

## Joint Physics and Physical Oceanography Seminar and Biophysics Society Seminar

Time and Place: Thursday July 5, 12 noon in C-3024.

Speaker: Prof. Gautam Menon  
The Institute of Mathematical Sciences,  
Chennai, INDIA

Title: The large-scale architecture of the cell nucleus

**Abstract:** Model approaches to nuclear architecture have traditionally ignored the consequences of ATP-fueled active processes acting on chromatin. However, such activity is a source of stochastic forces that are substantially larger than the Brownian forces present at physiological temperatures. I will describe a first-principles approach to large-scale nuclear architecture in metazoans that incorporates such activity. The model predicts the statistics of positional distributions, shapes and overlaps of each chromosome. Our simulations reproduce common organising principles underlying large-scale nuclear architecture across human cell nuclei in interphase. These include the differential positioning of euchromatin and heterochromatin, the territorial organisation of chromosomes including both gene-density-based and size-based chromosome radial positioning schemes, the non-random locations of chromosome territories and the shape statistics of individual chromosomes. I will argue that the biophysical consequences of the distribution of transcriptional activity across chromosomes should be central to any chromosome positioning code.

