

# Report on MPI-PKS Focus Workshop “Many Body Dynamics Out of Equilibrium”

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The MPI-PKS workshop “Many Body Dynamics Out of Equilibrium” was held from March 11-14, 2015. The goal of the workshop was to bring together theorists and experimentalists working at the interface of two of the most complex issues in quantum science: non-equilibrium dynamics and strongly interacting many-body systems.

Broadly speaking, the talks were organized around the following main themes:

- The theory of many-body localization, and attendant questions of ergodicity breaking
- Realizing many-body localization in experiments
- Floquet dynamics of periodically driven systems
- Basic issues of non-equilibrium dynamics and thermalization

The organizers attempted to have a wide representation of participants from different fields. These included many of the key workers in the theory of many-body localization systems (Prof. D. Abanin, Dr. B. Bauer, Dr. A. Chandran, Prof. F. Huveneers, Dr. J.A. Kjäll, Prof. C.R. Laumann, Prof. A. Mirlin, Prof. V. Oganesyan, Prof. D. Pekker, Prof. A. Scardicchio, Dr. M. Serbyn, Prof. S. Sondhi, Dr. R. Vasseur) and driven systems (Dr. A.G. Grushin, Prof. A. Mitra and Prof. M. Rudner); in the theoretical and experimental study of such phases in cold atomic gases (Prof. I. Bloch, Prof. M. Lukin, Prof. D. Weld); experts in the field of thermalization and non-equilibrium dynamics (Prof. L.F. Cugliandolo, Dr. F. Heidrich-Meisner, Prof. F. Marquardt, Prof. S. Miyashita, Prof. M. Rigol, Prof. K. Sengupta); and on issues of adiabaticity and quantum optimization (Prof. A. Green, as well as Profs. Laumann and Scardicchio). The workshop was truly international, with participants representing several countries in Europe, the United States, Japan, and India. The main scientific program was preceded by tutorial sessions led by Profs. I. Bloch, A. Green, and S. Sondhi, and concluded with a day of discussions.

## Younger Participants

As the central topics are relatively young, much of our participation was from PhD/Masters student, postdocs and junior faculty. Indeed, several nice talks were given by postdoctoral fellows and junior faculty: Dr. B. Bauer, Dr. A. Chandran, Prof. A. Das, Prof. D. Weld, Dr. A.G. Grushin, Dr. J. Kjäll, Prof. M. Rudner, and Dr. R. Vasseur. We also had an excellent selection of posters (both by junior and senior participants).

## Summary

The workshop substantially achieved its stated goal of bringing together a diverse range of participants actively engaged in research on a wider variety of topics within the umbrella of non-equilibrium aspects of many-body systems. There were several fruitful interactions across the different subtopics represented at the workshop; hopefully these will stimulate further work and collaborative research in new directions. Participants particularly appreciated the abundant time for discussions that were an integral part of the program, and the tutorials that preceded the scientific program.