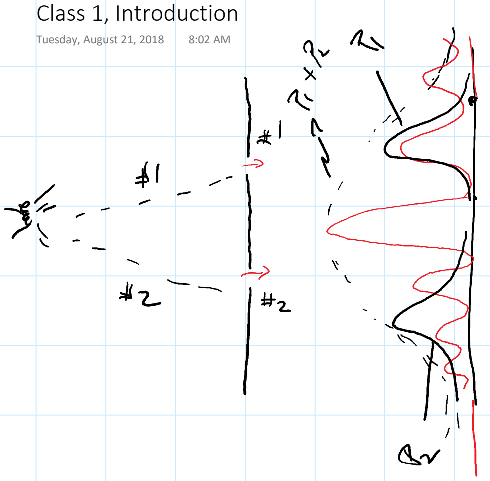
Class 1, Introduction

Tuesday, August 21, 2018 8:02 AM



$$P_1 = |\psi_1(x)|^2 \qquad\qquad P = |\psi_1(x)+\psi_2(x)|^2$$

$$P_2 = |\psi_2(x)|^2 \qquad\qquad = \overbrace{|\psi_1|^2 + |\psi_2|^2}^{\text{classical contrib.}}$$

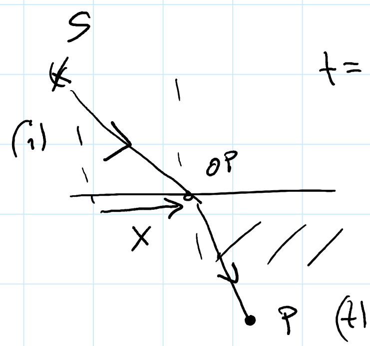
$$+ \underbrace{\psi_1^*\psi_2 + \psi_2^*\psi_1}_{\text{"Interference term"}}$$

$$\vec{E}_1(x,t) = E_0\cos(kx-\omega t)$$

<u>In E&M</u>

$$\vec{E} = \vec{E}_1 + \vec{E}_2$$

$$|\vec{E}|^2 = |\vec{E}_1|^2 + |\vec{E}_2|^2 + \underbrace{2E_1E_2\cos\theta}_{\text{Interf.}}$$



$$t = \frac{SO}{v_i} + \frac{OP}{v_t}$$

$$\frac{dt}{dx} = 0$$

$$\ast\ \delta\left(\frac{1}{c}\int n_i(s)\,ds\right) = 0$$

$$\Rightarrow \theta_i = \theta_R$$

$$n_i\, s\theta_i = n_t\, s\theta_t$$

The Time Dependent Schrodinger

$$-\frac{\hbar^2}{2m}\vec{\nabla}^2\Psi(\vec{x},t) + V(\vec{x})\,\psi(\vec{x}) = i\hbar\frac{\partial}{\partial t}\Psi(\vec{x},t)$$

$$\Psi(\vec{x},t) = \psi(\vec{x})\,\phi(t)$$

$$\Rightarrow -\frac{\hbar^2}{2m}\vec{\nabla}^2\psi(x) + V(\vec{x})\,\psi(\vec{x}) = \overset{\text{Energy}}{E}\,\psi(\vec{x})$$

$$\phi(t) = \phi(0)\,e^{-iE/\hbar\, t}$$

$$V(\vec{x}) = V(|\vec{x}|) = -\frac{e^2}{4\pi\epsilon_0|\vec{x}|}$$

$$E_n = -\frac{R}{n} \qquad n = 1, 2, \ldots$$

Wave function : $\Psi(\bar{x}, t)$ } "Statistical Concept"

$$|\Psi(\bar{x}, t)|^2 = \text{"Probability Density"}$$

$|\Psi(\bar{x}, t)|^2 \Delta V$ = "Proba. that the system will be found in the volume ΔV at time t"

$$\int_{\text{All Space}} |\Psi(\bar{x}, t)|^2 \, d^3x = 1$$

"Normalization Condition"