

Tensor product states for strongly correlated electron systems

Steven R. White
Department of Physics and Astronomy
University of California
Irvine, California, 92697, USA

The density matrix renormalization group (DMRG) has become one of the most used tools for simulating strongly correlated electron systems. Recently, the matrix product wavefunctions produced by DMRG have been shown to be the simplest example of a wide class of tensor product states, and to be closely tied to methods from quantum information. The tensor product generalizations of DMRG have allowed progress in essentially all the key weaknesses of DMRG, most notably higher dimensional systems and dynamics. I will give an overview of some of the recent developments, focusing on two dimensional fermion systems and on an approach for treating finite temperatures using a new type of typical thermal wavefunction.