Condensed Matter Physics Seminar Series

Location and thermal evolution of the pseudogap due to spin fluctuations

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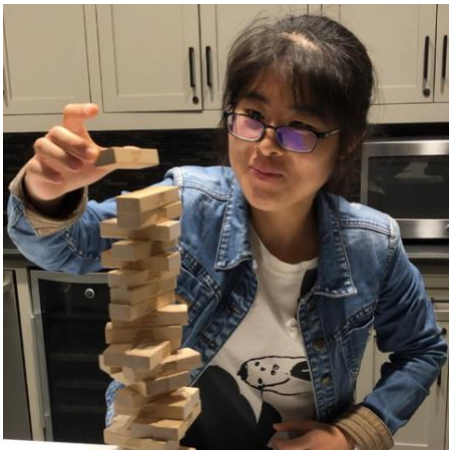

The pseudogap behavior, observed in several classes of materials, most notably high Tc cuprates, remains one of the most debated phenomena in correlated electron systems. In the past few years, there have been significant numerical advances which suggest an important role of spin fluctuations in pseudogap formation at finite temperature. In this talk, I propose a minimal analytical model that can capture the essential features observed numerically and discuss its implications to the phase diagram of high Tc cuprates. I will argue that for proper description of the pseudogap one needs to sum up infinite series of diagrams for both the fermionic Green's function and the SDW order parameter in the SDW state or the magnetic correlation length in the paramagnetic state. As a result, the electrons remain a dynamical memory about the underlying order in a finite temperature range even if the order is already destroyed by thermal fluctuations. This range is split by regions of strong and weak pseudogap behavior. In the first region, the pseudogap energy is weakly temperature dependent, despite that it comes from thermal fluctuations. Generalizations to other systems will also be discussed.

Ye is currently a postdoc scholar at KITP, UC Santa Barbara, and will join the University of Utah as an assistant professor this summer. Ye obtained her Ph.D. from the University of Minnesota in 2019. She works on the interplay between symmetry, correlation and topology in crystals. She is also interested in transport and ultrafast dynamics in correlated systems. Her past works include electronic orders hosted in Kagome metals, thermal Hall transport in quantum magnets, ultrafast dynamics in 2D magnets, quantum critical transport at the metal-insulator transition.

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