



Second International Conference on Optical Angular Momentum

Second International Conference on Optical Angular Momentum
03 – 05 June 2013
The Burrell Collection, Glasgow, UK

Conference Chair: Sonja Franke-Arnold

Oral programme

All talks are invited

Monday 3 June 2013

08:00 Registration and refreshments

09:10 Welcome and Introduction

Session 1: OAM phenomenology

Chair: S Barnett, University of Strathclyde, UK

09:20 **(session introduction) Analogies between wave optics and quantum mechanics**
G Nienhuis, Universiteit Leiden, Netherlands

09:50 **What is spin to orbit angular momentum transfer?**
I Fernandez-Corbaton, Macquarie University, Australia

10:10 **Singular phase structure of nano-antenna system**
M Coles, University of East Anglia, UK

10:30 Refreshments

11:00 **Optical angular momentum and symmetries**
R Cameron, University of Strathclyde, UK

11:20 **Chiral electromagnetic fields**
E Hendry, University of Exeter, UK

11:40 **Five momenta**
M Berry, University of Bristol, UK

12:00 Poster mini talks

13:00 Lunch

Session 2: Vortices in optical, electron and matter waves

Chair: D Andrews, University of East Anglia, UK

14:20 **(session introduction) Peculiar rotation of electron vortices in magnetic fields**
P Schattschneider, University Service Centre for Electron Microscopy, Austria



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- 14:50 **Generation and detection of OAM in electron beams**
J Verbeeck, University of Antwerp, Belgium
- 15:10 **Manipulation and detection of OAM in electron vortex beams**
B McMorran, University of Oregon, USA
- 15:30 Refreshments
- 16:00 **Controlling the handedness of laser resonators**
A Forbes, National Laser Centre, South Africa
- 16:20 **The physics of conserved quantities in classical electrodynamics**
B Thide, Swedish Institute of Space Physics, Sweden
- 16:40 **Radio applications of OAM states**
F Tamburini, University of Padova, Italy
- 17:00 Poster mini talks
- 18:00 Drinks reception
- 18:30 Poster session part 1
- 19:45 Finger buffet
- 20:30 Poster session part 2

Tuesday 4 June 2013

08.30 Registration

Session 3: OAM toolbox (Phorbitech)

Chair: M Padgett, University of Glasgow, UK



- 09:00 **(session introduction) Spiral photolithography of azopolymers**
L Marrucci, Università di Napoli Federico II, Italy
- 09:30 **Complete experimental toolbox for alignment-free quantum communication**
F Sciarrino, Sapienza Università di Roma, Italy
- 09:50 **Integrated vortex beam emitters**
S Yu, University of Bristol, UK
- 10:10 **'Twisted' photon entanglement**
W Löffler, Leiden University, Netherlands
- 10:30 Refreshments
- 11:10 **Dimensionality in orbital angular momentum entanglement**
M J Romero, University of Glasgow, UK
- 11:30 **Biphoton optical vortices**
S Walborn, Universidade Federal do Rio de Janeiro, Brazil
- 11:50 **Quantum nature of radial degree of freedom of paraxial waves**
E Karimi, University of Ottawa, Canada



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- 12:10 **High density atom traps using holographically shaped beams**
N Radwell, University of Glasgow, UK
- 12:30 **Experimental instability of higher-order optical vortices**
M van Exter, Leiden University, Netherlands
- 13:00 Lunch

Session 4: Vector vortex beams and spin-orbit interactions of light

Chair: F Sciarrino, University of Rome, Italy

- 14:20 **(session introduction) Transverse spin and momentum in evanescent waves**
K Bliokh, RIKEN, Japan
- 14:50 **Vector beams**
G Milione, City College of New York, USA
- 15:10 **Polarization patterns and singularities of Poincare beams**
E J Galvez, Colgate University, USA
- 15:30 **Optical and matter vortices and interactions**
M Babiker, University of York, UK
- 15:50 Refreshments
- 16:20 **Singularimetry and topological aberrations**
J Götte, Max-Planck-Institute for the Physics of Complex Systems, Germany
- 16:40 **Imprinting skyrmion spin textures in spinor Bose-Einstein condensates**
Y Shin, Seoul National University, South Korea
- 17:00 **Exploiting the angular momentum of light in nanophotonics**
G Molina-Terriza, Macquarie University, Australia
- 18:00 Coaches depart from the Burrell Collection
- 18:30 Drinks reception and conference dinner (National Piping Centre)

Wednesday 5 June 2013

- 08:30 Registration

Session 5: OAM applications in imaging

Chair: B Boyd, University of Ottawa, Canada and University of Rochester, USA

- 09:00 **(session introduction) Using OAM light for optical imaging**
M Ritsch-Marte, Innsbruck Medical University, Austria
- 09:30 **Quantitative spiral phase contrast imaging in a stimulated emission depletion microscope**
M Guillon, Centre National de la Recherche Scientifique, France
- 09:50 **On the generation and analysis of wave vortices**
K Volke-Sepúlveda, Universidad Nacional Autónoma de México, México



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10:10 **Storage and non-collinear retrieval of optical angular momentum of light in cold atoms**
L Pruvost, Centre National de la Recherche Scientifique, France

10:30 Refreshments and guided tour of the Burrell Collection

Session 6: OAM matter interaction

Chair: S Franke-Arnold, University of Glasgow, UK

11:30 **(session introduction) Vortex beams and angular momentum of light**
H Rubinsztein-Dunlop, University of Queensland, Australia

12:00 **Structured light fields based on spiral beams – promoting photonic lattices and optical micromanipulation**
C Denz, University of Münster, Germany

12:20 **Twisted light in nanostructures**
N M Litchinitser, The State University of New York, USA

12:40 **Topological shaping of light by structured thin metal films**
E Brasselet, Centre National de la Recherche Scientifique and University of Bordeaux, France

13:00 Lunch

Session 7: OAM applications in quantum information

Chair: L Marrucci, University of Naples, Italy

14:20 **(session introduction) The Poincare sphere for OAM: variations on a theme**
M Dennis, University of Bristol, UK

14:50 **The duality relationship in the presence of post-selection**
J Leach, Heriot-Watt University, UK

15:10 **Playing with quantum states, playing with dimensions**
J P Torres, Institut de Ciències Fotoniques, Spain

15:30 **Visualizing quantum state rotations through weak measurements of orbital angular momentum**
M Malik, University of Rochester, USA

15:50 Refreshments

16:20 **Real-time imaging of quantum entanglement**
R Fickler, University of Vienna, Austria

16:40 **More twists on optical twistors: of helicon-conical beams, superpositions and combinations**
D Z Palima, Technical University of Denmark, Denmark

17:00 Close



Poster programme

Topic: OAM phenomenology

- P.01 **Experimental study of the cross-correlation function for partially coherent Laguerre-Gaussian beams**
A Mourka, University of St. Andrews, UK
- P.02 **Optical angular momentum in conical diffraction**
R Darcy, Trinity College Dublin, Ireland
- P.03 **Clebsch-Gordan coefficients for the addition of orbital angular momentum of Gaussian modes**
M Dennis, Bristol University, UK
- P.04 **The role of vortices in the generation of optical lift (withdrawn)**
- P.05 **Modal characterisation using principal component analysis: application to Laguerre-Gaussian beams and their superposition**
A Mourka, University of St Andrews, UK
- P.06 **The forgotten quantum number: radial modes of Laguerre-Gauss beams**
W Plick, Institute for Quantum Optics and Quantum Information, Austria
- P.07 **Do waves carrying orbital angular momentum possess azimuthal linear momentum?**
F Speirits, University of Strathclyde, UK

Topic: Vortices in optical, electron and matter waves

- P.08 **Electron vortex propagation in magnetic fields**
C Greenshields, University of Glasgow, UK
- P.09 **Chiral specific electron vortex beam spectroscopy**
S Lloyd, University of York, UK
- P.10 **Subwavelength control of orbital angular momentum of light**
G Parisi, Padova University and Laboratory of Nanofabrication of Nanodevices, Italy
- P.11 **Electron diffraction catastrophies**
T C Petersen, Monash University, Australia
- P.12 **Instability of higher-order optical vortices**
F Ricci, University of Padova, Italy
- P.13 **Experimental study of nanomanipulation of nanoparticles using electron vortex beams**
J Yuan, University of York, UK
- P.14 **Angular momentum-dependent helicity transfer in nano-apertures**
X Zambrana-Puyalto, Macquarie University, Australia

Topic: OAM toolbox (Phorbitech)

- P.15 **Photonic qudits and their applications in fundamental quantum mechanics and quantum information**
V D'Ambrosio, Sapienza Università di Roma, Italy
- P.16 **Simulation of a spin polarization device in an electron microscope**
V Grillo, S3-NANO CNR, Italy



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- P.17 **Detection of a spinning object using light's orbital angular momentum**
M Lavery, University of Glasgow, UK
- P.18 **Nonlinear interpolation of OAM enhanced beam shifts**
A Nugrowati, Leiden University, Netherlands
- P.19 **Method for direct measurements of the mean and variance of light OAM**
B Piccirillo, Università degli Studi di Napoli, Italy
- P.20 **3D fluorescence imaging of laser beams**
N Radwell, University of Glasgow, UK
- P.21 **Transverse Doppler Effect using optical beams with a twist**
C Rosales-Guzmán, ICFO-Institut de Ciències Fotoniques, Spain
- P.22 **Photoalignment-based liquid crystal q-plate technology**
S Slussarenko, Università degli Studi di Napoli "Federico II", Italy
- P.23 **Joining the quantum state of two photons into one**
N Spagnolo, Sapienza Università di Roma, Italy
- Topic: Vector vortex beams and spin-orbit interactions of light**
- P.24 **Controlled acceleration of superimposed higher-order Bessel beams**
A Dudley, Council for Scientific and Industrial Research National Laser Centre, South Africa
- P.25 **Measuring Poynting vector of optical vortices using polarization interference**
G Milione, City College of New York, USA
- P.26 **Optical angular momentum and phase conjugation (withdrawn)**
- P.27 **Topology of dark tangles in light**
A Taylor, University of Bristol, UK
- P.28 **Spatial correlation singularities of partially coherent fields**
Y Yang, University of Electronic Science and Technology of China, China
- Topic: OAM applications in imaging**
- P.29 **Ince-Gaussian beams: manifold perspective in optical tweezers**
C Alpmann, University of Münster and Institute of Applied Physics, Germany
- P.30 **Heralded single-photon ghost imaging utilising EPR correlations**
R Aspden, University of Glasgow, UK
- P.31 **3D computational imaging via correlation measurement**
B Sun, University of Glasgow, UK
- P.32 **Sub-Rayleigh optical vortex coronagraphy**
E Mari, University of Padova, Italy
- P.33 **Optimising the use of detector arrays for measuring intensity correlations of photon pairs**
D Tasca, University of Glasgow, UK



Topic: OAM matter interaction

- P.34 **Propagation of high-intensive femtosecond vortex beams in media with focusing and inertial defocusing nonlinearities**
O Fedotova, Belarus National Academy of Sciences, Belarus
- P.35 **Duality and beams of well-defined helicity: how to use them for experimental purposes**
I Fernandez-Corbaton, Macquarie University and 2 ARC Center of Excellence for Engineered Quantum Systems, Australia
- P.36 **Light-matter angular momentum exchange in nanophotonic structures: beyond “spin” and “orbital” angular momentum**
R Oulton, Bristol University, UK
- P.37 **Highly collimated source of cold Rb atoms from a 2-dimensional magneto-optical trap**
L Pruvost, Centre National de la Recherche Scientifique, France
- P.38 **Classical and quantum regimes of collective orbital angular momentum exchange between light and ultracold atoms**
G Robb, University of Strathclyde, SUPA, UK

Topic: OAM applications in quantum information

- P.39 **Fractional quantisation of optical angular momentum**
K Ballantine, Trinity College Dublin, Ireland
- P.40 **Efficient quantum state reconstruction with mutually unbiased bases in high-dimensional orbital angular momentum subspaces**
D Giovannini, University of Glasgow, UK
- P.41 **Imaging high-dimensional spatial entanglement with a camera**
M Edgar, University of Glasgow, UK
- P.42 **Entanglement in 100 dimensions**
M Krenn, University of Vienna, Austria
- P.43 **Gaussian entropy minimising states for orbital angular momentum and angular position**
A Yao, University of Strathclyde, UK