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Inhomogeneous phases in dense nuclear matter

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Quantum Chromodynamics at high densities is likely to exhibit inhomogeneous phases. The chiral density wave is a simple ansatz for a class of such phases, and it has been extensively studied in models based on quark degrees of freedom. We are exploring the possibility of a chiral density wave in a nucleon-meson model, taking into account the contribution of the Dirac sea. We find that for small pion mass, even though in the homogeneous case the chiral transition is a crossover, the chiral density wave is energetically favored in a certain density regime. Our model allows us to link the existence of this regime to the properties of nuclear matter at saturation. For the physical pion mass, we find that the chiral density wave is disfavored and more complicated inhomogeneous configurations may appear.

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