

Q What is probability current?

Ans - A kind of equation of continuity was satisfied by ψ is, $\vec{\nabla} \cdot \vec{J} + \partial \rho / \partial t = 0$

where $\rho = \psi^* \psi$

and $\vec{J} = \frac{i\hbar}{2m} (\psi \vec{\nabla} \psi^* - \psi^* \vec{\nabla} \psi)$

Max Born interpreted $|\psi(x, t)|^2 dx$ as the probability that the particle described by the wave function $\psi(x, t)$ may be found between x and $x+dx$ at time 't'.

Therefore, we require

$$\int_{-\infty}^{\infty} |\psi(x, t)|^2 dx = 1.$$

So $|\psi(x, t)|^2$ is interpreted as the probability density, then,

$$\vec{J} = \frac{i\hbar}{2m} (\psi \vec{\nabla} \psi^* - \psi^* \vec{\nabla} \psi)$$

is termed as probability current.