

# JITCP Seminar

THE UNIVERSITY OF HONG KONG  
HKU-UCAS JOINT INSTITUTE OF THEORETICAL AND COMPUTATIONAL PHYSICS  
[Thursday afternoon, 4 pm, Zoom (online)]

## Possible Kitaev Magnets with 3d Electrons: Hope, Reality and Opportunity

**Dr. Yuan LI**  
*Peking University*

Magnetism in cobalt compounds has an interesting facet due to the element's non-negligible spin-orbit interplay. In recent years, several cobalt oxides with layered honeycomb crystal structures have been proposed to have the potential to realize the celebrated Kitaev model for quantum spin liquids, and becoming intensively studied as 3d-electron analogues of 5d iridates and 4d  $\alpha$ -RuCl<sub>3</sub>.

From a crystal grower and spectroscopist's view point, I will present our study on two of these compounds: Na<sub>2</sub>Co<sub>2</sub>TeO<sub>6</sub> (NCTO) and Na<sub>3</sub>Co<sub>2</sub>SbO<sub>6</sub> (NCSO), which look similar at first sight. Our data suggest that subtle differences make the systems highly contrasting against each other: NCTO has a nominally C<sub>3</sub>-symmetric crystal structure, whereas NCSO has monoclinic stacking; NCTO is more antiferromagnetic than NCSO, probably due to further-neighbor interactions. At the end of the day, we believe that the two systems might not be very close to the idealized Kitaev model but are nonetheless highly interesting – the fact that subtle differences in the “initial” conditions of the crystal lattice lead to dramatically different physical properties indicates strong magnetic phase competition, which we see as a precursor to quantum spin liquids. Experimental hints at the realization of the latter will be discussed, along with remaining open issues.

### About the speaker:

Yuan Li received his B.S. degrees from Peking University in 2004, and Ph.D. degree from Stanford University in 2010. He was a Humboldt Research Fellow at the Max Planck Institute for Solid State Research, Germany, from 2010 to 2012. Since 2012, he has been working as an associate professor at the International Center for Quantum Materials, Peking University, where he received tenure in 2018. His research involves state-of-the-art crystal growth and the use of scattering spectroscopy, in particular neutron and photon scattering, for studying the structure and dynamics of materials with strong electron correlation and novel quasiparticle excitations. He has been selected for an elite research program supported by the MOST of China and a recipient of Sir Martin Wood China Prize.

**Online Zoom Seminar**  
**Thursday, November 10, 2022, 4:00 pm**  
Meeting ID: 920 2181 7069  
Password: 25600

<https://hku.zoom.us/j/92021817069?pwd=cDY4RThzUDRQd0MxTEMzQk1tbFAyUT09>

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