Algorithms for Lattice Field Theory at Extreme Scales

Richard C. Brower, Boston University

Increases in computational power are allowing lattice field theories to resolve ever smaller scales, but to realize the full benefit to scientific discovery, new multi-scale algorithms are needed to maximize efficiency. Examples of this trend in algorithms include adaptive multigrid solvers for the computation of quark propagators and improved Force Gradient integrators for the Hamiltonian evolution used to include quark contributions to vacuum fluctuations in the quantum path integral. Future challenges to algorithmic and software infrastructure targeting many-core GPU accelerators and heterogeneous extreme scale computing are Identified.