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LIVERPOOL

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O(a)-improved QCD+QED Wilson Dirac operator on GPUs

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Heterogeneous clusters of GPU-accelerated nodes offer large total memory bandwidth which can be used to speed-up our application, openQxD-1.1. In this work we investigate offloading solves of the Dirac equation from our framework openQxD-1.1 to GPU using the lattice-QCD library QUDA, and our early results demonstrate a significant potential speed-up in the time-to-solution for state-of-the-art problem sizes.

Minimal extensions to the existing QUDA library are required for our specific physics programme (mainly implementing C* boundary conditions) while greatly enhancing the performance portability of our code and retaining the reliability and robustness of existing applications in openQxD-1.1.

Our new interface will enable us to utilize pre-exascale infrastructure and reduce the systematic uncertainty in our physics predictions by incorporating the effects of quantum electromagnetism in our simulations.

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