

## COLLOQUIUM

### *Computational Radiology: Rank-Sparsity Model and Photon Transport*

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**Abstract:** Computational radiology is a new interdisciplinary synergy between computational sciences and radiology. This talk will introduce two such examples: rank-sparsity model and photon transport.

The former applies to dynamic or multi-spectral problems for compressive image reconstruction (e.g., cine MRI, 4D CT, multi-energy CT, and multimodal reconstruction) or robust image analysis (e.g., classification, change detection, feature recognition, and multimodal registration), which is often treated as a model-based inverse problem solved through optimization and numerical linear algebra techniques.

The latter is the forward model of light propagation in scattering media (e.g., optical imaging, photoacoustic imaging, fluorescence imaging, and bioluminescence imaging), an integro-differential equation with 3 spatial dimensions and 2 angular dimensions. To meet the practical need, the rapid solutions of such large-scale problems propose the new challenges for numerical PDE and parallel computing.

Thursday, February 23, 2012, 4:00 pm  
Mathematics and Science Center: W201

MATHEMATICS AND COMPUTER SCIENCE  
EMORY UNIVERSITY