



Contribution ID: 370

Type: Oral presentation

A new technique for solving the freezing problem in the complex Langevin simulation of 4D SU(2) gauge theory with a theta term

Wednesday 28 July 2021 21:45 (15 minutes)

We apply the complex Langevin method (CLM) to overcome the sign problem in 4D SU(2) gauge theory with a theta term extending our previous work on the 2D U(1) case. The topology freezing problem can be solved by using open boundary conditions in all spatial directions, and the criterion for justifying the CLM is satisfied even for large θ as far as the lattice spacing is sufficiently small. However, we find that the CP symmetry at $\theta = \pi$ remains to be broken explicitly even in the continuum and infinite-volume limits due to the chosen boundary conditions. In particular, this prevents us from investigating the interesting phase structure suggested by the 't Hooft anomaly matching condition. We also try the so-called subvolume method, which turns out to have a similar problem. We therefore discuss a new technique within the CLM, which enables us to circumvent the topology freezing problem without changing the boundary conditions.

Author: Mr MATSUMOTO, Akira (SOKENDAI)

Co-authors: Mr YOSPRAKOB, Atis (SOKENDAI); Prof. NISHIMURA, Jun (KEK, SOKENDAI); Dr HATAKEYAMA, Kohta (KEK); Prof. HONDA, Masazumi (YITP); Dr HIRASAWA, Mitsuaki (KEK); Dr ITO, Yuta (Tokuyama College)

Presenter: Mr MATSUMOTO, Akira (SOKENDAI)

Session Classification: Algorithms (including Machine Learning, Quantum Computing, Tensor Networks)

Track Classification: Algorithms (including Machine Learning, Quantum Computing, Tensor Networks)