Time-dependence of Superpositions

A particle can be in a superposition of states that have different energies.

This superposition is still a solution of the time-dependent SEQ, but not of the time-independent SEQ, because two different E's are involved.

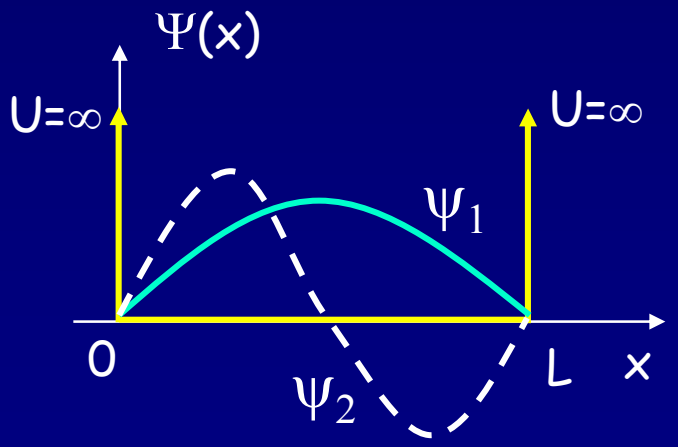
Two questions:

- How does this superposition evolve with time?
  For example, is the probability density still stationary?
- What happens if we measure the particle's energy?

First, look at the time dependence. Consider the first two energy states in an infinite well. Here's the superposition:

$$\Psi(x,t) = \psi_1(x)e^{-i\omega_1 t} + \psi_2(x)e^{-i\omega_2 t}$$

$$\omega_1 = \frac{E_1}{\hbar},\ E_1 = \frac{h^2}{8mL^2} \qquad \omega_2 = \frac{E_2}{\hbar},\ E_2 = 4E_1$$



The two terms have different frequencies, so they oscillate in and out of phase.

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