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Investigating a Renormalization Group Multigrid Approach for Domain Wall Fermions

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Previous work has shown that renormalization group blocking of a 2+1 flavor DWF ensemble with $1/a = 2$ GeV can produce an ensemble with $1/a = 1$ GeV, with physical quantities on the blocked 1 GeV ensemble within a few percent of their values on an independently generated 1 GeV ensemble. This has led us to investigate using the blocked ensemble DWF operator as a coarse-grid operator for a multigrid DWF solver. We find that the low-mode space of the coarse-grid operator spans the low-mode space of the original operator quite well. However, in the simplest coarse-grid to fine-grid interpolation step, fine-grid high modes are introduced into a low-mode-accurate, coarse-grid solution. We have studied various filtering schemes to reduce this contamination, with partial success to date. We will review our overall approach and detail our current status.

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Session Classification: Algorithms (including Machine Learning, Quantum Computing, Tensor Networks)

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