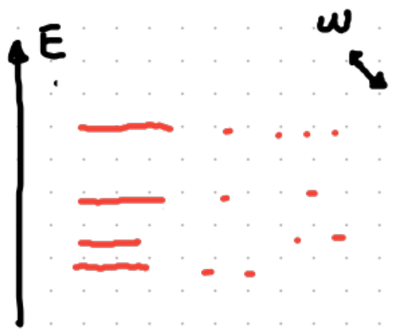
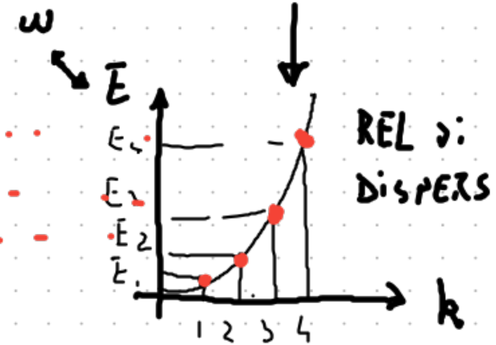
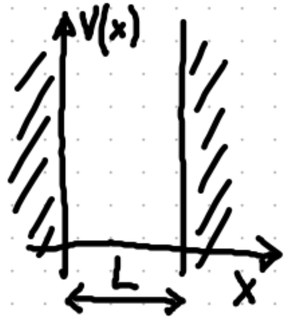
PARTICLE IN A BOX . CONTINUED

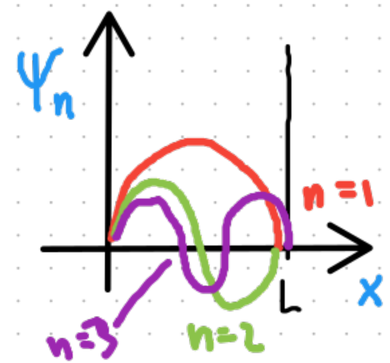
$$\psi_n = \sqrt{\frac{2}{L}} \sin \frac{n\pi}{L} x \qquad E_n = \frac{\hbar^2 n^2 \pi^2}{2mL^2}$$



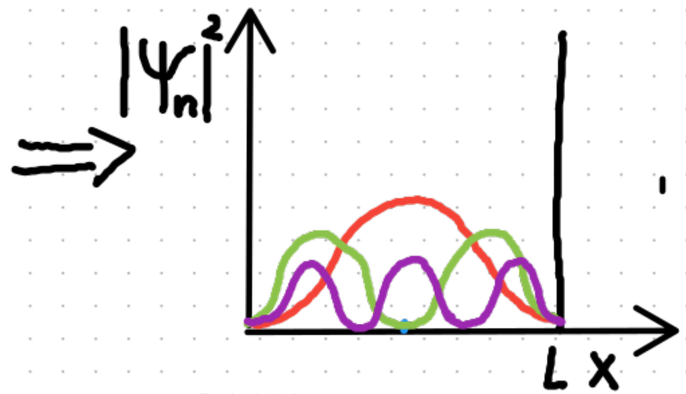




$$\omega = \frac{E}{\hbar}$$



Funzioni d'onda



Probabilità

Esempio di calcolo di valore di aspettazione

$\psi = \sqrt{\frac{2}{L}} \sin \frac{\pi n}{L} x$ funzione d'onda di esempio (quella della particle in a box)

In generale:

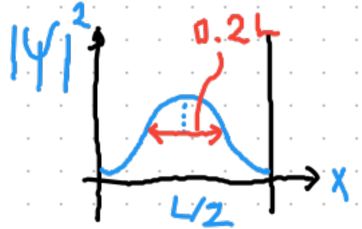
$$\langle q \rangle = \int_{-\infty}^{\infty} \psi^* \hat{q} \psi \, dx = \langle \psi^* | \hat{q} | \psi \rangle$$

Per il valore di aspettazione della posizione: $\hat{x} = x$

$$\langle x \rangle = \int_0^L \psi^* \hat{x} \psi \, dx = \int_0^L \psi^* x \psi \, dx = \int_0^L |\psi|^2 x \, dx$$

$$= \int_0^L x \frac{2}{L} \sin^2 \frac{\pi n}{L} x \, dx = \frac{L}{2}$$

deviazione standard $\Delta x = \sqrt{\langle x^2 \rangle - \langle x \rangle^2} \simeq 0.2\,L$



PARTICLE IN A 3-D BOX

$$E = \frac{h^2 \pi^2}{2m} \frac{1}{L^2} \left(n_x^2 + n_y^2 + n_z^2 \right)$$

QUANTUM DOTS