Winter
2025

Optics & Photonics Group Lunchtime Seminar Series

University of Nottingham

High-throughput automated characterization for nano-opto-electronics

Dr . Patrick Parkinson
University of Manchester

12:00 Wed 12 Feb 2025

Pope – C14

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Patrick Parkinson

High-throughput automated characterization for nano-opto-electronics

Optoelectronic components—LEDs, lasers, solar cells, and sensors—have driven much recent technological progress, while the miniaturization of electronics has fuelled the computing revolution. At their intersection, miniaturized optoelectronics offer great potential for applications ranging from photonic-integrated circuits to quantum sensing. However, as components approach wavelength scale, producing scalable, high-yield optoelectronics becomes increasingly challenging. In particular, nanolasers are difficult to develop and characterize due to the strong dependence of performance on both material quality and device geometry. This challenge results in poorly controlled, highly inhomogeneous, and low-yield devices, hindering easy study and optimization.

I will present a high-throughput, automated, multi-modal spectroscopy and imaging platform designed to robustly study tens of thousands of nano-lasers and other emerging nanomaterials. In a recent study, we applied this approach to 9 different material architectures for lasers, including GaN, ZnO, GaAs, and InP [Church et al., Laser and Photonics Review 2024]. By examining over 50,000 devices, our method not only provides insights into best-in-class performance and the dependence of performance on design parameters but also reveals interclass "global" properties linking materials, cavities, and lasing.

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All are welcome

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