

An application of the UV-filtering preconditioner to the Polynomial Hybrid Monte Carlo algorithm

Presenter: Ken-Ichi Ishikawa (Hiroshima University)

PACS-CS Collaboration: S.Aoki, K-I.Ishikawa, T.Ishikawa, N.Ishizuka, K.Kanaya, Y.Kuramashi, M.Okawa, K.Sasaki, Y.Taniguchi, A.Ukawa, T.Yoshie

Abstract: The UV-filtering preconditioner has been used to improve the Multiboson algorithm. We apply the UV-filtering preconditioner to the Polynomial Hybrid Monte Carlo algorithm with the plaquette gauge action and the $O(a)$ -improved Wilson quark action. The UV-filtering preconditioner is used to further precondition the symmetrically even/odd-site preconditioned $O(a)$ -improved Wilson-Dirac operator. We employ the $O(\kappa^2)$ UV-filtering preconditioner for which we still obtain a local effective action. We investigate the efficiency of the algorithm at $N_f = 2, \beta = 5.2, c_{\text{SW}} = 2.02, M_\pi/M_\rho \sim 0.8$ and 0.7 on $16^3 \times 48$ lattices. We find that the UV-filtering reduce the magnitude of the molecular-dynamics force from the pseudo fermion by a factor 3 by tuning the UV-filter parameter at $M_\pi/M_\rho \sim 0.7$. Combining with the multi-time scale molecular-dynamics integrator we achieve a factor 3 improvement.