

Lecturers

- Ralf Drautz (Bochum)
- Robert Eder (Karlsruhe)
- Matthew Foulkes (London)
- Rolf Heid (Karlsruhe)
- Robert Jones (Jülich)
- Erik Koch (Jülich)
- Alexander Lichtenstein (Hamburg)
- Markus Müller (Aachen)
- Frank Neese (Mülheim)
- Eva Pavarini (Jülich)
- Frank Pollmann (München)
- Raffaele Resta (Trieste)
- Andreas Schnyder (Stuttgart)
- David Sénéchal (Sherbrooke)
- Manfred Sgrist (Zürich)
- Józef Spałek (Kraków)

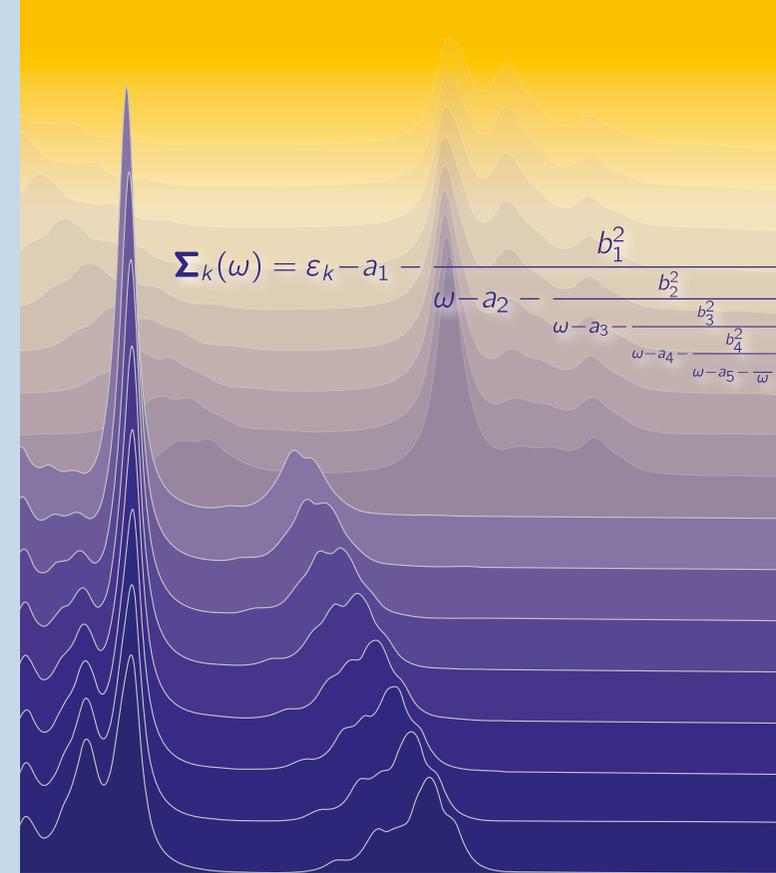


Organizers

Eva Pavarini, Forschungszentrum Jülich
Erik Koch, Forschungszentrum Jülich

Further information

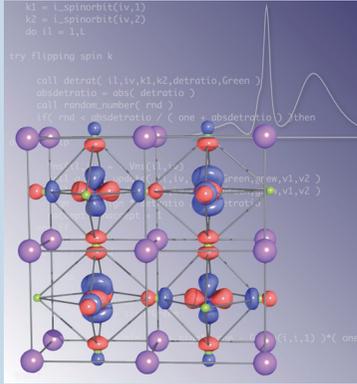
Please refer to www.cond-mat.de/events/correl20 for updated details of arrangement and final program. For further questions, please write to correl20@fz-juelich.de



Autumn School on Correlated Electrons

Topology, Entanglement and Strong Correlations

21 – 25 September 2020
Forschungszentrum Jülich



Topology and entanglement are key concepts in many-body physics. Understanding the associated emergent phenomena beyond toy models – in the world of real strongly-correlated materials – requires the mastery of a wealth of different methods. These encompass analytical tools such as group theory, first principles techniques based on density-functional theory, materials-specific model-building schemes, as well as advanced modern numerical approaches for solving realistic many-body models.

This year's school will provide students with an overview of the state-of-the art of these methods, their successes and their limitations. After introducing the basics, lectures will present the core concepts of topology and entanglement in many-body systems. To make contact to experiment, strategies for building materials specific models and techniques for their solution will be introduced. Among the latter, the school will cover quantum Monte Carlo methods, construction and optimization of correlated wavefunctions, recursion and renormalization group techniques, as well as dynamical mean-field theory. More advanced lectures will give an overview of topological materials and their physics: topological semimetals, metals and superconductors. Towards the end of the school entanglement in quantum dynamics and perspectives in quantum computation will be discussed.

Lectures

Concepts

- strong correlations
- effective Hamiltonian theory
- Hubbard model and Mott physics
- superconductivity

Methods

- density-functional theory
- dynamical mean-field theory
- LDA+DMFT and beyond
- linear response
- variational wave functions
- exact diagonalization and quantum Monte Carlo

Topology

- topological invariants
- geometry and topology
- spin-orbit and many-body interactions
- topological metals and semimetals
- topological superconductors

Entanglement

- entangled states
- measures of correlation
- bond-particle approaches
- entangled dynamics

General Information

Venue: The school will take place at the Forschungszentrum Jülich, in the lecture hall of the Peter Grünberg Institute, from **21 to 25 September 2020**.

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, 2020** at www.cond-mat.de/events/correl20. Accepted applicants will be informed by e-mail 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. 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 and the application form at www.cond-mat.de/events/correl20.

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 and www.juelich.de/hotelsundpensionen.