## Physical Sciences Seminar

# Multi-flavor quantum criticality

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Quantum-critical metal CeCoIn5 exhibits T-linear resistivity and inverse-T-square Hall angle, similar to the cuprates. Unlike cuprates, it has very low Fermi- and superconducting energy scales allowing a more thorough study of the thermodynamics of its quantum criticality. After 20 years of such studies, the microscopic origin of metallic criticality in CeCoIn5 in general, and the nature of its interaction with the magnetic field, in particular, are still in flux. Thermal impedance spectroscopy allows access to the electronic density of states in two independent ways—via the specific heat and the nuclear spin-lattice relaxation rate — simultaneously in the same measurement. Magnetic field and temperature dependence of the nuclear spin-lattice relaxation rate show that the density of states on the Fermi surface in CeCoIn5 is determined entirely by the energy-scale competition near the quantum critical point. Such dynamic effect of magnetic field near quantum critical point has been established in the cuprates through magnetotransport and Hall measurements. However, in CeCoIn5, direct interpretation of magnetic field and temperature dependence of the specific heat in terms of such energy-scale competition reveals an excess entropy in the normal state. This suggests quantum critical physics beyond mass renormalization on the Fermi surface, e.g., the second “flavor” of quantum critical bosons. We argue that such a multi-flavour quantum criticality is at play in a broader class of quantum critical systems.

**Thursday, November 9, 2023 11:00am - 12:00pm**
Heinzel Seminar Room, Office Building West

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