

CURRICULUM VITAE:

Professor Mark C. Leake

Anniversary Chair of Biological Physics

Royal Society University Research Fellow (URF)

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Web: single-molecule-biophysics.org, **D.O.B:** 21st March, 1972.

SUMMARY:

I am the Anniversary Professorial Chair of Biological Physics, York University, heading an interdisciplinary science 9 person team specializing in single molecule research using a range of cutting-edge biophotonics/photophysical techniques in combination with state-of-the-art genetics. My work on biomolecule manipulation/AFM and optical tweezers, ultrasensitive imaging in vivo and customized microscope design involving nanometre scale imaging with millisecond time resolution leaves me well-placed to lead this research. My published work in >60 articles/books includes *Nature* and *Science*, accruing ~1,000 citations. My reputation in live-cell single molecule investigations involving multi-institutional collaborations has led to being invited to present at >40 talks worldwide as well as chairing/organizing several international meetings, and I have written a sole-authored textbook "Single-molecule cellular biophysics" for Cambridge University Press. My expertise in interfacial life/physical science research has led to several competitive research fellowships (Leverhulme Trust Early Career Fellowship, Hertford College Research Fellowship, Royal Society URF and a Systems Biology Senior Fellowship) in addition to an "Illustrious Team Research Award" from the Daiwa Adrian Anglo-Japanese Foundation. In 2010 I was the winner of the "Young Investigator Award" from the British Biophysical Society, a distinguished biennial honour to an early career biophysicist in the UK/Ireland demonstrating outstanding contributions. I have built on these achievements, establishing a lab that has exceptional expertise in the UK for studying single-molecule cell biophysics. I sit on three national level committees (Biological Physics Group of the Institute of Physics, the British Biophysical Society and the Royal Microscopical Society) which drive UK research strategy in biophysics and microscopy, in addition to sitting on the steering panel for the UK Network+ of the EPSRC Physics Grand Challenge "Understanding the Physics of Life", and I am very well-placed to drive high level biophysics research.

Since my Ph.D, I focused on developing ultrasensitive single molecule techniques to investigate complex processes of living organisms, making my own apparatus, including an atomic force microscope, a dual laser-tweezers manipulation system, nanometre and sub-millisecond resolution laser-interferometry optical apparatus and multi-colour single molecule fluorescence microscopes. These are complemented by advanced biochemical, micro and molecular biological methods, as well as significant mathematical modelling. During my Ph.D in biophysics at King's College London I developed optical techniques to characterize the mechanical properties of single molecules which act as nanoscale entropic springs. This was complemented by postdoctoral work in Heidelberg, Germany, designing and constructing an atomic force microscope for use in single molecule force spectroscopy on proteins essential to normal functioning of skeletal and cardiac muscle. Subsequently in Oxford I implemented a fluorescence system to image probes attached to bacterial filaments of live cells, and was able to resolve unprecedented nanoscale steps in rotation of a sub-cellular motor (*Nature* 2005, 437, 916). I developed novel microscopy techniques (*Nature* 2006, 443, 355 - ~140 citations; *PNAS* 2008, 105, 15376; *PNAS* 2010, 107, 11347) which, with the aid of cutting-edge genetics methods, allowed single protein molecules to be observed within a live cell, and enabled monitoring of their dynamic exchange. I also devised a novel "slimfield" imaging system to enable single molecule imaging at the millisecond time scale, used to study the architecture of DNA replication machinery in live cells (*Science* 2010, 328, 498; *Science* 2012, 338, 528). These are all vital bespoke research tools which will be implemented into my future research initiatives over the time scale of 5-10 years. In 2007, I won a Royal Society URF with a remit to perform single molecule research on live cells using advanced optical techniques, and was also elected Senior Fellow of the Oxford Centre for Integrative Systems Biology (OCISB). My interdisciplinary background and experience gives me ideal grounding for addressing fundamental biophysical and biomedical questions. These present significant challenges in interfacing several scientific disciplines. The research group I have comprises researchers of multi-discipline experience, including physics, biochemistry, chemistry and computer science Ph.D students, as well as postdocs from the physical, engineering and life sciences. This is of a significant benefit to performing groundbreaking interfacial science research. I have been successful in securing several research grants from multiple sources, with cumulative funds from all grants currently totally ~£3M.

QUALIFICATIONS:

Ph.D (Biological Physics), Randall Institute, King's College London, UK. *Investigation of the extensile properties of the giant sarcomeric protein titin by single-molecule manipulation using a laser-tweezers technique*. Supervised by Prof. R.M. Simmons FRS, 2001.

M.A. Oxford University, UK, 2008.

M.A. Cambridge University, UK. 1997.

M.Sc. Medical Physics (IPEM accredited), University of Surrey, UK, 1995.

B.A. Natural Sciences (Physics, with Honours), King's College Cambridge, UK, 1993.

A-Level 5 Passes, all grade A1 (Biology, Chemistry, "Double" Mathematics, Physics) 1990.

AS/GCSE-Level 10 Passes, all grade A, 1988.

AWARDS & HONOURS:

1. **European Biophysical Societies Association (EBSA)**, Young Investigator Finalist, 2011.
2. **Young Investigator Award**. A distinguished award made every 2 years by the British Biophysical Society to honour a single early career research scientist in the UK and Ireland who has demonstrated an outstanding contribution to biophysics, 2010.
3. **Fellow of the Royal Microscopical Society (FRMS)**, elected, 2008+.
4. **Hertford College Science Research Fellowship**, 2008-2011.
5. **Royal Society University Research Fellowship** for independent research, 2007+.
6. **Daiwa Adrian Anglo-Japanese Prize**. Co-author for bacterial motor research, 2007.
7. **Leverhulme Trust Early Career Fellowship** for independent research, 2006-07.
8. **Merit Award**, for exceptional research performance, Oxford University, 2005, 6, 7, 11 & 12.
9. **BBSRC Special Scholarship Award**, King's College London 1996-2000.
10. **Newton Trust Award**, high academic performance, Cambridge University, 1990-92.
11. **Bronze Award for British Physics Olympiad**, top 100 UK school physicists, 1990.

EMPLOYMENT HISTORY:

RESEARCH:

1. **Incoming Anniversary Chair and Professor (Full) of Biological Physics, York University, UK 2013+**.
2. **Senior Researcher/Reader, Oxford University, UK 2012+**.
3. **Royal Society University Research Fellowship (URF), Oxford University, UK 2007+**. Development of advanced single-molecule optical techniques in living cells (*Science* 2010, 328, 498; *Science* 2012, 338, 528).
4. **Senior Research Fellow & Principal Investigator in Systems Biology, Oxford University, UK. 2007+**. Hosted by the Oxford Centre for Integrative Systems Biology Centre (OCISB).
5. **Hertford College Oxford Science Research Fellowship**, 2008-2011.
6. **Principal Investigator of the Interdisciplinary Research Collaboration in Bionanotechnology, Oxford University, UK. 2007-2009**.
7. **Leverhulme Trust Early Career Fellow, Oxford University, UK. 2006-2007**. Establishing an independent biophotonics research laboratory.
8. **Interdisciplinary Research Collaboration Research Fellow in Bionanotechnology, Oxford University, UK. 2003-2006**. Designed and constructed a single-molecule fluorescence microscope for live cell imaging (*Nature* 2006, **443**, 355; *Nature* 2005 **437**, 916).
9. **Deutsche Forschungsgemeinschaft Postdoctoral Research Fellow, Ruprecht-Karls-Universität Heidelberg, Germany. 2002-2003**. Designed and constructed an atomic-force microscope for force spectroscopy of single bio-molecules, developed mathematical models for muscle function to relate single-molecule properties to those of whole cells and tissues: Institute of Physiology and Pathophysiology, University of Heidelberg, Germany, including sabbatical at Columbia University, USA with Prof. Julio Fernandez.
10. **Postdoctoral Research Fellow in Biological Physics, Oxford University, UK. 2001-2002**. Investigation of living cells by developing electrorotation and laser-tweezers techniques.

TEACHING:

11. **Incoming Chair of Biological Physics, York University, UK 2013+**.
12. **Lecturer, Single-Molecule Measurements in Biological Physics, Physics Dept, Oxford University, UK. 2010+**.
13. **Lecturer, Advanced Microscopy Course, Biochemistry Dept, Oxford University, UK. 2009+**.
14. **Organizer/chair of condensed matter physics graduate student seminars, Physics Dept (Biological Physics), Oxford University, UK, 2009+ (24 seminars per year)**.

15. **College Lecturer in Physics, Hertford College Oxford, UK, 2008+**. Thermal physics, kinetic theory and statistical mechanics, biological physics, single-molecule methods.
16. **College Lecturer in Biochemistry, Hertford Oxford, UK, 2008+**. Biophysical chemistry, biophysical techniques.
17. **College Lecturer in Biological Physics, Lincoln College Oxford, UK, 2007-2009**.
18. **Lecturer in Bionanotechnology, Biochemistry Dept, Oxford University, UK. 2007+**
19. **Lecturer in Systems Biology, Biochemistry Dept, Oxford University, UK. 2007+**

CONSULTANCY:

20. **Registered scientific expert consultant, Oxford University Consulting Services (OUCS), UK. 2010+.**

5 MOST IMPORTANT RECENT PUBLICATIONS (>430 CITATIONS FROM TOP 5 PAPERS):

= first/lead author. * = corresponding/senior author.

1. Badrinarayanan A, Reyes-Lamothe R, Uphoff S, **Leake MC*** & Sherratt DJ. *In vivo* architecture and action of bacterial structural maintenance of chromosome proteins. *Science* 338, 528-531 (2012).
2. Reyes-Lamothe R, Sherratt DJ & **Leake MC.*** Stoichiometry and architecture of active DNA replication machinery in *Escherichia coli*. *Science* (2010), 328, 498-501. [Rated Exceptional by the Faculty of 1000 Biology, <http://www.f1000biology.com/article/id/3176956>]
3. **Leake MC^{#,*}**, Greene NP, Godun RM, Granjon T, Buchanan G, Chen S, Berry RM, Palmer T & Berks BC. Variable stoichiometry of the TatA component of the twin-arginine protein transport system observed by *in vivo* single-molecule imaging. *Proc Natl Acad Sci U S A*. 105, 15376-15381 (2008).
4. **Leake MC[#]**, Chandler JH, Wadhams GH, Bai F, Berry RM & Armitage JP. Stoichiometry and turnover in single, functioning membrane protein complexes. *Nature*. 443, 355-8 (2006).
5. Sowa Y, Rowe AD, **Leake MC**, Yakushi T, Homma M, Ishijima A & Berry RM. Direct observation of steps in rotation of the bacterial flagellar motor. *Nature*. 437, 916-919 (2005).

PAST/EXTANT COMPETITIVE RESEARCH GRANTS/FUNDING AWARDS (TOTAL AS PI/CO-APP £3.3M):

1. Royal Society University Research Fellowship Renewal. Inside the black box: probing functional DNA-based nanomachines, one by one, 2012-2015. Sole PI. £394,946.00.
2. Oxford Cancer Research Centre Development Fund (CRUK C38302/A12278). Investigating cancer in living human cells using ultrasensitive single-molecule optical microscopy. 2011-2012. Sole PI. £25,000.00.
3. Marie Curie EU FP7 Initial Training Network (ITN) "ISOLATE. Developing single cell technologies for systems biology", (ranked 92.4/100%), Establishing a graduate training network of 11 new researchers in the development of single cell measurement techniques, 2011-2014. Co-applicant (from 9 co-applicants, 1 PI). Leake total £208,959.20 from €2,994,929.00 project total.
4. Wellcome Trust "Micron" Bio-Imaging Unit, Oxford University, 2010-2015. 1 of 15 named group leader participants. Ca. £3M.
5. MRC PhD Studentship (3-year). Monitoring cancer in living human cells using advanced optical microscopy. 2010-2013. Sole PI. £65,000.00.
6. Royal Society URF 2008R2/Fellow Award, RG0803569. Developing an advanced super-resolution multi-dimensional custom optics module to monitor biological systems to single-molecule precision in real-time in living cells, 2009. Sole PI. £50,000.00.
7. EPSRC, EP/G061009/1. Advanced multidimensional optics to investigate biological complexity at the single-molecule level in living, functional cells, 2009-2012. Sole PI. £244,824.00.
8. BBSRC, BB/F021224/1. Protein turnover studies using single-molecule microscopy in functional bacterial flagellar motors of live cells to assess molecular complex stability, 2008-2012. 1 of 3 co-applicants. £796,201.00.
9. Hertford College Fellowship, Oxford University. Bottom-up systems biology using multidimensional optical proteomics, 2008-2011. Sole PI. £24k.
10. OUP (John Fell Fund). Multidimensional optical proteomics at the single-molecule level in vivo, 2008. Sole PI. £90k.
11. Oxford Centre for Integrative Systems Biology (BBSRC BB/D020190/1), Oxford University. Quantitative subcellular image analysis, 2008-2011. 1 of 3 PIs. £256,562.44.

12. Interdisciplinary Research Collaboration PI award. Developing advanced optical microscopy techniques for investigating living cells, 2007-2009. Sole PI. £78,000.00.
13. David Ryan Clarendon Summer Studentship Project Award. Development of advanced optical techniques for single-molecule biophysical application, 2008. Sole PI. £1,400.00.
14. Nuffield Foundation Undergraduate Project Studentship, URB/36029. Investigating the dynamics of membrane protein complexes, 2008. Sole PI. £1,400.
15. Royal Society University Research Fellowship, 516002.K5920/ROG. Bottom-up systems biology using molecular, multidimensional optical proteomics, 2007-2012. Sole PI. £483,709.60.
16. Leverhulme Trust Early Career Fellowship, ECF/2006/0428. Molecular exploration of chemotaxis with advanced optics, 2006-2007. Sole PI. £50,918.00.
17. BBSRC, 96/B1/E/02289, Mechanics and structure of single biopolymer molecules. 1996-2000. Studentship. £37,106.00.

CONFERENCE AND LEARNED-MEETINGS ORGANIZATION:

1. **Physics of the Living Cell, International Plenary Workshop co-organizer and chair for Physics of Life EPSRC Network**, Oxford University (for July 2013).
2. **Conference co-organizer and chair**, 2013. International IoP meeting in Advanced Photonics Techniques in Biology, Institute of Physics, London.
3. **Physics meets Biology, International IoP conference organizing committee**, Oxford University (for Sept 2012).
4. **Oxford Photonics Workshop meeting co-organizer**, Oxford University, 2012.
5. **Conference co-organizer and chair**, 2011. International IoP meeting in Advanced Photonics Techniques in Biology, Institute of Physics, London.
6. **Conference chair**, 2010. Biological applications of single molecule fluorescence, Biophysics 2010: 50 years of the BBS, Cambridge.
7. **Conference co-organizer and chair**, 2009. International Conference for Quantitative Imaging in Systems Biology, St. Catherine's College Oxford University.
8. **Oxford Biological Physics seminar series**, 2009+. Organizer and chair of weekly interdepartmental-themed seminars held in the Oxford University Physics Dept involving domestic and international speakers of excellence in biological physics.
9. **Conference co-organizer and chair**, 1999. 18th Alternative Muscle Club Conference, National Institute for Medical research, Mill Hill, London.

COMMITTEE AND EDITORIAL BOARD MEMBERSHIP:

1. **Royal Society Research Grants Scheme Biological Sciences Board**, elected member, 2013+.
2. **Senior Editor**, invited editorial board member, for the *ScienceJet* journal, 2012+.
3. **The Physics of Life** invited steering panel member for UK biological physics network 2012+.
4. **Understanding the Physics of Life** invited bid committee member, 2011-12 to establish an EPSRC Physics Grand Challenge Network+.
5. **Editorial Board Member**, invited member, 2011+ for the *Scientific World Journal*.
6. **Oxford University Photonics Working Group**, 2011+, 1 of 5 invited Principal Investigators across all Oxford University Science Depts working to foster focused, interfacial collaboration through future research and graduate training in Photonics across Oxford.
7. **Royal Society International Exchange Scheme Review Committee**, elected member, 2011+.
8. **Editorial Board Member**, invited member, 2010+ for the *Journal of Bioprocessing and Biotechniques*.
9. **Micron Oxford Steering Committee**, elected member, 2010+ of the Advanced Microscopy Unit management committee, Biochemistry Dept, Oxford University.
10. **Light Microscopy Committee (Royal Microscopical Society)**, elected member, 2010+.
11. **Faculty Member** Dept of Physics, Oxford University, 2010+.
12. **Trustee of Hertford College Oxford**, 2010+.
13. **Royal Society International Travel Grants Committee**, elected member, 2009-2011.
14. **British Biophysical Society (BBS)** elected committee member, 2009+.
15. **Member of Oxford University Congregation**, 2009+.
16. **Oxford Biomedical Imaging Network** elected management committee member, 2008+.
17. **Biological Physics (Institute of Physics, UK)** elected committee member, 2008+.
18. **Governing Body Member**, Hertford College Oxford, 2008-2011.
19. **Condensed Matter Physics**, Oxford University, committee member, 2006+.

UNIVERSITY EXAMINER AND ADMISSIONS RESPONSIBILITIES:

1. **Formal Oxford University exam invigilator**, biological physics, 2011+.
2. **Graduate student Thesis Committee**, Oxford University Biochemistry Dept, 2011+.
3. **Invited external assessor** for Marie Curie Initial Training Network on Muscle Protein Complexes, Universität Wien, Austria, 2011.
4. **DPhil/Ph.D examiner**, 2009+ (internal/external examiner for 10 vivas to date).
5. **MPhys oral examiner, Physics Dept, Oxford University**, 2008+ (conducted ca. 50 vivas to date for biological physics final year undergraduate projects).
6. **Collections exam marker**, 2008+ Thermal Physics and Kinetic Theory, Dept of Physics, Oxford University.
7. **University admissions interviewer**, 2008, Lincoln College Oxford.
8. **D.Phil (Ph.D) transfer examiner, Physics and Biochemistry Depts, Oxford University**, 2007+ (conducted ca. 20 transfer viva examinations to date for graduate students).
9. **Exam assessor in Systems Biology, Biochemistry Dept, Oxford University**, 2007+ (4th year biochemistry undergraduate course).
10. **Exam assessor in Bionanotechnology, Biochemistry Dept, Oxford University**, 2007+ (4th year biochemistry undergraduate course).

ACADEMIC SUPERVISION AND PASTORAL CARE:

1. **DPhil (Ph.D) student supervisor, Physics and Biochemistry Depts, Oxford University**, 2007+ (currently to 6 students).
2. **Group supervisor to post-doctoral staff, Physics and Biochemistry Depts, Oxford University** 2007+ (currently to 2 PDRAs).
3. **Short project supervisor**, 2007+ (supervised 10 short undergraduate and graduate research projects).
4. **Pastoral undergraduate tutor**, 2007-2009 Lincoln College Oxford (Biochemistry).

INVITED TALKS:

1. **Single cell technology workshop 2012, University of Gothenburg, Sweden**. Invited speaker.
2. **Physics meets Biology 2012, Institute of Physics Conference, Oxford University**. Invited speaker.
3. **Biophysics at All Scales, British Biophysical Society 2012 Conference, Durham University**. Invited speaker.
4. **Zoology Dept, Oxford University**, 2012. Invited speaker for the JWS Pringle Centenary Lectures: muscles, flight and the diversification of zoological research in Oxford.
5. **Edinburgh University**, 2012. Invited seminar speaker.
6. **Dept of Physics, York University**, 2011. Invited seminar speaker.
7. **Polymer Physics Group, Leeds University**, 2011. Invited seminar speaker.
8. **Dept of Physics, Surrey University**, 2011. Invited seminar speaker.
9. **Cavendish Laboratory, Cambridge University**, 2011. Invited seminar speaker.
10. **Biology School, York University**, 2011. Invited seminar speaker.
11. **Biomedical Sciences Division, Sheffield University**, 2011. Invited divisional seminar speaker.
12. **Hertford College Oxford University**, 2011. Invited academic lecture speaker.
13. **CMMP10, Institute of Physics, Warwick University**, 2010. Invited conference speaker.
14. **Biophysics 2010: Celebrating 50 years of the BBS, Cambridge University**, 2010. Invited keynote conference speaker.
15. **Berkeley, UCLA**, 2010. Invited speaker for bioengineering and biotechnology seminar.
16. **Oxford Biochemistry**, 2010. Invited speaker for departmental seminar series.
17. **Institute of Biophysics, Imaging and Optical Science (IBIOS), Nottingham University** 2009. Invited conference speaker.
18. **Boston, US Biophysical Society**, 2009. Invited speaker for single molecule workshop.
19. **Oxford Biochemistry**, 2009. Invited speaker for departmental seminar series.
20. **Oxford University Vice-Chancellor Forum**, 2008. Invited speaker for interdepartmental research forum.
21. **Hertford College Oxford University**, 2008. Invited research presentation.
22. **Optical Proteomics Research Network, KCL**, 2008. Invited conference speaker.
23. **Microscience, London**, 2008. Invited conference speaker.

24. **Systems Biology Doctoral Training Centre, Oxford University**, 2008. Invited workshop speaker.
25. **Centres for Integrative Systems Biology (CISB), Newcastle**, 2007. Invited conference speaker.
26. **Japan-Anglo Bionanotechnology Forum**, 2007. Invited workshop speaker.
27. **Oxford Physics**, 2007. Invited research presentation.
28. **Interdisciplinary Research Collaboration Bionanotechnology Industry Day, Oxford University**, 2007. Invited workshop speaker.
29. **Life Sciences Initiative Doctoral Training Centre, Oxford University** 2007. Invited research presentation.
30. **European Light Microscopy Institute, York University**, 2007. Invited conference speaker.
31. **Edinburgh Physics Dept, Edinburgh University**, 2007. Invited research presentation.
32. **Edinburgh Centre for Systems Biology, Edinburgh University**, 2007. Invited research presentation.
33. **Oxford Centre in Integrative Systems Biology, Oxford University**, 2007. Invited research presentation.
34. **Nottingham Genetics Dept, Nottingham University**, 2006. Invited research presentation.
35. **Oxford Bionanotechnology IRC, Oxford University**, 2006. Invited seminar speaker.
36. **Oxford Physics**, 2003. Invited research presentation.
37. **European Molecular Biology Laboratory (EMBL) Heidelberg, Germany**, 2002. Invited seminar speaker.
38. **Institut für Physiologie und Pathophysiologie, Universität Heidelberg, Germany**, 2002. Invited seminar speaker.
39. **San Francisco, US Biophysical Society**, 2002. Invited research presentation.

OUTREACH:

1. **Institute of Physics Mentor**, 2011+ (registered, active mentor for the IoP Mentor scheme)
2. **Oxford Physics open days**, 2003+ (assisting in the departmental outreach to prospective undergraduate students).

PROFESSIONAL AFFILIATIONS:

Full member of the British and American Biophysical Societies, of the Biochemical Society (UK) and of the Institute of Physics (UK). Fellow of the Royal Microscopical Society (FRMS) and member of the European Microscopy Society. Invited article reviewer for several journals including *Nature*, *Science*, *PNAS*, *Nature Methods*, *Biophysical Journal*, *PloS ONE*, *Journal of Molecular Biology*, *Journal of Integrative Biology*, *Journal of Biotechnology*, *Computer Physics Communications*, *Acta Biomaterialia*, *Bulletin of Mathematical Biology*, *Biotechnology Journal*, *Trends in Biochemistry*, *Biomicrofluidics*, *Recent Patents in Biotechnology* and the *European Biophysics Journal*, 2004-Present, editorial board member of the *Journal of Bioprocessing and Biotechniques* (2010-Present), the *Scientific World Journal* (2011-Present) and Senior Editor of the *ScienceJet* journal (2012-Present). Peer-reviewed multiple grant applications for BBSRC, EPSRC, Leverhulme Trust, MRC, Royal Society and Wellcome Trust, and several non-UK research funding councils including CNRS/INSB (France), IWT (Belgium), FCT (Portugal) and NOW (The Netherlands).

FULL PUBLICATIONS LIST (63 IN TOTAL, ~1,000 CUMULATIVE CITATIONS):

= first author. * = corresponding/senior author.

PEER-REVIEWED ORIGINAL RESEARCH PAPERS, LETTERS AND ARTICLES:

2012:

1. **Leake MC.#,*** The Physics of Life: one molecule at a time. *Phil Trans B.* (2012) 368, 20120248.
2. Robson A, Burrage K & **Leake MC.*** Inferring diffusion in single live cells at the single molecule level. *Phil Trans B.* (2012) 368, 20130029.
3. Badrinarayanan A, Reyes-Lamothe R, Uphoff S, **Leake MC*** & Sherratt DJ. *In vivo* architecture and action of bacterial structural maintenance of chromosome proteins. *Science* 338, 528-531 (2012).
4. Lenn T & **Leake MC.*** Experimental approaches for addressing fundamental biological questions in living, functioning cells with single molecule precision. *Open Biol.* (2012), 2, 120090. [Featured Article of the Month].

2011:

5. Harriman OLJ & **Leake MC**.* Single molecule experimentation in biological physics: exploring the living component of soft condensed matter one molecule at a time. *J. Phys.: Condens. Matter* (2011), 23, 503101.
6. Chiu S-W & **Leake MC**.* Functioning nanomachines seen in real-time in living bacteria using single-molecule and super-resolution fluorescence imaging. *Int. J. Mol. Sci.* (2011)12, 2518-2542.

2010:

7. **Leake MC**.* Shining the spotlight on functional molecular complexes: the new science of single-molecule cell biology. *Commun Integr Biol.* (2010), 3, 415-418.
8. Reyes-Lamothe R, Sherratt DJ & **Leake MC**.* Stoichiometry and architecture of active DNA replication machinery in *Escherichia coli*. *Science* (2010), 328, 498-501.
9. Delalez NJ, Wadhams GH, Rosser G, Xue Q, Brown MT, Dobbie IM, Berry RM, **Leake MC*** & Armitage JP. Signal-dependent turnover of the bacterial flagellar switch protein FliM. *Proc Natl Acad Sci U S A* 107, 11347-11351 (2010).
10. Xue Q, Jones NS & **Leake MC***. A general approach for segmenting elongated and stubby biological objects: extending a chord length transform with the radon transform. *Proc. IEEE Internat. Symp. Biomed. Imaging (ISBI): From Nano to Macro* (2010), 161-164. (available at <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=05490388> DOI: 10.1109/ISBI.2010.5490388).

2009:

11. Dobbie IM, Robson A, Delalez N & **Leake MC**.* Visualizing Single Molecular Complexes In Vivo Using Advanced Fluorescence Microscopy. (2009) *J Vis Exp* 31, 1508 (2009). Available at: www.jove.com/index/Details.stp?ID=1508, DOI: 10.3791/1508.
12. Plank M, Wadhams GH & **Leake MC***. Millisecond timescale slimfield imaging and automated quantification of single fluorescent protein molecules for use in probing complex biological processes. *Integr. Biol.* 1, 602 – 612 (2009). Available at <http://xlink.rsc.org/?doi=B907837A>, DOI: 10.1039/b907837a.
13. Pilizota T, Brown M, **Leake MC**, Branch R, Berry RM & Armitage JPA. A molecular brake, not a clutch, stops the *Rhodobacter sphaeroides* flagellar motor. *Proc Natl Acad Sci U S A*. 106, 11582-11587 (2009).
14. Xue Q & **Leake MC***. A novel multiple particle tracking algorithm for noisy in vivo data by minimal path optimization within the spatio-temporal volume. *Proc. IEEE Internat. Symp. Biomed. Imaging (ISBI): From Nano to Macro* (2009), 1158-1161, (available at <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5193263&isnumber=5192959>) DOI: 10.1109/ISBI.2009.5193263

2008:

15. Lenn T, **Leake MC**[#] & Mullineaux CW. In vivo clustering and dynamics of cytochrome bd complexes in the *Escherichia coli* plasma membrane. *Mol. Microbiol.* 70, 1397-1407. (2008).
16. **Leake MC**^{#,*}, Greene NP, Godun RM, Granjon T, Buchanan G, Chen S, Berry RM, Palmer T & Berks BC. Variable stoichiometry of the TatA component of the twin-arginine protein transport system observed by *in vivo* single-molecule imaging. *Proc Natl Acad Sci U S A*. 105, 15376-15381 (2008).
17. Lenn T, **Leake MC** & Mullineaux CW. Are *Escherichia coli* OXPHOS complexes concentrated in specialised zones within the plasma membrane? *Biochem. Soc. Trans.*, 36, 1032-1036 (2008).

2007:

18. Lo CJ, **Leake MC**, Pilizota T & Berry RM. Single-cell measurements of Membrane Potential, Sodium-Motive Force and Flagellar Motor Speed in *Escherichia coli*. *Biophys. J.* 93, 294-302 (2007).

2006:

19. **Leake MC**[#], Chandler JH, Wadhams GH, Bai F, Berry RM & Armitage JP. Stoichiometry and turnover in single, functioning membrane protein complexes. *Nature*. 443, 355-8 (2006).
20. Reid SW, **Leake MC**, Chandler JH, Lo CJ, Armitage JP, Berry RM. The maximum number of torque-generating units in the flagellar motor of *Escherichia coli* is at least 11. *Proc Natl Acad Sci U S A*. 103, 8066-71 (2006).
21. **Leake MC**[#], Grutzner A, Kruger M & Linke WA. Mechanical properties of cardiac titin's N2B-region by single-molecule atomic force spectroscopy. *J Struct Biol.* 155, 263-72 (2006).

22. Bullard B, Benes V, Tzintzuni G, **Leake MC**, Linke WA & Oberhauser AF. The molecular elasticity of the insect flight muscle proteins projectin and kettin. *Proc. Natl. Acad. Sci. U S A.* 103, 4451-6 (2006).
23. Lo CJ, **Leake MC** & Berry RM. Fluorescence measurement of intracellular sodium concentration in single *Escherichia coli* cells. *Biophys. J.* 90, 357-65 (2006).
- 2005:**
24. Sowa Y, Rowe AD, **Leake MC**, Yakushi T, Homma M, Ishijima A & Berry RM. Direct observation of steps in rotation of the bacterial flagellar motor. *Nature.* 437, 916-919 (2005).
25. Lo CJ, **Leake MC** & Berry RM. Intracellular sodium concentration of chimera *Escherichia coli*. *FEBS J.* 272, 345-6 (2005).
- 2004:**
26. Linke WA. & **Leake MC**. Multiple sources of passive stress relaxation in muscle fibres. *Phys. Med. Biol.* 49, 3613-3627 (2004).
27. Makarenko I, Opitz CA, **Leake MC**, Neagoe C, Kulke M, Gwathmey JK, del Monte F, Hajjar RJ & Linke WA. Passive stiffness changes of compliant titin isoforms in human DCM hearts. *Circ. Res.* 95, 708-16 (2004).
28. **Leake MC[#]**, Wilson D, Gautel M & Simmons RM. The elasticity of single titin molecules using a two-bead optical tweezers assay. *Biophys. J.* 87, 1112-1135 (2004).
29. Opitz CA, **Leake MC**, Makarenko I, Benes V & Linke WA. Developmentally regulated switching of titin size alters myofibrillar stiffness in the perinatal heart. *Circ. Res.* 94, 967-75 (2004).
30. Bullard B, Ferguson C, Minajeva A, **Leake MC**, Gautel M, Labeit D, Ding L, Labeit S, Horwitz J, Leonard KR & Linke WA. Association of the chaperone {alpha}B-crystallin with titin in heart muscle. *J. Biol. Chem.* 279, 7917-7924 (2004).
- 2003:**
31. Opitz CA, Kulke M, **Leake MC**, Neagoe C, Hinssen H, Hajjar RJ & Linke WA. Damped elastic recoil of the titin spring in myofibrils of human myocardium. *Proc. Natl. Acad. Sci. U S A.* 100, 12688-93 (2003).
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