International Workshop & Seminar
5 - 16 August 2019 (workshop week: 5 - 9 August 2019)

Quantum Criticality and Topology in Correlated Electron Systems

PROGRAM

Supported by National High Magnetic Field Laboratory

Scientific coordinators:
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Organisation:
Maria Voigt • MPIPKS, Germany
The program will be continuously updated during the event. This version was printed on August 12, 2019
Program

Sunday, 04 August

18:00 - 20:00  Registration at guest house 4, library
19:00 - 21:00  Welcome reception and dinner at the MPIPKS
20:00 - 21:30 Informal discussions
Program

workshop week - seminar rooms 1 - 3

Monday, 05 August

08:45 - 09:00  **Roderich Moessner (MPIPKS) & scientific coordinators**
Opening

*Chair: Jonathan Ruhman*

09:00 - 09:45  **Sergey Borisenko** (Leibniz Institute for Solid State and Materials Research (IFW) Dresden)
Nematicity and topology in iron-based superconductors from ARPES

09:45 - 10:30  **Takasada Shibauchi** (University of Tokyo)
Electronic nematicity in the pseudogap state in cuprates

10:30 - 11:00  Coffee break

11:00 - 11:45 **Rafael Fernandes**
(University of Minnesota, Minneapolis)
Vestigial electronic orders in correlated systems: nematicity and beyond

11:45 - 12:30 **Alain Sacuto** (University Paris Diderot)
Energy Scale of Charge Density Wave in Cuprates

12:30 - 13:30  Lunch break

13:30 - 14:00  Discussions

*Chair: Erez Berg*

14:00 - 14:45 **Mathias Scheurer** (Harvard University)
Gauge theories for the cuprate superconductors
14:45 - 15:30  **Yuxuan Wang** (University of Florida, Gainesville)  
A solvable random model for the non-Fermi liquid pairing problem

15:30 - 16:00  **Richard Greene (via Skype)**  
(University of Maryland, College Park)  
Strange metal transport properties of an electron-doped cuprate

16:00 - 16:30  Coffee break

**qctces19-colloquium**

*Chair: Falko Pientka (MPIPKS)*

16:30 - 17:30  **Jörg Schmalian**  
(Karlsruhe Institute of Technology)  
Critical and incoherent electron systems and superconductivity within the Sachdev-Ye-Kitaev approach

*Chair discussion session: Erez Berg*

17:30 - 19:00  Discussions

19:00 - 20:00  Dinner

20:00 - 21:00  Informal discussions
Tuesday, 06 August

Chair: Kamran Behnia

09:00 - 09:45  Amit Kanigel  
(Technion - Israel Institute of Technology)  
Chiral superconductivity in 4Hb-TaS2

09:45 - 10:30  Andrew Mackenzie  (Max Planck Institute for Chemical Physics of Solids Dresden)  
Superconductivity and normal state properties of Sr 2 RuO 4

10:30 - 11:00  Coffee break

11:00 - 11:45  Ronny Thomale  (Julius-Maximilians-University Würzburg)  
Towards a microscopic theory of unconventional superconductivity in Sr 2 RuO 4

11:45 - 12:30  Jonathan Ruhman  (Bar-Ilan University)  
Superconductivity in ultra low density semimetals due to a ferroelectric quantum critical point

12:30 - 13:30  Lunch break

13:30 - 14:00  Discussions

Chair: Andrey V. Chubukov

14:00 - 14:45  Avi Klein  (University of Minnesota, Minneapolis)  
Intertwined pairing states of superconductivity at a nematic quantum critical point
14:45 - 15:10  **Maxim Dzero** (Kent State University)
Thermodynamic properties of disordered unconventional superconductors with competing interactions

15:10 - 15:30  **Elio Koenig** (Rutgers University)
Crystalline symmetry protected helical Majorana modes in the iron pnictides

15:30 - 16:00  Coffee break

Chair: Hitesh Changlani

16:00 - 16:45  **Yuji Matsuda** (Kyoto University)
Half-integer thermal quantum Hall effect in a chiral spin liquid

16:45 - 17:30  **Natalia Perkins**
(University of Minnesota, Minneapolis)
Probing Kitaev spin liquids

17:30 - 18:00  Discussions

18:00 - 19:00  Dinner

19:00 - 20:30  Poster session I (focus on odd poster numbers)

20:30 - 21:30  Informal discussions
Wednesday, 07 August

Chair: Dmitrii L. Maslov

09:00 - 09:45  **Sean Hartnoll** (Stanford University)
Simple models of strange transport

09:45 - 10:30  **Erez Berg** (The Weizmann Institute of Science)
Transport in strange metals

10:30 - 10:40  Group photo (to be published on the event’s web page)

10:40 - 11:00  Coffee break

11:00 - 11:45  **Kamran Behnia** (CNRS Paris)
Metallicity and superconductivity in strontium titanate

11:45 - 12:30  **Jörg Schmalian**
(Karlsruhe Institute of Technology)
Lévy flights and hydrodynamic superdiffusion in quantum-critical transport

12:30 - 13:30  Lunch break

13:30 - 14:00  Discussions

14:00  Departure for the guided tours by tram from the institute (meeting point: reception of MPIPKS)

14:30 - 18:00  Meeting with the guides in Dresden Neustadt and guided tours (3 groups):

**group 1:** guided tour through Dresden incl. visit of the Royal Castle Dresden
**group 2**: guided tour through Dresden incl. visit of the Zwinger and its Mathematisch-Physikaler Salon

**group 3**: guided tour through Dresden incl. tour of the ascent of the dome of Frauenkirche

18:00 - 21:00 Buffet-dinner at the restaurant *Palastecke*, Schloßstraße 2 (Tel.: +49 351 4841730)
Thursday, 08 August

Chair: Oskar Vafek

09:00 - 09:45  Eva Andrei (Rutgers University)
Strategies for transforming the band structure of 2D materials

09:45 - 10:30  Bogdan Andrei Bernevig (Princeton University)
Possible Effects of Topology on Moire Lattices

10:30 - 11:00  Coffee break

11:00 - 11:45  Elena Bascones (Consejo Superior de Investigaciones Científicas)
Exploring correlations in twisted bilayer graphene

11:45 - 12:15  Eli Fox (Stanford University)
Emergent ferromagnetism in twisted bilayer graphene

12:15 - 12:45  Matthias Punk (Ludwig-Maximilian University of Munich)
Metallic states with topological order in twisted bilayer graphene

12:45 - 13:45  Lunch break

13:45 - 14:00  Discussions

Chair: Yuxuan Wang

14:00 - 14:45  Senthil Todadri (Massachusetts Institute of Technology)
Correlations and topology in moire graphene materials
14:45 - 15:30 Jian Kang (Florida State University & National High Magnetic Field Laboratory)  
Nonlocal interactions beyond Hubbard model in twisted bilayer graphene near magic angle

15:30 - 16:00 Coffee break

Chair: Yong-Baek Kim

16:00 - 16:30 Saurabh Maiti (Concordia University)  
Is the composite fermion state in graphene a Haldane’s Chern insulator?

16:30 - 17:15 Hitesh Changlani  
(Florida State University, Tallahassee)  
The mother of all states of the kagome quantum antiferromagnet

17:15 - 18:00 Discussions

18:00 - 19:00 Dinner

19:00 - 20:30 Poster session II (focus on even poster numbers)
Program

Friday, 09 August

Chair: Natalia Perkins

09:00 - 09:45  Hidenori Takagi (Max Planck Institute for Solid State Research Stuttgart)
Exotic spin-orbital entangled phases in 5d and 4d transition metal oxides

09:45 - 10:30  Yong-Baek Kim (University of Toronto)
Magnetic field induced novel phases in Kitaev magnets

10:30 - 11:00  Coffee break

Chair: Saurabh Maiti

11:00 - 11:45  Roderich Moessner (Max Planck Institute for the Physics of Complex Systems)
Intermediate energy spin dynamics

11:45 - 12:30  Dam Son (University of Chicago)
Hydrodynamics of composite fermions

12:30 - 13:30  Lunch break

13:30 - 14:00  Discussions

Chair: Revaz Ramazashvili

14:00 - 14:45  Nicola Poccia (Leibniz Institute for Solid State and Materials Research (IFW) Dresden)
Current progress in high temperature superconducting nano-devices using novel “van der Waals technologies”
14:45 - 15:15  **Alex Levchenko** (University of Wisconsin, Madison)  
Mesoscopic and anomalous Nernst effect in disordered superconductors

15:15 - 15:45  **Julia Link** (Simon Fraser University)  
Hydrodynamic transport in Luttinger semimetals

15:45 - 16:15  Coffee break

16:15 - 16:45  **Serguei Brazovskii** (LPTMS-CNRS, Paris-Sud University)  
From Chiral Anomaly to two-fluid hydrodynamics for electronic Vortices

16:45 - 17:00  Closing remarks workshop week

17:00 - 18:00  Discussions

18:00 - 19:00  Dinner

19:00 - 21:00  Informal discussions
Program

Monday, 12 August

Seminar room 1

Quantum Matter with and without Quasiparticles

09:45 - 10:00  Scientific coordinators
Opening seminar week

10:00 - 10:30  Coffee break

10:30 - 12:00  Black board talks and discussions
10:30 - 11:00  Revaz Ramazashvili
11:00 - 11:30  Elliot Christou
11:30 - 12:00  Avi Klein

12:00 - 13:00  Lunch break

13:00 - 15:00  Black board talks and discussions
13:00 - 13:30  Alex Levchenko
13:30 - 14:00  Andrey V. Chubukov
14:00 - 14:30  Dmitrii L. Maslov

15:00 - 15:30  Coffee break

Seminar room 3 and 4

15:30 - 18:00  Discussions

18:00 - 19:00  Welcome dinner of seminar week

19:00 - 21:00  Informal discussions
Tuesday, 13 August

Seminar room 4

09:00 - 10:00  Informal discussions

10:00 - 10:30  Coffee break

10:30 - 11:30  **James Analytis**  
(University of California, Berkeley)  
Vanishing Quasiparticles Across a Quantum critical point connecting two Fermi liquids

11:30 - 12:00  Discussions

12:00 - 13:00  Lunch break

13:00 - 14:00  Discussions

14:00 - 15:00  **Leo Radzihovsky**  
(University of Colorado, Boulder)  
Fractionalized mobility in a vector gauge theory

15:00 - 15:30  Coffee break

15:30 - 16:30  **Ilya Eremin**  (Ruhr University Bochum)  
Knight Shift and Leading Superconducting Instability from Spin Fluctuations in Sr2RuO4

16:30 - 18:00  Discussions

18:00 - 19:00  Dinner

19:00 - 21:00  Informal discussions
**Wednesday, 14 August**

*Seminar room 4*

09:00 - 10:00  Informal discussions

10:00 - 10:30  Coffee break

10:30 - 11:30  **Liang Fu** *(Massachusetts Institute of Technology)*

Supermetal

11:30 - 12:00  Discussions

12:00 - 13:00  Lunch break

13:00 - 14:00  Discussions

14:00 - 15:00  **Aharon Kapitulnik** *(Stanford University)*

Thermal Transport, Thermalization, and Possible Signatures of Quantum Chaos in Complex Crystalline Materials

15:00 - 15:30  Coffee break

15:30 - 17:00  Discussions

17:00 - 19:00  Summer party / barbeque at MPIPKS

19:00 - 21:00  Informal discussions
**Thursday, 15 August**

*Seminar room 4*

09:00 - 10:00  Informal discussions

10:00 - 10:30  Coffee break

10:30 - 11:30  **Subir Sachdev** (Harvard University)
               Theory of a Planckian metal

11:30 - 12:00  Discussions

12:00 - 13:00  Lunch break

13:00 - 14:00  Discussions

14:00 - 15:00  **Claudia Felser** (Max Planck Institute for Chemical
               Physics of Solids Dresden)
               Magnetic Weyl Semimetals

15:00 - 15:30  Coffee break

15:30 - 18:00  Discussions

18:00 - 19:00  Dinner

19:00 - 21:00  Informal discussions
Friday, 16 August

Seminar room 1

**Interaction meets topology**

09:00 - 10:00 Black board talks and discussions
09:00 - 09:30 Kun Yang
09:30 - 10:00 Pavel Volkov

10:00 - 10:30 Coffee break

10:30 - 12:00 Black board talk and discussions
10:30 - 11:00 Inti Sodemann (MPIPKS)
11:00 - 11:30 Elio Koenig

12:00 - 13:00 Lunch break

13:00 - 14:00 Black board talks and discussions

14:00 - 14:15 Closing remarks seminar week and departure