Mixed coherent and incoherent dynamics in strongly correlated quantum systems

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In studying the dynamics of strongly correlated quantum systems one frequently wants to pick out a coherent quantum part against an incoherent background, and to study the response to a driving field that may be coherent (for example, a magnetic field) or incoherent (for example a temperature gradient) in nature. In this talk I will discuss how the standard theory of linear response must be modified to deal with cases where a system is perturbed by a change to the relaxation processes it undergoes, as well as by a change to the Hamiltonian, and I will give three examples where this type of mixed coherent-incoherent process is important: the theory of time-dependent electron spin resonance, the low-frequency spin dynamics of rare-earth ions [1], and the recently proposed generation of spin entanglement by interaction with a common thermal bath [2].

References


Work performed with C.M.S. Gannarelli, D.P. McCutcheon, S. Bose, A. Nazir and W. Wu