

Quantum Matter from the Nano- to the Macroscale

Seminar and Workshop

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The seminar and workshop, which took place at the MPIPKS between June 18 and July 6, 2012, were a forum to bring together leading theorists and experimentalists to discuss recent progress in understanding the unconventional and puzzling properties exhibited by many strongly correlated electron materials and, in particular, the evolution of strong-correlation effects from the nano- to the macroscale. The 52 invited and contributed talks, as well the 36 poster contributions covered a wide variety of topics currently at the center of an intense scientific debate, ranging from Kondo physics in nanostructures and heavy-fermion materials to unconventional superconducting hybrid structures, non-equilibrium transport in quantum-dot arrays, and novel exotic phases in graphene and optical lattices. By bringing together key experts from different subfields, the seminar and workshop led to many fruitful discussions among the 96 participants from Europe, North and South America, Japan, China, and India and initiated a series of new collaborations. While invited talks were presented by a number of leading experts in the field who covered major recent achievement in both theory and experiment, younger participants presented their results in the form of contributed talks and posters.

At the end of this seminar, a roundtable discussion took place that summarized some of the major developments that were reported during the seminar, and discussed some of the most pressing challenges that we face in this field.

Based on the feedback we received from the participants, this meeting was very well received and quite a success since it achieved the important goals we had set: (i) to bring together leading scientists working in the different subfields in order to discuss the recent advances in the area of correlated quantum matter, to visualize further research prospects, and to promote new research collaborations and (ii) to bring together top level scientists and young researchers, to stimulate lively interaction and exchange of ideas between them.

We would like to thank the MPIPKS for its hospitality and excellent infrastructure provided to us and the participants of our workshop. We would also like to thank the team of secretaries and, in particular, Mandy Lochar, for their kind assistance and always friendly support in organizing the meeting.