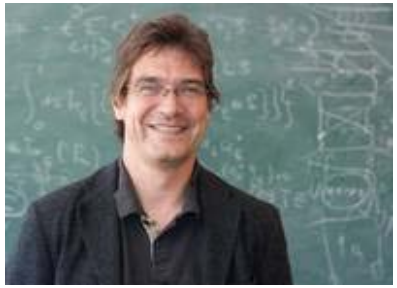
**Universität Konstanz**
**Sonderforschungsbereich 767**
***Controlled Nanosystems***

# *SFB 767 Kolloquium*

## Prof. Dr. Karsten Held



Institute for Solid State Physics, TU Wien

### *Electronic Correlations at the Nanoscale: Dynamical Mean Field Theory and beyond*

Dynamical mean field theory (DMFT) has been a big step forward for our understanding of electronic correlations. A major part of the electronic correlations, the local ones, are included. On the other hand, DMFT neglects non-local correlations that are at the origin of many physical phenomena such as (quantum) criticality, high-T superconductivity, weak localization and other vertex corrections to transport in nanoscopic systems. To address these topics the scientific frontier moved to cluster and diagrammatic extensions of DMFT such as the dynamical vertex approximation [1]. I will present an introduction to DMFT and its diagrammatic extensions and discuss selected applications: the calculation of critical exponents [2], transport and magnetic properties of nanostructures such as a benzene ring, a quantum point contact and manganite clusters [3,4]. Among others, these approaches allow for describing spin-fluctuation-mediated pseudogaps and for calculating critical exponents of the Hubbard model [3].

*[1] A. Toschi, A. A. Katanin, and K. Held, Phys. Rev. B 75, 045118 (2007).*
*[2] G. Rohringer, A. Toschi, A. Katanin, and K. Held, Phys. Rev. Lett. 107, 256402 (2011).*
*[3] A. Valli, G. Sangiovanni, O. Gunnarsson, A. Toschi, and K. Held, Phys. Rev. Lett. 104, 246402 (2010), A. Valli, Ph.D Thesis, TU Wien (2013).*
*[4] H. Das, G. Sangiovanni, A. Valli, K. Held, and T. Saha-Dasgupta, Phys. Rev. Lett. 107, 197202 (2011).*

**Donnerstag 9. Januar 2014**

Kaffee und Tee um **15:15 Uhr**, Vortrag um **15:30 Uhr** in P 603

gez. Wolfgang Belzig

Betreuer: F. Pauly, 4926