2.1: Background

At the beginning of the 1900 s, there was actually a great deal of debate as to whether or not science was a valuable subject for study. At the time, Newtonian physics had proven to be a very reliable model for predicting the behavior of the observable universe. However, as was discussed in Chapter 1, the figurative scientific roof was about to collapse with the advent of a quantum theory.

Quantum theory attempts to do many of the same things that classical (Newtonian) physics does. The goal is to be able to model the behavior of particles and predict how they will behave in the future. In classical physics, this is accomplished by deriving an equation of motion for a particle. With such an equation, and a few initial parameters (such as position, velocity and acceleration at time $t=0$) the entire trajectory of a particle can be predicted as time moves forward.

The equivalent construct in the quantum theory is a **wavefunction**. The wavefunction for a system contains all of the information needed to predict what can be measured and observed in terms of the properties of the particle or system. The rules describing a wavefunction are not arbitrary, however. Based on a few simple postulates (given below) the requirements of the wavefunction are outlined, and the entire quantum theory is defined.