# CHAPTER OVERVIEW

## 12: Time-Dependent Perturbation Theory

Consider a system whose Hamiltonian can be written

$$H(t) = H_0 + H_1(t). \tag{12.1}$$

Here, $H_0$ is again a simple time-independent Hamiltonian whose eigenvalues and eigenstates are known exactly. However, $H_1$ now represents a small time-dependent external perturbation. Let the eigenstates of $H_0$ take the form

$$H_0\,\psi_m = E_m\,\psi_m. \tag{12.2}$$

We know (see Section [sstat]) that if the system is in one of these eigenstates then, in the absence of an external perturbation, it remains in this state for ever. However, the presence of a small time-dependent perturbation can, in principle, give rise to a finite probability that if the system is initially in some eigenstate $\psi_n$ of the unperturbed Hamiltonian then it is found in some other eigenstate at a subsequent time (because $\psi_n$ is no longer an exact eigenstate of the total Hamiltonian). In other words, a time-dependent perturbation allows the system to make transitions between its unperturbed energy eigenstates. Let us investigate such transitions.



### Contributors and Attributions


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