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New Noise Subtraction Methods in Lattice QCD

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Lattice QCD calculations of quark loop operators are extremely time-consuming to evaluate. To calculate these diagrams we use stochastic noise methods, which employ a randomly generated set of noise vectors to project out physical signals. This is done with linear equation solvers like GMRES-DR (Generalized Minimum RESidual algorithm-Deflated and Restarted) for the first noise, and GMRES-Proj (similar algorithm projected over eigenvectors) for remaining noises. In this context, we are attempting to employ matrix deflation algorithms to reduce statistical uncertainty in these time-consuming lattice calculations. In addition, we are developing noise suppression algorithms using polynomial subtraction techniques, as well as combining deflation and polynomial methods in an original way.

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