



Contribution ID: 37

Type: talk

Canonical Approach for Exploring Finite Density QCD

Monday, 26 June 2017 11:45 (25 minutes)

Canonical approach is a way to map QCD at imaginary chemical potential regions to the real ones. The essential idea is simple: $Z(\mu, T) = \sum_n Z_n (\exp(\mu/T))^n$, where Z_n , the canonical partition functions, do not depend on μ . We construct Z_n in the imaginary μ regions, and we can calculate $Z(\mu, T)$ at any real μ .

Since Z_n drops very fastly as $|n|$ increases, and we must fight against the overlap problem, we need several algorithmic and computational tricks, such as a multi-precision calculation.

In Vladivostok, we have investigated the sources of unstable Z_n , and developed methods to overcome them. I will report these studies and the outcomes, especially those for comparison of heavy ion collision experiment.

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