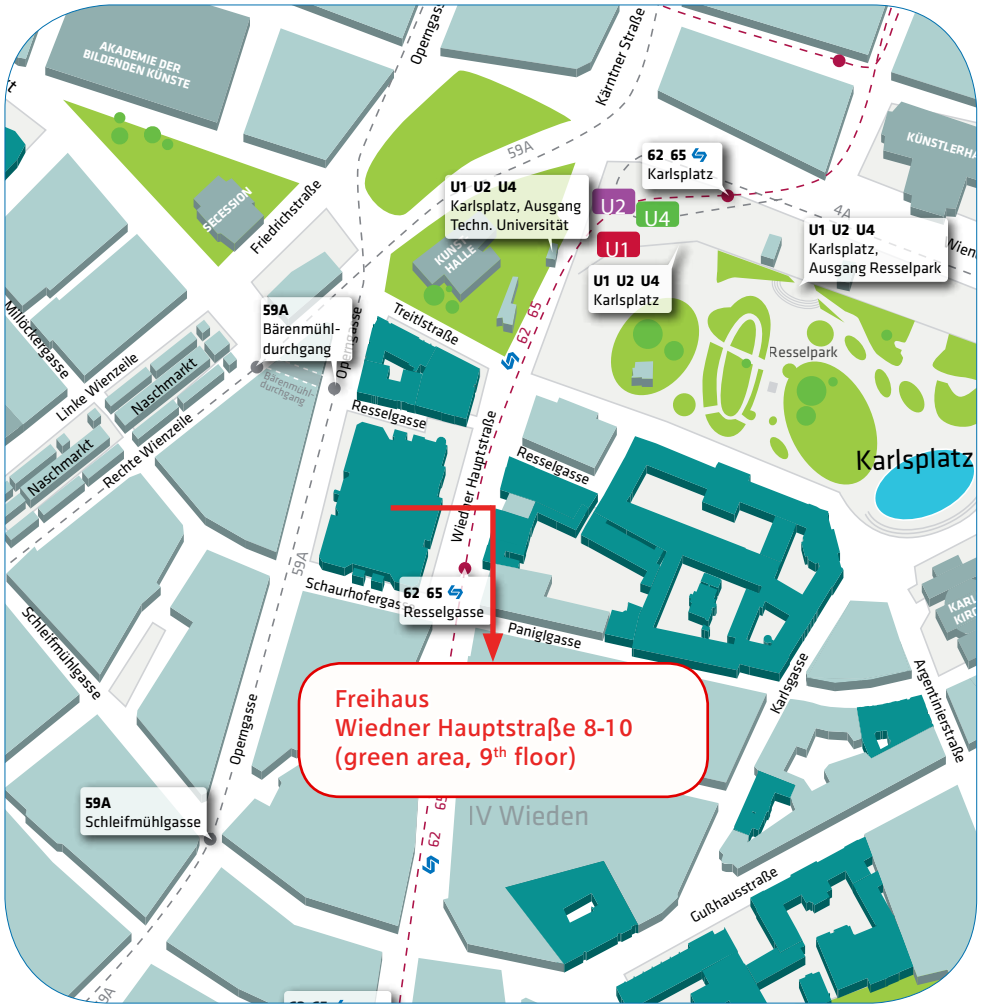

We look forward to seeing you.
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TECHNISCHE UNIVERSITÄT WIEN

Faculty of Physics
Institute of Solid State Physics

European Research Council
Established by the European Commission

INVITATION

Mini Symposium Solid State Theory

January 28th, 2016

Technische Universität Wien
Institute of Solid State Physics
Freihaus, Wiedner Hauptstraße 8-10
1040 Vienna

Conference room DA09E10
(green area, 9th floor, elevator up to 8th floor)

Thursday, January 28th, 2016

09:00 Christoph Karrasch
Freie Universität Berlin, Department of Physics
Correlation effects in one- and two-dimensional electron systems in and out of equilibrium

I will start my presentation with a short overview on low-dimensional systems: Why are they interesting, and why is it challenging to study their physics theoretically? Thereafter, I will give a pedagogical example that illustrates the general two-fold theme of my research: developing new methods to then deepen our understanding of correlation effects. I will briefly review my past achievements and then outline my future agenda, which focuses on four main topics: i) spectral properties of 1d systems, ii) real-time dynamics in two dimensions, iii) the physics of disorder and correlations, and iv) the dynamics of topological excitations. Some preliminary results will be presented.

09:45 Discussion

10:30 Jan Kuneš
Institute of Physics of the Czech Academy of Sciences
Excitonic magnetism in models and materials

Excitonic magnetism, also called van Vleck magnetism, is a new phenomenon that has been theoretically proposed in strongly correlated materials with non-magnetic atomic ground states.
I will describe the strong-coupling approach to this phenomenon and explain its connection to Bose-Einstein condensation of spinfull bosons. I will present numerical result obtained for the two-band Hubbard model as well as some results of the search for excitonic magnetism in real materials.

11:15 Discussion

12:00 Philipp Hansmann
Max Planck Institute for Solid State Research
Calculating the electronic structure of correlated materials

When electrons in a solid move not independently but correlated, materials tend to be loaded with interesting physics but are notoriously difficult to treat theoretically. One strategy is to look for the best possible effective single particle descriptions: The most famous and successful realization of this strategy, which allows for a parameter-free materials calculation is the conception of density functional theory. A complementary strategy is to give up on being ab-initio and formulate toy models concentrating on key „microscopic mechanisms" that explain certain behaviour of a material: Here, the Hubbard model and its relatives are the most prominent representatives.
In the past 20 years the idea was born and pushed forward to merge the strengths of both strategies and derive low energy Hamiltonians from ab-initio methods. In the seminar a review of some of the methods that are used nowadays will be given alongside with results for real materials ranging from cuprate high Tc superconductors, transition metal oxide heterostructures to correlated ad-atom lattices on semiconductor surfaces.

12:45 Discussion

13:30 Lunch

Before, i.e. Wednesday, January 27th, 2016

19:00 Dinner

If you are interested in individual discussions with the invited speakers or in joining lunch/dinner, please contact Prof. Karsten Held (held@ifp.tuwien.ac.at) by January 25th, 2016.