HOW DO WE OBTAIN THE WAVEFUNCTION Ψ(x,t) FOR A SYSTEM?

Given the wavefunction Ψ(x,t) at some given time, say t = 0, how do we obtain Ψ(x,t) at any later time t? Your textbooks calls this the fundamental problem of quantum mechanics.

Quantum Mechanics is similar to Classical Mechanics in the sense that both theories are dynamical theories. That is, both describe how the initial state of a system evolves with time if we know the forces acting on the system (particle).

	Classical Mechanics	Quantum Mechanics
Initial state at t = 0	x(0), v(0) (just two numbers)	Ψ(x,0) (infinite set of waves)
later time t	x(t), v(t) (Obtained from N2L)	Ψ(x,t) (Obtained from the Schrodinger Equation)

The Schrodinger Equation

$$\frac{-\hbar^2}{2m}\frac{\partial^2\Psi(x,t)}{\partial x^2}+U(x)\Psi(x,t)=i\hbar\frac{\partial\Psi(x,t)}{\partial t}$$