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spricht

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über

**Electron Correlations and Magnetism in Nanostructures**

**Abstract**

Small particles, wires, thin films and the nanostructures derived from them constitute a vast research area with multiple subfields and a truly interdisciplinary character. One of the most challenging problems in this field is the study of many-body phenomena and their dependence on size, dimensionality and local environment. In particular the magnetism of metals currently motivates a very intense experimental and theoretical research activity that is driven by both fundamental and technological interests. The purpose of this talk is to review some recent progress in the theory of magnetic nanostructures by considering representative examples of clusters, wires, thin films, and nanoparticle ensembles.

The subjects to be discussed concern three major aspects of this field with their own characteristics. First, in increasing degree of complexity, we consider small clusters and nanoparticles (NPs) regarded as *isolated objects*, which show specific geometric and electronic finite-size behaviors. Second, we examine the properties of *clusters and thin films deposited on surfaces*, giving emphasis to the effects of the interactions with the macroscopic support and to the contributions of the surface atoms in the immediate environment of the nano-object. Finally, we investigate cooperative phenomena appearing in *cluster ensembles*, where cluster-cluster interactions and disorder effects play a central role. As specific examples we focus on the following problems: i) the local moment formation and dynamical Kondo screening of magnetic impurities in simple- and noble-metal clusters, ii) the magnetic anisotropy of CoRh alloy clusters, iii) the spin-reorientation transitions and canted phases at the interfaces of thin CoPd films, and iv) the magnetic order and elementary relaxation processes occurring in disordered two-dimensional ensembles of dipole-coupled magnetic nanoparticles. Finally, we conclude with a brief perspective on current open problems.

Einladender: Eberhard Hilf