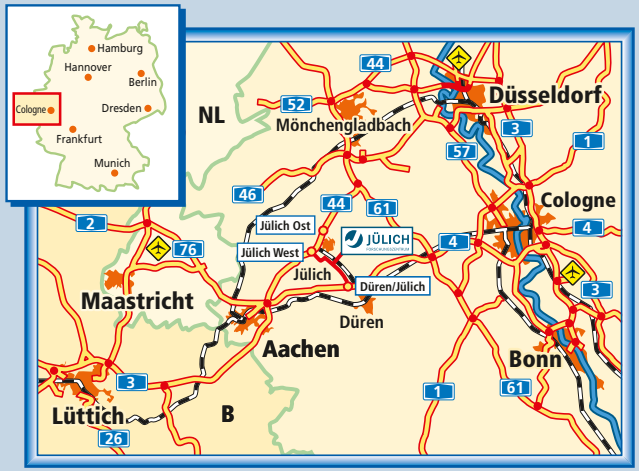
Lecturers

- Ali Alavi (Stuttgart)
- Henri Alloul (Paris)
- Andrea Damascelli (Vancouver)
- Robert Eder (Karlsruhe)
- Matthew Foulkes (London)
- Christian Hess (Dresden)
- Erik Koch (Jülich)
- Andreas Läuchli (Innsbruck)
- Franca Manghi (Modena)
- Eva Pavarini (Jülich)
- Lucia Reining (Paris)
- Helge Rosner (Dresden)
- George Sawatzky (Vancouver)
- Richard Scalettar (Davis)
- Jeroen van den Brink (Dresden)
- Gerrit van der Laan (Didcot)
- Dirk van der Marel (Genève)

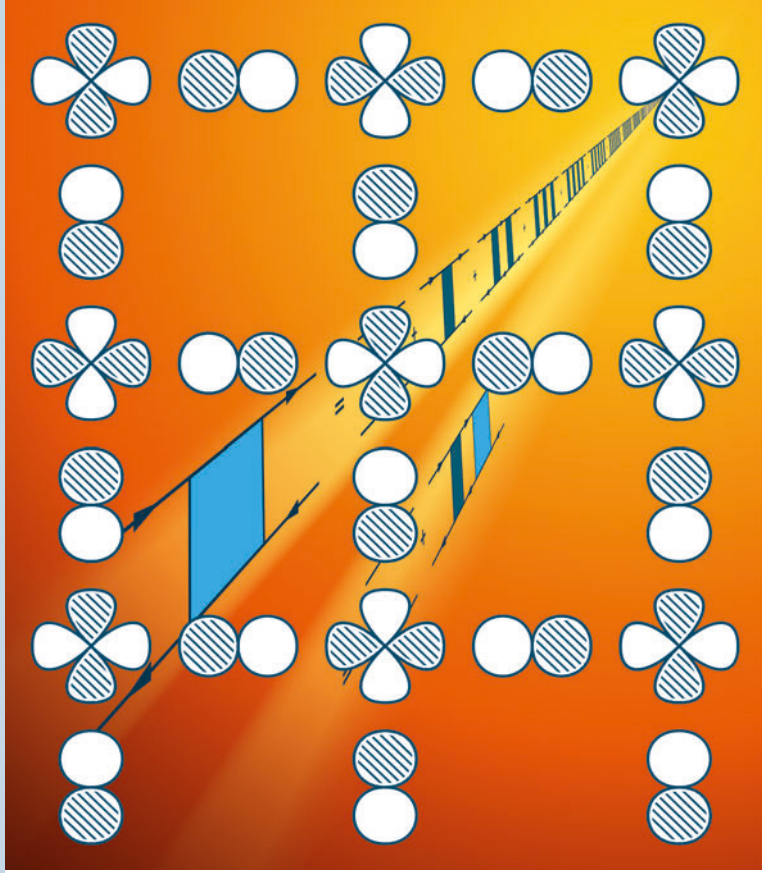


Organizers

Eva Pavarini, Forschungszentrum Jülich
Erik Koch, Forschungszentrum Jülich
Jeroen van den Brink, IFW Dresden
George Sawatzky, University of British Columbia

Further information

Please refer to www.cond-mat.de/events/correl16 for updated details of arrangement and final program. For further questions, please write to correl16@fz-juelich.de



Autumn School on Correlated Electrons

Quantum Materials: Experiments and Theory

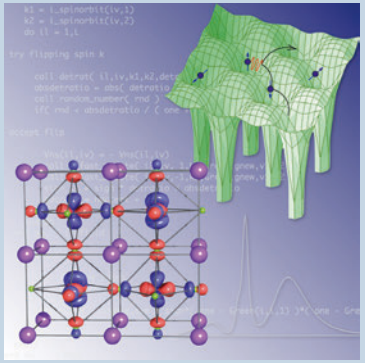
12 – 16 September 2016
Forschungszentrum Jülich

JÜLICH FORSCHUNGSZENTRUM

German Research School for Simulation Sciences

DFG Deutsche Forschungsgemeinschaft

ICAM-I2CAM Institute for Complex Adaptive Matter



Quantum materials exhibit a spectacularly rich variety of unusual emergent behavior that is practically impossible to predict from first-principles. Experiment is crucial for discovering phenomena such as the metal-insulator-transition, the Kondo effect, or superconductivity. Theory provides the paradigm for understanding these states of matter. Developing such understanding relies on the close interplay between theory and experiment, with experiments constantly putting theoretical ideas to a test.

This year's school will cover experimental techniques ranging from optics, photoemission, and NMR to tunneling spectroscopy. Understanding these experiments requires the realistic modeling of materials as well as reliable approaches to solving them. Lectures ranging from the model building schemes to advanced many-body techniques provide the foundation to unraveling the mystery of quantum materials. Introductions to theoretical approaches for calculating spin, charge, and orbital structure as well as response functions provide direct contact to the experimental probes.

The aim of the school is to introduce advanced graduate students and up to the essence of emergence and modern approaches for understanding strongly correlated matter.

Lectures

Models

- Mean-Field and BCS
- Multiband Hubbard Models
- Multiplets and Spin-Orbit Coupling

Materials and Phenomena

- Transition Metal Oxides
- Orbital Ordering
- Continuous-Symmetry Breaking

Methods

- Full-CI Quantum Monte Carlo
- Bethe-Salpeter Equation
- Cluster Perturbation Theory
- Dynamical Mean-Field Theory

Experiments

- Resonant X-Ray Scattering
- Angular Resolved Photoemission
- Dichroic Photoemission
- Optical Properties
- Scanning Tunneling Spectroscopy
- Nuclear Magnetic Resonance

General Information

Venue: The school will take place at the Forschungszentrum Jülich, in the lecture hall of the Peter Grünberg Institute, from **12 to 16 September 2016**.

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, 2016** at **www.cond-mat.de/events/correl16**. 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 be accommodated in the Aachen Youth Hostel **www.aachen.jugendherberge.de**. Funding for accommodation is limited.

ICAM Junior Travel Awards: We will be able to provide a limited number of ICAM Junior Travel Awards. For more information see **icam-i2cam.org** and the application form at **www.cond-mat.de/events/correl16**.

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 these web sites **www.aachen-tourist.de** and **www.juelich.de/hotelsundpensionen**.