北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Seminar

Ultrafast Optics of Graphene and Graphene Multilayers

Prof. Ted Norris

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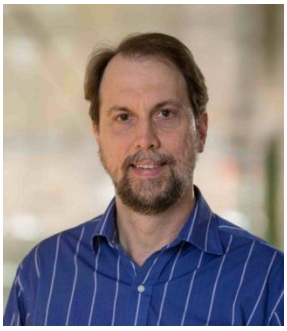

Time: 10:00am, July 20, 2018 (Friday)

时间：2018年07月20日 （周五）上午10:00

Venue: Room W563, Physics building, Peking University

地点：北京大学物理楼，西563会议室

Abstract

Graphene is being widely investigated for both its remarkable electronic and optical properties. Graphene is of course famous for the unique properties arising partly from being atomically thin, but there are also many interesting phenomena and new applications opened up by the exploration of layered graphene structures. This talk will present a summary of our experimental program in ultrafast spectroscopy of graphene, and discuss how unusual properties of graphene and multilayer structures built of graphene can be revealed through optical and THz-domain spectroscopy. I will discuss femtosecond mid-infrared spectroscopy as an approach to studying the dynamics of hot electrons, their interactions with acoustic phonons, and the materials properties of multilayer epitaxial graphene. I will then discuss our extensions of mid-infrared studies to coherent control of optically generated ballistic currents in graphene, and our demonstration that a consequence of the “relativistic” band structure of graphene is that electron-electron scattering can relax a current (unlike the situation in normal parabolic-band semiconductors). Time-domain THz spectroscopy also reveals new aspects of interlayer interactions in multilayer systems, such as thermal coupling via carrier Coulomb interactions. Multilayers of graphene separated by dielectric layers can also provide new opportunities. One is the realization of hyperbolic metamaterials, which may be applied to novel IR modulators or to near-field thermal hyperconductivity. Another is the development of new configurations for ultrasensitive ultrabroadband photodetectors, including paradoxical highly transparent photodetectors.

About the speaker

Theodore B. Norris is the Gerard A Mourou Collegiate Professor of Electrical Engineering and Computer Science at the University of Michigan. His research interests include application of femtosecond optical techniques to the physics of semiconductor nanostructures, including novel 2D materials such as graphene, and, in developing new ultrafast optical and optoelectronic measurement techniques, the generation and measurement of THz radiation, plasmonics in nanostructures, and novel methods for imaging and in vivo biological sensing. He has published over 185 refereed journal publications and book chapters, over 300 conference papers, and 12 patents. Professor Norris has received many honors and awards from the University of Michigan including the Rackham Graduate School Distinguished Faculty Achievement Award in 2014, the College of Engineering David E. Liddle Research Excellence Award in 2012; he was named Fellow of the American Physical Society in 2005 and Fellow of the Optical Society of America in 2000.