OPTICS & PHOTONICS
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Optics and Photonics Group Lunchtime Seminar

"Image reconstruction for novel diffuse optical and hybrid imaging modalities using stochastic forward models"

Samuel Powell

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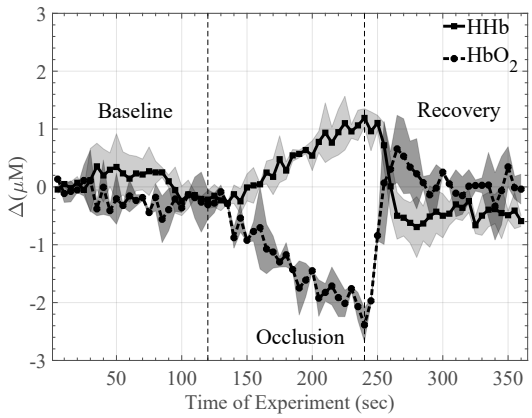

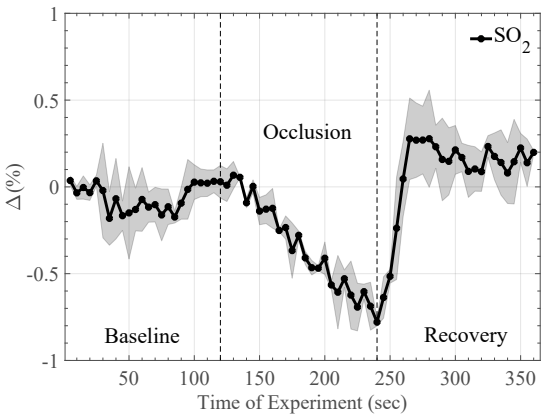

1:00pm Monday 8th July 2019
B14 ESLC building
All Welcome

Abstract

http://optics.nottingham.ac.uk/wiki/Talks_2019

“Image reconstruction for novel diffuse optical and hybrid imaging modalities using stochastic forward models”

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The use of diffuse optics to probe the composition and dynamics of biological tissues has been a topic of activate research for many years, due in large part to the clinical relevance of the contrast provided by near-infrared light. Despite this promise, the lack of spatial resolution which arises from the highly scattering nature of tissues has limited clinical translation. To address this problem, a number of alternative measurement techniques such as high-density, time-domain, and interferometric methods have been investigated, alongside research into newer hybrid methods such as acousto-optic tomography, and photo-acoustic tomography.

Each of these methods introduces new challenges for the image reconstruction techniques required to interpret the measured data. In particular, the use of the diffusion approximation to the radiative transport equation (RTE) is often inappropriate. Direct use of the RTE as part of traditional approaches to the inverse problem is challenging however, since solutions are usually only available using noisy, stochastic Monte-Carlo methods.

In this presentation I will introduce recent experimental work we have undertaken in these modalities, and discuss the difficulties that each of these present for traditional image reconstruction methods. I will then introduce new methods we are exploring to enable the use of stochastic forward models, whilst maintaining a computationally feasible inverse problem.