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***Manipulating elementary excitations in functional quantum materials using resonant X-ray techniques***

**Date: 2024/12/20 (Fri)**

**Venue: S4-625(Online)**

**Time: 14:00-15:00**

**Abstract:**

The increasing demand and interests of quantum materials, as well as their intriguing macroscopic manifestation of collective phenomena and exotic properties, have led to unprecedented opportunities for materializing these emergent properties into functional devices, e.g. high-temperature superconductivity, quantum Hall effect, ferroelectricity, etc. In this vein, characterizing the underlying physics highlights a hallmark and unique realization in condensed matter physics, both from a fundamental as well from an applied perspective. In this talk, I will present studies using resonant X-ray spectroscopy techniques on elementary excitations in a number of quantum materials, specifically low-dimensional transition-metal magnets. Such experimental probes are sensitive to all electron degrees of freedom, i.e. lattice, spin, orbital and charge, capable of revealing unique information about the microscopic electronic interactions that are vital to the low-energy Hamiltonian. In addition to the aforementioned research achievements and present focus, future prospect including the ultrafast time control of electronic dynamics will be discussed.