

Dr. Matthew R. Foreman (last updated: March 4, 2018)

PERSONAL DETAILS

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RESEARCH EXPERIENCE

Oct 2016 – present	Royal Society University Research Fellow , Photonics, Imperial College London, UK <i>“Mesoscopic plasmon speckle: fundamentals and applications”</i>
Jan 2015 – Sep 2016	Max Planck Postdoctoral Researcher , Max Planck Institute for the Science of Light, Germany (Supervisor: Prof. Gerd Leuchs) <i>“Anisotropic whispering-gallery mode resonators”</i>
Sep 2013 – Jan 2015	Alexander von Humboldt Fellow , Max Planck Institute for the Science of Light, Germany (Host: Dr. Frank Vollmer) <i>“Hybrid photonic-plasmonic micro-resonators for single molecule sensing”</i>
Oct 2012 – Sep 2013	Max Planck Postdoctoral Researcher , Max Planck Institute for the Science of Light, Germany (Supervisor: Dr. Frank Vollmer) <i>“Theory of plasmon enhanced whispering-gallery mode biosensing”</i>
Dec 2011 – Sep 2012	KTS Research Fellow , National Physical Laboratory, UK (Host: Prof. Richard Leach) <i>“Characterisation and calibration of 3D optical tomographic systems for surface metrology”</i>
Nov 2010 – Nov 2011	Research Associate , Photonics, Imperial College London, UK (Supervisor: Prof. Peter Török) <i>“Super-Resolution Photonics for Advanced Storage Systems (SURPASS)”</i>
Jan 2010 – Oct 2010	EPSRC Research Fellow , Photonics, Imperial College London, UK (Supervisor: Prof. Peter Török) <i>“Single molecule studies via polarisation microscopy”</i>

EDUCATION

Oct 2006 – Jan 2010	PhD Physics, Imperial College London, UK (Supervisor: Prof. Peter Török) <i>“Informational limits in optical polarimetry and vectorial imaging”</i>
Sep 2002 – Jul 2006	MPhys Physics, Trinity College, University of Oxford, UK 1st class
Sep 2001 – Jun 2002	Advanced Extension Award in Mathematics and A-Levels, Rainham Mark Grammar School, Kent, UK - Distinction, 5 at A including Mathematics, Further Mathematics and Physics

TEACHING/SUPERVISION EXPERIENCE

	LECTURING	
	2017 – present	Partial differential equations (Y2 undergraduate level - 6 hours) – Department of Materials – Imperial College London, UK
	2017 – present	Electromagnetism (Y2 undergraduate level - 6 hours) – Department of Materials – Imperial College London, UK
	2013	Whispering Gallery Mode Resonators (postgraduate level - 8 hours) – SAOT Winter Academy, Hintertux, Austria
	2010	Polarisation imaging (postgraduate level - 18 hours), Institute of Biophotonics, National Yang-Ming University, Taipei, Taiwan
	2010	Fundamentals of Matlab - 20 hours (postgraduate level), Institute of Biophotonics, National Yang-Ming University, Taipei, Taiwan
	SUPERVISION	
	2017 – present	PhD supervisor – 1 (1) student as lead (co-) supervisor – Department of Physics, Imperial College London, UK
	2017	MSc project supervisor (3 students) – Department of Physics, Imperial College London, UK
	2017 – present	MSci/BSci project supervisor (1 student) – Department of Physics, Imperial College London, UK
	2009 – present	UROD/ERASMUS project supervisor – 13 students – Department of Physics, Imperial College London, UK
	2013	PhD intern supervisor (1 student) – Max Planck Institute for the Science of Light, Germany
	OTHER	
	2017 – present	Undergraduate tutorials – Department of Materials, Imperial College London, UK
	2010 – 2011	Undergraduate tutorials – Department of Physics, Imperial College London, UK
	2008 – 2010	Experimental demonstrator – MSc Optics laboratory, Imperial College London, UK
	2007 – 2008	Undergraduate classwork assistant – Department of Physics, Imperial College London, UK
	2011 – present	MSci/BSc project assessor (17 students) – Department of Physics, Imperial College London, UK

CITATION STATISTICS

Total papers (invited): 36 (5)	Total books/chapters: 2	Total conference presentations (invited): 27 (6)
Total citations (since 2013): 984 (877)	h-index (since 2013): 16 (15)	i10-index (since 2013): 23 (19)

GRANTS AND FUNDING OBTAINED

2016	Royal Society Fellowship (~ £500k)	2013	Humboldt Fellowship (~ €100k)
2011	EPSRC KTS grant (~ £85k)	2008	Royal Academy of Engineering travel grant (~ £1k)
2010	EPSRC PhD Plus fellowship (~ £35k)	2008	Institute of Physics travel grant (~ £0.25k)
2009	Imperial Trust grant (~ £0.5k)	2008	Valerie Myserscough grant (~ £1.2k)
2009	EU-COST grant (~ £0.5k)	2006 – 2010	EPSRC DTA PhD scholarship (~ £150k)

ESTEEM INDICATORS, AWARDS AND HONOURS

2017 – present	Associate Editor - Optics Express (2016 Impact Factor: 3.307)
2017	Round table member Formulating joint statement by Royal Society, Berlin-Brandenburg Akademie der Wissenschaften and Leopoldina on German-UK collaboration post-Brexit
2016 – 2021	Royal Society University Research Fellowship – The Royal Society, UK
2013 – 2015	Humboldt Research Fellowship – Alexander von Humboldt Foundation, Germany
2011 – 2016	Visiting scholar – Imperial College London, UK
2011	Excellence in Teaching Award – Faculty of Natural Sciences, Imperial College London, UK
2010	Visiting Lectureship – Institute of Biophotonics, National Yang-Ming University, Taipei, Taiwan
2010	Springer Outstanding PhD Research Prize – Springer-Verlag
2010	EPSRC PhD Plus Fellowship – Engineering and Physical Sciences Research Council, UK
2010	Young Researcher Invitation – Lindau Nobel Laureate Meeting 2010
2007	Springer Presentation Award
2006 – 2010	EPSRC DTA PhD scholarship – Engineering and Physical Sciences Research Council, UK
2006	Peter Fisher Prize and Finals Prize – Oxford University, UK
2003 – 2006	Millard Exhibition/Scholarship in Physics – Oxford University, UK

ADMINISTRATIVE AND OUTREACH ACTIVITIES

OUTREACH	2017	Outreach Volunteer – Imperial Festival, Imperial College London, UK
	2015	Outreach Volunteer – Siegmund International School on Lasers, Max Planck Institute for the Science of Light, Germany
	2013	Outreach Volunteer – Lange Nacht der Wissenschaften (Long Night of Science), Max Planck Institute for the Science of Light, Germany
PEER REVIEW	2017	Proposal reviewer – National Natural Science Foundation of China (NSCF) and Israel Science Foundation (ISF)
	2011 – 2015	Proposal reviewer – Romanian National Council for Scientific Research
	2011	Proposal reviewer – Georgian Shota Rustaveli National Science Foundation
	2007 – present	Scientific reviewer – Nature Publishing, American Physical Society, Optical Society of America, IOP Publishing, American Chemical Society, Elsevier, European Optical Society. Full Publons record: https://publons.com/author/1282392
COMMITTEE	2017 – present	Chair – Physics Fellows' Forum, Imperial College London, UK
	2017 – present	Committee Member – Juno subcommittee on Career Development and Advice, Imperial College London, UK
	2014	Workshop organisation – Developed online registration system, administered registration process and facilitated production of conference proceedings for 560. WE Heraeus Workshop, Bad Honnef, Germany
OTHER	2012 – 2015	Web manager – Setup and maintenance of group website, Max Planck Institute for the Science of Light, Germany
	2007 – 2010	Administrative assistant – Journal of the European Optical Society
	2007 – 2010	Senior layout- and copy- editor – Journal of the European Optical Society

SCIENTIFIC COLLABORATIONS

2017 – present	Single Molecule Enzymology Laboratory, Francis-Crick Institute, London, UK
2016 – present	Max Planck Institute for the Science of Light, Erlangen, Germany
2016 – 2018	Max Planck Institute for Biophysical Chemistry, Göttingen, Germany
2016 – 2017	New York University Polytechnic School of Engineering, New York, USA
2014 – 2015	Research Center for Applied Sciences, Academia Sinica, Taipei, Taiwan
2013 – 2014	Consiglio Nazionale delle Ricerche, Istituto Nazionale di Ottica (INO), Naples, Italy
2012 – 2014	Brigham and Women's Hospital, Boston, USA
2011 – present	Ben-Gurion University, Beer-Sheva, Israel
2011 – 2016	Imperial College London, London, UK
2011 – 2012	Loughborough University, Loughborough, UK
2010 – 2013	Biophotonics Institute, National Yang-Ming University, Taipei, Taiwan
2009 – 2012	Carl Zeiss AG, Jena, Germany
2009 – 2012	CEA-LETI, Grenoble, France
2008 – 2012	Eindhoven University of Technology, Eindhoven, Netherlands
2006 – 2008	Canadian National Research Center (NRC-CNRC), Ottawa, Canada

MEMBERSHIP OF PROFESSIONAL/LEARNED SOCIETIES

- UK Higher Education Authority (Associate Fellow)
- Institute of Physics (Full Member)
- The Royal Society (Research Fellow)
- European Optical Society (Full Member)
- Alexander von Humboldt Foundation (Research Fellow Alumni)

Dr. Matthew R. Foreman : Publication List (last updated: March 4, 2018)

All publications are available from www.mrforeman.com/publications.php.

PEER-REVIEWED PUBLICATIONS (ITALICS DENOTES INVITED ARTICLE)

- *N. T. Urban, M. R. Foreman, S. W. Hell and Y. Sivan, "Nanoparticle-assisted STED nanoscopy with gold nano-spheres" ACS Photon. in press (2017).*
- **M. R. Foreman**, D. Keng, E. Treasurer, J. Lopez and S. Arnold, "Whispering gallery mode single nano-particle detection and sizing: the validity of the dipole approximation" *Opt. Lett.* **42**, 963–966 (2017).
- F. Sedlmeir, **M. R. Foreman**, U. Vogl, R. Zeltner, G. Schunk, D. V. Strekalov, C. Marquardt, G. Leuchs and H. G. L. Schwefel "Polarization-selective out-coupling of whispering gallery modes" *Phys. Rev. Applied* **7**, 024029 (2017).
- **M. R. Foreman**, F. Sedlmeir, H. G. L. Schwefel and G. Leuchs, "Dielectric tuning and coupling of whispering gallery modes using an anisotropic prism" *J. Opt. Soc. Am. B* **33**, 2177–2195 (2016).
- W. T. Chen, P. Török, **M. R. Foreman**, C. Y. Liao, W.-Y. Tsai, P. R. Wu and D. P. Tsai, "Integrated plasmonic metasurfaces for spectropolarimetry" *Nanotechnology* **27**, 224002 (2016).
- **M. R. Foreman** A. Favaro and A. Aiello "Optimal frames for polarization state reconstruction" *Phys. Rev. Lett.* **115**, 263901 (2015). Featured as cover article for *Phys. Rev. Lett.*
- E. Kim, **M. R. Foreman**, M. D. Baaske and F. Vollmer "Thermal characterisation of (bio)polymers with a temperature-stabilized whispering gallery mode microsensors" *Appl. Phys. Lett.* **106**, 161101 (2015).
- **M. R. Foreman** and F. Vollmer "Tracking anomalous diffusion kinetics in polymer microspheres" *Phys. Rev. Lett.* **114**, 118001 (2015). Featured as "Editor's Suggestion" in *Phys. Rev. Lett.*
- **M. R. Foreman**, *J. D. Swaim and F. Vollmer "Whispering gallery mode sensors" Adv. Opt. Photon.* **7**, 168–240 (2015).
- M. D. Baaske, **M. R. Foreman** and F. Vollmer "Single molecule nucleic acid interactions monitored on a label-free microcavity biosensor platform" *Nat. Nanotech.* **9**, 933–939 (2014).
- Y. Sonnefraud, H. G. Sinclair, Y. Sivan, **M. R. Foreman**, C. W. Dunsby, M. A. A. Neil, P. M. French and S. A. Maier "Experimental proof of concept of nanoparticle assisted STED" *Nano. Lett.* **14**, 4449–4453 (2014).
- **M. R. Foreman**, *S. Avino, R. Zullo, H.-P. Looock, F. Vollmer and G. Gagliardi "Enhanced nanoparticle detection with liquid droplet resonators" Eur. Phys. J. Spec. Top.* **223**, 1971–1988 (2014).
- C. Macías-Romero, **M. R. Foreman**, P. R. T. Munro and P. Török "Confocal polarization imaging in high numerical aperture space" *Opt. Lett.* **39**, 2322–2325 (2014). Featured in *V. J. Biomed. Opt.*
- *N. Mazumder, C.-W. Hu, J. Qiu, M. R. Foreman, C. Macías-Romero, P. Török, and F.-J. Kao "Revealing molecular structure and orientation with Stokes vector resolved second harmonic generation microscopy" Methods* **66**, 237–245 (2014).
- **M. R. Foreman**, W.-L. Jin and F. Vollmer "Optimizing detection limits in whispering gallery mode biosensing" *Opt. Express* **22**, 5491–5511 (2014). Featured in *V. J. Biomed. Opt.*
- G. Antonacci, **M. R. Foreman**, C. Paterson and P. Török "Spectral broadening in Brillouin imaging" *Appl. Phys. Lett.* **103** 221105 (2013).
- **M. R. Foreman** and F. Vollmer "Level repulsion in hybrid photonic-plasmonic microresonators for enhanced biodetection" *Phys. Rev. A* **88**, 023831 (2013).
- **M. R. Foreman** and F. Vollmer "Theory of resonance shifts of whispering gallery modes by arbitrary plasmonic nanoparticles" *New J. Phys.* **15**, 083006 (2013). Featured as a "Highlight of 2013" by *New J. Phys.*
- **M. R. Foreman**, C. L. Giusca, P. Török and R. K. Leach "Phase-retrieved pupil function and coherent transfer function in confocal microscopy" *J. Microsc.* **251**, 99–107 (2013).
- **M. R. Foreman**, C. L. Giusca, J. M. Coupland, P. Török and R. Leach, "Determination of the transfer function for optical surface topography measuring instruments - a review" *Meas. Sci. Technol.* **24**, 052001 (2013).
- N. Mazumder, J. Qiu, **M. R. Foreman**, C. Macías-Romero, P. Török, and F.-J. Kao, "Stokes vector based polarization resolved second harmonic microscopy of starch granules" *Biomed. Opt. Express* **4**, 538–547 (2013).
- **M. R. Foreman**, Y. Sivan, S. A. Maier and P. Török "Independence of plasmonic near-field enhancements to illumination beam profile" *Phys. Rev. B* **86**, 155441 (2012).
- N. Mazumder, J. Qiu, **M. R. Foreman**, C. Macías-Romero, C. Hu, H. Tsai, P. Török, and F. Kao, "Polarization-resolved second harmonic generation microscopy with a four-channel Stokes-polarimeter" *Opt. Express* **20**, 14090–14099 (2012).
- C. Macías-Romero, **M. R. Foreman** and P. Török, "Spatial and temporal variations in vector fields" *Opt. Express* **19**, 25077–25083 (2011).
- **M. R. Foreman** and P. Török, "Fundamental limits in single molecule orientation measurements" *New J. Phys.* **13**, 093013 (2011). Image featured in *New J. Phys* promotional material.
- **M. R. Foreman** and P. Török, "Spin-orbit coupling and conservation of angular momentum flux in non-paraxial imaging of forbidden radiation" *New J. Phys.* **13**, 063041 (2011).

PEER-REVIEWED PUBLICATIONS CTD.

- C. Macías-Romero, R. Lim, **M. R. Foreman** and P. Török, “Synthesis of partially spatially coherent beams” *Opt. Lett.* **36** 1638–1640 (2011).
- **M. R. Foreman** and P. Török, “Computational methods in vectorial imaging” *J. Mod. Opt.* **58** 339–364 (2011)
- T. Dellwig, **M. R. Foreman** and F.-J. Kao, “Coherent long-distance signal detection using stimulated emission: a feasibility study” *Chinese J. Phys.* **48** 873–884 (2010).
- **M. R. Foreman** and P. Török, “Information and resolution in electromagnetic optical systems” *Phys. Rev. A* **82** 043835 (2010). Image featured in *Phys. Rev. A Kaleidoscope*.
- **M. R. Foreman** and P. Török, “Focusing of inhomogeneous partially coherent, partially polarised electromagnetic fields” *J. Opt. Soc. Am. A* **26** 2470–2479 (2009).
- **M. R. Foreman**, C. Macías-Romero, and P. Török, “*A priori* information and optimisation in polarimetry” *Opt. Express* **16** 15212–15227 (2008).
- **M. R. Foreman**, C. Macías-Romero, and P. Török, “Determination of the three dimensional orientation of single molecules” *Opt. Lett.* **33** 1020–1022 (2008). Featured in *V. J. Biomed. Opt.*
- **M. R. Foreman**, S. S. Sherif, P. R. T. Munro, and P. Török, “Inversion of the Debye-Wolf diffraction integral using an eigenfunction representation of the electric fields in the focal region” *Opt. Express* **16** 4901–4917 (2008). Featured in *V. J. Biomed. Opt.*
- S. S. Sherif, **M. R. Foreman**, and P. Török “Eigenfunction expansion of the electric fields in the focal region of a high numerical aperture focusing system” *Opt. Express* **16** 3397–3407 (2008). Featured in *V. J. Biomed. Opt.*
- **M. R. Foreman**, S. S. Sherif, and P. Török, “Photon statistics in single molecule orientational imaging” *Opt. Express* **15** 13597–13606 (2007). Featured in *V. J. Biomed. Opt.*

NON PEER-REVIEWED PUBLICATIONS

- **M. R. Foreman**, “Single-particle spectroscopy: Whispers of absorption” *Nat. Photon.* **10**, 755–757 (2016).

BOOKS AND BOOK CHAPTERS

- S. Arnold, D. Keng, E. Treasurer and **M. R. Foreman**, *How latitude location on a micro-world enables real-time nanoparticle sizing*, in “Nano-Optics: Principles Enabling Basic Research and Applications”, B. Di Bartolo, J. Collins, and L. Silvestri, eds., NATO Science for Peace and Security Series B: Physics and Biophysics (Springer Netherlands, 2017).
- **M. R. Foreman**, “Informational limits in optical polarimetry and vectorial imaging” Springer Theses Series (Springer, 2012)

SELECTED CONFERENCE/COLLOQUIA PRESENTATIONS (ITALICS DENOTES INVITED CONTRIBUTION)

- Y. Sivan, **M. R. Foreman**, N. T. Urban and S. W. Hell “STED nanoscopy assisted by small metal nanoparticles new advances” *Nanometa 2017*, Tirol, Austria, Jan 2017.
- **M. R. Foreman**, A. Favaro and A. Aiello “Multipoles, spherical t-designs and polarization state reconstruction” *Particle, Condensed Matter and Quantum Physics: Links Via Maxwells Equations Topical Meeting*, Chicheley Hall, UK, Nov 2015.
- **M. R. Foreman**, A. Favaro and A. Aiello “Optimal Frames for Polarisation State Reconstruction” 600. *WE Heraeus Workshop*, Bad Honnef, Germany, Oct 2015.
- **M. R. Foreman** and F. Vollmer “Nanoparticle based plasmonic enhancement of high Q optical microresonators” *IPC 14*, San Diego, USA, Oct 2014.
- **M. R. Foreman**, M. D. Baaske and F. Vollmer “Single molecule detection with a high Q plasmonic-photonic biosensor” *Photon 14*, London, UK, Sep 2014.
- **M. R. Foreman**, A. Webster, J. Huang and F. Vollmer “Single particle sensing with conically scattered surface plasmons” *Photon 14*, London, UK, Sep 2014.
- *M. D. Baaske, M. R. Foreman and F. Vollmer, “Single molecule detection with high Q plasmonic photonic biosensors” ICTON 2014, Graz, Austria, Jul 2014.*
- **M. R. Foreman**, W.-L. Jin and F. Vollmer, “Optimizing detection limits in whispering gallery mode biosensing” 560. *WE Heraeus Workshop*, Bad Honnef, Germany, Apr 2014.

SELECTED CONFERENCE/COLLOQUIA PRESENTATIONS CTD.

- G. Antonacci, **M. R. Foreman**, C. Paterson and P. Török, “Scanning confocal Brillouin microscopy” Focus on Microscopy 2014, Sydney, Australia, Apr 2014.
- *F. Vollmer, M. R. Foreman, M. Baaske ”Level-repulsion in hybrid photonic plasmonic resonators: enhancing WGM biosensing,” SPIE Photonics West, San Francisco, USA, Feb 2014.*
- G. Antonacci, **M. R. Foreman**, C. Paterson and P. Török, “Dark field Brillouin microscopy for biomedical imaging ” ECBO 2013, Munich, Germany, May 2014.
- G. Antonacci, **M. R. Foreman**, C. Paterson and P. Török, “Dark-field brillouin microscopy for elasticity imaging” Focus on Microscopy 2013, Maastricht, Netherlands, Apr 2013.
- Y. Sivan, **M. R. Foreman**, S. Maier and P. Török “Independence of plasmonic near-field enhancements to the illumination beam profile” The International Conference on Surface Plasmon Photonics SPP6, Ottawa, Canada May 2013.
- R. K. Leach, J. Coupland, R. Mandal, C. Giusca, **M. R. Foreman** “Calibration of areal surface topography measuring instruments: are we there yet?” 27th Annual Meeting of the American Society for Precision Engineering, San Diego, USA October 2012.
- **M. R. Foreman**, Y. Sivan, and P. Török, “Illumination matching in plasmonic fluorescence imaging” Focus on Microscopy 2012, Singapore, Apr 2012.
- *M. R. Foreman, and P. Török, “Fundamental limits in determining the orientation of single molecules” IEEE International Symposium on Biomedical Imaging, Barcelona, Spain May 2012.*
- *M. R. Foreman, and P. Török, “Analysis of resolution in data storage and beyond” IQEC/CLEO Pacific Rim, Sydney, Australia Aug 2011.*
- **M. R. Foreman**, and P. Török, “Rigorous electromagnetic imaging of spheres on dielectric surfaces” Focus on Microscopy 2011, Konstanz, Germany Apr 2011.
- **M. R. Foreman**, and P. Török, “Focusing of inhomogeneous partially coherent, partially polarised electromagnetic fields” EOS Advanced Imaging Topical Meeting, Engelberg, Switzerland June 2010.
- *M. R. Foreman, and P. Török, “Singular system analysis in electromagnetic focusing problems” TaCoNa Photonics 2009, Bad Honnef, Germany Oct 2009.*
- *C. Macías-Romero, A. S. Van de Nes, M. R. Foreman, P. R. T. Munro and P. Török, “Multiplexed optical data storage” nanoCharm Advanced Polarimetric Imaging Techniques Meeting, Paris, France November 2009.*
- **M. R. Foreman**, C. Macías-Romero, and P. Török, “Information theoretic analysis of polarisation microscopy,” EOS Advanced Imaging Topical Meeting, Jena, Germany June 2009.
- **M. R. Foreman**, C. Macías-Romero, and P. Török, “Determination of the three dimensional orientation of single molecules,” Focus on Microscopy 2009, Krakow, Poland Apr 2009.
- **M. R. Foreman**, S. S. Sherif, P.R.T. Munro, and P. Török, “Inverse problems in high numerical aperture focusing systems,” Focus on Microscopy 2008, Osaka, Japan Apr 2008.
- **M. R. Foreman**, S. S. Sherif, and P. Török, “Polarisation structured illumination,” EOS Advanced Imaging Topical Meeting, Lille, France Sept 2007.
- **M. R. Foreman**, S. S. Sherif, and P. Török, “Determination of the orientation of a dipole subject to random orientational motion,” Focus on Microscopy 2007, Valencia, Spain Apr 2007.