OPTICS & PHOTONICS
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Optics and Photonics Group Lunchtime Seminar

"Adapting the next generation of super-resolution microscopy tools for biomedical imaging at the true molecular scale"

Izzy Jayasinghe

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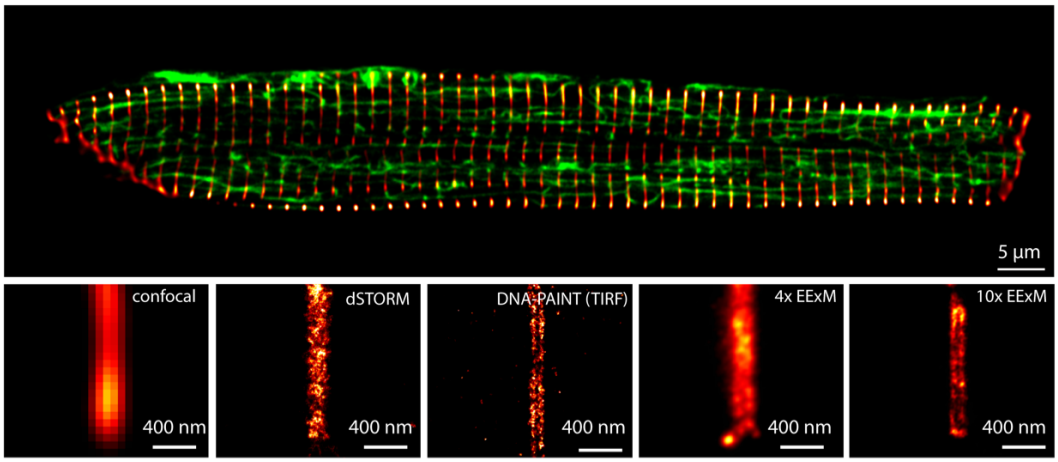

1:00pm Tuesday 11th June 2019
203 Tower building
All Welcome

Abstract

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

"Adapting the next generation of super-resolution microscopy tools for biomedical imaging at the true molecular scale"

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Intimate clustering of signalling proteins, in spaces known as nanodomains, is a common strategy in nature for amplifying and speeding up intracellular communication. Over the last decade, super-resolution fluorescence microscopy techniques known by the acronyms STED, SIM, PALM and STORM have furthered out understanding of the general structure of nanodomains. However, with resolution limited to $\sim$40 nm in-plane and $\sim$100 nm axially, these methods have limited our ability to visualise individual molecules within nanodomains. Classical localisation microscopy techniques have also suffered from the long image acquisition times (typically > 20 mins per image), limiting their utility as time-efficient research methods.

In this seminar, I outline our recent work which have adapted DNA-PAINT and expansion microscopy to visualise nanodomains of the heart at a resolution of 10-15 nm. I will outline how the new target counting protocols enabled by these techniques have allowed us to characterise heterogeneities in protein organisation in nanodomains in both health and disease. Finally, I will introduce 'sandSTORM', the newest localisation microscopy protocol which we have developed, in collaboration with the University of Nottingham, to attain a 3- to 5-fold speed advantage in image acquisition over existing methods such as dSTORM.