Institute Lecture

Supercooled Liquids, Glasses and their Ultimate Fates

Prof. Peter G. Wolynes
Rice University, Houston, Texas

Monday, February 17, 2014, Time: 6:30 PM
Venue: Outreach Auditorium

Abstract
The random first order transition theory of supercooled liquids, the glass transition and the glassy state itself will be discussed in the lecture emphasizing the theory's prediction that can be compared to experiment. The theory also gives some new ideas on how crystallization ultimately occurs in simple glassy systems and how glasses break.

About the speaker

Prof. Wolynes was born in Chicago, Illinois, in 1953. He joined the faculty of Harvard University in 1976 and, in 1980, he moved to the University of Illinois at Urbana-Champaign. He continued there till 2000 as a Professor of Chemistry, Physics and Biophysics and also held the James R Eiszner Chair in Chemistry. In 2000, he moved to the University of California, San Diego, as a Professor of Chemistry, Biochemistry and Physics and also the Francis H Crick Chair in the Physical Sciences. In 2011, he took up the position of D.R. Bullard-Welch Foundation Professor in Science at Rice University and he has been continuing there since then.

Prof. Wolynes has made seminal contributions to theoretical molecular science in areas ranging from the dynamics of liquids and biomolecules to the quantum mechanics of small molecules. His most well known work has been his pioneering energy landscape approach to protein folding. He has shown how the energy landscape approach can be turned into a quantitative algorithm for predicting protein structure from sequence. His idea that proteins have been selected by evolution to have “minimally frustrated” interactions and thus to have a funnel-like energy landscapes has been the key to most recent work on the folding problem and may be a crucial idea in molecular recognition more generally. Prof. Wolynes’s work on the glass transition describing it as coming from a new class of phase transition, the so-called “random first order transition” provides the first predictive framework for understanding the unusual properties of supercooled liquids and glasses. His picture suggested a variety of new experiments that have lead to the discovery of the dynamic mosaic structure of liquids. Prof. Wolynes also has brought new insights to the old problem of how vibrational energy flows in molecules by introducing “local random matrix” models for intramolecular vibrations.

Prof. Wolynes is a member of the National Academy of Sciences, and the American Philosophical Society, a Fellow of the American Academy of Arts and Sciences and American Association for the Advancement of Science. He is a foreign member of the Royal Society London and German National Academy of Sciences. He received the Peter Debye Award in Physical Chemistry of the American Chemical Society in 2000 and the ACS award in Theoretical Chemistry in 2012.

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Tea at 6.15 PM **All interested are welcome.**

Amalendu Chandra
Dean of Research and Development