THE MATERIALS SCIENCE AND ENGINEERING DEPARTMENT
FALL COLLOQUIUM SERIES PRESENTS:

Nadya Mason

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Electronic Transport in Strain-Engineered Graphene

There is wide interest in using strain-engineering to modify the physical properties of 2D materials, for both basic science and applications. Deformations of graphene, for example, can lead to the opening of band gaps, as well as the generation of pseudo-magnetic fields and novel electronic states. We demonstrate how controllable, device-compatible strain patterns in graphene can be engineered by depositing graphene on corrugated substrates. We discuss several techniques for creating corrugated substrates, focusing on periodic spherical curvature patterns in the form of closely packed nanospheres. We show how the smaller nanospheres induce larger tensile strain in graphene, and explain the microscopic mechanism of this. We also present experimental results demonstrating how a nearly periodic array of underlying nanospheres creates a strain superlattice in graphene, which exhibits mini-band conductance dips and magnetic field effects that depend on the magnitude of induced strain. This control of the strain degree of freedom provides a novel platform both for fundamental studies of 2D electron correlations and for prospective applications in 2D electronic devices.

Nadya Mason is the Rosalyn S. Yalow Professor of Physics at the University of Illinois at Urbana-Champaign. She received her B.S. from Harvard University and her PhD from Stanford University, both in physics. Dr. Mason's research focuses on the electronic properties of small-scale and hybrid materials, such as graphene, semiconducting nanowires, nanoscale superconductors, and topological insulators. Her research is relevant to applications involving nanoscale and quantum computing elements. She currently serves as founding Director of the Illinois Materials Research Science and Engineering Center (I-MRSEC), a multidisciplinary research and education center funded by the NSF. Dr. Mason has been recognized for her work with numerous awards, including the 2009 Denise Denton Emerging Leader Award, the 2012 Maria Goeppert Mayer Award of the American Physical Society (APS), the 2019 APS Edward Bouchet Award, and in 2021 was elected to both the American Academy of Arts and Sciences and the National Academy of Sciences.

Tuesday, November 9 • 4 pm CT • Tech L211

Registration is required. RSVP here.

Questions? Contact elena.lindstrom@northwestern.edu.

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