

QUANTUM PHYSICS

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We now have the concepts and language needed for a general summary:

- ① The state function Ψ contains all information that can be known about the system. ② The behavior of Ψ is determined by the Schrödinger equation,

$$H\Psi = i\hbar \frac{\partial \Psi}{\partial t}.$$

- ③ Each measurable dynamical quantity is represented by a Hermitian operator Ω with a complete set of orthonormal eigenfunctions Ψ_n ,

$$\Omega\Psi_n = \omega_n\Psi_n.$$

- ③a Since the Ψ_n are complete, the state function can be represented by the expansion

$$\Psi = \sum_n C_n \Psi_n, \quad C_n = \int \Psi_n^* \Psi.$$

- ④ The possible results of a measurement of Ω are the eigenvalues, and the probability of obtaining ω_n is $|C_n|^2$.

In our approach these statements were developed through discussions of what happens and what is reasonable, but they are really the essential axioms of quantum mechanics. They contain what we have done and will do. If you are formally inclined and mathematically skillful, you might consider clipping the previous paragraph and throwing the rest of the book away.