# Sampling and Reconstruction in Fluorescence Diffuse Optical Tomgraphy

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In fluorescence diffuse optical tomography, light at an excitation wavelength in the visible of near infrared part of the optical spectrum, is used to illuminate a target and cause the emission of light at a longer wavelength by interaction with endogeneous of exogeneous flurophores. Several aspect of the fluorophore, such as concentration or lifetime cane be reconstructed using methods for ill-posed inverse problems.

One current topic in this methodology is the acquisition of data using camera detectors. The data can be obtained in a rotating scanning geometry and can include time resolved data, leading to large 4 or 5 dimensional data sets of size up to $10^8 - 10^{10}$. Due to the inherent low resolution of the method (stemming from its severe ill-posedness) much of this data is redundant. In this talk I will consider some methods for compressing the information content in these data sets and the commensurate improvement in image reconstruction performance.

A second topic of interest is the combination of optical imaging with another method such as X-Ray CT or MRI. For such multimodality image reconstruction, methods need to be developed for the reconstruction of the optical image, with appropriate constraints arising from the associated imaging system. In this talk I will discuss methods based on Bayesian posterior estimation, using both anatomical and statistical priors.