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pMR: A high-performance communication library

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On many parallel machines, the time LQCD applications spend in communication is a significant contribution to the total wall-clock time, especially in the strong-scaling limit.

We present a novel high-performance communication library that can be used as a de facto drop-in replacement in existing software.

Its lightweight nature that avoids some of the unnecessary overhead introduced by MPI allows us to improve the communication performance of an application without any algorithmic or complicated implementation changes.

As a first real-world benchmark, we make use of the library in the coarse grid solve of the DD- α AMG algorithm.

On realistic lattices, we see an improvement of a factor 2x in pure communication time and total time savings of up to 20%.

Primary author: Mr GEORG, Peter (University of Regensburg)

Co-authors: Mr RICHTMANN, Daniel (University of Regensburg); Prof. WETTIG, Tilo (University of Regensburg)

Presenter: Mr GEORG, Peter (University of Regensburg)

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