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Chiral Phase Transition at Finite Isospin Density in Linear Sigma Model

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Abstract: Using the linear sigma model, we have introduced the pion isospin chemical potential. The chiral phase transition is studied at finite temperatures and finite isospin densities. We have studied the μ-T phase diagram for the chiral phase transition and found the transition cannot happen below a certain low temperature because of the Bose-Einstein condensation in this system. Above that temperature, the chiral phase transition is studied by the isotherms of pressure versus density. We indicate that the transition, in the chiral limit, is a first-order transition from a low-density phase to a high-density phase like a gas-liquid phase transition.

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Key words: finite temperature field theory, nuclear matter, chiral symmetries

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