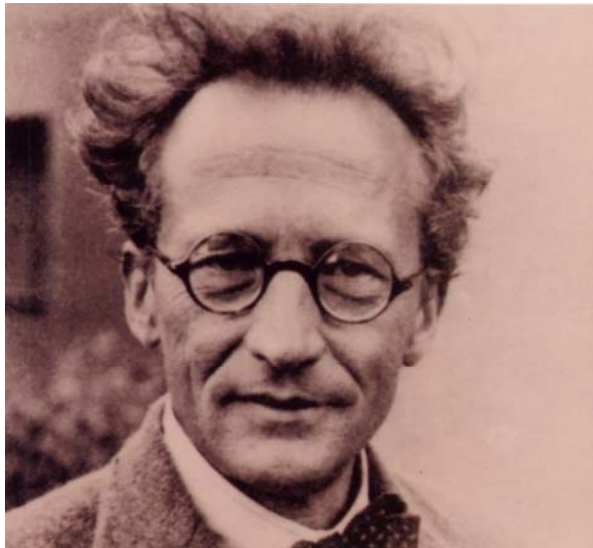


# GREAT MINDS IN SCIENCE

## Erwin Schrödinger



Erwin Schrödinger (1887-1961), Austrian physicist and Nobel laureate, formulated the theory of wave mechanics, which describes the behavior of the tiny particles that make up matter in terms of waves. Schrödinger formulated the Schrödinger wave equation to describe the behavior of electrons (tiny, negatively charged particles) in atoms. For this achievement, he was awarded the 1933 Nobel Prize in physics with British physicist Paul Dirac.

In the mathematical formulation of quantum mechanics, each system is associated with a complex Hilbert space such that each instantaneous state of the system is described by a unit vector in that space. This state vector encodes the probabilities for the outcomes of all possible measurements applied to the system. As the state of a system generally changes over time, the state vector is a function of time. **The Schrödinger equation** provides a quantitative description of the rate of change of the state vector. Using Dirac's bra-ket notation, the definition of energy results in the time derivative operator: at time  $t$  by  $|\psi(t)\rangle$ . Thus, the Schrödinger equation follows as: 
$$H(t) |\psi(t)\rangle = i\hbar \frac{\partial}{\partial t} |\psi(t)\rangle$$

where  $i$  is the imaginary unit,  $t$  is time,  $\frac{\partial}{\partial t}$  is the partial derivative with respect to  $t$ ,  $\hbar$  is the reduced Planck's constant (Planck's constant divided by  $2\pi$ ),  $\psi(t)$  is the wave function, and  $H(t)$  is the Hamiltonian. The Hamiltonian describes the total energy of the system. As with the force occurring in Newton's second law, its exact form is not provided by the Schrödinger equation, and must be independently determined based on the physical properties of the system

**Famous quote:** This life of yours which you are living is not merely a piece of this entire existence, but in a certain sense the whole; only this whole is not so constituted that it can be surveyed in one single glance.