PURDUE UNIVERSITY

Birck Nanotechnology Center

Thomas E. Murphy received his bachelor's degrees in Electrical Engineering and Physics from Rice University in 1994. He then studied Electrical and Computer Engineering at Massachusetts Institute of Technology, receiving the MS degree in 1997 and Ph.D degree in 2001. He was employed as a member of the technical staff at MIT Lincoln Laboratory from 2001-2002, and joined the faculty at the University of Maryland in 2002. He currently holds a joint appointment as a Professor in the Department of Electrical & Computer Engineering and Director of the Institute for Research in Electronics & Applied Physics. His research interests include terahertz and microwave photonics, two-dimensional optoelectronics, integrated optics, nonlinear and ultrafast optics, electrooptics, and nonlinear dynamical systems.

THz Nonlinear Optics in Graphene

Professor Thomas Murphy

Thursday, August 2nd
1:00pm
MRGN 121

Nonlinear optical effects were first observed soon after the first lasers were invented, and since those early days nonlinear optics has remained both an active area of research and practical ingredient in a number of important technologies and products. However, nonlinear optical effects are seldom observed in the far-infrared or terahertz spectral regime, in part because of the historical paucity of intense optical sources in this spectral range. Nonlinearities are even more challenging to observe in two-dimensional materials like graphene, where the region of interaction is constrained to a surface rather than an interaction volume. In the past few years, there have been significant advances in our ability to produce bright, intense optical signals in the terahertz regime, which has enabled the study of THz nonlinear effects in materials and devices. At the same time, graphene has matured as a two- dimensional material with unique electrical and thermal properties that make it appealing for applications in the terahertz regime. We will present some of the new techniques for observing nonlinearities in uncharted spectral regime, and discuss the nature and origin of the nonlinear optical response in graphene, and methods to engineer and enhance the nonlinear response by engineering the graphene structure.

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