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Keldysh approach to periodically driven systems with fermionic bath: non-equilibrium steady state, proximity effect, and interaction instabilities DONG E. LIU, Station Q, Microsoft Research, ALEX LEVCHENKO, University of Wisconsin-Madison, ROMAN M. LUTCHYN, Station Q, Microsoft Research — We study properties of a periodically driven system coupled to a thermal bath. As a nontrivial example, we consider periodically driven metallic system coupled to a superconducting bath. The effect of the superconductor on the driven system is two-fold: it (a) modifies density of states in the metal via the proximity effect and (b) acts as a thermal bath for light-excited quasi-particles. Using Keldysh formalism, we calculate, nonpertubatively in the system-bath coupling, the steady-state properties of the system and obtain non-equilibrium distribution function. The latter allows one to calculate observable quantities which can be spectroscopically measured in tunneling experiments. A more interesting question is: Can interactions generate instabilities (e.g. BCS, Stoner's, charge density-wave, et al.) for dissipative Floquet systems. If the driving potential do not change the structure in momentum space, we then developed an RG processes, where we can integrate out the excitations in the momentum space but still keep the structures in the frequency space invariant. Based on this approach, we study BCS instability and transition temperature for 2D dissipative periodically driven systems with interaction.

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