

Effects of Density-Dependent Quark Mass on Phase Diagram of Color-Flavor-Locked Quark Matter

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Abstract: Considering the density dependence of quark mass, we investigate the phase transition between the (unpaired) strange quark matter and the color-flavor-locked matter, which are supposed to be two candidates for the ground state of strongly interacting matter. We find that if the current mass of strange quark m_s is small, the strange quark matter remains stable unless the baryon density is very high. If m_s is large, the phase transition from the strange quark matter to the color-flavor-locked matter in particular to its gapless phase is found to be different from the results predicted by previous works. A complicated phase diagram of three-flavor quark matter is presented, in which the color-flavor-locked phase region is suppressed for moderate densities.

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Key words: strange quark matter, color-flavor locked quark matter, pairing

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