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High-resolution functional renormalization group calculations for interacting fermions on the square lattice[1] JULIAN LICHTENSTEIN, DAVID SÁNCHEZ DE LA PEÑA, Institute for Theoretical Solid State Physics, RWTH Aachen University, DANIEL ROHE, EDOARDO DI NAPOLI, Jülich Supercomputing Centre, Forschungszentrum Jülich GmbH, CARSTEN HONERKAMP, Institute for Theoretical Solid State Physics, RWTH Aachen University — We derive a novel computational scheme for functional Renormalization Group (fRG) calculations for interacting fermions on 2D lattices [1]. The scheme is based on the exchange parametrization fRG for the two-fermion interaction, with additional insertions of truncated partitions of unity. These insertions decouple the fermionic propagators from the exchange propagators and lead to a separation of the underlying equations. We demonstrate that this separation is numerically advantageous and may pave the way for refined, large-scale computational investigations. Furthermore, on the basis of speedup data gained from our implementation, it is shown that this new variant facilitates efficient calculations on a large number of multi-core CPUs. We apply the scheme to the t,t' Hubbard model on a square lattice to analyze the convergence of the results with the bond length of the truncation of the partition of unity. Due to the computational performance of the implementation a high resolution in momentum space can be achieved, which allows for an analysis of long ranged interactions.
[1] J. Lichtenstein, D. Sánchez de la Peña, et al., *ArXiv e-prints* (2016), arXiv:1604.06296.

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