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Graphics Processing Unit Accelerated Hirsch-Fye Quantum Monte Carlo CONRAD MOORE, SAMEER ABU ASAL, KAUSHIK RAJAGOPLAN, DAVID POLIAKOFF, JOSEPH CAPRINO, Louisiana State University, KAREN TOMKO, Ohio State University, BHUPENDER THAKUR, SHUXIANG YANG, JUANA MORENO, MARK JARRELL, Louisiana State University — In Dynamical Mean Field Theory and its cluster extensions, such as the Dynamic Cluster Algorithm, the bottleneck of the algorithm is solving the self-consistency equations with an impurity solver. Hirsch-Fye Quantum Monte Carlo is one of the most commonly used impurity and cluster solvers. This work implements optimizations of the algorithm, such as enabling large data re-use, suitable for the Graphics Processing Unit (GPU) architecture. The GPU's sheer number of concurrent parallel computations and large bandwidth to many shared memories takes advantage of the inherent parallelism in the Green function update and measurement routines, and can substantially improve the efficiency of the Hirsch-Fye impurity solver.

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