

Boston University Physics Colloquium



Liquid Water: New Results in Bulk, Nanoconfined, and Biological Environments

This talk will introduce some of the 63 anomalies of the most complex of liquids, water. We will demonstrate some recent progress in understanding these anomalies by combining information provided by recent experiments and simulations on water in bulk, nanoconfined, and biological environments. We will interpret evidence from recent experiments designed to test the hypothesis that liquid water may display “polymorphism” in that it can exist in two different phases -- and discuss recent work on water’s transport anomalies¹ as well as the unusual behavior of water in biological environments². Finally, we will discuss how the general concept of liquid polymorphism³ is proving useful in understanding anomalies in other liquids, such as silicon, silica, and carbon, as well as metallic glasses, which have in common that they are characterized by two characteristic length scales in their interactions.

¹ P. Kumar, S. V. Buldyrev, S. L. Becker, P. H. Poole, F. W. Starr, and H. E. Stanley, “Relation between the Widom line and the Breakdown of the Stokes-Einstein Relation in Supercooled Water,” *Proc. Natl. Acad. Sci. USA* 104, 9575-9579 (2007).

² P. Kumar, Z. Yan, L. Xu, M. G. Mazza, S. V. Buldyrev, S.-H. Chen, S. Sastry, and H. E. Stanley, “Glass Transition in Biomolecules and the Liquid-Liquid Critical Point of Water,” *Phys. Rev. Lett.* 97, 177802 (2006).

³ H. E. Stanley, ed., *LIQUID POLYMORPHISM* [Advances in Chemical Physics], series edited by S. A. Rice (Wiley, New York, 2008).

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October 7, 2008 (Tuesday) at 3:30pm (Refreshments at 3:15pm)

SCI 107, Metcalf Science Center, Boston University

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