CHAPTER OVERVIEW

10: Time-Correlation Functions

Time-correlation functions are an effective and intuitive way of representing the dynamics of a system, and are one of the most common tools of time-dependent quantum mechanics. They provide a statistical description of the time evolution of an internal variable or expectation value for an ensemble at thermal equilibrium. They are generally applicable to any time-dependent process, but are commonly used to describe random (or stochastic) and irreversible processes in condensed phases. We will use them extensively in the description of spectroscopy and relaxation phenomena. Although they can be used to describe the oscillatory behavior of ensembles of pure quantum states, our work is motivated by finding a general tool that will help us deal with the inherent randomness of molecular systems at thermal equilibrium. They will be effective at characterizing irreversible relaxation processes and the loss of memory of an initial state in a fluctuating environment.
