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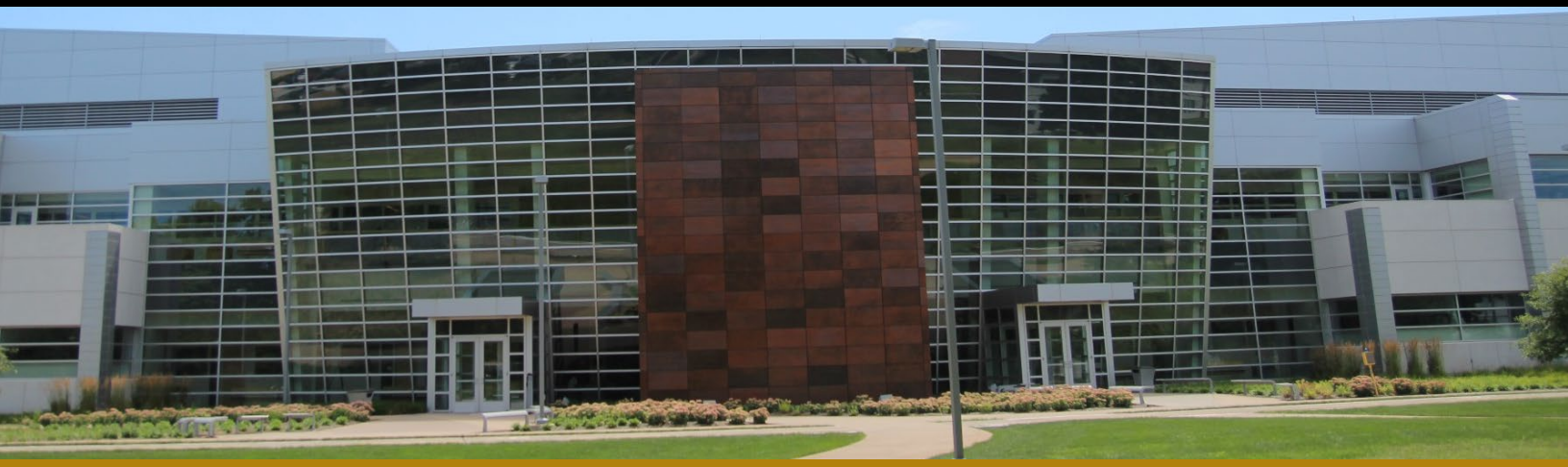

BNC Seminar

Current Understanding and Unsolved Problems in Thermal Transport at the Nanoscale

David G. Cahill

Department of Materials Science and Engineering and Materials Research Laboratory
University of Illinois, Urbana-Champaign

Wednesday, June 5, 2019
11:00am – 12:00pm, BRK 1001

Bio: David Cahill is the Willett Professor of Engineering and Professor of Materials Science and Engineering at the University of Illinois at Urbana-Champaign. He joined the faculty of the Department of Materials Science and Engineering at the U. Illinois after earning his Ph.D. in condensed matter physics from Cornell University, and working as a postdoctoral research associate at the IBM Watson Research Center. His current research program focuses on developing a microscopic understanding of thermal transport at the nanoscale; extremes of low and high thermal conductivity in materials; the interactions between phonons, electrons, photons, and spin; and the kinetics and thermodynamics of aqueous and electrochemical interfaces with materials. He received the 2018 Innovation in Materials Characterization Award of the Materials Research Society (MRS); the 2015 Touloukian Award of the American Society of Mechanical Engineers; the Peter Mark Memorial Award of the American Vacuum Society (AVS); and is a fellow of the MRS, AVS, and APS (American Physical Society).

Abstract: Thermal conductivity is a basic and familiar property of materials: silver spoons conduct heat well and plastic does not. In recent years, the combined efforts of materials scientists, engineers, physicists, and chemists have succeeded in pushing-back long-established limits in the thermal conductivity of materials and have made exciting progress on methods for dynamic control of thermal conductivity. In this lecture, I will highlight a three topics that I consider to be important unsolved problems in thermal conduction in materials: 1) ultralow thermal conductivity in hard and soft matter; 2) heat transport by magnetic excitations; and 3) solid-state approaches for thermal regulators and thermal switches.

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