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HISQy Business

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Tackling ever more complex problems of non-perturbative dynamics requires simulations and measurements on ever increasingly large lattices at physical quark masses. In the age of the exascale, addressing the challenges of ensemble generation and measurements at such scales requires a plethora of algorithmic advances, both in theory space and in the implementation space. In this talk we will focus on tackling these issues on the largest physical-quark ensembles in active use which feature a $192^3 \times 384$ global volume and utilize the HISQ fermion discretization. We will present results from a three-pronged approach implemented in the QUDA library for GPUs: a multigrid algorithm for HISQ fermions, a refactoring and optimization of the HISQ fermion force, and a local preconditioner to the Schur-preconditioned HISQ stencil.

Topical area

Algorithms and Artificial Intelligence

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