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## **”Black holes, wormholes and solid state realizations of Sachdev-Ye-Kitaev models”**

*Tuesday 4 June 2019 15:15 (30 minutes)*

An intriguing connection, pointed out by Kitaev in 2015, exists between a simple model of Majorana fermions with random all-to-all interactions –the Sachdev-Ye-Kitaev (SYK) model –and the horizons of extremal black holes in two-dimensional anti-de Sitter space. This connection furnishes a rare example of holographic duality between a solvable quantum-mechanical model and Einstein gravity. It also opens up a possibility to study quantum black holes and possibly also wormholes realized holographically in a quantum mechanical model, in a tabletop experiment. In this talk I will review some of these developments and describe the recent efforts to bring the family of SYK models closer to experimental reality. The proposed experimental realizations employ both complex and Majorana fermions in various atomic and solid state systems. These include some of the standard platforms for Majorana zero modes (proximitized quantum wires and topological insulator - superconductor interfaces) as well as electrons in the lowest Landau level in a graphene flake with an irregular boundary.

**Author:** FRANZ, Marcel (University of British Columbia)

**Presenter:** FRANZ, Marcel (University of British Columbia)

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