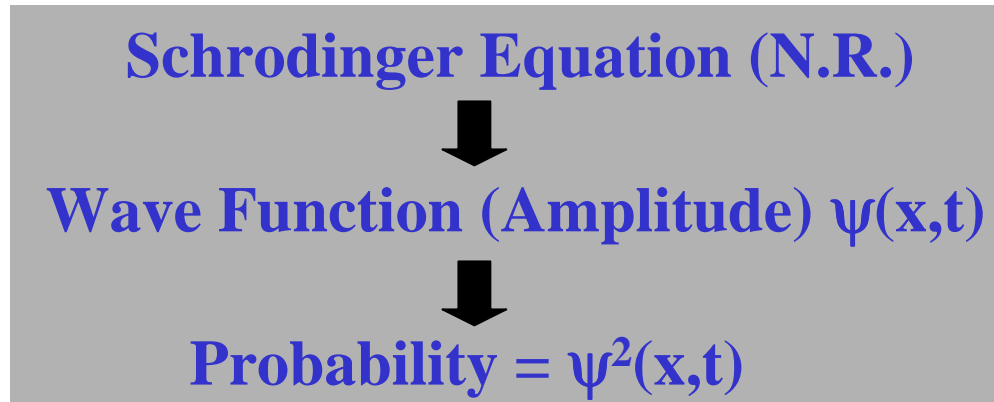


Physics 113 Lecture 12

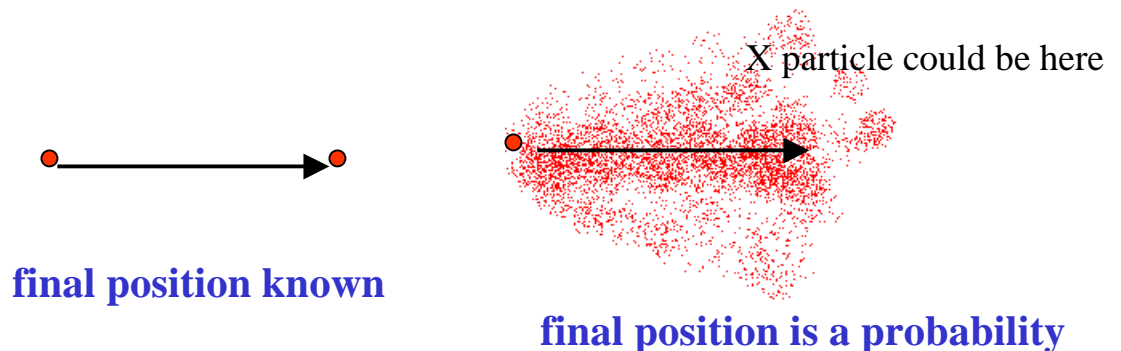
Quantum Mechanics



Correspondence Principle

Quantum Mechanics should yield classical results for macroscopic world

Quantum Mechanics is not Deterministic !



Heisenberg Uncertainty Principle

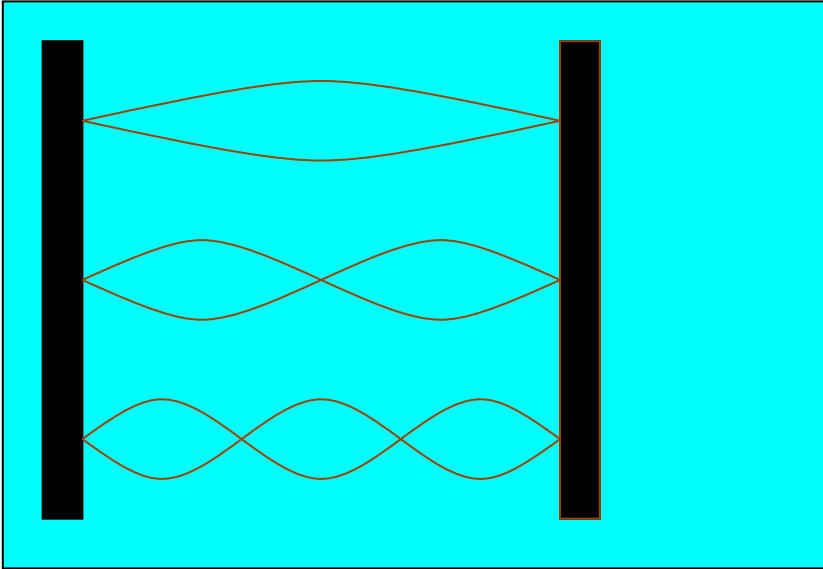
$$\Delta x \Delta p \geq \frac{h}{2\pi}$$

$$\Delta E \Delta t \geq \frac{h}{2\pi}$$

Where Δx , Δp , ΔE , and Δt are uncertainties in position, momentum, energy, and time respectively

Particle in a Box

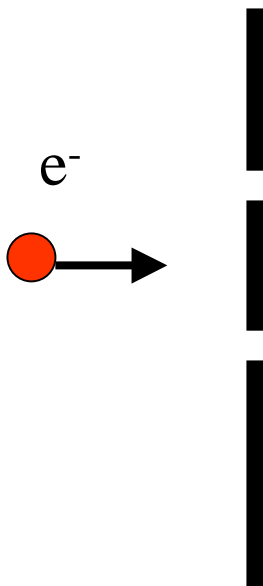
(just like standing waves in organ pipes)



$$\lambda_n = \frac{2L}{n} \quad n = 1, 2, 3, \dots$$
$$E_n = \frac{p_n^2}{2m} = \frac{h^2}{2m\lambda_n^2} = \frac{n^2 h^2}{8L^2 m}$$

Note: finite zero point energy !

Two Slit Experiment with Electrons



Which slit does it pass through?

Both ! On a distance screen the probability distribution is Young's diffraction pattern! Yet each electron is detected as a single particle hitting the screen !