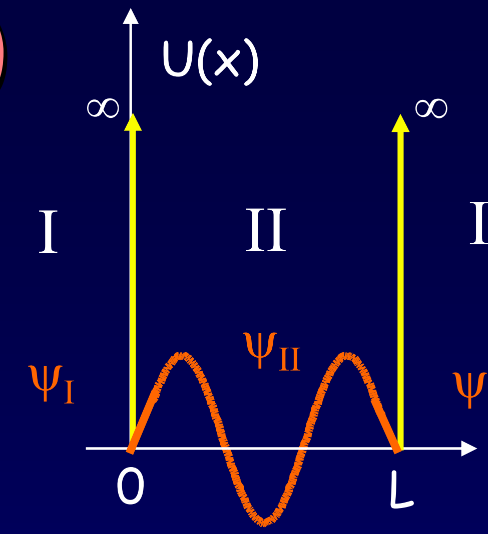
Particle in a Box (4)



Now, match ψ at the right boundary (x = L).

At x = L: $\psi_I(L) = \psi_{II}(L)$

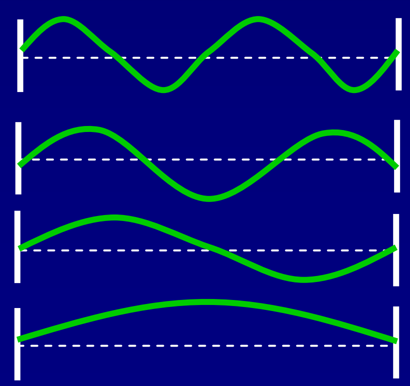
$$\Rightarrow \quad 0 = B_1 \sin(kL)$$

This constraint requires k to have special values:

$$k_n = \frac{n\pi}{L} \qquad n = 1, 2, \ldots$$

Using $k = \frac{2\pi}{\lambda}$, we find: $n\lambda = 2L$

This is the same condition we found for confined waves, *e.g.*, waves on a string, EM waves in a laser cavity, etc.:



n	λ (= v/f)
4	L/2
3	2L/3
2	L
1	2L

For matter waves, the wavelength is related to the particle energy: $E = h^2/2m\lambda^2$

Therefore →