



清华大学高等研究院

Institute for Advanced Study, Tsinghua University

物理学术报告

Physics Seminars (biweekly)

Title: Ultrahigh-Q microcavity photonics and optomechanical cooling

Speaker: Yun-Feng Xiao
State Key Lab for Mesoscopic Physics, Peking University

Time: 4:00pm, Wednesday, March 11, 2015
(3:30~4:00pm, Tea, Coffee, and Cookie)

Venue: Conference Hall 322, Science Building, Tsinghua University

Abstract

Confinement and manipulation of photons using microcavities have triggered intense research interest in both basic and applied physics for more than one decade. Prominent examples are ultrahigh-Q whispering gallery microcavities which confine photons by means of continuous total internal reflection along a curved and smooth surface. The long photon lifetime, strong field confinement, and in-plane emission characteristics make them promising candidates for enhancing light-matter interactions on a chip. In the first part of this talk, I will introduce some representative applications of ultrahigh-Q microcavities, such as ultralow-threshold microcavities with highly directional emission and single nanoparticle detection. In the second part, I will introduce the concept of microcavity optomechanical coupling, and focus on the optomechanical cooling in which a mesoscopic mechanical resonator can be cooled down its quantum ground state. The quantum ground state at mesoscopic or macroscopic scale enables not only the fundamental test of quantum theory and the exploration of the quantum-classical boundary but also important applications in quantum information processing and precision metrology.

Bio: Dr. Yun-Feng Xiao joined the faculty at Peking University in Jan, 2009, after a postdoctoral research at Washington University in St. Louis, USA, and was promoted to Associate Professor with tenure in 2014. During the past few years, he was awarded the Excellent Young Scientist by National Natural Science Foundation of China (NSFC) in 2012, The Rao Yutai First Prize in Fundamental Optics in 2013. His research interests lie in the fields of whispering-gallery microcavity optics and photonics. He has authored or co-authored more than 90 refereed journal papers with over 1600 citations (h-index: 22), and has delivered over 50 invited talks/seminars in international or national conferences/universities.