When: **Friday 11:30 – 13:00**
Where: **BLOC 149**

Speaker: **Prof. Hemant D. Tagare**

Professor
Department of Radiology
Department of Biomedical Engineering
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Title: **Covariance Tomography: Understanding Heterogeneous Protein Structures Using Cryogenic Electron Microscopy**

Date: **11-04-2016**

Abstract: Modern cryogenic electron microscopy offers near-atomic reconstructions of 3d protein structure. In 2015, the journal Nature declared cryo-em as the method of the year. Because cryo-em does not require crystallization, it is possible to image heterogeneous proteins (proteins whose structure is not rigid) with cryo-em. This talk will address mathematical and algorithmic questions about reconstructing 3d principal components of heterogeneous proteins from noisy 2d tomographic images. I will discuss a basic theorem showing that 3d covariances can be recovered from 2d tomographic projections. This is covariance tomography. I will also discuss two algorithms based on this theorem, and present results from simulations and real cryo-em images. Finally, I will discuss some open questions raised by this problem.

Biography: Hemant D. Tagare is a Professor in the Department of Radiology and the Department of Biomedical Engineering at Yale University. His research addresses mathematical and algorithmic problems in biomedical image analysis. For the last eight years, he has worked on problems in cryo-em. He also works on the more classical problems of image registration and segmentation. Dr. Tagare obtained his Ph.D. in Electrical Engineering from Rice University in 1990, and enjoyed living in Texas for many years.