chemisch
physikalische
gesellschaft

Gegründet im Jahre 1869 von H. Hlasiwetz,
J. Loschmidt, J. Petzval und J. Stefan

EINLADUNG

zum Vortrag von

Dr. Lucia Reining

École Polytechnique, Palaiseau, Frankreich

über

Electronic excitations and the calculation of dielectric functions

am

Dienstag, dem 18. Oktober 2005, um 17.30 Uhr

im Großen Hörsaal des Instituts für Experimentalphysik der Universität Wien
1090 Wien, Strudlhofgasse 4 / Boltzmanngasse 5, 1. Stock

Abstract:

Today, one of the big challenges of theoretical condensed matter physics is to find ways for describing accurately and efficiently the response of electrons to an external perturbation. In fact, spectra such as absorption or electron energy loss can be directly derived from response functions. More indirectly, but as importantly, response functions enter the description of correlation effects, for example the screening of the hole left by the photoelectron in a photoemission experiment.

We will give an overview of the role of the dynamical dielectric screening in various experimental situations. We will point out which contributions and effects are dominant for certain materials and certain kinds of spectroscopy. We will summarize the two main lines of development that are today followed in the community of theoretical solid state physics (namely, many-body Green's functions and density-functional based approaches. For both cases, we will discuss the fundamental ideas, possible contributions to the interpretation of experimental results, and limitations. Illustrations will include semiconductors and insulators as well as nanostructures. We will finally present a new approach that combines the main advantages of the Green's functions equations and the density-functional concept, and discuss possible developments.