School and Workshop Programme

The Quantum Controlled Ultrafast Multimode Entanglement and Measurement (QCUMbER) Conference includes international speakers from varied disciplines collectively working on time-frequency quantum photonics.

The aim is to present key findings while fostering new collaborative partnership and facilitate the dissemination of ideas from researchers in different fields related to the study of generation, manipulation and measurement of multimode quantum states of light. The workshop will present topics with particular emphasis on temporal-spectral modes, and key applications including metrology, sensing, and information processing.

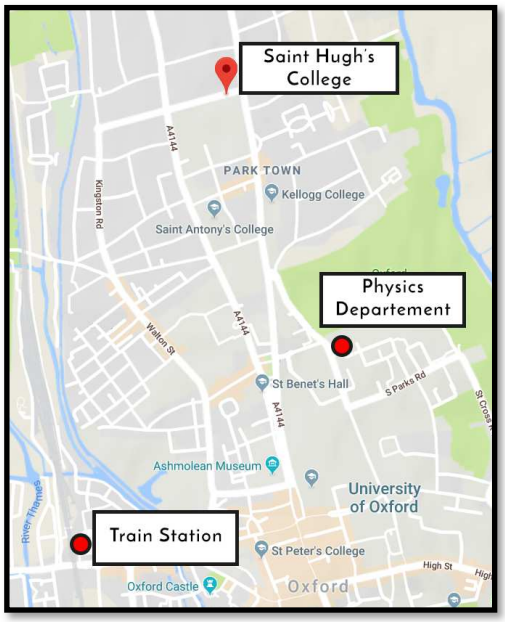
The QCUMbER consortium comprises six internationally acknowledged partner institutions - University of Oxford, University of Lille, University of Paderborn, University of Paris, University of Rome and University of Rostock.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 665148

QCUMbER

Venue information

Arrival



Workshop and **accommodation** are located at **St Hugh's College** (St Margaret's Road, Oxford, OX2 6LE)

Getting to Oxford:

St Hugh's College is a short distance about 20 minutes (1,5 km) by foot from Oxford city centre and it's a lovely walk along either Banbury Road or Woodstock Road . If you would prefer to hop on the bus, the Oxford Bus Company runs services along Woodstock Road (city6) and Banbury Road (city2). Parking is limited within Oxford, it is recommended you make use of the Oxford Park and Ride to get to the city centre.

Accommodation

Check in: Check in at St Hugh's is from 2pm. All guests will need to arrive at the main Porters Lodge on St Margaret's Road.

Check out: Check out at St Hugh's is strictly 10am, checkouts after 10am may incur additional charges Breakfast and Dinner particulars will be provided on arrival.

Conference dinner Thursday 12th 19:00

The **formal dinner** will take place in the **Dickson Poon China Centre**. There will be a drinks reception at 19:00, followed by Dinner at 19:30. The **dress code** is smart / formal attire.

St Hugh's

Please **check in** at **The Lodge** on arrival**. Conference** is in the **Maplethorpe Building.**

Dinner is in **The Dickson Poon China Centre.**

Detailed Schedule

Summer School

Tutorial #1
Pr. Claude Fabre
Laboratoire Kastler Brossel, Paris
Modes and states in quantum optics

Tutorial #2
Pr. Dr. Christine Silberhorn
University of Paderborn, Paderborn
Controlling temporal modes of pulsed quantum light

Tutorial #3
Pr. Marco Barbieri
Universita Roma Tre, Rome
A primer on quantum metrology

Tutorial #4
Pr. Brian J. Smith
University of Oxford, Oxford
Characterization of single-photon pulses

Tutorial #5
Pr. Mikhail Kolobov
Laboratoire PHLAM, Lille
Quantum temporal imaging

Tutorial #6
Pr. Dr. Werner Vogel
Institut für Physik, Rostock
Verification of quantum light

Invited Talks

Wednesday 11—13:15: Timothy Ralph - University of Queensland
Quantum correlations and non-local quantum computing

Wednesday 11—15:15: Paul Lett - NIST
Noise and spatial mode coupling in twin-beams for 4-wave mixing

Wednesday 11—16:00: Maria Checkhova - Max-Planck Institute for the Science of Light
Nonlinear SU(1,1) interferometer with multimode light

Thursday 12—09:15: Nicolas Cerf - Université Libre de Bruxelles
Multiphoton interference in passive vs. active Gaussian unitaries, partial time reverseal and "spacelike" vs. "timelike" indinstinguishability effect

Thursday 12—11:15: Peter Van Loock - University of Mainz
Long-distance quantum communication: theoretical approaches to experimental realizations

Thursday 12—13:45: Olivier Pfister - Virginia University
Entangling the quantum optical frequency comb

Thursday 12—14:30: Michael Raymer - University of Oregon
High-efficiency multiplexing and demultiplexing of quantum information in temporal modes of single photons

Friday 13—09:15: Alexander Gaeta - Columbia University
Photon processing via four-wave mixing

Friday 13—11:15: Ben Buchler- Australian National University
Stopped light, stationary light and deep learning with cold atoms

Abstract Talks

Wednesday 11—14:00: Session 1
Chair: Ilaria Gianani
John Donohue: *Temporal mode-selective purification and manipulation of multimode quantum light*
Sarah Thomas: *High-dimensional temporal mode manipulation using quantum memories*
Alex Davis: *Two-photon joint spectral wave function measurement*

Thursday 12—10:00: Session 2
Chair: John Matthew Donohue
Thibault Michel: *A real-time device-independent QRNG*
Jano Gil Lopez: *Towards practical multi-colour nonlinear mixing devices*
Frank Schlawin: *Theory of coherent control with quantum light*

Thursday 12—12:00: Session 3
Chair: Alex O.C. Davis
Tiphaine Kouadou: *Single-pass squeezed states of light for quantum computation*
Adrien Dufour: *Tailored non-Gaussian multimode states*
Stefan Gerke: *Entanglement detection via numerical approaches*

Thursday 12—16:00: Session 4
Chair: Giuseppe Patera
Armando Leija: *Observation of photon-subtracted two-mode squeezed vacuum states*
Farid Shahandeh: *Quantum correlations in non-local boson sampling*
Jean-Phillipe Mac Lean: *Direct characterization of ultrafast energy-time entangled photon pairs*

Friday 13—10:00: Session 5
Chair: Mattia Walschaers
Jefferson Flórez: *Limitations to the sensitivity of a three-mode nonlinear interferometer*
Marta Misiaszek: *Measuring dispersion in nonlinear crystals beyond detector's spectral range*
Filip Sośnicki: *Electro-optic spectral manipulation driven by optical pulses*

Schedule

	Tuesday 10 Tutorials	Wednesday 11 Tutorials / Workshop	Thursday 12 Workshop	Friday 13 Workshop
09:00		**Welcome**	**Welcome**	**Welcome**
09:15		**Tutorial 5** Mikhail Kolobov *Quantum temporal imaging*	**Invited Talk** Nicolas Cerf	**Invited Talk** Alexander Gaeta
09:30				
09:45				
10:00			Abstract Talks 2 Chair: John Matthew Donohue	Abstract Talks 5 Chair: Mattia Walschaers
10:15		**Refreshment Break**		
10:30				
10:45		**Tutorial 6** Werner Vogel *Verification of quantum light*	**Refreshment Break**	**Refreshment Break**
11:00				
11:15			**Invited Talk** Peter Van Loock	**Invited Talk** Ben Buchler
11:30				
11:45		**Closure**		
12:00	**Welcome**	**Welcome**	Abstract Talks 3 Chair: Alex O.C. Davis	**Lunch**
12:15	**Lunch**	**Lunch**		
12:30				
12:45			**Lunch**	
13:00				**Closure**
13:15	**Tutorial 1** Claude Fabre *Modes and states in quantum optics*	**Invited Talk** Timothy Ralph		
13:30				
13:45			**Invited Talk** Olivier Pfister	
14:00		Abstract Taks 1 Chair: Ilaria Gianani		
14:15	Inofficial Break			
14:30	**Tutorial 2** Christine Silberhorn *Controlling temporal modes of pulsed quantum light*		**Invited Talk** Michael Raymer	
14:45		**Refreshment Break**		
15:00				
15:15		**Invited Talk** Paul Lett	**Refreshment Break**	
15:30	**Refreshment Break**			
15:45			Abstract Talks 4 Chair: Giuseppe Patera	
16:00	**Tutorial 3** Marco Barbieri *A primer on quantum metrology*	**Invited Talk** Maria Checkhova		
16:15				
16:30			Inofficial Break Poster Session	
16:45		**Refreshment Break**		
17:00	Inofficial Break			
17:15	**Tutorial 4** Brian J. Smith *Characterization of single-photon pulses*	Poster Session		
17:30				
17:45				
18:00				
18:15	**Closure**		**Closure**	
18:30	Pub crawl			
18:45		**Closure**		
19:00			**Dinner**	

Invited Talks: 30 minutes + 15 minutes Q&A; Abstract Talks: 12 minutes + 3 minutes Q&A