

Abstract Submitted
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Possible mechanism for s -wave superconductivity in heavy-fermion systems: Variational cluster study¹ KEISUKE MASUDA, Department of Physics, Waseda University, DAISUKE YAMAMOTO, Waseda Institute for Advanced Study, Waseda University — We study s -wave superconductivity in heavy-fermion systems, which cannot be easily understood due to the existence of the strong Coulomb repulsion between f electrons. The key idea of our proposal is to consider the interorbital Cooper pairing between conduction electrons (c electrons) and localized f electrons, which we refer to as the “ c - f pairing.” We analyze the periodic Anderson model by means of the variational cluster approach, in which all the three types of on-site pairing, namely intraorbital pairings between c electrons and between f electrons and the c - f pairing, are taken into account. At half filling, the system exhibits the Kondo insulating or antiferromagnetic state, depending on the strength of the Coulomb repulsion. When electrons or holes are doped to the antiferromagnetic state, s -wave superconductivity appears coexisting with the antiferromagnetic long-range order. We also find that the magnetic order vanishes for further doping, and a pure s -wave superconducting state is formed for a certain range of doping concentration. We suggest the c - f pairing as a possible mechanism for s -wave superconductivity in heavy-fermion systems.

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