



Contribution ID: 159

Type: **Oral Presentation**

Infinite Variance in Fermionic Systems

Thursday, August 11, 2022 9:00 AM (20 minutes)

In Monte Carlo simulations of lattice quantum field theories, if the variance of an estimator of a particular quantity is formally infinite, or very large compared to the square of the mean, then expectation of the estimator can not be reliably obtained using the given sampling procedure. A particularly simple example is given by the Gross-Neveu model where Monte Carlo calculations involve the introduction of auxiliary bosonic variables through a Hubbard-Stratonovich (HS) transformation. Here, it is shown that the variances of HS estimators for classes of operators involving fermion fields are divergent in this model. To correctly estimate these observables, an infinite sequence of discrete Hubbard-Stratonovich transformations and a reweighting procedure that can be applied to any non-negative observable are introduced.

Primary authors: YUNUS, Cagin (MIT); DETMOLD, William (MIT)

Presenter: YUNUS, Cagin (MIT)

Session Classification: Algorithms

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