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Chiral rank-k truncations for the multigrid preconditioner of Wilson fermions

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A modification to the setup algorithm for the multigrid preconditioner of Wilson fermions is presented. A larger basis of test vectors than used in conventional multigrid is calculated by the smoother and is truncated by a singular value decomposition on the chiral components of the test vectors. The truncated basis is used to form the prolongation and restriction matrices of the multigrid hierarchy. The efficacy of the approach is demonstrated on an anisotropic lattice with $m_\pi \approx 280$ MeV and an isotropic lattice with $m_\pi \approx 220$ MeV. The scaling of the method with lattice volume is also examined.

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