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# Polynomial Noise Subtraction in Lattice QCD

In Lattice QCD, solutions of the quark matrix $M$ can be difficult to obtain via Krylov methods due to the low-lying eigenvalue distribution. Polynomial preconditioning can be used to speed up the convergence of Krylov solvers by shifting the low-lying eigenvalues away from the origin. New polynomial preconditioners have been previously developed to achieve high-degree polynomials and an application of these high-degree polynomials in the context of noise theory will be the subject of this talk. Measurements in Lattice QCD, particularly those involving disconnected loops, produce a significant amount of noise. Noise subtraction methods have previously been developed to reduce the noise from such measurements. Some of these methods involve producing polynomials as approximate matrix inverses, but only low-degree polynomials have been applied to these methods. The new method of constructing polynomials has been applied to these methods to allow for much higher degree polynomials to be achieved, theoretically improving the approximation as a matrix inverse in the subtraction methods, the results of which will be discussed.

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