

IPaQS Symposium 2025

Postgraduate Building Room PG201

Day 1

Time	Event	Name	Title
09:55 – 10:00	Introduction by the Head of IPaQS	Prof Erik Gauger	Introduction
10:00 – 10:45	Invited Talk 1	Prof John Travers	Flashes to the blue: a quest for short pulses and short wavelengths with gas, glass, and light
10.45 – 11.30	Talks by PhDs and Post Docs	Dr Hanna Ostapenko	Diode-Pumped GHz Ti:Sapphire and Yb: Ceramic Lasers for Space and Astronomy Applications
		Tara Van Abeelen	Ultra-short pulsed laser welded-and-cut glass support pillars for vacuum insulating glass
		Dave Muir	Analysis of the electric field and photocurrent densities in Ge-on-Si Single Photon Avalanche Diodes
11.30 – 11.50	Coffee Break		
11.50 – 12.35	Talks by PhDs and Post Docs	Dr András Kufcsák	Clinical translation of an early-photon imaging system for safe placement of feeding tubes
		Jake Sanwell	Highly Compact Stable-Unstable Tm:LLF Thin-Slab Resonator
		Kiki Dekkers	Imaging High-Dimensional Bell Violations via Two-Photon Multi-Slit Interference
12.35 – 14.05	Lunch Break		
14.05 – 14.50	Invited Talk 2	Prof Margherita Mazzera	On the quest for a broadband quantum memory for telecom photons
14.50 – 15.20	Talks by PhDs and Post Docs	Dr Zhe Li	Probing Moiré Interfaces in 2D Materials Using Nonlinear Optical Spectroscopy
		Finley Giles-Brook	Towards a high efficiency integrated gradient echo memory
15.20 – 15.40	Coffee Break		
15.40 – 16.40	Panel Session	Dr Calum Ross Dr Christiaan Bekker Prof Mehul Malik	Building a Career in Academia
16.40 – 17.30	Poster Session PG Building Ground Floor Cafe		

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Day 2

Time	Event	Name	Title
09:55 – 10:00	Introduction by Director of PGR	Prof Jonathan Leach	Introduction
10:00 – 10:45	Invited Talk 3	Dr Lisa Saalbach	Single photon detectors and motivation for your PhD experience
10.45 – 11.30	Talks by PhDs and Post Docs	James Peat	Mixing Classical and Quantum Oblivious Transfer Protocols
		Priyankar Banerjee	Measurable signatures of coherence in bio-inspired dimers
		Dylan Danese	Programming High-dimensional time-bin measurements inside a multi-mode fiber
11.30 – 11.50	Coffee Break		
11.50 – 12.35	Talks by PhDs and Post Docs	Dr Lucas Groult	
		Frederik Brooke Barnes	Decoy state quantum key distribution with a bright telecom wavelength quantum dot single-photon source
		Thibaud Van Gorp	Ultrafast Laser Assisted Etching of a Prototype Image Slicer
12.35 – 14.05	Lunch Break		
14.05 – 14.50	Invited Talk 4	Dr Ross Donaldson	From curiosity to challenge-driven research
14.50 – 15.20	Talks by PhDs and Post Docs	Julian Wiercinski	Cooperative emission from self-assembled quantum dots
		Sheena Shaji	Cooperative photon emission between multiple indistinguishable quantum dots
15.20 – 15.40	Coffee Break		
15.40 – 16.40	Panel Session	Prof Gerald Buller Dr Chris Brahms Prof Brian Gerardot Prof Duncan Hand	Emerging Technology in Optics and Quantum Science
16.40 – 17.30	Poster Session PG Building Ground Floor Cafe		

Abstracts – Invited Speakers:

Prof John Travers:

Flashes to the blue: a quest for short pulses and short wavelengths with gas, glass, and light

In this talk, I will give an overview of my research career (so far, I'm not retiring yet!). I will combine scientific steps (and missteps) along with insights into how I navigated my academic progression—mostly by getting very lucky. I will talk about supercontinuum generation, mode-locked lasers, hollow-core fibres, optical attosecond pulses, deep and vacuum ultraviolet light generation, and the crazy things we have planned. I will also ask if any of it is of any use.

Prof Margherita Mazzera:

On the quest for a broadband quantum memory for telecom photons

The coherent interaction between photons and atoms lays the bases of quantum information science. It is crucial, for example, for the realisation of quantum memories for quantum communication and computing. The first proof of principle demonstrations were carried out in ensembles of atomic gases, but solid-state systems have emerged as a promising alternative, unleashing prospects for integration and multiplexing. In this contribution, I will present strategies to develop quantum memories using rare earth doped crystals and I will report on a novel approach to answer the longstanding quest of a broadband quantum memory for telecom single photons.

Dr Ross Donaldson:

From curiosity to challenge-driven research

This presentation explores the shift from purely curiosity-driven to majority challenge-driven research, emphasizing its significance in establishing a unique selling point for my independent research career in a "crowded field". By addressing real-world problems, challenge-driven research fosters innovation and practical solutions. This approach not only enhances research impact but also aligns with funding priorities and stakeholder interests. I'll provide an overview of the broad research being conducted by my team and the vision for the future.

Dr Lisa Saalbach:

This presentation will be split into two sections, the first will be technical, providing a brief overview of our work on single photon avalanche diode (SPAD) detectors. Germanium on silicon-based SPADs provide highly sensitive light detection in the short-wave infrared (SWIR) region of the spectrum. This is valuable for a multitude of applications including light detection and ranging (LiDAR) through obscurants, with reduced solar background and increased eye-safety, as well as quantum communication applications. I will provide an

overview of the design and performance of the first-generation pseudo-planar geometry Ge-on-Si SPADs [1, 2] exhibiting high detection efficiencies and low jitter. I will also summarise our recent work on Ge-on-Si avalanche photodiode (APD) detectors based on similar device designs [3].

Part II of this talk will look at common challenges experienced by PhD candidates and explore strategies for overcoming these. A PhD tends to be a wholly different experience from undergraduate university studies and candidates are often faced with new challenges and ways of learning. There is typically more focus on independent, self-motivated working while goals tend to be less tangible and additionally many may be faced with 'imposter syndrome' at some point in their studies. Based on my own experience, I will try to provide some useful pointers and motivation for anyone currently doing their PhD.

References

1. L. Ferre Llin, J. Kirdoda, F. Thorburn, L. L. Huddleston, Z. M. Greener, K. Kuzmenko, P. Vines, D. C. S. Dumas, R. W. Millar, G. S. Buller, and D. J. Paul, "High sensitivity Ge-on-Si single-photon avalanche diode detectors," *Optics Letters* 45, 6406-6409 (2020).
2. P. Vines, K. Kuzmenko, J. Kirdoda, D. C. S. Dumas, M. M. Mirza, R. W. Millar, D. J. Paul, and G. S. Buller, "High performance planar germanium-on-silicon single-photon avalanche diode detectors," *Nature Communications* 10, 1086 (2019).
3. F. Fleming, X. Yi, M. M. A. Mirza, X. Jin, J. Kirdoda, D. C. S. Dumas, L. Saalbach, M. Modak, D. A. S. Muir, C. Smith, C. Coughlan, Q. Tian, R. W. Millar, J. P. R. David, D. J. Paul, and G. S. Buller, "Surface-normal illuminated pseudo-planar Ge-on-Si avalanche photodiodes with high gain and low noise," *Optics Express* 32, 19449-19457 (2024).