北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Weekly Seminar

Unusual "normal state" of cuprates: a Bose liquid descriptions on Bad metal, Non-fermi liquid, kink, and pseudogap phase

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Time: 4: 00 pm, March 21, 2018 (Wednesday)

2018 3 21 4:00

Venue: Room W563, Physics building, Peking University

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Abstract

Through thirty years of intensive studies, it has become clear that the key to uncover the puzzle of high-temperature superconductivity in the cuprates is really their unusual non-superconducting . Particularly in the hole-doped cuprates, the is anything but normal. Nearly the entire low-temperature phase diagram are covered by a pseudo-gap phase that does not seem to break any symmetry but partially gaps out the Fermi surface into a Fermi arc. Even above the pseudogap temperature, the observed transport, optical conductivity, ARPES, and STM are all qualitatively distinct from normal metals. It is only fair to conclude that to-date a unified simple physical picture is still not available to explain all these non-fermi liquid behaviors.

This talk will present strong evidences that these seemingly unexplained unusual behaviors are in fact quite generic features of a simple emerged Bose liquid. These include the features in optical conductivity, temperature-linear resistivity, non-Fermi liquid behavior and kinks in the ARPES. The same picture also provides explanation on the demise of superconductivity at low doping, where a new phase can be realized that is actually the true nature of the pseudogap phase. In essence, these comparisons suggest a new paradigm that cuprates are the simplest prototype of a emerged Bose liquid that describes a big class of strongly correlated condensed matter systems. The intrinsic behaviors of Bose liquid call for a second volume of Solid State Physics textbook parallel to the one for the Fermi liquid.

About the speaker

Wei Ku 1991 2000

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