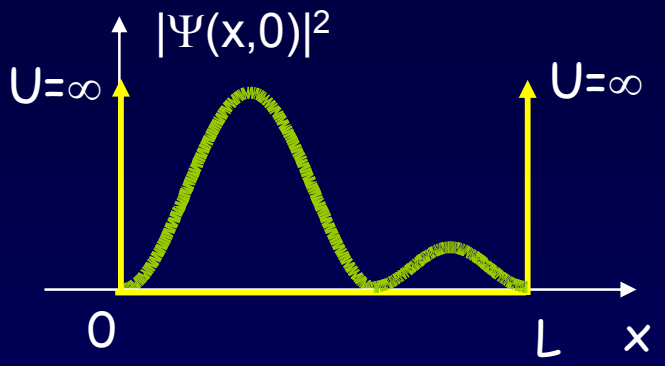
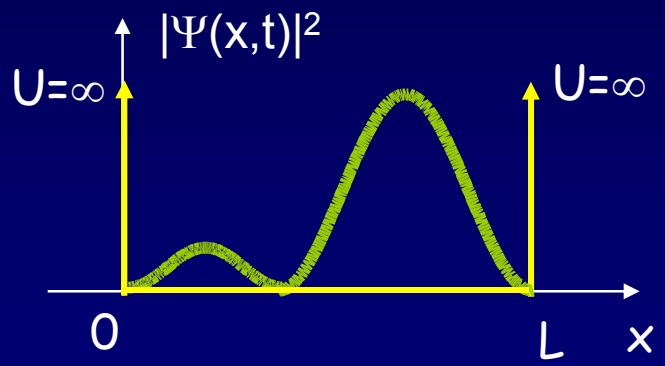
Solution

An electron in an infinite square well of width L = 0.5 nm is (at t=0) described by the following wave function:

$$\Psi(x,t=0) = A\sqrt{\frac{2}{L}}\left(\sin\left(\frac{\pi}{L}x\right) + \sin\left(\frac{2\pi}{L}x\right)\right)$$





1) Suppose we measure the energy. What results might we obtain?

a) E_1 b) E_2 c) E_3 d) Any result between E_1 and E_2

We will only obtain results that correspond to the terms appearing in Ψ. Therefore, only E_1 and E_2 are possible.

2) How do the probabilities of the various results depend on time?

a) They oscillate with f = $(E_2-E_1)/h$

b) They vary in an unpredictable manner.

c) They alternate between E_1 and E_2. (*i.e.*, it's always either E_1 or E_2).

d) They don't vary with time.

The probabilities depend on the coefficients, not on the various Ψ terms themselves. Because the coefficients are simply numbers ($A\sqrt{\frac{2}{L}}$), there is no time dependence.