Condensed Matter Lecture Series

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(3 lectures on 2 topics)

10.01.2017	11:00 a.m.	A-304
18.01.2017	11:30 a.m.	AG 69
19.01.2017	11:00 a.m.	AG 69

What is topological order, and is it present in the high temperature superconductors ?

I will present an elementary introduction to topological order, and highlight its importance in determining the quantum phases and phase transitions of lattice models of bosons or fermions with short-range interactions. I will then highlight some puzzling features of the phase diagram of the hole-doped cuprate compounds, and argue that they are most naturally understood using metallic states with topological order.

SYK models, strange metals, and black holes

The SYK models provide solvable realizations of disordered metallic states without quasiparticle excitations. Explicit holographic duals of the SYK models can be constructed, in terms of black holes with a near-horizon AdS2 geometry. I will also compare the SYK models with more realistic models of the strange metals in the cuprates. A common thread connecting these models is the remarkable connection between many-body quantum chaos and diffusive thermal transport in states of quantum matter without quasiparticle excitations