



北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Special Seminar

Metamaterials and Topological Mechanics

Tom Lubensky

Department of Physics and Astronomy, University of Pennsylvania



Time: 10:00am, Nov. 15, 2018 (Thursday)

时间: 2018年11月15日 (周四) 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

Metamaterials are engineered to have properties not found in nature, such as a negative optical index of refraction, one-way light or vibration waves, or exotic elastic behavior. Made-to-order structures at length scales as short as a micron can now be fabricated with advanced materials processing like 3D printing. Topology is a unifying mathematical concept related to properties that do not change under continuous changes in parameters. *Topological materials*, like topological insulators, have bulk excitation spectra characterized by topological invariants, associated with the opening of bandgaps, that determine physical properties like the Hall conductivity or the nature of edge excitations. This talk will discuss mechanical metamaterials with topologically protected zero-energy edge states in an idealized limit. These states exist at every wavenumber on a surface so that any surface shape distortion costs no energy. Changing the topological class of the material causes one or more zero modes per wavenumber to move from one side of a sample to the opposite creating rigid and supersoft edges .

About the speaker

Prof. Tom Lubensky is a physicist at the University of Pennsylvania. He received his B.S. in Physics from the California Institute of Technology in 1964 and both his M.A. (1965) and Ph.D. (1969) in Physics from Harvard University. He was an NSF Postdoctoral Fellow at the University of Paris in Orsay (1969–70) and a postdoctoral Research Associate at Brown University (1970–71). He joined the University of Pennsylvania in 1971, promoted to associate professor in 1975 and to full professor in 1980. He is a fellow of the American Physical Society (1985), American Association for the Advancement of Science (2000), elected member of the National Academy of Sciences (2002) and the American Academy of Arts and Sciences (2007), Alfred P. Sloan Fellow (1975–77), Guggenheim Fellow (1981), and honored member of the International Liquid Crystal Society. Prof. Lubensky is a well-known soft-matter theorist. In 2004, he received Oliver E. Buckley Condensed Matter Prize for seminal contributions to the theory of condensed matter systems including the prediction and elucidation of the properties of new, partially ordered phases of complex materials.