Spatial structure of the Cooper pairs in color superconductivity at moderate densities

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Abstract

Two flavor color superconductivity is studied with special emphasis on the *spatial* structure of the quark-pair wavefunction. In the Nambu-Gorkov formalism with the Higashijima-Miransky approximation for the QCD running coupling, the superconducting gap with spatial-momentum dependence, the Cooper pair wavefunction and the coherence length are calculated for a very wide range of densities. While reproducing the known results at very high densities, we found that, at *moderate* densities (a few - 10 times the nuclear matter density) expected to be realized in the core of neutron stars, the fermi surface is substantially diffused, and quark pairs form tightly bound bosonic states unlike the case of electron pairs in the BCS superconductors. Physical implication of these results will be also reported.

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