

Nonequilibrium and nonlinear terahertz spectroscopy study on Higgs modes in conventional and unconventional superconductors

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Seminar Date/Time/Venue

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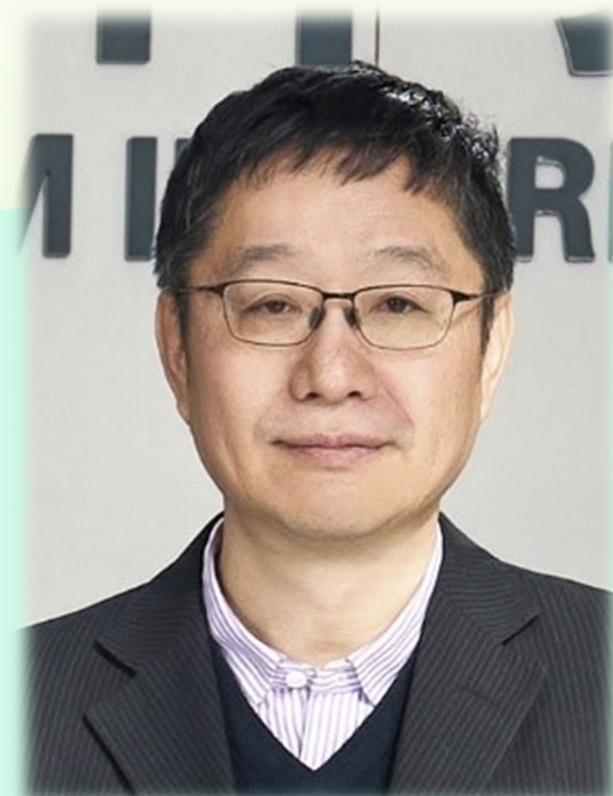
LG1 – CYPP3, Chong Yuet Ming Physics Building, HKU

Abstract

We present recent progress in exploring the detection of superconducting collective modes in NbN, MgB₂, and YBa₂Cu₃O_{6+x} using innovative terahertz spectroscopy techniques. Transient Higgs oscillations and a higher-order nonlinear light-Higgs mode coupling effect were detected in NbN superconductors. In MgB₂, the Higgs mode contribution from the dirty 3D pi-band and the Leggett mode contribution were identified. In YBCO samples, a beat pattern in the terahertz signal revealed a coupling effect between the Higgs mode and the mode developed below T*, indicating the pseudogap phase may be a distinct order, not a precursor to superconductivity. This strong coupling effect provides fresh insights into superconductivity and the pseudogap.

About the speaker

Professor Nan-Lin WANG is a chair professor at the international center for quantum materials (ICQM), School of Physics, Peking University. He also serves as a vice-president of Beijing Academy of Quantum Information Sciences. He obtained his PhD in condensed matter physics from the University of Science and Technology of China in 1992. His research focuses primarily on infrared and terahertz spectroscopy study of strongly correlated electronic systems, including high temperature superconductors, charge/spin density wave compounds, transition metal oxides/chalcogenides, heavy fermions, quantum magnetic systems, 3D Dirac/Weyl semimetals in both equilibrium and nonequilibrium states. He is a fellow of the American Physical Society.



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