



LUDWIG-  
MAXIMILIANS-  
UNIVERSITÄT  
MÜNCHEN

ARNOLD SOMMERFELD  
CENTER FOR THEORETICAL PHYSICS



# Arnold Sommerfeld Lecture Series

Professor Gabriel Kotliar  
Rutgers University, USA

Public Lecture:

## The Quest for High Temperature Superconductivity

Superconductivity is a state of matter where electrons can flow without resistance and where magnetic fields are expelled. It was discovered serendipitously more than a hundred years ago. Today, superconductors are essential components of medical imaging devices as well as high energy particles accelerators.

Understanding this phenomena was one of the greatest intellectual challenges of the twentieth century. A dramatic advance was provided by the BCS (Bardeen Cooper Schrieffer) theory 45 years after. It posits that superconductivity is the result of macroscopic condensation of electron pairs, which are held together by the vibrations of the lattice. The condensate is a macroscopic quantum objects and its rigidity accounts for its striking macroscopic properties.

The BCS theory was so successful that by the early 70's superconductivity was considered a completely understood subject with the maximum achievable critical temperature having been reached experimentally around 30K. In the late 80's this field of research took a dramatically turn with the discovery of new ceramic compounds which superconduct at temperatures as high as 160 K. These materials, cannot be described by straightforward extensions of the BCS theory. Scientists are still working on finding new explanations for these materials and we will describe the challenge they pose. The quest for room temperature superconductivity thus continues. A breakthrough in this field would have unimaginable consequences, changing the way we transmit electricity from its generation to its consumption to the way we design computers.

Tuesday, January 20, 2015, 17:15h, Room B052, Theresienstr. 39, LMU

You are cordially invited to attend the reception following the public lecture on January 20.

Prof. J. v. Delft, Prof. U. Schollwöck