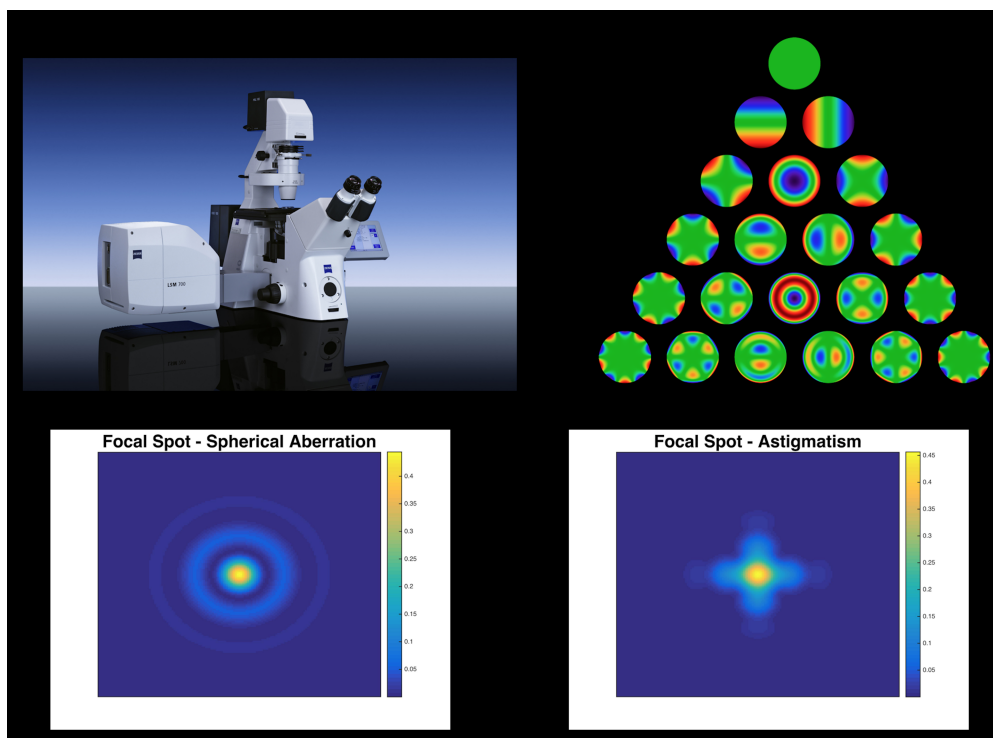


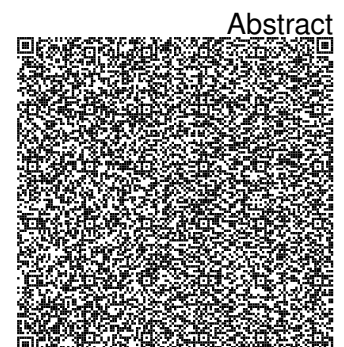
Optics and Photonics Group
Lunchtime Seminar
**“Aberration retrieval and
correction in confocal
microscopy”**

Pieter Smid



12:00pm Thursday 14th June 2018
203 Tower Building
All Welcome

http://optics.nottingham.ac.uk/wiki/Talks_2018



“Aberration retrieval and correction in confocal microscopy”

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Modal wavefront sensing is a technique to measure and correct for optical aberrations and mitigating their detrimental effects in, among others, confocal microscopes. In modal aberration correction, orthogonal Zernike modes are applied to the illuminating light beam in the microscope. Each Zernike mode is corrected for in turn by measuring the change in intensity with a pinhole detector. The design and sensitivity of a confocal microscope with incorporated adaptive optics, which is used for modal aberration correction, will be presented. Variable pinhole size detection using an EMCCD, alignment issues, and differences between reflection and fluorescent confocal microscopy will be discussed. In the presence of large aberrations, modal wavefront sensing becomes challenging because of increased aberration cross talk which can lead to local sub-maxima. The method proposed here uses a pre-correction determined from ray tracing simulations of the sample. A pre-correction, which is close to what one might expect as typical aberrations of the sample, simplifies the modal correction process. It speeds up the modal correction process, reduces the number of interactions and mitigates problems associated with cross-talk. In reflection, odd aberrations (e.g. coma) cannot be detected by modal wavefront sensing in a confocal microscope. An experiment with a specific object for detecting coma will be presented at the end.