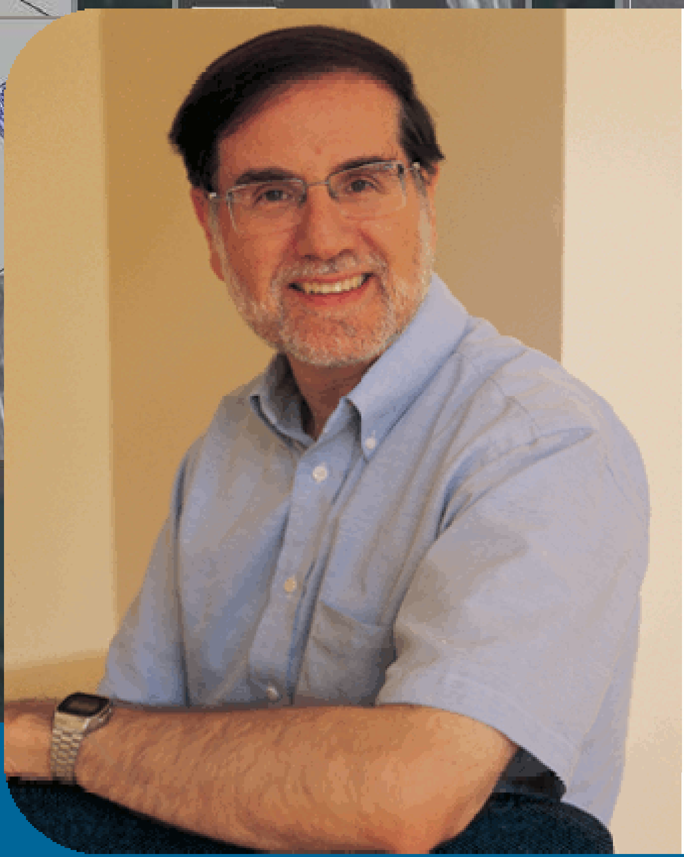
IMS Public Lecture



Order and Rigidity Sensing by Biological Cells

Speaker: Professor Samuel Safran
Weizmann Institute of Science, Israel

Date: Monday, November 14, 2011

Time: 6:30pm - 7:30pm

Venue: LT33, Faculty of Science
National University of Singapore
Block S17, Level 2
10 Lower Kent Ridge Road
Singapore 119076

About the Speaker

Professor Samuel Safran has been a professor in the Department of Materials and Interfaces of the Weizmann Institute since 1990. He also served as Vice President of the Weizmann Institute and Dean of its Graduate School. From 1980-1990 he was at the Exxon Corporate Research Labs where he worked on the theory of soft matter with a focus on the structure and phase behavior of oil-water-surfactant dispersions. His recent research interests have extended soft matter concepts to treat biological membranes and cells. Professor Safran is the author of a graduate text on Statistical Thermodynamics of Surfaces, Interfaces and Membranes and a recipient of the de Gennes and Beller Lectureship Awards of European and American Physical Societies as well as the Lectureship Award of the Japanese Chemical Society.

Abstract

Understanding the fundamental response of biological cells to mechanical stress is an important theoretical challenge that can impact both in-vivo and synthetic biology. Recent research at the interface of physical/ materials science and cell biology has shown that the regulation of cellular processes such as proliferation, differentiation and tissue development, is controlled by the elastic rigidity of cells and their environment. This talk reviews current experiments on cellular sensing of substrate rigidity and stress and how this relates to orientational (nematic) and layer (smectic) ordering that occur in the cellular cytoskeleton of nascent tissues derived from stem cells. We then present simple, theoretical models that integrate the active, elastic forces exerted by cells with liquid-crystal analogies to understand the observed ordering with a focus on the long-range nature of the cytoskeletal interactions that characterize living matter. Finally, we speculate on how environmentally responsive, physical forces in the cellular cytoskeleton can affect the long-term fate of stem cells.

Free Admission

Organized by
Institute for Mathematical Sciences
National University of Singapore

For more information, please visit www.ims.nus.edu.sg

NUS National University of Singapore | IMS Institute for Mathematical Sciences