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A solution for infinite variance problem of fermionic observables

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Monte Carlo simulations with continuous auxiliary fields encounter challenges when dealing with fermionic systems due to the infinite variance problem observed in fermionic observables. This issue renders the estimation of observables unreliable, even with an infinite number of samples. In this talk, I will propose an approach to address this problem by employing a reweighting method that utilizes the distribution from an extra time-slice. I will explore two strategies to compute the reweighting factor using Hubbard model: one involves truncating and analytically calculating the reweighting factor, while the other employs a secondary Monte Carlo estimation. Through our findings, I will demonstrate that utilizing the sub-Monte Carlo reweighting technique, coupled with an unbiased estimator, offers a solution that effectively mitigates the infinite variance problem at a minimal additional cost.

Topical area

Algorithms and Artificial Intelligence

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