



Sommerfeld Theory Colloquium

Prof. Walter Metzner

MPI for Solid State Research, Stuttgart

Functional renormalization group approach to correlated fermion systems

The functional renormalization group (RG) is an ideal tool for dealing with the diversity of energy scales and competition of instabilities in interacting fermion systems. Starting point is an exact flow equation which yields the gradual evolution from a microscopic model action to the effective low-energy action as a function of a continuously decreasing energy scale. Expanding in powers of the fields yields an exact hierarchy of flow equations for vertex functions. Truncations of this hierarchy have led to powerful new approximation schemes [1]. Applications reviewed in the colloquium include: (i) d-wave superconductivity and other instabilities in the two-dimensional Hubbard model, and (ii) transport through a barrier and resonant tunneling in a one-dimensional Luttinger liquid metal. Recently, the functional RG has been upgraded from a weak-coupling method to a computational tool for strongly interacting fermion systems [2,3].

[1] W. Metzner et al., Rev. Mod. Phys. 84, 299 (2012).

[2] C. Taranto et al., Phys. Rev. Lett. 112, 196402 (2014).

[3] D. Vilaridi et al., Phys. Rev. B 99, 104501 (2019).

Wednesday, 26 June 2019, 16:15h, Room A348, Theresienstr. 37/III

Prof. J. von Delft, Prof. M. Punk