Contribution ID: **9**   Type: **Talk**

Scaling Multigrid to the Exascale

Thursday, 29 June 2017 09:30 (45 minutes)

Owing to its success in removing the critical slowing down of Dirac linear systems, adaptive multigrid is now a standard solver in the arsenal of tools that the lattice field theorist expects. In this work we report on the latest progress in improving the strong scaling of adaptive multigrid algorithms when running on GPU-accelerated architectures using the QUDA library. Techniques include Schwarz preconditioning, pipelined solvers, precision truncation and RDMA-enabled MPI. Furthermore, we report on progress on optimizing the adaptive setup process in order to increase its applicability to Hybrid Monte Carlo. Finally we discuss the challenges in scaling multigrid to the Exascale-generation of supercomputers.

Title

Scaling Multigrid to the Exascale

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