

# Kieran R Ross

## Technical CV

### EDUCATION

2013-2018 Heriot-Watt University, Kieran graduated with a Master of Physics (MPhys) First Class

2016-2018 Advanced Courses: Condensed Matter Physics, Electromagnetism and Laser Physics, Nanophotonics, Nanophysics, Numerical Modelling & Data Analysis, Quantum Mechanics & Statistics, Quantum Theory & Solid State, Semiconductor Optoelectronics, Statistical, Nuclear & Particle Physics, Soft Matter and Biophysics.

2007-2013 Charleston Academy Inverness: A Scottish Baccalaureate in Science including Advanced Higher Physics and Technological Studies, Higher Maths, Physics, Technological Studies, Art & Design and English.

### RESEARCH

#### **Master's Thesis 2018:** 'Imaging Quantum Super-Resolution Interference'

Optical alignment skills were developed in highly sensitive quantum optics experiments. Alignment of both free-space and optical fibre beams was required.

Investigation of NOON state interference was performed using down-conversion of UV radiation. Quantum entangled photon states were verified by counting singles photons. A novel method was employed using EMCCD detection schemes. Strong programming skills and MATLAB were required to generate a numerical simulation of the experimental problem.

#### **Carnegie Trust Research Project Summer 2017:** 'Single-Photon Imaging through a Diffusive Medium'

Received scholarship from Carnegie Trust to research into non-invasive laser imaging in human tissue. The group researching these phenomena was the 'Extreme Light' research group within the Institute of Photonics and Quantum Sciences at Heriot-Watt University. Within this group I was involved in complex numerical analysis on noisy photon data, the photons having had travelled through mock tissue slabs. We were successful in developing a methodology that will later be used to image non-invasively inside the human body. This would result in becoming a low cost, safe alternative to highly expensive MRI.

#### **STMicronics Project 2017:** '\$1 Quantum Optics'

We investigated the potential for \$1 quantum optics by using commercial infrared ranging sensors in the classic Quantum optics experiment by Hanbury Brown and Twiss. This was only partially successful in developing a low cost imaging solution to quantum optics experiments. I was fortunate enough to work closely with industrial pioneers STMicronics, and was thus able to acquire a wide selection of commercial sensors and technical guidance from experts within the company.

### PRESENTATIONS

- Kieran Ross "BRL: Laser damage for optical coaters", Proc. SPIE SD20EX, SPIE ESD20 Exhibition Product Demonstrations, SD20EX02 (18 September 2020); <https://doi.org/10.1117/12.2582546>

### MAGAZINE PUBLICATIONS

- Dr R E Belford and K R Ross, "[Testing Matters](#)", including Whitepaper "[High Power Laser Damage - Threshold Elevation](#)", Electro Optics Magazine, March 2021.
- Dr R E Belford, K R Ross and Dr M Duff, "[High power laser damage & annealing - Justification for ISO Standard Recommendations](#)", Whitepaper, Electro Optics Magazine, June 2020
- Dr R E Belford, K R Ross and Dr M Duff, "[High Power Pulsed and CW Laser Damage, Understanding the Differences in Pulsed and CW Damage](#)", Whitepaper, Electro Optics Magazine, May 2020

### WHITEPAPERS

- 2021 February: "[High Power Laser Damage – Threshold Elevation](#)", Dr R E Belford, K R Ross
- 2020 June: "[High Power Laser Damage & Annealing](#)", Dr R E Belford, K R Ross
- 2020 March: "[High Power Pulsed and CW Laser Damage](#)", Dr R E Belford, K R Ross and Dr M Duff

### TECHNICAL SKILLS

#### Power Lasers and Optical Delivery Skills:

- High-powered laser radiation intra-cavity and extra-cavity alignment and delivery.
- University Carnegie Trust single-photon experimental experience.
- Developed a range of optical bed setups to facilitate high-power Laser Damage for both pulsed and CW systems.

- Skilled in aligning coherent radiation into optical fibre delivery systems.
- Experienced in both Quantum and Classical optical systems.

### Computer Languages and Technical Software:

- MATLAB: Advanced level MATLAB use for several applications including; laser beam diagnostics including caustic analysis, primal-dual inverse algorithm application and NOON state interference probability density function modelling.
- Tex: Technical report writing
- LabVIEW: Platform fabrication with single-photon counting modules
- SQL: Database formation
- C++: Junior level for personal computing applications
- Microsoft Office: Advanced level for all apps

### EMPLOYMENT HISTORY

- May 2019-Present, BRL Labs, Edinburgh: Instrumental in constructing new high power CW laser damage bed and enabling beam and full caustic diagnostics. Part of a team operating and building different laser formats specifically for use in laser damage. Also gaining experience in using laser-line sensors and investigating their operational mechanisms in order to maximum efficacy. Since joining the company we have launched a number of new products including CW laser damage testing.
- July 2018– May 2019, Sykes Enterprises Inc, eCommerce Agent: was responsible for sales in excess of £300k.
- Summer 2016, Hitrak Ltd, Inverness: As part of a team, used rotary laser levels and MATLAB to survey agricultural land for drainage. We also laid 300 meters of fibre-optic communications line for a £3.2m hydroelectric scheme.