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Fourier-accelerated HMC for the 2D SU(N) X SU(N) principal chiral model

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We report the results of Fourier-accelerated HMC simulations of 2D SU(N) X SU(N) principal chiral models for N = 2, 3, 4, 6, 9. These models share several key properties with 4D QCD, for example asymptotic freedom and dynamical mass generation. Even for modest correlation lengths, we find integrated autocorrelation times are decreased by an order of magnitude relative to standard HMC, with relatively little computational overhead. Our results suggest that the relative advantage of Fourier Acceleration over traditional HMC decreases as N increases, possibly due to the enlarged group space associated with larger N. Our Monte Carlo results agree with the exact mass spectra and continuum scaling behaviour predicted by the exact solution obtained using the Bethe ansatz.

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