Wave function

Wave function is a complex mathematical function used to describe the quantum state of an isolated quantum system (i.e state of quantum mechanical system)

In one dimension, wave function are often denoted by $\psi(x,t)$.

It contains all the information of the particle's matter wave at a particular time.

ψ is a variable quantity associated with moving particle.

It is a complex function of space & time.

Significance of wave function

1. The wavefunction has no physical meaning.
2. It is a complex quantity representing a matter wave of a particle.
3. $|\psi|^2 = \psi^* \psi$ represents the probability density or probability of finding the particle in a given region.
4. For a given volume $d\tau$, probability $P = \iiint \psi^* \psi \, d\tau$ where $d\tau = dx\,dy\,dz$.
5. Probability value lies between 0 & 1. & $\iiint \psi^* \psi \, d\tau = 1$ gives normalization constant.