



Contribution ID: 65

Type: Oral presentation

Improved topological sampling for lattice gauge theories

Thursday, 29 July 2021 13:15 (15 minutes)

Standard sampling algorithms for lattice QCD suffer from topology freezing (or critical slowing down) when approaching the continuum limit, thus leading to poor sampling of the distinct topological sectors. I will present a modified Hamiltonian Monte Carlo (HMC) algorithm that triggers topological sector jumps during the assembly of Markov chain of lattice configurations. We study its performance in the 2D Schwinger model and compare it to alternative methods, such as fixing topology or master field. We then discuss the difficulties of the algorithm in a $SU(2)$ gauge model in 4D.

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

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