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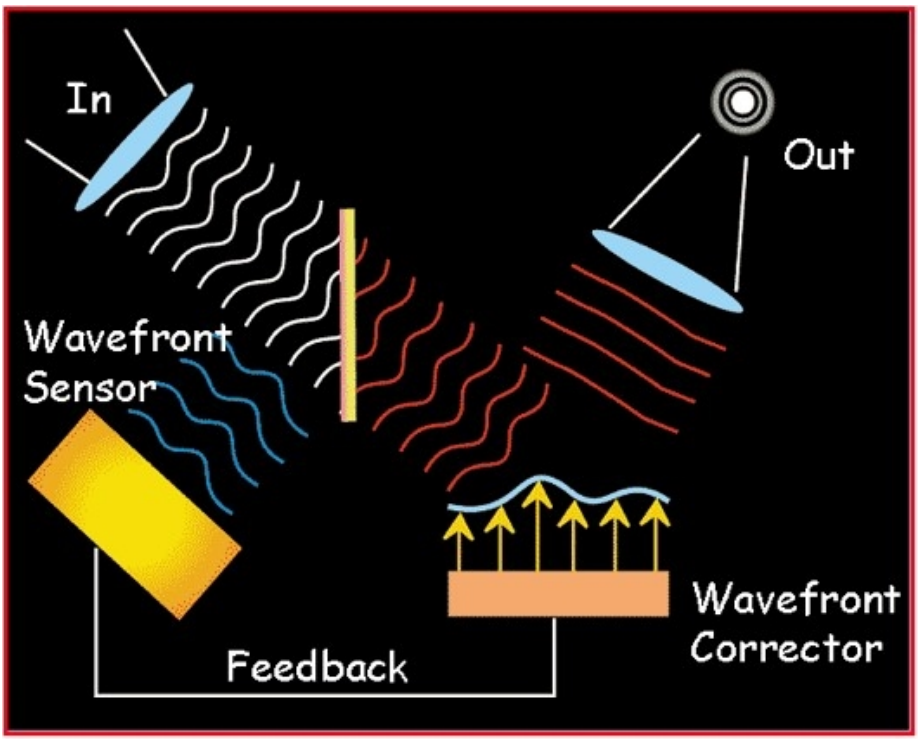
Optics and Photonics Group
Lunchtime Seminar

"Aberration correction in confocal microscopy using adaptive optics"

Pieter Smid



12:00pm Thursday 30th March 2017
203 Tower Building
All Welcome

Abstract

http://optics.nottingham.ac.uk/wiki/Talks_2017

"Aberration correction in confocal microscopy using adaptive optics"

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In optical microscopy, imaging through thick and complex samples gives rise to optical aberrations which reduce image quality at depth. Confocal detection mitigates out-of-focus light and reduces bulk scatter, and Adaptive Optics (AO) can correct for aberrations. The challenge with AO is that it requires the wavefront aberrations present to be known.

In microscopy direct wavefront sensing is often not possible because of the lack of naturally fluorescent reference points. Sensor-less methods which optimise a parameter, e.g. maximum intensity, are often used to improve image quality and resolution. These methods can be time consuming resulting in sample photobleaching and photodamage. We investigated whether ray tracing simulations can be used to estimate sample induced aberrations prior to imaging and if they can provide accurate wavefront corrections for 3D confocal imaging. We studied root samples of the Arabidopsis Thaliana plant (a sample that has proven useful for studying plant development at the molecular level because of its fully sequenced genome and its simple cultivation in the lab).