

Subject

The scientific focus of the Summer School encompasses phenomena in materials that are directly determined by the quantum nature of the constituent particles. This includes a large variety of collective quantum phenomena due to strong electron correlations, including unconventional superconductivity, spin, charge, and orbital order, as well as more exotic states such as electronic analogs of liquid crystals. Recent advances, driven in part by researchers at the participating institutions, have allowed the systematic investigation of electronic ordering phenomena not only in the bulk, but also at surfaces and hetero-interfaces of transition metal oxides. In particular, it has been shown that electronic reconstructions at interfaces can generate many-body states with physical properties qualitatively different from those of the constituent bulk materials. This opens up exciting new opportunities to create dense two-dimensional electron systems with controlled interactions.

Invited Speakers

D. Bonn, UBC (Vancouver)
A. Damascelli, UBC (Vancouver)
D. Elfimov, UBC (Vancouver)
M. Franz, UBC (Vancouver)
E. Goering, MPI-MF (Stuttgart)
Y. Grin, MPI-CPfS (Dresden)
S. Kirchner, MPI-PKS (Dresden)
G. Logvenov, MPI-FKF (Stuttgart)
A. MacFarlane, UBC (Vancouver)
D. Manske, MPI-FKF (Stuttgart)
R. Moessner, MPI-PKS (Dresden)
N. Nilius, FHI (Berlin)
M. Scheffler, FHI (Berlin)
A. Tennant, HZB (Berlin)
L. H. Tjeng, MPI-CPfS (Dresden)
P. Wahl, MPI-FKF (Stuttgart)

The International Max Planck Research School for

Advanced Materials (IMPRS-AM)

has been established in 2001 as an international graduate school with a PhD training program in Advanced Materials. The school is a cooperation of the Max Planck Institute for Metals Research (MPI-MF), the Max Planck Institute for Solid State Research (MPI-FKF), and the University of Stuttgart (Chemistry and Physics faculties).

Location

Werner Köster Hörsaal (2 R4)

Max Planck Institute for Metals Research
Heisenbergstraße 3 • 70569 Stuttgart

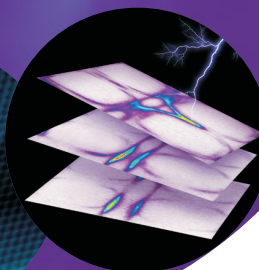
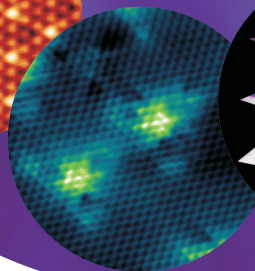
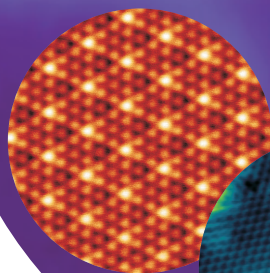
Participation

Everyone interested in participating is cordially invited to come to Stuttgart. The participation is free of charge. Members of the University of British Columbia should contact one of the UBC lecturers about participation.

More Information and Registration

Please consult our web pages at

www.imprs-am.mpg.de



a place of mind

THE UNIVERSITY OF BRITISH COLUMBIA



Max Planck Society &
University of British Columbia

International School on Quantum Materials

October 5 – 8, 2010 • Stuttgart (Germany)

Surface phenomena

Unconventional superconductivity

Topological states and excitations

Correlations at interfaces

Materials synthesis and
spectroscopic characterization



Contact



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Useful Links

www.stuttgart-tourist.de • www.hotel.de • www.hrs.de
• www.bahn.de • www.vvs.de



Bundesministerium
für Bildung
und Forschung

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Program • International School on Quantum Materials

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Tuesday, October 5

9.00 – 10.30 **P. Wahl, MPI-FKF (Stuttgart)**
Introduction to scanning-tunneling spectroscopy and its application

10.30 – 11.00 Coffee break

11.00 – 12.30 **N. Nilius, FHI (Berlin)**
Quantum well states in 1D, 2D and 3D metal particles probed with STM

12.30 – 13.30 Lunch

13.30 – 14.15 **M. Scheffler, FHI (Berlin)**
Get real! Ab-initio description of functional materials

14.15 – 15.00 **L. H. Tjeng, MPI-CPfS (Dresden)**
Photoelectron spectroscopy: a powerful tool to identify electron correlation effects

15.00 – 15.30 Coffee break

15.30 – 15.50 **J. Zhu, UBC (Vancouver)**
Fermi surface nesting and orbital dependent deformation in Mn-substituted $Sr_3Ru_2O_7$

15.50 – 16.10 **B. Lau, UBC (Vancouver)**
Spin background and spin polaron in 2D

16.10 – 16.30 **H. Ebrahimnejad, UBC (Vancouver)**
Studying the Anderson localization of polarons using momentum-average approximation

16.30 **Poster session**

The lab tours will be organized for small groups of 5 - 6 persons. You should specify your interests from a list of laboratories and locations until Tuesday lunchtime.

green – Student / Postdoc Talks

Quantum phenomena in low dimensions

Wednesday, October 6

9.00 – 10.30 **D. Manske, MPI-FKF (Stuttgart)**
Introduction to unconventional superconductivity

10.30 – 11.00 Coffee break

11.00 – 12.30 **A. Damascelli, UBC (Vancouver)**
Angle-resolved photoemission spectroscopy and its application to the investigation of unconventional superconductors

12.30 – 13.30 Lunch

13.30 – 14.15 **D. Bonn, UBC (Vancouver)**
Quantum Oscillation in high-temperature superconductors

14.15 – 15.00 **S. Kirchner, MPI-PKS (Dresden)**
Magnetically-driven superconductivity in heavy-fermion compounds

15.00 – 15.20 **J. Day, UBC (Vancouver)**
Precision microwave electrodynamic measurements of K- and Co-doped $BaFe_2As_2$

15.20 – 15.40 **S. Sen Gupta, UBC (Vancouver)**
Importance of inter-site coherences in the x-ray absorption spectra of mixed-valent systems

15.40 – 16.00 Coffee break

16.00 – 17.00 **Lab tours**

Thursday, October 7

9.00 – 10.30 **M. Franz, UBC (Vancouver)**
Pedagogical introduction to topological insulators

10.30 – 11.00 Coffee break

11.00 – 11.45 **R. Mössner, MPI-PKS (Dresden)**
Magnetic monopoles in frustrated magnets

Unconventional superconductivity

Topological states and excitations

11.45 – 12.30 **A. Tennant, MPI-PKS (Dresden)**
Symmetry, topology, and twists in magnetism

12.30 – 13.30 Lunch

13.30 – 15.00 **I. Elfimov, UBC (Vancouver)**
Electronic reconstruction phenomena at polar and non-polar transition-metal-oxide surfaces and interfaces

15.00 – 15.30 Coffee break

15.30 – 16.30 **G. Logvenov, MPI-FKF (Stuttgart)**
Synthesis of transition-metal-oxide (TMO) multilayers and first steps towards TMO electronic devices

16.30 – 16.50 **C. Weeks, UBC (Vancouver)**
Impurity induced topological insulating phase in graphene

16.50 – 17.10 **A. Schnyder, MPI-FKF (Stuttgart)**
Topological insulators and superconductors: ten-fold way and dimensional hierarchy

17.10 – 17.30 **I. Garate, UBC (Vancouver)**
Charge kondo effect in mesoscopic superconductors

Friday, October 8

9.00 – 10.30 **E. Goering, MPI-MF (Stuttgart)**
Resonant X-ray absorption and reflectivity, and their application to magnetic thin films and interfaces

10.30 – 11.00 Coffee break

11.00 – 12.30 **A. MacFarlane, UBC (Vancouver)**
 μ SR and β -NMR as probes to study the local magnetism in the bulk and at interfaces

12.30 – 13.30 Lunch

13.30 – 14.15 **A. Leithe-Jasper, MPI-CPfS (Dresden)**
Chemistry and physics of intermetallic compounds

14.15 **Final remarks**

Materials synthesis and spectroscopic characterization

Correlations at interfaces