

## SIMULATING STRONGLY CORRELATED QUANTUM SYSTEMS WITH MATRIX PRODUCT STATES

In this series of lectures I want to introduce matrix product states as a very natural way to encode the wave functions of low-dimensional strongly correlated quantum systems, capturing the essence of quantum entanglement. Moreover, these states lead to very powerful algorithms for the calculation of ground states and low-lying excited states of correlated Hamiltonians (also known as DMRG - density matrix renormalization group), the time-evolution of such systems, and their finite-temperature properties. These algorithms will be presented in order to enable the audience to start writing simple programs using matrix product states.

Professor Ulrich Schollwöck