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Landau-Zener Transition for a qubit coupled to an Ohmic environment[1] MAXIM G. VAVILOV, CANRAN XU, University of Wisconsin - Madison, AMRIT POUDEL, Dartmouth College — We study dynamics of a qubit coupled to an Ohmic environment using the Bloch-Redfield approach. We first discuss how Bloch-Redfield equations can be modified to describe a quantum system with a slowly varying Hamiltonian. We apply this method to the Landau–Zener problem in the presence of environment at zero and finite temperatures. We show that the environment causes relaxation and excitation processes with time–dependent transition rates and the transition probability is greatly affected by these processes. In particular, the transition probability is reduced for environment at zero temperature, when only relaxation is present. At finite temperatures, the competition between relaxation and excitation give rise to non–monotonic dependence of the transition probability on the coupling strength. We also discuss the applicability of the Lindblad formalism to this problem.

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