



PICQUE Integrated Quantum Photonics Workshop

7-9 January 2015, Oxford, UK

PROGRAMME & GENERAL INFORMATION

Scientific Committee

Paolo Mataloni, *Università di Roma “La Sapienza”, Italy*
Jeremy O’Brien, *University of Bristol, UK*
Sébastien Tanzilli, *LPMC – University of Nice Sophia-Antipolis, France*
Philip Walther, *University of Vienna, Austria*

Organising Committee

Ian Walmsley, Chair, *University of Oxford, UK*
Fabio Sciarrino, PICQUE Project Coordinator, *Università di Roma “La Sapienza”, Italy*
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Joshua Nunn, *University of Oxford, UK*
Marco Barbieri, *Università degli Studi Roma Tre, Italy*
Stefanie Barz, *University of Oxford, UK*
Michal Karpinski, *University of Oxford, UK*

Venues

Oxford Martin School, University of Oxford (Scientific Sessions)
Department of Physics, University of Oxford (Poster Session and Board Meetings)

We are delighted to welcome you to the PICQUE Workshop on Integrated Quantum Photonics, which is held under the 'dreaming spires' of Oxford.

We are experiencing exciting times for quantum photonics: pioneering experiments have set the case for the photonics approach to quantum technologies, and now the community is eagerly working on making this a solid possibility by increasing the complexity of our systems to levels unconceivable a few years back. Integrated photonics is the key technology that has permitted this transformation to happen, thanks to the contribution of expertise from many disciplines, from quantum optics to material science, to computer science, and to microfabrication.

Thanks to you all for taking part in the workshop, one of the first initiatives specifically devoted to this new trend in quantum photonics. It is one component of the efforts that our Marie-Curie Training Network PICQUE is devoting to developing integrated quantum photonics and to training a new generation of scientists with the broad expertise necessary for advancing the field.

We hope that you will enjoy learning what has been achieved so far and the discussions on what lies ahead, and feel the excitement of the conjunction of fundamental physics with the technology of the future.

Ian Walmsley
Chair of the Workshop
University of Oxford, UK

Fabio Sciarrino
PICQUE Project Coordinator
Università di Roma "La Sapienza", Italy

SCIENTIFIC PROGRAMME

Wednesday 7 January

9:20-10:50 Morning Session

Quantum information processing

Edward A. Hinds, Imperial College London, UK

Oral presentation Session 1

Photonic emulation of coherent effects in biology in integrated 3D direct-write waveguide arrays - *A. Fedrizzi*

Generalized multi-photon quantum interference - *M. Tillmann*

Coffee break

11:20-12:40 Late Morning Session

Integrated quantum sources

Sokratis Kalliakos, Toshiba Research Europe, UK

Oral presentation Session 2

Quantum Information Devices in Rare-Earth Ion Doped Waveguide Materials
- *D. Oblak*

Efficient construction of a linear optical cluster state - *M. Gimeno-Segovia*

14:30-15:45 Afternoon Session

Short talk Session 1

Photon pair sources in AlGaAs: from state engineering to electrical injection
- *C. Autebert*

Micro-optics based Quantum Key Distribution sender unit for secure short distance communication - *G. Vest*

Quantum entanglement generation in the presence of noise - *M. Zuppardo*

Bloch Oscillations of Photonic EPR-States - *M. Lebugle*

Fully-tuneable Purcell-enhanced on-chip quantum sources - *M. Petruzzella*

17:00-19.00 Poster Session (Oxford University)

Thursday 8 January

9:20-10:50 Morning Session

Integrated detectors

Sae Woo Nam, National Institute of Standards and Technology (NIST), USA

Oral presentation Session 3

Anderson Localization of Path-Entangled Photons - *Y. Gilead*

Sampling with partially distinguishable bosons - *M. Tichy*

Coffee Break

11:20-13:05 Late Morning Session

Integrated quantum light sources

Christine Silberhorn, University of Paderborn, Germany

Oral presentation Session 4

An integrated source of filtered photon pairs for large scale quantum photonic systems - *C. Galland*

Interfacing telecom photons to a solid-state optical memory via frequency up-conversion in a PPKTP waveguide - *N. Maring*

Fermionic statistics suppresses Fano resonances - *A. Crespi*

14:30-15:30 Afternoon Session

Short talk Session 2

Manipulating a non-classical state of light propagating through a multiply scattering medium - *H. Defienne*

Bi-photon spectral correlation measurements from a silicon nanowire: classical vs quantum - *A.C. Clark*

Birefringent Optical Fibres and Laser Written Waveguides for Generation of Photon Pairs - *W. McCutcheon*

A quantum walk in a single optical waveguide - *J. Boutari*

Coffee Break

17:00-19.00 Social Event

Friday 9 January

9:20-10:40 Morning Session

Integrated quantum communication

Eleni Diamanti, CNRS, Télécom ParisTech, France

Oral presentation Session 5

Secure delegated computations: recent results and future challenges - *S. Barz*

Experimental Boson Sampling with integrated photonics - *N. Spagnolo*

Coffee Break

11:20-12:40 Late Morning Session

Laser-written integrated photonic quantum circuits

Alexander Szameit, Friedrich-Schiller University of Jena, Germany

Scientific discussion with the Editors of the *Nature* Publishing Group

How to publish in the *Nature* family of journals - *Leonie Mueck, Nature Publishing Group*

Career development - *Iulia Georgescu, Nature Physics*

Discussion with the Editors

14:30-15:30 Afternoon Session

Short talk Session 3

Experimental demonstration of measurement-only blind quantum computing
- *C. Greganti*

Broadband evanescent coupling of single NV-centers to dielectric single-mode waveguides - *L. Liebermeister*

Multidimensional quantum interferometry on a chip - *T. Meany*

Quantum dots for quantum information science - *E. Murray*

Coffee Break

**17:00-19.00 Lab tours/PICQUE Committee meetings
(Oxford University)**

Oral presentations

Session 1 - Wed 7 Jan

Photonic emulation of coherent effects in biology in integrated 3D direct-write waveguide arrays. D. N. Biggerstaff, **A. Fedrizzi**, I. Kassal, R. Heilmann, M. Gräfe, S. Nolte, A. Szameit, T. Meany, M. Ams, M. J. Withford, and A. G. White

Generalized multi-photon quantum interference. **M. Tillmann**, S. Tan, S. E. Stoeckl, B. C. Sanders, H. de Guise, R. Heilmann, S. Nolte, A. Szameit, P. Walther

Session 2 - Wed 7 Jan

Quantum Information Devices in Rare-Earth Ion Doped Waveguide Materials. **D. Oblak**, N. Sinclair, E. Saglamyurek, J. Jin, H. Mallahzadeh, T. Lutz, L. Veissier, J. A. Slater, M. Hedges, M. George, R. Ricken, V. Verma, F. Marsili, M. D. Shaw, C. Thiel, W. Sohler, S. W. Nam, C. Simon, W. Tittle

Efficient construction of a linear optical cluster state. **M. Gimeno-Segovia**

Session 3 - Thu 8 Jan

Anderson Localization of Path-Entangled Photons. **Y. Gilead**, M. Verbin and Y. Silberberg

Sampling with partially distinguishable bosons. **M.C. Tichy** and K. Mølmer

Session 4 - Thu 8 Jan

An integrated source of filtered photon pairs for large scale quantum photonic systems. N. C. Harris, D. Grassani, A. Simbula, M. Pant, M. Galli, D. Englund, D. Bajoni and **C. Galland**

Interfacing telecom photons to a solid-state optical memory via frequency up-conversion in a PPKTP waveguide. **N. Maring**, K. Kutluer, J. Cohen, M. Cristiani, M. Mazzera, P. M. Ledingham and H. de Riedmatten

Fermionic statistics suppresses Fano resonances. **A. Crespi**, L. Sansoni, G. Della Valle, A. Ciamei, R. Ramponi, F. Sciarrino, P. Mataloni, S. Longhi and R. Osellame

Session 5 - Fri 9 Jan

Secure delegated computations: recent results and future challenges. **S. Barz**

Experimental Boson Sampling with integrated photonics. **N. Spagnolo**, C. Vitelli, M. Bentivegna, D. J. Brod, A. Crespi, F. Flamini, R. Ramponi, P. Mataloni, R. Osellame, E. F. Galvão and F. Sciarrino

Short talks

Session 1 - Wed 7 Jan

Photon pair sources in AlGaAs: from state engineering to electrical injection. **C. Autebert**, G. Boucher, F. Boitier, A. Eckstein, A. Lemaître, I. Favero, G. Leo, S. Ducci

Micro-optics based Quantum Key Distribution sender unit for secure short distance communication. **G. Vest**, M. Rau, L. Fuchs, G. Corrielli, H. Weier, S. Nauerth, A. Crespi, R. Osellame and H. Weinfurter

Quantum entanglement generation in the presence of noise. **M. Zuppardo**

Bloch Oscillations of Photonic EPR-States. **M. Lebugle**, M. Gräfe, R. Heilmann, A. Perez-Leija, S. Nolte, Y. Lahini and A. Szameit

Fully-tuneable Purcell-enhanced on-chip quantum sources. **M. Petruzzella**, T. Xia, F. M. Pagliano, S. Birindelli, L. Midolo, Ž. Zobenica, L.H. Li, E. H. Linfield, A. Fiore

Session 2 - Thu 8 Jan

Manipulating a non-classical state of light propagating through a multiply scattering medium. **H. Defienne**, M. Barbieri, B. Chalopin, B. Chatel, I. Walmsley, B. Smith, S. Gigan

Bi-photon spectral correlation measurements from a silicon nanowire: classical vs quantum. I. Jizan, L. G. Helt, C. Xiong, M. J. Collins, M. Liscidini, M. J. Steel, B. J. Eggleton, and **A.S. Clark**

Birefringent Optical Fibres and Laser Written Waveguides for Generation of Photon Pairs. A. R. McMillan, G. Corrielli, B. A. Bell, **W. McCutcheon**, R. Osellame, J. G. Rarity

A quantum walk in a single optical waveguide. **J. Boutari**, S. Barz, S. Kolthammer, C. Di Franco, M. S. Kim, I. Walmsley

Session 3 - Fri 9 Jan

Experimental demonstration of measurement-only blind quantum computing. **C. Greganti et al.**

Broadband evanescent coupling of single NV-centers to dielectric single-mode waveguides. **L. Liebermeister**, M. Zeitlmair, F. Böhm, N. Heinrichs, P. Altpeter, H. Weinfurter, and M. Weber

Multidimensional quantum interferometry on a chip. Z. Chaboyer, **T. Meany**, L. G. Helt, M. J. Steel, M. J. Withford

Quantum dots for quantum information science. **E. Murray et al.**

Posters - Wed 7 Jan

Integration of superconducting single-photon detectors in a quantum photonic integrated circuit. **G.E. Digeronimo**, M. Petruzzella, R. Gaudio and A. Fiore

Integration of Superconducting Nanowires Single Photon Detectors (SNSPDs) with photonic circuits. **M. Graziosi** et al.

Experimental transfer of quantum entangled photons in Jx photonic lattices. **D. Guzmán-Silva**, A. Perez-Leija, S. Weimann, M. Lebugle, and A. Szameit

Strain-optic control for integrated quantum circuits. **P. Humphreys** et al.

High-visibility nonclassical interference of photon pairs generated in a multimode nonlinear waveguide. **M.Jachura**, M.Karpinski, C.Radzewicz, K.Banaszek

Silica-on-silicon waveguide circuits for quantum information processing. **B. Metcalf** et al.

Low-loss fiber-waveguide coupling for PDC-based single photon sources. **N. Montaut**, H. Herrmann, and C. Silberhorn

Decoherence-protected spin transitions of nitrogen vacancy centers in 99.99% carbon-13 diamond. **A. J. Parker**, H. Wang, Y. Li, D. Budker, A. Pines, and J. P. King

Fabrication of an integrated photonic circuit carrying discrete time Hamiltonian dynamics. **I. Pitsios**, A. Crespi, L. Banchi, S. Bose, F. Sciarrino, P. Mataloni, R. Osellame

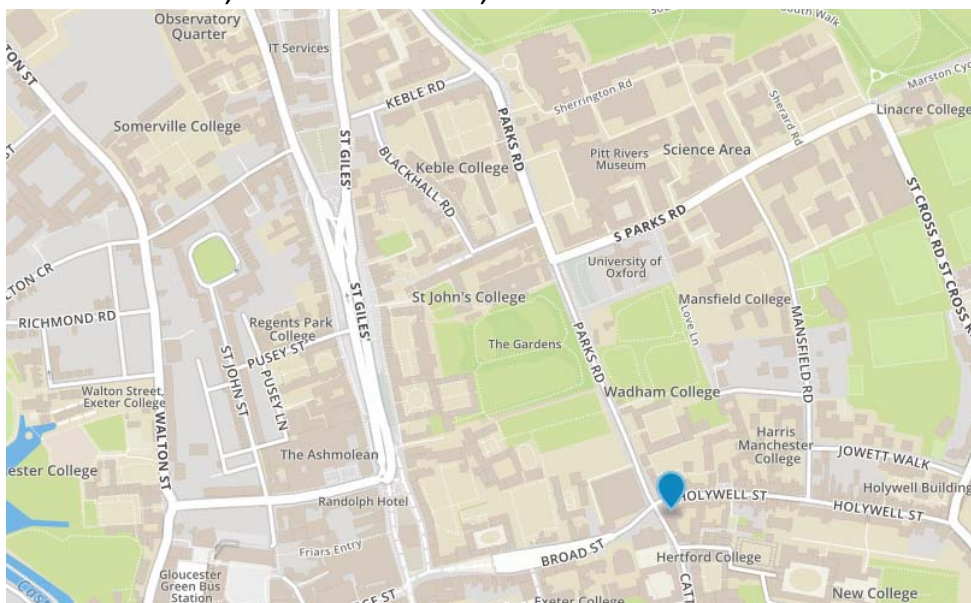
Proposed ultrafast optical control and broadband optical quantum memory with neutral nitrogen-vacancy centers in diamond. **E. Poem**, K. T. Kaczmarek, C. Weinzetl, J. Munns, T. F. M. Champion, D. J. Saunders, J. Nunn, and I. A. Walmsley

Photonic Bandgap Analysis on Square and Triangular Lattice Photonic Crystal Slab. **S. Roy** and C. Hari Krishna

GENERAL INFORMATION

VENUES

Main Sessions: Oxford Martin School, University of Oxford
Seminar Room, 34 Broad Street, Oxford OX1 3BD

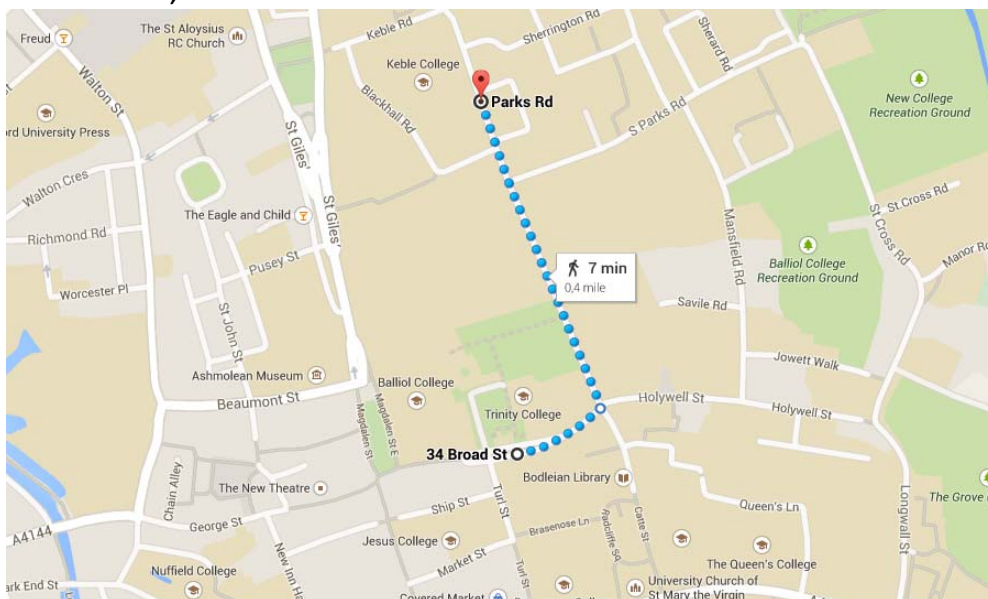


Poster Session: Department of Physics

7 January, 5:00 pm

Martin Foyer, Clarendon Laboratory

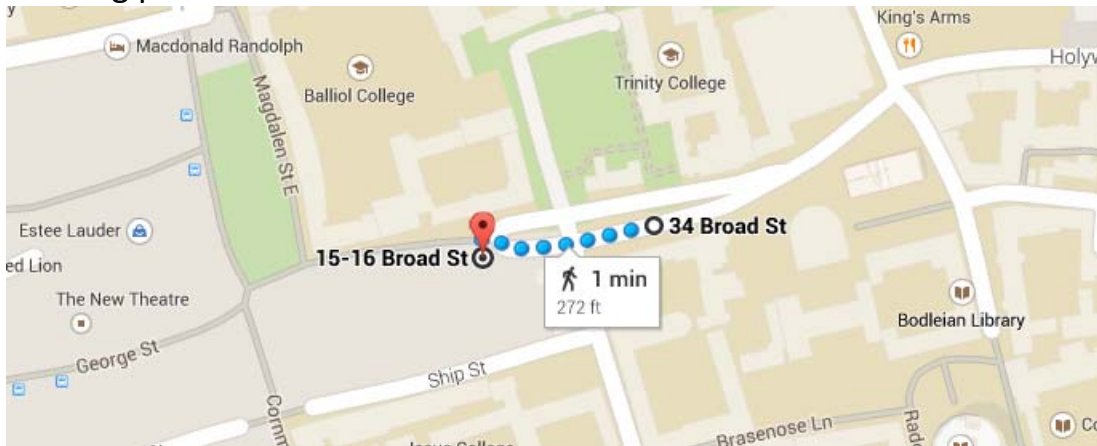
Parks Road, Oxford OX1 3PU



Social Event: Oxford Ghost Trail

8 January, 5:00 pm

Meeting point: 15-16 Broad Street



EATING

Oxford offers a wide choice of restaurants and eateries in the city centre and nearby districts.

A **quick lunch** can be had on **Broad St.**, or **Little Clarendon St.**, a few minute walk from the Martin School. You can also explore the **Covered Market on Cornmarket St.** for a cosier option.

The city is not short of options for dinner: you can enjoy a **traditional meal** in almost all the **pubs** in Oxford; please note that dining times are generally earlier than on the continent, and most premises stop serving food at around 9:30pm.

Ethnic options – as diverse as Indian, Chinese, Italian, Levantine, Greek and French – can be found in **Walton St.** in the Jericho district. **George St.** has also a selection of restaurants, including American-style burgers.

Cowley Rd. is a 15 -minute walk from the city centre: there you will find Oxford's **ethnic district**, with a good choice of restaurants – Greek, Russian, Italian pizza, and Japanese among them.

LIST OF PARTICIPANTS

Claire Autebert

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Margherita Zuppardo

School of Physical and Mathematical,
Singapore

Don't miss next PICQUE event in Rome!



PICQUE Scientific School in Integrated Quantum Photonics Applications: from Simulation to Sensing *6-10 July 2015, Rome, Italy*

Registration fee: € 280 (by 15 May 2015)
Abstract submission: 31st March 2015
www.picque.eu/romaschool2015/

Invited lectures

Antonio Acin, ICFO - The Institute of Photonic Sciences, Spain
Vittorio Giovannetti, Scuola Normale Superiore, Italy
Seth Lloyd, Massachusetts Institute of Technology (MIT), USA
Mauro Paternostro, Queen's University Belfast, Northern Ireland, UK
Tim Ralph, University of Queensland, Australia
Grégoire Ribordy, ID Quantique, Switzerland
Alexander Szameit, University of Jena Friedrich-Schiller, Germany
Philip Walther, University of Vienna, Austria

Chair: Fabio Sciarrino, University of Rome La Sapienza

Contact person: Giuliana Pensa, PICQUE Project Manager

Invited seminars

Marco Barbieri, Università di Roma Tre, Italy
Marco Bellini, INO-CNR, Italy
Anthony Laing, University of Bristol, UK
Lorenzo Marrucci, University of Naples Federico II, Italy
Roberto Osellame, IFN-CNR, Italy
Christine Silberhorn, University of Paderborn, Germany
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Robert Thew, Université de Genève, Switzerland
Mark Thompson, University of Bristol, UK

Scientific Committee

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Alexander Szameit, University of Jena
Mark Thompson, University of Bristol

