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Toward large-scale many-fermion calculations on Graphics Processing Units KYLE WENDT, JOAQUIN DRUT, The Ohio State University, TIMO LAHDE, Aalto University — We apply Graphics Processing Units (GPUs) to simulations of quantum many-body systems. Specifically, we study the performance of sparse matrix-vector multiplication and preconditioned conjugate gradient iteration on the NVIDIA Tesla c1060 GPU card. These operations are of direct relevance to Hybrid Monte Carlo calculations at finite temperature and density. We report a CPU-GPU performance comparison for the Fermi Hubbard model in $d + 1$ space-time dimensions, where we find speedup factors in excess of 40. We present an overview of our algorithm, possible optimization strategies and projected performance on the recently released NVIDIA Fermi architecture.

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