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**MP 2: Hauptvorträge**

Zeit: Dienstag 9:00–10:30

Raum: M010

**Hauptvortrag** MP 2.1 Di 9:00 M010  
**Many-Body Effects in Mesoscopic Systems – a Functional Renormalization Group Approach** — •VOLKER MEDEN — Inst. f. Theoretische Physik, RWTH Aachen

Solid-state based artificial mesoscopic structures provide a well-controllable environment to study and manipulate quantum many-body effects. In a typical experiment the mesoscopic system is connected to two leads and the electron transport through the device is investigated (e.g. the linear and non-linear conductance is measured). For a theoretical understanding of transport properties it is quite often necessary to go beyond a standard mean-field treatment of the two-particle interactions. We describe an approximative approach to capture correlations which is based on the field theoretical functional renormalization group method. In this scheme a set of coupled differential equations for the one-particle irreducible  $m$ -particle vertex functions is derived. From the solution of these equations physical observables can be computed. We apply our method to several systems

(such as quantum dots) and compare the results obtained on different levels of approximation to those derived by other methods as well as to the outcome of recent experiments. Based on this the merits and shortcomings of our approach are discussed.

**Hauptvortrag** MP 2.2 Di 9:45 M010  
**An Information-Geometric Approach to Complexity Theory** — •NIHAT AY — MPI f. Mathematik i.d. Naturwissenschaften, Leipzig

In the first part of the talk, the information-geometric formalism will be introduced. Furthermore, based on the concept that the complexity of a system should reflect the extent to which that system, considered as a whole, cannot be characterized in terms of the properties of its parts, it will be demonstrated how information geometry provides a natural way to quantify complexity. In the second part of the talk, several results on complexity maximization will be presented. Finally, some open problems will be discussed.