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Canonical approach to the finite density QCD with winding number expansion

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The canonical partition function is related to the grand canonical one through the fugacity expansion.

In this talk we perform the fugacity expansion by a method of the hopping parameter expansion in temporal direction: winding number expansion.

Since the convergence of our expansion is good only for a small κ we concentrate on heavy quark mass region.

For a numerical simulation we adopt the improved Wilson fermion with the APE stout smeared gauge links.

The grand canonical partition function is made for $N_f = 2$ QCD in the imaginary chemical potential region including $\mu = 0$.

After a derivation of the canonical partition function we study the Lee-Yang zeros of the complexified grand partition function.

Primary author: Dr TANIGUCHI, Yusuke (University of Tsukuba)

Co-authors: Prof. NAKAMURA, Atsushi (Hiroshima University); Mr FUKUDA, Ryutaro (The University of Tokyo); Mr OKA, Shotaro (Rikkyo University); Mr SAKAI, Shuntaro (Kyoto University)

Presenter: Dr TANIGUCHI, Yusuke (University of Tsukuba)

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