

Sommerfeld Theory Colloquium

Wednesday, 7th December 05

at 11.15 h

room 349, Theresienstr. 37 / III

Prof. Frank Verstraete

California Institute of Technology, USA

Numerical renormalization group methods in one and higher dimensions

The numerical renormalization group methods of K. Wilson and S. White can be reformulated as variational one-dimensional methods on the set of so-called matrix product states. In this talk we will show how these methods can be generalized to higher dimensions and how dynamical properties can be calculated. Within this formalism, we will prove the extraordinary accuracy of the numerical renormalization methods in the case of one-dimensional systems by using tools from the field of quantum information theory. We will also discuss the properties of the higher dimensional generalizations of matrix product states such as exemplified by the cluster states (a universal resource for quantum computation) , the toric code states of A. Kitaev (exhibiting topological quantum order) and a class of critical 2-D quantum systems.

Prof. V. Mukhanov