

## SEMINAR ANNOUNCEMENT

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**Title:** Testing Degenerate Tensors in Diffusion Tensor Images

**Abstract:** Diffusion tensor (DT) images are used to map accurately the structure and orientation of fiber tracts in the white matter of the human brain in vivo. The directional dependence of diffusion is characterized by a matrix of the effective diffusion of water, denoted by  $D$ . Tractography algorithms have been developed to connect consecutive directions of maximal diffusion in order to reconstruct white matter tracts in the human brain in vivo. However, the performance of these algorithms is strongly influenced by the amount of noise in the images and by the number and prevalence of degeneracy in the brain where maximal diffusion is poorly defined. We propose a simple procedure for searching for degeneracy that uses rigorous test statistics based on invariant measures of diffusion tensors, such as fractional anisotropy. Our procedure effectively identifies singularities while accounting for the effects of noise. Examining DT images in human subjects, we demonstrate that this new procedure readily classifies diffusion tensors at each voxel into standard types (nondegenerate, oblate, prolate, and isotropic) without resorting to tensor characteristics at neighboring voxels. We also study the effects of singularities on the reconstructing fiber tracts in specific anatomical regions.

**Speaker:** Professor Hongtu Zhu  
MRI unit, Department of Psychiatry  
Columbia College of Physicians and Surgeons  
and The New York State Psychiatric Institute

**Date:** Friday, October 14, 2005

**Time:** 11:00 am - 12:00 pm

**Location:** Rome Hall (801 22nd Street NW), Room 351

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**Directions:** Foggy Bottom-GWU Metro Stop on the Orange and Blue Lines. The campus map is at <http://www.gwu.edu/~map>.

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