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Improving HISQ quark solves using deflation

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Typically, the conjugate gradient (CG) algorithm employs mixed precision and even-odd preconditioning to compute propagators for highly improved staggered quarks (HISQ). This approach suffers from critical slowing down as the light quark mass is decreased to its physical value. Multigrid is one alternative to combat critical slowing down, however, it involves setup costs which are not always easy to amortize. We consider deflation, which can also remove critical slowing down, but incurs its own setup cost to compute eigenvectors. Results using the MILC and QUDA software libraries to generate eigenvectors and to perform deflated solves on lattices up to $144^3 \times 288$ (with lattice spacing 0.042 fm) and with a range of quark masses from the physical strange down to the physical light quark values will be presented. We compare with CG and comment on deflation versus multigrid.

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