## **JITCP Seminar**

THE UNIVERSITY OF HONG KONG HKU-UCAS JOINT INSTITUTE OF THEORETICAL AND COMPUTATIONAL PHYSICS HK INSTITUTE OF QUANTUM SCIENCE & TECHONOLOGY [Thursday Morning, 10:30 am, Zoom]

## Van der Waals Topological Magnets and Circuits Dr. Dmitry OVCHINNIKOV

Department of Physics and Astronomy, The University of Kansas

The breaking of time-reversal symmetry in topological insulators leads to novel quantum states of matter. One prominent example at the two-dimensional limit is the Chern insulator, which hosts dissipationless chiral edge states at sample boundaries. These chiral edge modes are perfect one-dimensional conductors whose chirality is defined by the material magnetization and in which backscattering is topologically forbidden. Recently, van der Waals topological magnet MnBi2Te4 emerged as a new solid-state platform for studies of the interplay between magnetism and topology. In this talk, I will present an overview of our progress toward controlling topological phase transitions and chiral edge modes in MnBi2Te4. First, I will establish how topological properties are intimately intertwined with magnetic states. I will then demonstrate electrical control of the number of chiral edge states. Finally, I will show the discovery of chiral edge modes along crystalline steps between regions of different thicknesses and how these modes can be harnessed for the engineering of simple topological circuits.

## About the speaker:

Dmitry Ovchinnikov earned his Ph.D. from the Institute of Electrical and Micro Engineering at École Polytechnique Fédérale de Lausanne (EPFL), Switzerland in 2017. During his Ph.D., he conducted experiments on two-dimensional semiconductors and developed techniques to modulate disorder in low-dimensional systems. His thesis earned him the EPFL EDMI PhD thesis distinction award and the Gilbert Hausmann PhD thesis award. He received an early postdoc Swiss National Science Foundation (SNSF) mobility fellowship to research nanoscale van der Waals magnetic devices at the University of Washington. Currently, Dmitry is starting his lab at the Department of Physics and Astronomy at the University of Kansas. His work involves exploring the fundamental physics of topological magnets, controlling topological and magnetic states, and engineering novel device and circuit architectures based on topologically non-trivial band structures.

## **Online Zoom Seminar** Thursday, May 11, 2023, 10:30 am

https://hku.zoom.us/j/96251626506?pwd=c2gxOW9FRm5XdEFrQ1c3bjc5YlpUUT09 Meeting ID: 962 5162 6506, Password: 25600

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