



The Abdus Salam
International Centre
for Theoretical Physics



Joint ICTP-WE Heraeus School and Workshop on Advances in Quantum Matter: Pushing the Boundaries

Description:

This workshop and school, featuring lectures, tutorials, roundtables, and talks, will explore strongly correlated electron systems, focusing on novel phases, quantum criticality, exotic magnetic states, fractional excitations, moiré physics, and non-equilibrium phenomena.

MORE DETAILS:

This workshop and school will explore the rich physics of strongly correlated electron systems, focusing on their novel ground states, quantum critical phenomena, and emergent behaviors. Topics include fractionalized excitations in quantum spin liquids and topological phases, unconventional superconductivity, strange and bad metals, and transport in Dirac and Weyl semimetals. Special attention will be given to the impact of disorder, spin-phonon interactions, and non-equilibrium dynamics and light-induced, as well as cutting-edge developments in moiré systems such as twisted bilayer graphene and transition metal dichalcogenides. The event aims to integrate experimental and theoretical perspectives through lectures, tutorials, and in-depth discussions, fostering collaborations and advancing understanding.

TOPICS:

Novel ground states of matter and excitations Spectroscopies and transport of fractionalized excitations in topological phases of matter, such as quantum spin liquids and fractional Chern insulators. The roles of disorder and spin-phonon interaction in quantum matter A revolutionary "twist" on the quantum two-dimensional physics provided by exciting experiments on moire systems such as twisted bilayer graphene (TBG) and transition metal dichalcogenide (TMD) bilayers Quantum-critical behavior and superconductivity in correlated electron systems due to continuing discoveries of new materials Transport in strange and bad metals, including Weyl and Dirac semimetals Non-equilibrium dynamics and light-induced phenomena and dynamic phase transitions in quantum matter.

LECTURERS:

L. Balents, Kavli Institute for Theoretical Physics, USA
E. Berg, Weizmann Institute of Science, Israel
P. Cannfield, Iowa State University, USA
P. Coleman, Rutgers University, USA
R. Fernandes, University of Illinois at Urbana-Champaign, USA
L. Fu, Massachusetts Institute of Technology, USA
A. Kamenev, University of Minnesota, USA
A. Kapitulnik, Stanford University, USA
H.-Y. Kee, University of Toronto, Canada
Y. B. Kim, University of Toronto, Canada
D. Maslov, Florida University, USA
E. Morosan, Rice University, USA
S. Sachdev, Harvard University, USA
J. Schmalian, University of Karlsruhe, Germany
M. G. Vergniory, Université de Sherbrooke, Canada*

INVITED SPEAKERS:

E. Andrei, Rutgers University, USA
C. Batista, University of Tennessee, USA
F. Becca, Trieste University, Italy
A. Chubukov, University of Minnesota, USA
A. Coldea, Oxford University, UK
R. Coldea, Oxford University, UK
B. Douçoit, Sorbonne University, France
M. Gastiasoro, University of Donostia San Sebastian, Spain
S. Ilani, Weizmann Institute of Science, Israel
Y. Iqbal, IIT Madras, India
L. Ju, Massachusetts Institute of Technology, USA
A. Hallas, University British Columbia, Canada
J. Knolle, Technical University of Munich, Germany
E. König, University of Wisconsin, USA
Q. Ma, Boston College, USA
K. F. Mak, Cornell University, USA
L. Mangeolle, Technical University of Munich, Germany
Y. Motome, Tokyo University, Japan
T. Saha-Dasgupta, Kolkata University, India
J. Shan, Cornell University, USA
H. Takagi, MPI Stuttgart, Germany
A. Yazdani, Princeton University, USA
L. Ye, Caltech, USA
M. Yi, Rice University, USA



4 - 15 August 2025



Trieste, Italy



**Deadline:
1 April 2025**

DIRECTORS:

L. Bascones, ICMM-CSIC, Spain
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N. Perkins, University of Minnesota, USA
L. Savary, ENS, France
R. Valenti, Goethe-University Frankfurt am Main, Germany

LOCAL ORGANISER:

M. Kieselev, ICTP, Italy

FURTHER INFORMATION:

E-mail: smr4094@ictp.it

Web: <http://indico.ictp.it/event/10859/>

Female scientists are encouraged to apply.



REGISTRATION:

A limited number of grants are available to support the attendance of selected participants, with priority given to participants from developing countries. There is no registration fee.

