



Contribution ID: 88

Type: **Parallel Talk**

Multi-Polynomial Monte Carlo for Trace Estimation in Lattice QCD

Friday, 4 August 2023 09:40 (20 minutes)

Estimating the trace of the inverse of a large matrix is an important problem in lattice quantum chromodynamics. A multilevel Monte Carlo method is proposed for this problem that uses different degree polynomials for the levels. The polynomials are developed from the GMRES algorithm for solving linear equations. To reduce orthogonalization expense, the highest degree polynomial is a composite or double polynomial found with a polynomial preconditioned GMRES iteration. Added to some of the Monte Carlo pieces is deflation of eigenvalues that reduces the variance. Deflation is also used for finding a reduced degree deflated polynomial. The new Multipolynomial Monte Carlo method can significantly improve the trace computation for matrices that have a difficult spectrum due to small eigenvalues.

Topical area

Algorithms and Artificial Intelligence

Primary author: Prof. WILCOX, Walter (Baylor University)**Co-authors:** Dr LASHOMB, Paul (Baylor University); Prof. MORGAN, Ronald (Baylor University); Dr WHYTE, Travis (Cambridge University)**Presenter:** Prof. WILCOX, Walter (Baylor University)**Session Classification:** Algorithms and Artificial Intelligence