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Lattice QCD code set Bridge++ on arithmetic accelerators

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We are developing a code set “Bridge++” for simulations of lattice gauge theories that aims at an extensible, readable, and portable workbench, while achieving high performance.

This work concerns the design of Bridge++ to incorporate the accelerator devices, such as GPUs.

As generic frameworks for heterogeneous programming using CPU and accelerator devices, we apply OpenCL and OpenACC to Bridge++.

OpenCL and OpenACC are based on different policies.

The former explicitly controls the devices through API functions, while the latter is a directive-based extension of a programming language.

The inversion of a fermion matrix is offloaded to the accelerator devices.

From a viewpoint of constructing reusable components based on the object-oriented programming, as well as tuning the code to achieve high performance, we evaluate feasibility of these frameworks.

Primary author: Dr MOTOKI, Shinji (High Energy Accelerator Research Organization(KEK))

Co-authors: Dr NEMURA, Hidekatsu (Center for Computational Sciences, University of Tsukuba); Dr MATSUFURU, Hideo (High Energy Accelerator Research Organization (KEK)); Prof. KANAYA, Kazuyuki (University of Tsukuba); Dr UKITA, Naoya (University of Tsukuba); Prof. AOKI, Sinya (Kyoto University); Dr AOYAMA, Tatsumi (Nagoya University); Dr NAMEKAWA, Yusuke (University of Tsukuba); Prof. TANIGUCHI, Yusuke (University of Tsukuba); Dr UEDA, satoru (High Energy Accelerator Research Organization (KEK))

Presenter: Dr MOTOKI, Shinji (High Energy Accelerator Research Organization(KEK))

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