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Solving the Parquet Equations for the Hubbard Model beyond Weak Coupling KA-MING TAM, Louisiana State University, HERBERT FOTSO, Georgetown University, SHUXIANG YANG, TAE-WOO LEE, J. RAMANUJAM, JUANA MORENO, MARK JARRELL, Louisiana State University — We find that imposing the crossing symmetry in the iteration process considerably extends the range of convergence for solutions of the parquet equations for the Hubbard model. When the crossing symmetry is not imposed, the convergence of both simple iteration and more complicated continuous loading (homotopy) methods are limited to high temperatures and weak interactions. We modify the algorithm to impose the crossing symmetry without increasing the computational complexity. We also imposed time reversal and a subset of the point group symmetries, but they did not further improve the convergence. We elaborate the details of the latency hiding scheme which can significantly improve the performance in the computational implementation. With these modifications, stable solutions for the parquet equations can be obtained by iteration more quickly even for values of the interaction that are a significant fraction of the bandwidth and for temperatures that are much smaller than the bandwidth. This may represent a crucial step towards the solution of two-particle field theories for correlated electron models.

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