Akira Furusaki , RIKEN

Title: Anderson localization in two-dimensional electron gas with strong spin-orbit coupling

Abstract:
I will give an overview of our recent studies on the Anderson localization problem in two-dimensional electron gas with strong spin-orbit coupling,
The two-dimensional electron gas can be a metal, a trivial insulator, a quantum spin Hall insulator (two-dimensional Z_2 topologial insulator), and a metallic surface state of a three-dimensional Z_2 topological insulator.
The Anderson (de)localization in these states is discussed using a network model and a nonlinear sigma model of the symplectic class.
In particular, the Anderson delocalization is induced by a topological term which can be added to the nonlinear sigma model. The same mechanism is at work in the extended surface states of topological insulators and topological superconductors.
This work is based on collaborations with I. Gruzberg, A. Ludwig, C. Mudry, H. Obuse, and S. Ryu.