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Quantum Critical Phenomena in Metals with Competing Interactions Quantum

Tuesday, 19 October 2021 16:00 (30 minutes)

Quantum phase transitions (QPTs) are arguably one of the most intriguing phenomena that can occur when the electronic ground state of strongly correlated metals are tuned by external parameters such as pressure, magnetic field or chemical substitution. They define transitions between different states of matter that are driven by quantum (as opposed to thermal) fluctuations. The strong quantum critical fluctuations that arise at
QPTs often lead to the emergence of macroscopically coherent phases that are at the center of the current condensed matter research. Thus, microscopic studies of fluctuations across QPTs are central for novel quantum phenomena, but the microscopic nature of the pertinent fluctuations is unclear in many strongly correlated materials.
Neutron scattering is expected to continue playing a pivotal role in the research of quantum critical matter, because the technique allows to directly probe the spatial(Q)- and energy(E)-resolved properties of the quantum critical fluctuations. The spatial extend of the critical fluctuations, however, has often been neglected in the past, but has shown to be crucial in materials hosting competing interactions. In this presentation I will show how modern neutron spectrometers allow clarifying the contribution from different fluctuating order parameters, and will show potential future paths for the research on quantum critical phenomena in strongly correlated metals.

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