

## Lecturers

- Luca de' Medici (Paris)
- Robert Eder (Karlsruhe)
- Michele Fabrizio (Trieste)
- Florian Gebhard (Marburg)
- Rolf Heid (Karlsruhe)
- Václav Janiš (Prague)
- Erik Koch (Jülich)
- Hans Kroha (Bonn)
- Alexander Lichtenstein (Hamburg)
- Richard Martin (Urbana-Champaign)
- Andrzej Oleś (Cracow)
- Eva Pavarini (Jülich)
- Peter Prelovšek (Ljubljana)
- Raffaele Resta (Trieste)
- Antonio Sanna (Halle)
- Richard Scalettar (Davis)
- Nandini Trivedi (Columbus)

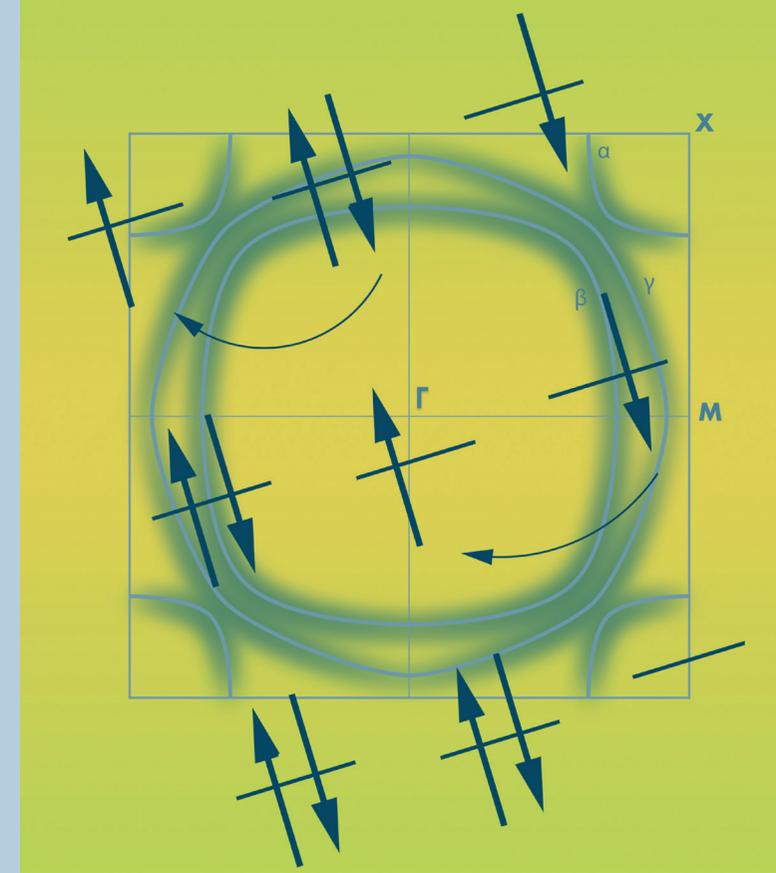


## Organizers

Eva Pavarini, Forschungszentrum Jülich  
Erik Koch, Forschungszentrum Jülich  
Richard Scalettar, UC Davis  
Richard Martin, U of Illinois at Urbana-Champaign

## Further information

Please refer to [www.cond-mat.de/events/correl17](http://www.cond-mat.de/events/correl17) for updated details of arrangement and final program. For further questions, please write to [correl17@fz-juelich.de](mailto:correl17@fz-juelich.de)

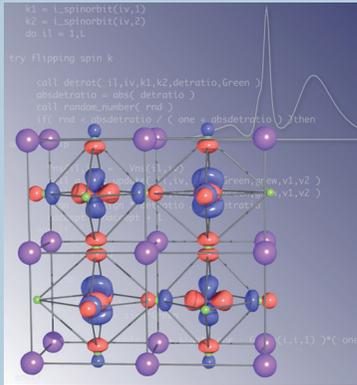


Autumn School on Correlated Electrons

## The Physics of Correlated Insulators, Metals, and Superconductors

25 - 29 September 2017  
Forschungszentrum Jülich





A naive distinction between metals and insulators rests on the single-electron picture: completely filled or empty bands characterize insulators while metals have some partially filled bands. Nature, however, offers a much richer variety of behaviors: Mott insulators would be band metals in the absence of electron correlation while strongly-correlated metals behave quasiparticle-like only in the Fermi-liquid regime. Correlated metals and insulators can be distinguished by the gap in the spectral function. Superconductors form a class of their own, they have a single-electron gap but are not insulators.

This year's school addresses the rich physics of correlated insulators, metals, and superconductors. Insulators show complex ordering phenomena involving charge, spin, and orbital degrees of freedom. Correlated metals exhibit non-Fermi-liquid behavior except right at the Fermi surface. Superconductors are dominated by the delicate interplay of coupling bosons and quasiparticles. Along with the phenomena, the models and methods for understanding and classifying them will be explained.

The aim of the school is to introduce advanced graduate students and up to the modern approaches for modeling strongly correlated materials and analyzing their behavior.

## Lectures

### Concepts

- Perspective of Electronic Structure Theory
- Hubbard Model
- Criteria for Insulators, Metals & Superconductors

### Methods

- LDA+DMFT
- Kondo Physics and Mott Transition
- Relation between CPA and DMFT
- Finite-Temperature Lanczos
- QMC for Lattice Fermions

### Insulators

- Exchange Mechanisms
- Geometrical Phases
- Orbital Physics

### Metals

- Kondo Effect vs. RKKY Interaction
- Gutzwiller DFT
- Hund's Metals

### Superconductors

- BCS Theory
- Electron-Phonon Coupling
- DFT for Superconductors

## General Information

**Venue:** The school will take place at the Forschungszentrum Jülich, in the lecture hall of the Peter Grünberg Institute, from **25 to 29 September 2017**.

**Participation:** The school is intended for advanced graduate or PhD students and postdocs in the field of electronic structure of materials.

**Admission:** Interested students should apply before **May 31, 2017** at [www.cond-mat.de/events/correl17](http://www.cond-mat.de/events/correl17). Accepted applicants will be informed by email shortly after the deadline.

**Accommodation:** Students can apply for financial support to cover accommodation costs. Participants supported by the school will stay in the Aachen Youth Hostel [www.aachen.jugendherberge.de](http://www.aachen.jugendherberge.de). Funding for accommodation is limited.

**ICAM Junior Travel Awards:** We might be able to provide a limited number of ICAM Junior Travel Awards. For more information see [icam-i2cam.org](http://icam-i2cam.org) and the application form at [www.cond-mat.de/events/correl17](http://www.cond-mat.de/events/correl17).

**Transport:** A shuttle bus will be operating in the mornings and evenings between the Youth Hostel in Aachen and the Forschungszentrum Jülich.

**Hotels in Aachen and Jülich:** Participants for whom no low-cost accommodation can be found or who wish to stay in a hotel may find hotels in Jülich or Aachen through the sites [www.aachen-tourist.de](http://www.aachen-tourist.de) and [www.juelich.de/hotelsundpensionen](http://www.juelich.de/hotelsundpensionen).