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Strangeness thermodynamic instabilities in dense hadronic matter

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In this investigation we show that, similarly to the low density nuclear liquid-gas phase transition, thermodynamic instabilities and, consequently, a pure hadronic phase transition can occur in regime of finite temperature and dense baryon matter. The analysis is performed by means of an effective relativistic mean-field model with the inclusion of hyperons, Δ-isobars, and the lightest pseudoscalar and vector meson degrees of freedom. The Gibbs conditions on the global conservation of baryon number and zero net strangeness in symmetric nuclear matter are required. It turns out that a continuous phase transition takes place with two phases at the same baryon and strangeness chemical potentials but with a different content of baryon and strangeness density, altering significantly the baryon-antibaryon and meson-antimeson ratios. Such a physical regime could be in principle investigated in the high-energy compressed nuclear matter experiments where it is possible to create compressed baryonic matter with a high net baryon density.

Collaboration

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