Photonics Theme

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Photonics

Photonics is a key theme in SUPA, with ~100 core photonics academics working in Scottish physics departments:

- Dundee > 5
- UWS ~ 10
- Glasgow > 10
- Heriot Watt > 30
- St Andrews > 17
- Strathclyde > 30

A further ~ 100 post-doctoral researchers, 250 doctoral students.

Training networks

EPSRC Centres for Doctoral Training

Applied Photonics
(£4.5m, funded to Feb. 2023)
Heriot Watt University (lead), Universities of **Dundee**, **Glasgow**, **St Andrews**, and **Strathclyde**
23 industrial partners, including Fraunhofer CAP

Centre for Doctoral Training in Applied Photonics

Integrative Sensing and Measurement
(£4.9m, funded to Oct. 2021)
University of Glasgow (lead) and the **University of Edinburgh**
Industrial, research and international partners

ISM

Optical Medical Imaging
(£4.5m, funded to Oct. 2022)
University of Edinburgh (lead) and the **University of Strathclyde**

optima

Horizon 2020 Marie Skłodowska-Curie Innovative Training Network

Collective effects and optomechanics in ultra-cold matter (ColOpt)
University of Strathclyde (co-ordinator), **University of Glasgow** and 7 other academic partners
€3.9M, Jan 2017

Training networks

2019 funding successes for EPSRC Centres for Doctoral Training in Photonics

EPSRC Centre for Doctoral Training in Industry-Inspired Photonic Imaging, Sensing and Analysis (£5.1 m, starts Oct. 2019, ends March 2028)
Heriot Watt University (lead), Universities of **Dundee, Edinburgh, Glasgow**, **St Andrews**, and **Strathclyde**
17 industrial partners, including Fraunhofer CAP

EPSRC and SFI Centre for Doctoral Training in Photonic Integration and Advanced Data Storage (£4.2 m, starts Oct. 2019, ends March 2028)
Queen's University Belfast (lead) with **University of Glasgow**
Industrial, research and international partners

Research Output

With selected highlights

Research output

SUPA Photonics impact since the last IAC

> 100* papers in top-ranking multidisciplinary and field specific journals, including:

High impact interdisciplinary journals

- Nature: 1
- Nature Communications: 14
- Scientific Reports: 12
- Science: 1
- Science Advances: 1

High impact physics journals

- Physical Review Letters: 21
- Physical Review A: 33
- Applied Physics Letters: 16
- Nano Letters: 4

High impact field-specific journals

- Nature Photonics: 3
- Nature Physics: 2
- ACS Photonics: 9
- Optica: 11
- Laser & Photonics Reviews: 3
- Journal of Biophotonics: 4
- Biomedical Optics Express: 8
- Optics Express: 42
- Optics Letters: 13

*__Minimum__ numbers based on a literature search.

Research highlights

University of Glasgow

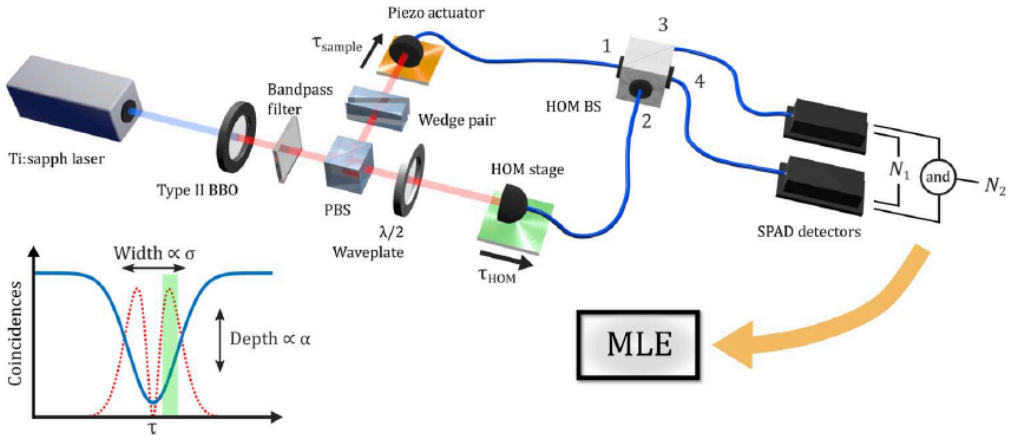
Strong activities in ***fundamental optics*** (e.g. Padgett, Barnett, Courtial, Franke-Arnold, Faccio) and ***optical instrumentation*** (e.g. Harvey & Taylor)

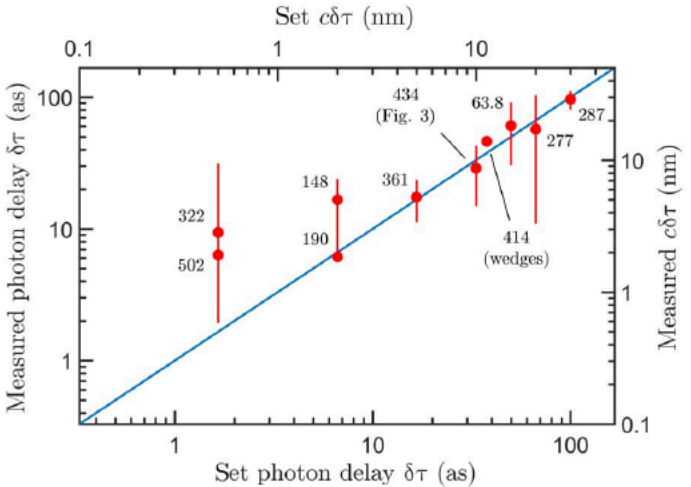
SCIENCE ADVANCES | RESEARCH ARTICLE

OPTICS

Attosecond-resolution Hong-Ou-Mandel interferometry

Ashley Lyons,[1,2] George C. Knee,[3] Eliot Bolduc,[1] Thomas Roger,[1] Jonathan Leach,[1] Erik M. Gauger,[1] Daniele Faccio[1,2]*





Research highlights

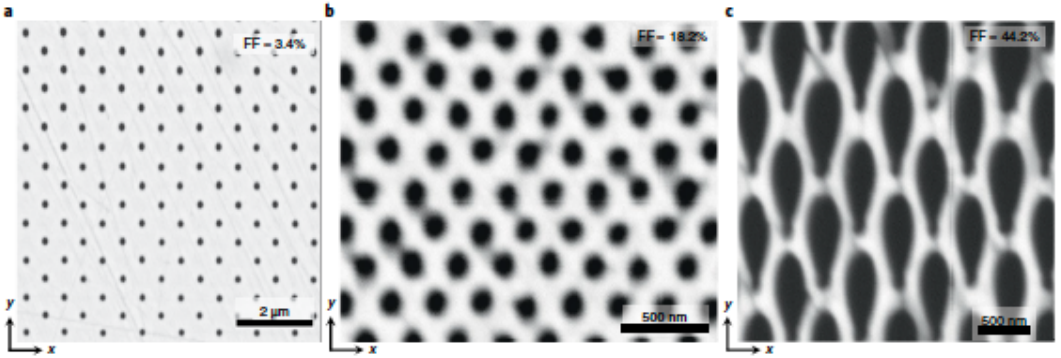
Heriot Watt University

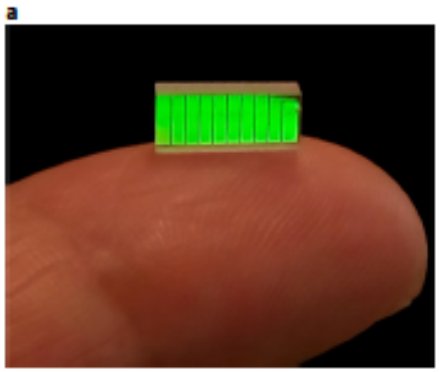
Strong activities ***quantum and ultrafast science and nonlinear optics*** (e.g. Reid, Andersson, Gerardot, Kar, Buller, Ferrera, Cataluna, Travers) ***laser manufacturing*** (e.g. Hand & Esser)

nature photonics
LETTERS
https://doi.org/10.1038/s41566-018-0327-9

Three-dimensional femtosecond laser nanolithography of crystals

Airán Ródenas[1*], Min Gu[2], Giacomo Corrielli[1], Petra Paiè[1], Sajeev John[3], Ajoy K. Kar[4] and Roberto Osellame[1]





Research highlights

University of St Andrews

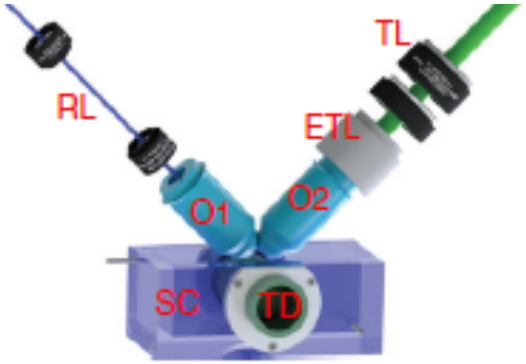
Strong activities in ***biophotonics, semiconductor optoelectronics, quantum optics, nano-photonics*** (e.g. Dholakia, Samuel, Turnbull, Brown, Di Falco, Gather & Koenig)

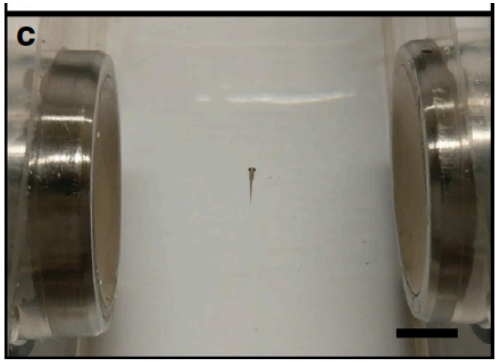
ARTICLE

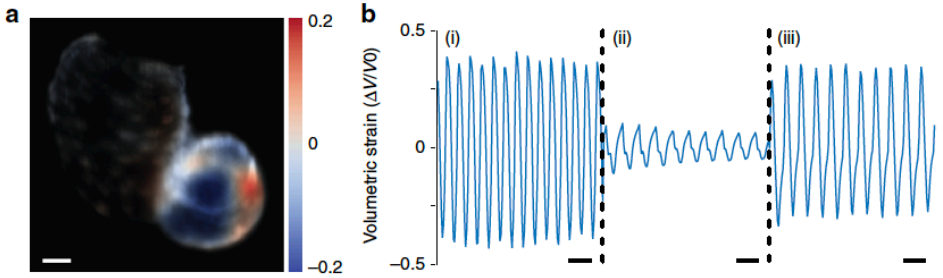
https://doi.org/10.1038/s41467-019-08514-5 OPEN

Light sheet microscopy with acoustic sample confinement

Zhengyi Yang[1,9], Katy L.H. Cole[2], Yongqiang Qiu[3,10], Ildikó M.L. Somorjai[4,5], Philip Wijesinghe[1,6,7], Jonathan Nylk[1], Sandy Cochran[3], Gabriel C. Spalding[8], David A. Lyons[2] & Kishan Dholakia[1]







Research highlights

University of Strathclyde

Strong activities in ***quantum optics,*** (e.g. Riis, Kuhr, Daley, Haller, Arnold, Griffin), ***nonlinear photonics*** (e.g. Oppo, Ackemann, Yao), ***quantum theory of light*** (e.g. Jeffers), ***optoelectronic devices*** (e.g. Dawson, Strain), ***advanced lasers*** (e.g. Kemp), and ***neurophotonics*** (Mathieson).

Research Article Vol. 5, No. 11 / November 2018 / Optica 1406

optica

Cascaded crystalline Raman lasers for extended wavelength coverage: continuous-wave, third-Stokes operation

Riccardo Casula,[1,*] Jussi-Pekka Penttinen,[2] Mircea Guina,[2] Alan J. Kemp,[1] and Jennifer E. Hastie[1]

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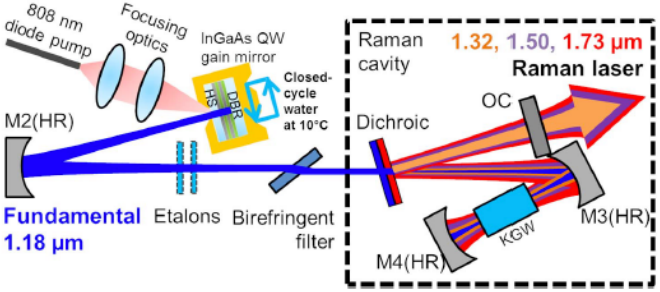

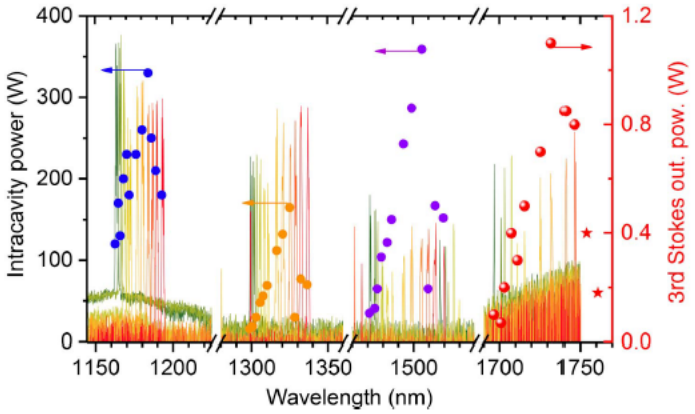

Photonics Grants

>£20M in project grants awarded since last IAC

(this does not include numerous grants and PhD projects with individual values <£100k)

Grant income

- **Andrea Di Falco (St Ands):** ERC Consolidator: All Optical Manipulation of Photonic Metasurfaces for Biophotonic Applications in Microfluidic Environments (ERC, 2m Euros)
- **Mehul Malik (HWU):** Putting Chaos to Work: Multi-Photon Entanglement in Complex Scattering Media (EPSRC Fellowship, £1.2m)
- **Cristian Bonato (HWU):** MOSQUITO: MObile Spin-based QUantum Information sTOrage (EPSRC Fellowship, £1.2m)
- **Gerald Buller (HWU):** Single Photons - Expanding the Spectrum (SPEXS) (EPSRC programme grant, £5.3 m)
- **John Marsh (Glasgow – Eng.):** Optically controlled THz phased array antennas (EPSRC, £1.2 m)
- **Mark Bradley (Edinburgh – Chem.):** EPSRC IRC Proteus - Multiplexed 'Touch and Tell' Optical Molecular Sensing and Imaging - Lifetime and Beyond (EPSRC, £3.9m)
- **Kev Dhaliwal (Edinburgh– Medical School):** IRC Next Steps Plus: Photonic Pathogen Theranostics - Point-of-care image guided photonic therapy of bacterial and fungal infection (EPSRC, £1.1m)

Awards and recognition

- **Daniele Faccio:** RAEng Chair in Emerging Technologies “Artificial intelligence and quantum-inspired imaging”

- **Keith Mathieson:** RAEng Chair in Emerging Technologies “Neural interfaces for the understanding and treatment of neurodegenerative conditions”