

SYRS 2 SYRS II

Zeit: Samstag 10:30–12:30

Raum: TU H3010

Hauptvortrag

SYRS 2.1 Sa 10:30 TU H3010

Reaction-diffusion processes: the non perturbative renormalization group approach — ●BERTRAND DELAMOTTE¹ and LEONIE CANET² — ¹Laboratoire de Physique Theorique des Liquides, University Paris VI, 4 Pl. Jussieu, 75252, Paris Cedex 05, France — ²Department of Physics and Astronomy, University of Manchester, Manchester M13 9PL, U.K.

Non perturbative phenomena play often a prominent role in equilibrium and out of equilibrium phase transitions. The reason is twofold: either these transitions correspond to the strong coupling regime of the field theories describing them or genuinely non perturbative excitations (topological defects, bound states, etc) drive the transition. In both cases, using perturbation theory becomes problematic. We describe on the example of reaction-diffusion processes how the non perturbative renormalization group formalism can be implemented for out of equilibrium systems. We show how to determine both universal and non universal properties (phase diagrams) of some branching and annihilating random walks in all dimensions.

Hauptvortrag

SYRS 2.2 Sa 11:00 TU H3010

Functional renormalization group methods for interacting Fermi systems — ●WALTER METZNER — Max-Planck-Institut fuer Festkoerperforschung, Heisenbergstr. 1, D-70569 Stuttgart

The functional renormalization group is an ideal tool for dealing with the diversity of energy scales and competition of correlations in interacting Fermi systems. Starting point is an exact hierarchy of flow equations which yields the gradual evolution from a microscopic model Hamiltonian to the effective low-energy action as a function of a continuously decreasing energy cutoff. Suitable truncations of the hierarchy have recently led to powerful new approximation schemes. Applications to be discussed in the talk include: i) d-wave superconductivity and other instabilities in the two-dimensional Hubbard model, ii) transport through a barrier and resonant tunneling in a one-dimensional Luttinger liquid metal.

Hauptvortrag

SYRS 2.3 Sa 11:30 TU H3010

Functional Renormalization for Disordered Systems: The Way out of Dimensional Reduction — ●KAY J. WIESE — LPT-ENS, 24 rue Lhomond, 75005 Paris, France

After 30 years of research, disordered systems remain one of the great challenges of theoretical physics. This is due to the existence of multiple minima, or broad distributions of disorder. The latter render meaningless standard perturbation theory, and its most prominent prediction, namely dimensional reduction, which states that disordered systems behave as pure systems in two space dimensions less. A theoretical treatment therefore has to take into account and follow under renormalization the whole disorder distribution. We review this approach and discuss a recent application to contact line depinning.

Hauptvortrag

SYRS 2.4 Sa 12:00 TU H3010

Universality classes in coarsening — ●BENJAMIN VOLLMAYR-LEE — Department of Physics, Bucknell University, Lewisburg PA 17837, USA

Coarsening systems, such as the phase separation dynamics that follows a rapid quench into an unstable region of the phase diagram, exhibit critical-like behavior. At late times, the system evolves into a self-similar state with a length scale that grows as a power of time $L \sim t^\alpha$. This growth exponent is highly universal, depending only on conservation laws and the nature of the order parameter. A dynamical renormalization group fixed point provides the natural scenario for understanding these features, but unfortunately no systematic RG approach exists for this problem. Further, recent exact solutions have made clear that the universality classes for the growth exponent and the correlation function differ. We are then faced with the problem of determining universality classes for a strong coupling RG fixed point. I will present a survey of the available results, a strategy for how to proceed, and a conjecture for coarsening universality classes.