

Meaning of the Wave Function in Quantum Mechanics

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Abstract – The exact meaning of the wave function Ψ is not a probability but a magnetic potential A .

In the Schrodinger equation:

$$\frac{d\Psi}{dt} = -i2\pi f\Psi \quad \text{and} \quad \frac{d\Psi}{dx} = i\frac{2\pi}{\lambda}\Psi$$

The electric and magnetic fields from magnetic potential are:

$$\vec{E} = \frac{dA}{dt} \quad \text{and} \quad \vec{B} = \frac{dA}{dx}$$

If $\Psi = A$:

$$\begin{cases} \vec{E} = -i2\pi f\Psi \\ \vec{B} = i\frac{2\pi}{\lambda}\Psi \end{cases} \Leftrightarrow \frac{\vec{E}}{\vec{B}} = -\lambda f \Leftrightarrow$$

$$\Leftrightarrow \frac{\vec{E}}{\vec{B}} = -c \quad (\text{Light speed})$$

We already know that: $\frac{\vec{E}_M}{\vec{B}_M} = c$

So, the wave function is a magnetic potential.