Abstract Submitted
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Dynamic theory of driven multilevel dissipative quantum systems[1] ZHONGYUAN ZHOU, Department of Chemistry and Department of Physics and Astronomy, University of Kansas, SHIH-I CHU, Department of Chemistry, University of Kansas, SIYUAN HAN, Department of Physics and Astronomy, University of Kansas — We develop a dynamic theory for a driven multilevel quantum system interacting with a fluctuating environment. In this theory, the driving field is an arbitrary external field, the environment is characterized by a spectral density function, and the density operator of system is governed by master equation. The leakage due to the coupling of both the driving field and environment is included. This theory has been used to analyze dissipation processes of a driven quantum system in a thermal bath. Analytical spontaneous decay rate is derived, which is in good agreement with that obtained by others using different methods. For two-level systems, the master equation is replaced by Bloch equations. For resonantly driven dissipative two-level systems, analytical expressions of energy relaxation time, decoherence time, as well as dephasing time are obtained, from which an approach to measure the dephasing time is proposed.

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