

**Welcome  
to LECTURES**

# QUANTUM TRANSPORT IN ONE DIMENSION

*Professor Ilya Gruzberg, The Ohio State University*



**WHEN: Monday, May 22, 14:00-17:00, room 303**

## **NON-INTERACTING SYSTEMS**

01

In the first lecture we will focus on non-interacting disordered systems which exhibit Anderson localization and Anderson transitions. For the sake of simplicity and better solvability, we will only consider one-dimensional and quasi-one-dimensional systems (wires). We will develop basic theoretical tools to analyze such wires, including the scattering formalism (Landauer formula, DMPK equation), supersymmetry method, and saddle-point (instanton) method. We will also discuss the Altland-Zirnbauer classification of non-interacting disordered systems, which has become central in the modern subject of topological insulators.

**WHEN: Tuesday, May 23, 14:00-17:00, room 303**

## **INTERACTIONS AND MANY-BODY LOCALIZATION**

02

In the second lecture we will consider how to add interactions into account. This will lead us to consider the problem of Anderson localization on Bethe lattice, which was historically proposed in the context of the problem of the life time of single-particle excitations in quantum dots. Eventually, this was applied to the problem of many-body de-localization, which happens to be most interesting and relevant exactly in the (quasi-) one-dimensional geometry, and is the subject of intensive current research.

Ilya Gruzberg obtained his PhD at Yale University under the supervision of Nick Read in 1998. He then spent three years as a postdoc at KITP, Santa Barbara, and one year as a Pappalardo Fellow at MIT. In 2002 he became a faculty member in the physics department at the University of Chicago, and in 2013 moved to Ohio State University. Ilya's research interests include disordered electronic systems, Anderson localization, quantum Hall effects, statistical and mathematical physics.

**LOOKING FORWARD TO SEEING YOU!**