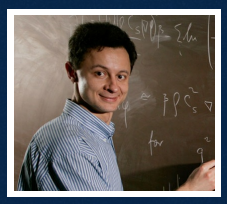
# Solving Decades-Old Problems in Materials Science




Vassiliy Lubchenko

Associate Professor, Chemistry and Physics


## CURRENT RESEARCH

### Developing novel approaches for understanding strongly non-equilibrium systems

Computers have revolutionized many branches of science and technology from quantum chemistry to bioimaging, genomics, astrophysics, flight simulations and many others. Despite these impressive advances, there are old-standing problems of Physics, Chemistry, and Biology that do not yield readily to computer modeling. These difficult problems call for radically new and elegant approaches, a motivation that drives Dr. Vassiliy Lubchenko's research at the University of Houston. Being a theoretician gives him the flexibility to think about a wide range of challenges and uncover their mutual connections.

Lubchenko's research efforts focus in three areas:

- Amorphous Solids and the Theory of the Glass Transition: Dr. Lubchenko is tackling long-standing problems posed by the phase-change materials. The phase change materials are special mixtures of two or more elements from the region in the periodic table centered at antimony and are best known for their use in Blu-ray disks. One can use phase-change materials to record information because of their unique ability to switch electrical and optical properties depending on whether the material is in the crystalline or an amorphous, glassy form. The phase-change materials are potential candidates for the next generation computer memory, ultrafast displays, and smart optics. To realize this potential, we must understand and, ultimately, control the transition between the crystalline and glassy forms of the phase-change material. Achieving this understanding and determining the structure of the phase-change materials are the main goals of this project.

- Mesoscopic Protein...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## AFFILIATION

University of Houston

## EDUCATION

- Ph.D., in Physical Chemistry, 2002 , University of Illinois Urbana-Champaign
- M.S., in Chemistry, 1995 , Carnegie Mellon University
- M.S., in Physics and Materials Science, 1994 , Moscow Institute of Physics and Technology

## AWARDS

- Alfred P. Sloan Research Fellow, 2011-2013
- NSF CAREER Award, 2010
- Beckman Young Investigator Award, 2008
- Postdoctoral Fellowship, Massachusetts Institute of Technology, 2003-2005
- Hovorka Fellowship, University Fellowship, University of Illinois at Urbana-Champaign, 1996-1998

## RESEARCH AREAS

Technology, Materials Science / Physics

## FUNDING REQUEST

Your contributions will support the research of Dr. Lubchenko as he continues to advance theoretical methods to enable design of novel materials with unique and useful properties. Donations will fund the necessary $200-300K/year in direct costs and additional donations will contribute substantially to speeding up his efforts. Dr. Lubchenko expects to achieve immediate goals in the next 3-5 years with projects pursuing longer-term goals to follow.