

## **Novel quantum phenomena in complex oxides**

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Understanding and controlling the behavior of correlated electron systems is one of grand challenges in condensed matter physics. The delicate interplay of spin, charge, lattice and orbital degrees of freedom in complex oxides results in the competition of various types of energetic states, often leading to discoveries of new phenomena and new physics. In this talk, after an introduction to complex oxides and neutron scattering technique, I will use bilayer ruthenate  $\text{Ca}_3\text{Ru}_2\text{O}_7$ , a peculiar complex oxide, as a model system to discuss the novel quantum phenomena achieved via chemical doping, magnetic field, and pressure tuning. I will show that this system provides a rare opportunity to investigate the interplay between correlated metal physics and Mott insulator physics.