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Center symmetry and the sign problem of finite density lattice gauge theory

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We study the phase transition of quantum chromodynamics (QCD) at finite temperature and density by focusing on the probability distribution function of quark density. The phase transition of QCD is expected to change its properties as the density changes, and the probability distribution function gives important information for understanding the nature of the phase transition. The numerical simulation of QCD at high density has the serious problem of "sign problem". In this study, we consider the center symmetry, which is important for understanding the phase transition of lattice gauge theory, and propose a method to avoid the sign problem using the symmetry. In this way, we aim to establish a method to calculate probability distribution functions of physical quantities such as quark density by numerical simulation.

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