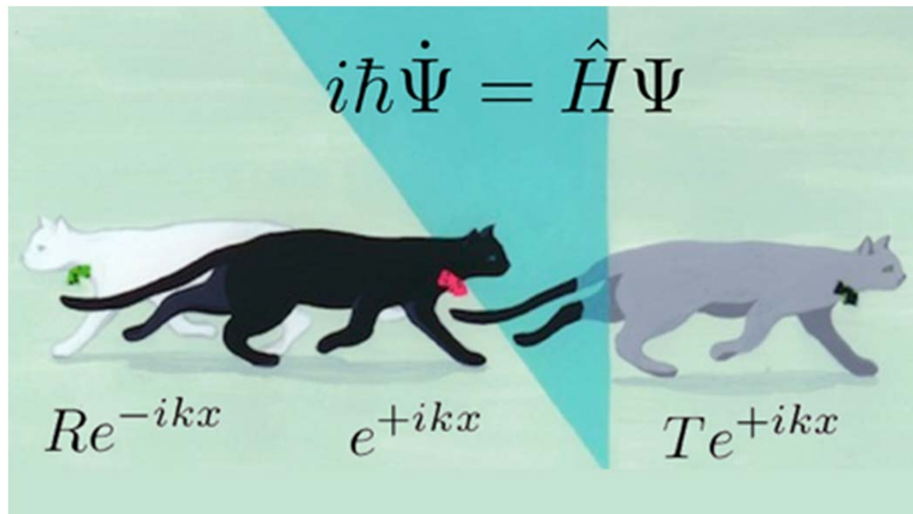
Exploring Quantum Physics

Coursera, Spring 2013 Instructors: Charles W. Clark and Victor Galitski

A physical interpretation of quantum theory

Part I: Meaning of the wave function; the Born rule



Schrödinger equation

$$i\hbar\frac{\partial\Psi(\vec{r},t)}{\partial t}=\left[-\frac{\hbar^2\nabla^2}{2m}+V(\vec{r})\right]\Psi(\vec{r},t)$$

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AN UNDULATORY THEORY OF THE MECHANICS OF ATOMS AND MOLECULES

By E. Schrödinger

Abstract

The paper gives an account of the author's work on a new form of quantum theory. §1. The Hamiltonian analogy between mechanics and optics. §2. The analogy is to be extended to include real "physical" or "undulatory" mechanics instead of mere geometrical mechanics. §3. The significance of wave-length;

The Nobel Prize in Physics 1933

Erwin Schrödinger, Paul A.M. Dirac

The Nobel Prize in Physics 1933 was awarded jointly to Erwir Schrödinger and Paul Adrien Maurice Dirac "for the discovery of new productive forms of atomic theory."

Born interpretation

$|\Psi(x,y,z;t)|^2\,dxdydz$ is the probability of finding the quantum particle [described by $\Psi(\vec{r},t)$] in the volume element $dV = dxdydz$ at time t.

The Nobel Prize in Physics 1954

Max Born, Walther Bothe

The Nobel Prize in Physics 1954 was divided equally between Max Born "for his fundamental research in quantum mechanics, especially for his statistical interpretation of the wavefunction"