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Superconducting pairing of interacting electrons: implications from the two-impurity Anderson model[1] LIJUN ZHU, JIAN-XIN ZHU, Theoretical Division and Center for Nonlinear Studies, Los Alamos National Laboratory, Los Alamos, New Mexico 87545, USA — We study the non-local superconducting pairing of two interacting Anderson impurities, which has an instability near the quantum critical point from the competition between the Kondo effect and an antiferromagnetic inter-impurity spin exchange interaction. As revealed by the dynamics over the whole energy range, the superconducting pairing fluctuations acquire considerable strength from an energy scale much higher than the characteristic spin fluctuation scale while the low energy behaviors follow those of the staggered spin susceptibility. We argue that the superconducting pairing might not need the spin fluctuations as the glue, but rather originated from the effective Coulomb interaction. On the other hand, critical spin fluctuations in the vicinity of quantum criticality are also crucial to a superconducting pairing instability, by preventing a Fermi liquid fixed point being reached to keep the superconducting pairing fluctuations finite at low energies. A superconducting order, to reduce the accumulated entropy carried by the critical degrees of freedom, may arise favorably from this instability.

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