Quantum Zeno effect and saturation broadening

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Solution: *a. See the solution of Exc. 2.5(a).*
b. The Liouville matrix and the results of the simulations can be found in the numerical MATLAB code in given in the file 'LM_Bloch_ZenoEffect.m'.
c. When the 'meter transition' $|2\rangle$-$|3\rangle$ is weakly excited, $\Omega_{23} \ll \Gamma_{23}$, the 'system transition' $|1\rangle$-$|2\rangle$ evolves normally, as expected for an isolated two-level system. As we increase Ω_{23} to be able to observe the light scattered on the 'meter transition' more easily and extract information on the state of the system more quickly, we perturb the evolution of the system and prevent it from evolving: The population ρ_{11} is getting weaker.

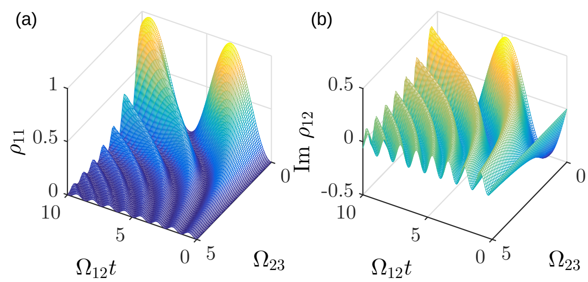

Figure 2.9: (code for download) (a) Temporal evolution of the excited state population ρ_{11} in a three-level system in V-configuration, as shown in Fig. 2.3(b), as a function of the Rabi frequency Ω_{23} of the 'meter' laser. (b) Temporal evolution of the coherence ρ_{12}.