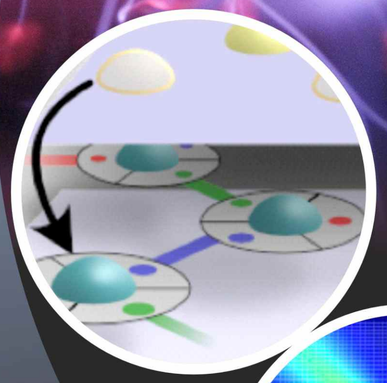
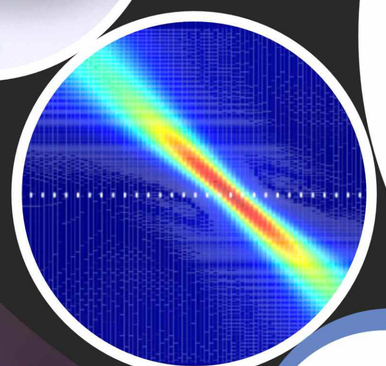
Workshop on correlated condensed quantum matter

Correlations in Novel Quantum Materials

July 24–28, 2023 • Stuttgart, Germany

Max Planck Institute for Solid State Research





Scope

Materials with strongly correlated quantum particles are at the forefront of present solid state research. Understanding the experimental properties of novel quantum materials crucially relies on the application of cutting-edge analytical and numerical tools.

This workshop aims at bringing together world-leading experts to advance the current perspective on important questions of the field: What are the signatures of quantum order in newly synthesized experimental setups? Which aspects of quantum materials can be described on the model level? What are the computational and algorithmic boundaries hindering the solution of the many-body problem? What is the nature of phase transitions between these novel states of matter?

ICAM-I2CAM
Institute for Complex Adaptive Matter

MAX PLANCK INSTITUTE FOR
SOLID STATE RESEARCH

Public interdisciplinary panel discussion

Tuesday, July 25, 2023

Refreshments will be served.

The Future of Solid State Research

6 pm • Lecture Hall 2D5

MPI for Solid State Research
Heisenbergstraße 1, 70569 Stuttgart

Panelists:

Prof. Piers Coleman
(Physicist, Rutgers University)

Prof. Martin Dressel
(Physicist, University of Stuttgart)

Prof. Antoine Georges
(Physicist, Collège de France)

Prof. Bettina V. Lotsch
(Nanochemistry, MPI for Solid State Research, Stuttgart)

Further information at

www.fkf.mpg.de/cnqm2023

ICAM BEST POSTER AWARD

There will be an award and a monetary prize of 200€ for the best poster contribution to the CNQM2023 conference.

The decision for the best poster will be taken democratically by the participants of the conference.

To this end, please use the ballots distributed in your conference folder to place your vote by **Wednesday, noon** in the appropriate box.

Program • Lecture Hall 2D5

Monday, July 24, 2023

CEDT AM 08:00	**Registration**
08:45	**Laura Classen, Elio König and Thomas Schäfer** Max Planck Institute for Solid State Research, Stuttgart **Welcome**
	Session 1 — Unconventional Superconductors and Intertwined Phases
09:00	**Andrey Chubukov** University of Minnesota **Superconductivity near spin and valley orders in Bernal bilayer graphene**
09:45	**Anna Seiler** University of Göttingen **Correlated phases in the vicinity of tunable van Hove singularities in Bernal bilayer graphene**
10:15	Coffee Break
10:45	**Srinivas Raghu** Stanford University **Reentrant superconductivity and multiple superconducting phases of UTe_2**
11:15	**Alex Levchenko** University of Wisconsin-Madison **Quantum transport from fluctuations near the end point of superconducting dome**
11:45	**Poster Ads**
CEDT PM 12:15	Lunch Break
01:15	**Discussion**
	Session 2 — Emergent Quasiparticles: Yes or no?
02:00	**Roderich Moessner** MPI-PKS Dresden **Progress in 3d quantum spin liquids**
02:45	**Johannes Reuther** FU Berlin **Quantum Effects on Unconventional Pinch Point Singularities**
03:15	Coffee Break
03:45	**Felix Baumberger** University of Geneva **The fate of quasiparticles beyond the Fermi liquid phase of Sr_2RuO_4**
04:15	**Mengxing Ye** University of Utah **Location and thermal evolution of the pseudogap due to spin fluctuations**
04:45	**Poster Ads**
05:30	**Poster Session**

Tuesday, July 25, 2023

	Session 3 — Strong Correlations: from Models to Materials
	Antoine Georges Collège de France, Paris and CCQ-Flatiron Institute, New York **What Do We Know Today about the 2D Hubbard model?**
	Jan von Delft Ludwig-Maximilians-Universität, Munich **Fermi surface reconstruction and strange metal behavior at a heavy fermion quantum phase transition**
	Coffee Break
	Emanuel Gull University of Michigan, Ann Arbor **Let's get real – Adapting the toolkit of many-body theory to realistic materials simulation**
	Matthieu Le Tacon IQMT KIT **Novel phenomena and perspectives in 3d- and 5d- transition metal compounds**
	Lunch Break
	Discussion
	Session 4 — Multiorbital Effects in Strongly Correlated Systems
	Piers Coleman Center for Materials Theory, Physics and Astronomy, Rutgers University Department of Physics, Royal Holloway University London **Spin: stem-cell for emergence in quantum materials.**
	Massimo Capone SISSA **Electron-phonon interaction and strong correlations in multi-orbital systems: Competition or cooperation?**
	Coffee Break
	Silke Bühler-Paschen TU Wien **Strange metal behavior in heavy fermion compounds and beyond**
	Premala Chandra Rutgers University **Light-Induced Transitions in Quantum Paraelectrics**
	Free Discussion
06:00	**Public interdisciplinary panel discussion: The Future of Solid State Research** Prof. Piers Coleman, Prof. Martin Dressel, Prof. Antoine Georges, Prof. Bettina V. Lotsch

Wednesday, July 26, 2023

	Session 5 — Quantum Information and Dynamics
	Dmitry Abanin University of Geneva **Probing non-equilibrium quantum matter with quantum processors**
	Igor Boettcher University of Alberta **Topological Hyperbolic Matter on A Circuit Board**
	Coffee Break
	Peter P. Orth Saarland University **Nonlinear interrogation of quantum materials: why higher order response tells you more**
	Vadim Oganesyan City University New York **Quantum annealing with AC field**
	Lunch Break
CEDT PM	**Discussion**
01:00	**Departure Excursion** **Esslingen am Neckar** Meeting point in front of the main entrance
05:00	**Workshop Discussion "The Future of Solid State Research"**
06:00	**Conference Dinner** **Trödler zur Burgschenke, Esslingen am Neckar** Return Excursion
9:00	**Free Discussion**

Thursday, July 27, 2023

	Session 6 — Mott is Different
	Roser Valentí University of Frankfurt **On heavy fermions and doped Mott physics in two-dimensional van der Waals platforms**
	Luca de' Medici ESPCI Paris **Mott Quantum Critical Points and phase separation at finite doping in Hund metals**
	Coffee Break
	Lucia Reining LSI, CNRS/Ecole Polytechnique **Some thoughts about perturbation theory**
	Alessandro Toschi TU Wien **Characteristic Timescales and Longterm-Memory Effects in Correlated Many-Electron Systems**
	Lunch Break
	Discussion
	Session 7 — Topology and Correlations
	B. Andrei Bernevig Princeton University **Quantum Geometry in Electron-Phonon Coupling: CDW in Kagome materials and a Famous superconductor**
	Valentin Leeb TU Munich **Quantum Oscillations of the Quasiparticle Lifetime**
	Coffee Break
	Yashar Komijani University of Cincinnati **Dynamic Mass Generation and Topological Order in Overscreened Kondo Lattices**
	Lorenzo Crippa University of Würzburg **Exceptional Points in strongly correlated materials: spontaneous symmetry breaking and charge response**

Friday, July 28, 2023

	Session 8 — Twistronics
	Pablo Jarillo-Herrero MIT **TBA**
	Mireia Tolosa Simeón RUB Bochum **Analog gravity in moiré Dirac materials**
	Coffee Break
	Erez Berg Weizmann Institute of Science **Novel chiral superconductors**
	Anushree Datta Université de Paris, Laboratoire Materiaux et Phenomenes Quantiques, CNRS and Université Paris-Saclay, CNRS, Laboratoire de Physique des Solides **Heavy quasiparticles and cascades without symmetry breaking in twisted bilayer graphene**
	Lunch Break
	Discussion

Organizing Committee
MPI for Solid State Research

Laura Classen
Elio J. König
Thomas Schäfer

Contact
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