

CHAPTER OVERVIEW

9: Irreversible and Random Processes

In condensed phases, intermolecular interactions and collective motions act to modify the state of a molecule in a time-dependent fashion. Liquids, polymers, and other soft matter experience intermolecular interactions that lead to electronic and structural motions. Atoms and molecules in solid form are subject to fluctuations that result from thermally populated phonons and defect states that influence electronic, optical, and transport properties. As a result, the properties and dynamics of an internal variable that we may observe in an experiment are mixed with its surroundings. In studying mixed states we cannot write down an exact Hamiltonian for these problems; however, we can describe the influence of the surroundings in a statistical manner. This requires a conceptual change.

[9.1: Concepts and Definitions](#)

[9.2: Thermal Equilibrium](#)

[9.3: Fluctuations](#)

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