Physics Department Seminar

Electrodynamic response of low dimensional correlated systems

Prof. Dr. Leonardo Degiorgi

Laboratorium für Festkörperphysik, ETH-Zürich, CH-8093 Zürich, Switzerland

The physical properties of low-dimensional systems have fascinated researchers for a great part of the last century, and have recently become one of the primary centers of interest in condensed matter research. Low-dimensional systems not only experience strong quantum and thermal fluctuations, but also admit ordering tendencies, which are difficult to realize in three-dimensional materials. Prominent examples are spin- and charge-density waves in quasi-one-dimensional compounds. Moreover, the competition among several possible order parameters leads to rich phase diagrams, which can be tuned by external variables as temperature, magnetic field, and both chemical and applied pressure. Tunable external parameters also affect the effective dimensionality of the interacting electron gas, which plays an essential role in defining the intrinsic electronic properties of the investigated systems. Strong interest in low-dimensional systems has also been brought about by the considerable deviations of their normal state properties from those of a Fermi liquid. Density-waves have been observed in several materials such as linear-chain organic and inorganic compounds. The investigation of their charge excitation spectrum acquired a lot of importance, in order to obtain relevant information about the nature of the collective ground states. I will review some of our recent results on prototype low dimensional materials, as e.g. organic Bechgaard salts, rare earth di- and tri-tellurides and carbon nanotubes. From the perspective of their optical response, I will address the issue of the broken symmetry ground state, of the dimensionality-crossover and of the evidence for a non-Fermi liquid state (e.g., Tomonaga-Luttinger liquid).

Tuesday, March 13th, 2007
Ayer Hall 112
3:10 p.m.
Refreshments will be served before the talk