

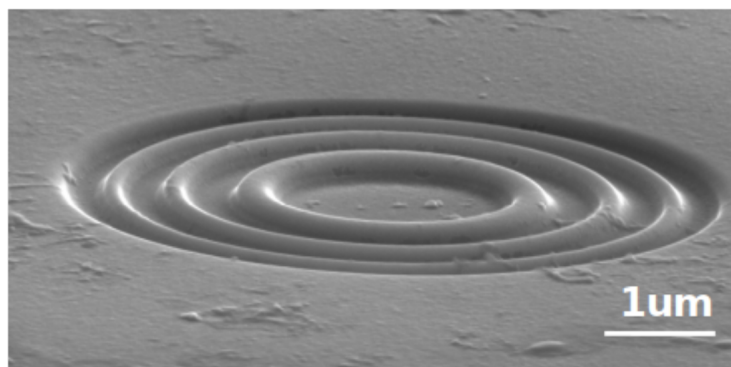
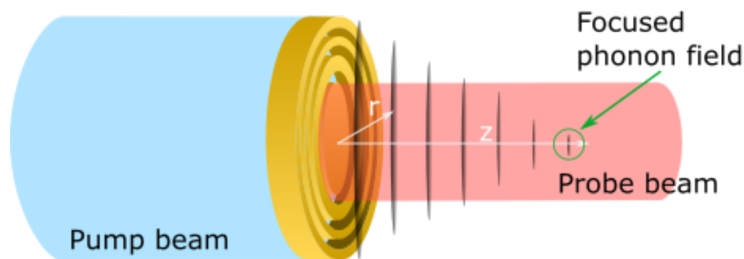


# Optics and Photonics Group Lunchtime Seminar

## “Development of GHz Optoacoustic Lenses for Lateral Super Resolution Imaging”

Mengting Yao

*Optics and Photonics Group*



13:30 Wednesday 22 February 2023  
C24 - Coates building  
All Welcome

[http://optics.eee.nottingham.ac.uk/wiki/Seminars\\_2022-2023](http://optics.eee.nottingham.ac.uk/wiki/Seminars_2022-2023)

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MS Teams link

The utilisation of Phonon microscopy has allowed for the imaging of elasticity in living biological cells in 3D by utilising coherent phonon fields to measure the Brillouin frequency (i.e. time-resolved Brillouin scattering). By producing phonons within the GHz frequency range, this technique provides an opportunity for obtaining images with sub-optical axial resolution ( $\lambda_{acoustic} \sim 280\text{nm}$ ). However, the lateral resolution is still limited by the optical system used to generate coherent phonon fields.

To overcome the limitations of lateral resolution and obtain true acoustic resolution in both axial and lateral dimensions, we suggest using novel optoacoustic lenses with GHz frequencies to focus coherent phonon fields. For example, the flat lens Fresnel zone plate and the common acoustic focusing transducer design of concave lenses can be utilised for this purpose. These lenses can be fabricated at the nanoscale and can also be compatible with ultrasonic endoscopic imaging systems by attaching them to the tip of hair-thin optical fibres.

In this talk, I will explain multiple designs of these GHz optoacoustic lenses and demonstrate their capabilities for focusing coherent phonon fields, and also talk about future experiment plans to obtain sub-optical resolution images.