

TRR80 – Young Researcher Forum

Date: May 8th ; 10:30

Venue: TUM Graduate School (“Villa Kunterbunt”)

This is the first of two young researcher forum (YRF) of the “Transregio 80” (TRR80) integrated graduate school (IGS) planned for the summer term 2014. The YRF is supposed to bring together the PhD students of the participating universities to stimulate further cooperation between young scientists and to offer the opportunity to get to know the participating fellow researchers.

The first YRF is entitled “**Bringing Physics Back Together**” and aims on bridging the gap between theoretical and experimental physicists. The first part of the workshop will try to motivate and summarize the experimental possibilities at TUM. The second part will offer the opportunity to discuss various theoretical and experimental topics in small groups of young scientists.



Programme

Welcome Coffee

11:00 Overview over Neutron Techniques at FRM II
Jonas Kindervater (TUM) (20' + 5')

11:25 Magnonics: the rich and anisotropic world of dipolar spin waves
Ioannis Stasinopoulos (TUM), (20' + 5')

12:00 Introduction to the Theory Workshops

- **Tight-Binding & Hubbard-Model**
Patrick Seiler (Universität Augsburg), (5' + 5')
- **Density Functional Theory**
Andreas Prinz-Zwick (Universität Augsburg), (5' + 5')
- **Transport Theory**
Sebastian Tölle (Universität Augsburg), (5' + 5')

Lunch

(Pizza at “Villa Kunterbunt”, ca. 12:30)

Mini-Workshops

ca. 13:30

Tight-Binding & Hubbard-Model

Patrick Seiler (Universität Augsburg)

In this workshop we will discuss tools for an analytic approach to band structure calculations. Most helpful for that matter is the concept of second quantization and the formulation of the tight-binding model - a surprisingly simple model which is already sufficient to reveal rich information of a lot materials' properties. By inclusion of electron-electron interaction, the tight-binding model is extended to the famous Hubbard model, which also looks elementary, but is only solvable exactly for very few systems.

Density Functional Theory

Andreas Prinz-Zwick (Universität Augsburg)

Within this workshop we will encounter the numerical investigations of band structure calculations. One-dimensional problems are used as an introduction to Bloch's theorem and the Kronig-Penny model, which stays at the basis of any crystal modelling. The extensive possibilities of density functional theory (DFT) will be discussed and as a practical example we will gain insight how to work with ab-initio methods using the SIESTA code.

ca. 14:30

Transport Theory

Sebastian Tölle (Universität Augsburg)

When we talk about transport phenomena in solids we basically ask the question: How does a macroscopic system react when an external field is applied? This workshop is supposed to give a basic introduction on general techniques which enable us to establish theoretical tools needed to answer this question. For this purpose we want to discuss some aspects of non-equilibrium statistical mechanics (Onsager relations, Green's function approach) and introduce transport equations for itinerant electrons like the Drude formula and the Boltzmann equation.

Neutron Scattering: From Sample to Data

Steffen Säubert, Jonas Kindervater (TUM)

In order to obtain valuable data using neutrons as a probe to investigate physical properties, many aspects have to be taken into account. We will discuss a typical neutron scattering experiment, starting with the demands on the sample and finishing with the treatment of the obtained data. The focus lies on the drawbacks and opportunities of the different neutron scattering techniques. Thereby, we want to show which physical quantities are accessible in the chosen experiment.

ca. 15:30

Feedback and brainstorming for the next YRF

ca. 15:45

Cryogenics and Bulk Measurements

Christopher Duvinage, Alexander Regnat, Felix Rucker (TUM)

This workshops aims on giving insights to different low temperature techniques and bulk measurements at very low temperatures. The concepts of He³/He⁴ dilution refrigerators and adiabatic demagnetization measurements will be discussed as well as bulk properties such as susceptibility, magnetization and Hall-Effect.

End of official part

Ca. 17:00 Biergarten
