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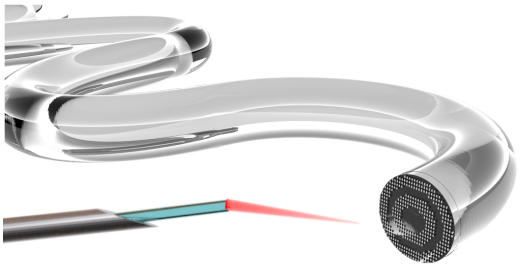
OPTICS & PHOTONICS
UNIVERSITY OF NOTTINGHAM

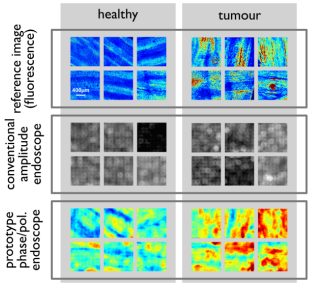
Optics and Photonics Group
Lunchtime Seminar

"Imaging through optical fibres for hair-thin endo-microscopes"

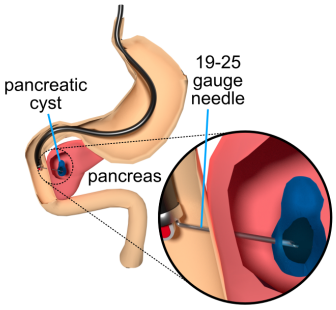
George Gordon



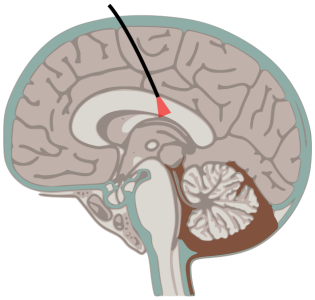
Technology: *Hair-thin optical endoscope with metasurface tip*



Results: *Imaging early tumours using phase information*



Application*: cancer detection in hard-to-reach places*



Future*: deep-brain optical imaging*

1330 Wednesday 23/02/2022
C24 Coates building
All Welcome

Add to Calendar

http://optics.nottingham.ac.uk/wiki/Talks_2022

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MS Teams link

Optical endoscopes are widely used in medicine to identify early-stage cancers in accessible parts of the body, such as the gastrointestinal tract, enabling early treatment and better patient outcomes. However, the next generation of endoscopes must overcome two key challenges to have a truly transformative impact. The first is size: hair-thin endoscopes would vastly expand the range of the body that can be examined in detail with minimal invasiveness, e.g. inside organs such as the pancreas via a needle, or inside tiny blood capillaries. The second is contrast: when imaging large regions it is difficult to identify subtle tissue changes indicative of early cancer. To overcome this, we have been developing a new type of endoscope that produces images through optical fibres: flexible hair-thin pieces of glass. This is achieved by full holographic control of light in the fibres, which in turn allows advanced microscopy modalities to be implemented at the fibre tip offering improved imaging contrast. In this talk I will introduce the fundamentals of our fibre imaging technique and show how it can achieve quantitative phase and polarimetric imaging of tissue. I will then show how using nano-structured optical metasurfaces and computational optics techniques will enable future clinical translation of this technology.