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Color superconductivity and charge neutrality in Yukawa theory

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It is generally believed that systems with two fermion species that form Cooper pairs form a neutral state, where the number densities of the two fermion species are equal. This belief is based on mean field calculations with a zero-range contact interaction. We investigate whether this claim still holds if a Yukawa model is employed, where the interaction range is finite. Our results indicate that the conclusions drawn from the zero-range interaction case may not be as general as initially believed. Our findings also support the results of an earlier Dyson-Schwinger based study that found the color-flavor locked phase to be non-neutral.

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