



Contribution ID: 412

Type: **Poster presentation**

Implementation of the twisted mass fermion operator on accelerators

Monday, 14 October 2013 15:00 (45 minutes)

Lattice Quantum Chromodynamics (LQCD) simulations are critical for understanding the validity of the Standard Model and the results of the High-Energy and Nuclear Physics experiments. Major improvements in the calculation and prediction of physical observables, such as nucleon form factors or flavor singlet meson mass, require large amounts of computer resources, of the order of hundreds of Tflop/s of sustained performance. For the first part of our study, we extended the QUDA library, an open source library for performing calculations in LQCD on NVIDIA GPUs, to include kernels for the non-degenerate twisted mass fermion operator. Next, we implemented the operator on the Intel MIC architecture. A detailed performance analysis for both cases is provided.

Summary

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Session Classification: Poster presentations

Track Classification: Software Engineering, Parallelism & Multi-Core