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Cool! I'am really happy

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so many fake sites. this is the first one which worked! Many thanks

PHYSICS 880.06 (Fall 2005) Problem Set 1 Solution

(1.1) AKM Problem 1.4

$$\frac{\partial \psi}{\partial t} = -i \left(\nabla^2 + \frac{m}{\hbar^2} V \right) \psi$$

$$\mathbf{H} = H_A$$

$$E(t) = E_0 e^{-i\omega t}$$

(a) Seek steady-state solutions of this form

$$\psi(\mathbf{r}, t) = \psi(\mathbf{r}) e^{-i\omega t}$$

$$\psi(\mathbf{r}, t) = \psi(\mathbf{r}) e^{-i\omega t}$$

$$\left(-\hbar^2 \nabla^2 + V(\mathbf{r}) - E \right) \psi(\mathbf{r}) = 0$$

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$$\left(-\hbar^2 \nabla^2 + V(\mathbf{r}) - E \right) \psi(\mathbf{r}) = 0$$

$$E(\mathbf{r}) = E_0 e^{-i\omega t}$$

$$E_0 = \hbar^2 \omega^2$$

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The solution is

$$\psi_0 = \frac{e^{-i\omega t}}{1 - i\omega \tau} E_0$$

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where

$$\tau = \frac{\hbar}{m v_F}$$

The current density is

$$\mathbf{j} = -\frac{i\hbar}{2m} \nabla \psi_0^* \psi_0$$

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where

$$\tau = \frac{\hbar}{m v_F}$$

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