Il concetto di indeterminazione nell'esempio del pacchetto generato dall'intervallo rettangolare "delta k"

$$\Delta x = \frac{2\pi}{\Delta k} - \left(-\frac{2\pi}{\Delta k}\right) = \frac{4\pi}{\Delta k}$$

$$\Rightarrow \boxed{\Delta x \ \Delta k = 4\pi}$$

HAMILTONIANA

$$E = E_{kin} + E_{pot} = \frac{1}{2} m v^2 + V(x) = \frac{p^2}{2m} + V(x)$$

$$\boxed{\text{HAMILTONIANA} \quad H(p,x) = \frac{p^2}{2m} + V(x)}$$

$$\frac{\partial H}{\partial p} = \frac{p}{m} = v = \frac{dx}{dt}$$

$$\frac{\partial H}{\partial x} = \frac{\partial V(x)}{\partial x} = -F(x) = -\frac{dp}{dt}$$

$$\longrightarrow \boxed{\begin{aligned} \frac{\partial H}{\partial p} &= \frac{\partial x}{\partial t} = v \\ \frac{\partial H}{\partial x} &= -\frac{\partial p}{\partial t} = -F \end{aligned}}$$

$$\frac{dp}{dt} = \frac{d}{dt} m v = \frac{d}{dt}\left(m \frac{dx}{dt}\right) = m \frac{d^2 x}{dt^2} = m a = F = -\frac{dV}{dt}$$

EQ. DI SCHRÖDINGER

$$\hat{x} = x$$

$$E = H = \frac{p^2}{2m} + V(x)$$

$$\hat{p} = -i\hbar \frac{\partial}{\partial x}$$

$$\hat{E} = i\hbar \frac{\partial}{\partial t}$$

$$i\hbar \frac{\partial}{\partial t}\psi(x,t) = -\frac{\hbar^2}{2m}\frac{\partial^2}{\partial x^2}\psi(x,t) + V(x)\psi(x,t)$$

$$-\frac{\hbar^2}{2m}\frac{\partial^2}{\partial x^2}\psi(x,t) + V(x)\psi(x,t) = E\psi(x,t)$$

$$\hat{H} = -\frac{\hbar^2}{2m}\frac{\partial^2}{\partial x^2} + V(x) \Rightarrow \boxed{\hat{H}\psi = E\psi}$$