SYRS 1 SYRS I

Zeit: Samstag 08:30–10:00 Raum: TU H3010

Hauptvortrag SYRS 1.1 Sa 08:30 TU H3010

Anisotropic Scale Invariance in Systems with Boundaries: Bulk and Surface Critical Behavior at Lifshitz Points — •Hans Werner Diehl — Fachbereich Physik, Universität Duisburg-Essen, Campus Essen, D-45117 Essen, Germany

A wealth of physical phenomena, both at thermal equilibrium and away from it, exhibit *anisotropic* scale invariance: distances along one or several principal axes scale as powers of the distances along the remaining ones. This anisotropy makes such phenomena already in *bulk* systems much richer and more challenging to study. All the more so, this applies to *boundary* critical phenomena in anisotropic scale invariant systems. For those, the orientation of a boundary plane matters in an essential way, since the distance from it scales differently, depending on how it is oriented. Critical phenomena at bulk Lifshitz points—multicritical points, at which a disordered phase meets both a homogeneous ordered as well as a modulated ordered phase— provide important examples of such systems. Their bulk universality classes are described by natural generalizations of the standard ϕ^4 n-vector model, whose systematic analysis via modern field-theoretic renormalization group methods has been a long-standing challenge ever since their introduction in the 1970s. A survey of recent progress made in this direction for the bulk case is presented. The construction of semi-infinite minimal ϕ^4 models representing the universality classes of the various surface transitions at m-axial bulk Lifshitz points for distinct types of surface orientations is explained. Results obtained mostly via dimensionality expansions are given and compared with available Monte Carlo and other results.

Hauptvortrag SYRS 1.2 Sa 09:00 TU H3010

Stacked triangular antiferromagnets: critical and multicritical behavior — •Andrea Pelissetto[1] and Ettore Vicari[2] — [1]University of Roma La Sapienza — [2]Pisa University

We review our present understanding of the critical behavior of stacked triangular antiferromagnets. We review the latest numerical and field-theoretical results on the nature of the transitions in these materials and discuss the implications for experimental systems.

Hauptvortrag SYRS 1.3 Sa 09:30 TU H3010

Transport properties of percolation clusters — •Olaf Stenull — Fachbereich Physik, Universitaet Duisburg-Essen, Campus Essen, 45117 Essen

Percolation is one of the most prominent problems in statistical physics. Theoretical studies of percolation and the application of percolation models in diverse scientific disciplines have resulted in thousands of papers over the last decades. The talk focuses on the electric transport properties of isotropic and directed percolation clusters as explained by the renormalization group. For studying these properties we consider simple and intuitive models, viz. the random resistor network, a bond percolation model where open bonds function as insulators and occupied bonds function as resistors, and the random diode network, where occupied bonds function as diodes. We explain the field theoretic formulation of these models and sketch their diagrammatic perturbation theory. It turns out that the Feynman diagrams for these models can be interpreted as if they were real networks: they consist of insulators and respectively resistors or diodes, they carry currents and so on. Being interested in a certain property of a real network we essentially just have to determine the corresponding property of the Feynman diagrams. For example, the resistance of the Feynman diagrams provides us with the average resistance of the real networks etc. We review some of the results obtained by exploiting this real world interpretation and compare them to numerical results.