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On stability of odd-frequency superconducting state DMITRY SOLENOV, IVAR MARTIN, DMITRY MOZYRSKY, Theoretical Division, Los Alamos National Laboratory — Odd-frequency pairing mechanism has been investigated for several decades. Nevertheless the properties of such superconducting phase as well as its thermodynamic stability have remained unclear. In particular it has been argued by numerous authors that the odd-frequency state is thermodynamically unstable, has an unphysical Meissner effect (at least within the mean-field approximation), and therefore can not exist as a homogeneous phase in equilibrium physical systems. We argue that such a conclusion is incorrect because it relies on an inappropriate assumption that the odd-frequency superconductor can be described by an effective Hamiltonian that breaks the U(1) symmetry. We show that the odd-frequency state can be appropriately formulated within the functional integral representation by using the effective action to describe such a superconducting state within the mean field approximation. We find that the odd-frequency superconductor is thermodynamically stable and exhibits ordinary Meissner effect, and therefore, in principle, it can be realized in equilibrium solid state systems.

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