

CHAPTER OVERVIEW

7: Interaction of Light and Matter

One of the most important topics in time-dependent quantum mechanics is the description of spectroscopy, which refers to the study of matter through its interaction with electromagnetic radiation. Classically, light-matter interactions are a result of an oscillating electromagnetic field resonantly interacting with charged particles in the matter, most often bound electrons. We observe these processes either through changes to the light induced by the matter, such as absorption or emission of new light fields, or by light-induced changes to the matter, such as ionization and photochemistry. By studying such processes as a function of the control variables for the light field (amplitude, frequency, polarization, phase, etc.), we can deduce properties of the samples.

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[7.2: Classical Light-Matter Interactions](#)

[7.3: Quantum Mechanical Electric Dipole Hamiltonian](#)

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