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Fluctuations in non-ideal pion gas with dynamically fixed particle number

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We consider a non-ideal hot pion gas with the dynamically fixed number of particles in the model with the $\lambda\phi^4$ interaction. The effective Lagrangian for the description of such a system is obtained after dropping the terms responsible for the change of the total particle number. Reactions $\pi^+\pi^-\leftrightarrow\pi^0\pi^0$, which determine the isospin balance of the medium, are permitted. Within the self-consistent Hartree approximation we compute the effective pion mass, thermodynamic characteristics of the system and the variance of the particle number at temperatures above the critical point of the induced Bose-Einstein condensation when the pion chemical potential reaches the value of the effective pion mass. We analyze conditions for the condensate formation in the process of thermalization of an initially non-equilibrium pion gas. The normalized variance of the particle number increases with a temperature decrease but remains finite in the critical point of the Bose-Einstein condensation. This is due to the non-perturbative account of the interaction and is in contrast to the ideal-gas case. In the kinetic regime of the condensate formation the variance is shown to stay finite also.

Topic:

Topic: Heavy Ion Collisions and Critical Phenomena

Summary

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