



Special Seminar

Bose-Fermi mixture: from Ruderman–Kittel–Kasuya–Yosida mechanism to Efimov molecules

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Venue: Room w563, Physics building, Peking University

地点: 北京大学物理楼, 西563会议室

Abstract

RKKY (Ruderman–Kittel–Kasuya–Yosida) mechanism and Efimov physics describe two seemingly disconnected quantum phenomena in condensed matter and nuclear physics, respectively. RKKY mechanism mediates long-range interactions of impurities embedded in a degenerate Fermi gas, while Efimov physics describes a universal bound state of three particles with resonant, pairwise interactions. Recent research suggests an intriguing connection between the two scenarios in the strong interaction regime.

We perform experiments on a quantum mixture of heavy bosons (Cs) embedded in light fermions (Li) near an interspecies Feshbach resonance. Interactions between Cs atoms mediated by the Li atoms observed in the weak coupling regime show consistency with the RKKY mechanism, while Efimov trimers manifest in the strong coupling regime. How are the 2 physics mingled? We present new measurements on the Bose-Fermi mixture over the entire weak- to strong-coupling regime, which revealed even more surprises, including the collapsing and revival of phonon modes.

About the speaker

Cheng Chin earned his B.S. degree in Physics from National Taiwan University in 1993 and his Ph.D. degree in Physics from Stanford University in 2001 under the advisory of Dr. Steven Chu. He conducted postdoctoral research at Stanford (2001~2003) and at Innsbruck University (2003~2005). He joined the University of Chicago in 2005 and has been a full professor in the Department of Physics, the Enrico Fermi institute, and the James Franck institute since 2012. He has also been a visiting professor at Innsbruck University (Austria), ETH (Switzerland), Rice University, MIT, Academic Sinica (Taiwan), Univ. of Ulm(Germany), Univ. of Munich(Germany), Max Planck institute (Germany), JILA, Tsinghua University (China) and National Sun Yat-Sen University (Taiwan).