Summary of Lecture 1

- Schrödinger Picture $\mathrm{i}\hbar\dfrac{\mathrm{d}}{\mathrm{d}t}|\Psi(t)\rangle = H(t)|\Psi(t)\rangle$

$$|\Psi(t)\rangle = U(t)|\Psi(0)\rangle \qquad U(t) = \mathscr{T}\,\mathrm{e}^{-\frac{\mathrm{i}}{\hbar}\int_0^t H(t')\mathrm{d}t'}$$

- Heisenberg Picture state, $|\Psi(0)\rangle$, time-independent

$$O_{\mathrm{H}}(t) = U^{\dagger}(t)OU(t) \qquad \frac{\mathrm{d}}{\mathrm{d}t}O_{\mathrm{H}}(t) = \frac{\mathrm{i}}{\hbar}\left[H_{\mathrm{H}}(t), O_{\mathrm{H}}(t)\right]$$

- Application to driven SHO

This Lecture (2)

- Spin-1/2 in external field
- Adiabatic approximation

Summary of Lecture 2

- Spin in a field $H(t) = \vec{H}(t) \cdot \vec{S}$

  Heisenberg picture $\frac{\mathrm{d}}{\mathrm{d}t}\vec{S}(t) = \frac{1}{\hbar}\vec{H}(t) \times \vec{S}(t)$

  Rabi Oscillations $\vec{H}(t) = (H_R \cos \omega t, H_R \sin \omega t, H_0)$

  Transform to rotating frame $\vec{H}_{\mathrm{Rabi}} = (H_R, 0, H_0 - \hbar\omega)$

- Adiabatic approximation (Schrödinger Picture)

Next Lecture (3)

- Landau-Zener Tunneling
- Berry Phase