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A Master equation approach to line shape in dissipative systems
CHIKAKO UCHIYAMA, Univ. of Yamanashi, MASAKI AIHARA, Nara Institute of Science and Technology, MIZUHIKO SAEKI, SEIJI MIYASHITA, The Univ. of Tokyo, CREST — The resonant type of experiments, such as ESR and NMR, provide us microscopic informations on materials. In analyzing the experiments, we often assume that the total system is in a factorized (decoupled) state of our relevant system and a heat bath at an initial time, even when the excited state is thermally distributed. However, the *whole* material is prepared in an equilibrium state just before application of external field. In such situation, our relevant system has quantum correlation with the heat bath at an initial time, which affects the time evolution of the system in a short time region. This means that we need to extend the linear response theory to include the system-bath correlation at an initial time. In this talk, we propose a new formulation on complex susceptibility which includes the initial correlation between system and bath under the condition that the total system is in an equilibrium state(Phys. Rev. E80 (2009) 021128). In our formulation, we also include frequency shift by system-bath interaction. Applying the obtained formula to spin systems which interact with bosonic reservoir, we find that the effects of initial correlation and frequency shift are reflected in the line shape of complex susceptibility. In the talk, we discuss these effect on one-spin system as well as interacting multiple spin systems.

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