

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Non-Markovian evolution equation of two-time correlation functions of system operators: beyond the quantum regression theorem HSI-SHENG GOAN, Department of Physics, National Taiwan University, PO-WEN CHEN, CHUNG-CHIN JIAN — Two-time (multiple-time) correlation functions (CF's) are important quantities that can provide more significant information about the system, which the single-time expectation values cannot. In the Markovian open systems, an extremely useful procedure to calculate the two-time (multiple-time) CF's of the system operators is the quantum regression theorem (QRT) that gives a direct relation between the time evolution equation of the single-time expectation values and that of their corresponding two-time (multiple-time) CF's. For the non-Markovian case, it is known that the QRT is not valid in general. Here we present, valid to second order in the system-environment interaction Hamiltonian, a non-Markovian evolution equation of two-time CF's of the system operators at finite environment temperatures for both Hermitian and non-Hermitian system coupling operators and for any initially separable system-environment state (pure or mixed). We then apply the non-Markovian evolution equation to a simple problem of a two-level system coupled to a bosonic environment, as well as to a problem of an exactly solvable pure-dephasing model. The presented evolution equation that generalizes the QRT to the non-Markovian finite-temperature case will have applications in many different branches of physics.

Hsi-Sheng Goan
Department of Physics, National Taiwan University

Date submitted: 25 Nov 2009

Electronic form version 1.4