Dr. Thomas E. Ouldridge

Contact Information

t.ouldridge@imperial.ac.uk +447533696954
Personal web page http://www.imperial.ac.uk/people/t.ouldridge
Group web page: http://www.imperial.ac.uk/principles-of-biomolecular-systems/

Research Summary

I combine molecular simulation, physical modelling and experiments to explore the possibilities and fundamental limits of engineered molecular systems and processes.

Qualifications

D. Phil. in Theoretical Physics, University of Oxford, Oxford, UK. 2007–2011
"Coarse-grained modelling of DNA and DNA self-assembly."

M.Phys. (Hons) in Physics, Keble College, University of Oxford, Oxford, UK. 2003–2007

- 1st class, awarded *Scott prize* for obtaining the highest mark out of 150 candidates.
- Awarded Keble College academic scholarship. 2004–2007

Memberships of learned bodies

International Society for Nanoscale Science, Computation and Engineering 2013–present

Academic Positions

Royal Society University Research Fellow in the Department of Bioengineering, Imperial College London, UK. 2016–present

- Group leader of the "Principles of Biomolecular Systems" group.
- Supervising an interdisciplinary team of students undertaking theoretical, computational and experimental work to probe the role of statistical mechanics and stochastic thermodynamics in biomolecular systems.
- My group designs models of biochemical systems on multiple scales, develops and applies novel methods to simulate and understand these models, and tests the results through nucleic-acid based experiments.

Junior Research Fellow in Applied Mathematics, Imperial College London, UK. 2014–2016

- An independent position awarded to investigate the fundamental physical principles of biochemical signalling networks.
- Leveraged my position to develop a broader research programme on the interplay between chemical details and general principles in determining the behaviour of complex systems.
- I led the research within this programme, either as a supervisor initiating and overseeing projects, or performing the detailed work personally.
- Used my independence to nurture collaborations both inside and outside of the college.

Weir Junior Research Fellow in Mathematical and Physical Sciences (Department of Physics), University College, University of Oxford, Oxford, UK 2011–2014

- An independent research position awarded to apply the model of DNA developed during my PhD to understand a range of biophysical and nanotechnological systems.
- Initiated national and international collaborations with experimentalists based on modelling successes.
- I visited a "Biochemical Networks" group in Amsterdam for six months to broaden my expertise; the resultant ideas formed my subsequent Fellowship proposal at Imperial.

Funding

Rational Engineering of Synthetic Systems for Propagation of Information by Catalytic Assembly of Copies (RESSPICAC) 2019-2024 £1.34M
Principal investigator. ERC starting grant.

Design of DNA nanostructures for disease diagnostics and prognostics 2019-2023 £64,000
Co-Investigator. Competitively-awarded EPSRC CDT studentship.

A synthetic biology toolbox for electronic control of gene expression 2019-2022 £67,000
Principal Investigator. Competitively-awarded Leverhulme CDT studentship.

Funding

Catalysed dimerization as a precursor to autonomous polymer copying in synthetic systems 2018
Principal Investigator. Royal Society Research Grant. £20,000

Principles and construction of molecular information processors 2018-2022
Principal Investigator. Royal Society-funded PhD studentship. £93,742

Genetically encoded nucleic acid control architectures 2017-2021
Joint Principal Investigator. EPSRC-funded. £631,140

Engineering of artificial push-pull networks from DNA 2017-2021
Principal Investigator. Royal Society-funded PhD studentship. £109,760

Persistent information: Thermodynamics of active biochemical systems 2016-2021
Principal Investigator. Royal Society University Research Fellowship. £460,000

Adding multiscale models of DNA to LAMMPS 2015-2016
Co-Investigator. EPSRC-funded ARCHER-embedded CSE support. £92,000

Non-additivity of DNA mismatches 2015
Principal Investigator. Imperial College London UROP award. £1,500

The limits constraining sensing and signalling 2014-2017
Principal Investigator. Imperial College London: Junior Research Fellowship. £166,000

New Langevin and Brownian algorithms for rigid bodies 2013-2015
Joint Principal Investigator. EPSRC-funded CCP5 Network collaboration grant. £500

Coarse-grained modelling of DNA nanotechnology 2011-2014
Principal Investigator. University College Oxford: Junior Research Fellowship. £90,000

Total: £3.13M

Part of the successful bid for an EPSRC CDT in Biodesign Engineering. 2019-2027

Professional Esteem

Honours:

- President's Award for Outstanding Early Career Research (Imperial College London). 2019
- Awarded the inaugural *Robert Dirks Molecular Programming Prize* by ISNCSE. 2016
- D.Phil. thesis awarded *IOP Computational Group annual PhD thesis prize.* 2012
- D.Phil. thesis selected for publication in *Springer Theses.* 2012

Impact of research: oxDNA, the coarse-grained model of DNA that I developed during my PhD, is now used by more than 17 groups worldwide, and has led to over 80 publications.

Submitted as a researcher for REF by the University of Oxford Physics Department. 2014

Refereeing, Reviewing and Examining 2010–present

- Reviewer for *Nat. Phys., Nat. Chem., ACS Nano, J. Am. Chem. Soc., ACS Synth. Biol., PNAS, Soft Matter, Phys. Rev. Lett., Phys. Rev. X, Nucl. Acids Res., PLoS Comp. Biol.* and others.
- Member of the DNA24, DNA25 and BioMedEng Program Committees. 2018-present
- External examiner on PhD theses at the University of Amsterdam, University of Luxembourg and University of Oxford. 2017-2019
- Reviewer for the NWO ECHO grant program. 2018
- External reviewer for the NASA Astrobiology Institute CAN 8 proposals. 2017
- Reviewer for the Simons Foundation's targeted grants in the mathematical modeling of living systems. 2016
- Selected as a "Top Reviewer" by the Journal of Chemical Physics. 2014
- Proposal review board member for the Molecular Foundry, California. 2012–2014

Invited to write an article for *The Biochemist* by Portland Press. 2019
Invited to submit a chapter for a book on the thermodynamics of computation by SFI press. 2018
Invited to contribute to the EPSRC-supported "Naked Scientists" podcast. 2017
Invited to submit a review for the *New Views* series by the editorial board at *Mol. Phys.* 2013

Professional Responsibilities

Department of Bioengineering Campus Champion 2019-present

- Responsible for representing staff during the move to a split-campus Department.
- Set up a platform to identify issues and bring these to the attention of the management.

Management Board for the IC Centre for Synthetic Biology 2018-present

- Representing the interests of modelling and theory within the centre.
- Responsible for creation and maintenance of website and online presence (twitter, mail etc.).

Department of Bioengineering Open Access Champion 2017-present

- Responsible for monitoring the evolving state of open access publishing, and communicating it to the Department.
- Created and managed an online resource dedicated to the Department's needs.

Organiser for the Biomathematics Group Seminar 2015-2016

- Responsible for selecting, contacting and hosting world-leading speakers.

During The COVID-19 pandemic of 2020 I provided additional support to the teaching office of the Department of Bioengineering at Imperial. Specifically, I set up and ran a system for managing students with additional arrangements for the remote exams.

Supervision and Teaching

Project Supervision 2008-present

- Currently supervising four research associates (two shared), six PhD students (two shared), four individual MEng project students and one MSc project.
- Led the 2018 Imperial entry to iGEM, a synthetic biology competition for teams of undergraduate students. The students received a gold award.
- Previously supervised 17 Masters students, and also previously *de facto* co-supervisor of two research associates and four PhD students.
- After completing their work with me, nine Masters students have subsequently undertaken PhDs, and four of the projects have led to peer-reviewed publications.

Lecturing

- Course Leader on Pre-Sessional Mathematics and Programming Module. 2017 - present
  Part of the new Intercalated BSc in Biomedical Sciences with Biomedical Engineering at Imperial College London.
  - Developed a distance-learning course *de novo*.
  - Extensive use of automated formative assessment through MapleTA.
  - Introducing new learning technology to the faculty (Adobe Connect, Zoom).
  - Developed an interactive, Arduino-based programming component.
- Lecturer on Stochastic Processes and Networks. 2016 - present
  Part of the Modelling in Biology module of the MEng in Biomedical Engineering/Molecular Bioengineering at Imperial College London.
  - Updated syllabus to provide a more complete understanding of stochastic processes.
  - Revamped delivery method to a flipped-classroom approach, with extensive notes, exercises and videos for the students to work through ahead of small group tutorials.
  - Lecturer SOLE score average: 1.065 (2017), 1.294 (2018) and 1.196 (2019). Course SOLE score average: 1.054 (2017), 1.31 (2018) and 0.910 (2019).
- Lecturer on "An Introduction to Matlab". 2019 - present
  Introductory course for incoming MSc/Intercalated BSc students in the Department of Bioengineering at Imperial College London.
  - Prepared a week-long course with lectures and coding-based activities for incoming students.

Supervision and Teaching

Providing Tutorials and Classes

- Personal tutor for 20 MEng and three MSc students. 2016-present
  Primary pastoral contact for students in college, providing guidance in professional and academic development and monitoring for student issues. In 2020 I took over the supervision of another tutor's students while they were incapacitated due to COVID-19.
- College tutor for the MPhys/BA in Physics at the University of Oxford. 2008–2014
  Tutored fluid mechanics, dynamical systems, stochastic processes, atomic and molecular physics, condensed matter physics and biophysics at University College, Oxford (2011–2014) and Keble College, Oxford (2008-2011). Responsible for 8-10 students per year, providing around 40 hours of total contact time in tutorials and small classes. Produced notes on fundamental principles to complement the lecture series and developed innovative extension problems for the tutorials. Personally singled out for praise for my commitment by students in feedback. Conducted interviews and designed questions for prospective students.

Outreach and Engagement

Mentor on the Windsor Fellowship Scheme 2017–present
Providing monthly advice and support for a year-12 student as part of an effort to increase the number of black students in STEMM disciplines.

Invited to publish an article on my work in Research Outreach 2020
Wrote an article explaining some of the deeper physical ideas underlying my work for a wider audience, in collaboration with a dedicated public outreach team.

Imperial College Festival 2017
Helped to run a CSynBI outreach stall.

Science Museum Lates, The Science Museum, London. 2015
Coordinated four interactive demonstrations of our research into stochasticity to the public.

Imperial College Outreach Programme. 2014–2016

- Planned and delivered four two-hour STEM potential development workshops, including one on my research area (entropy generation in biochemical reactions).
- Organised a work experience placement and project for a GCSE student from a local school.

Schools Liaison Forum, University College, Oxford. 2011–2013

- Participated in the development of University College's outreach and access framework.
- Led a demonstration interview for prospective applicants.

Personal development workshops

Introduction to teaching for learning April 2019
Understanding the range of approaches to teaching, and types of learning outcomes.

Royal Society science policy primer for research fellows March 2018
What policy is, how it is made, and how to enable scientific output to impact policy.

Introduction to supervising PhD students at Imperial May 2017
Understanding the role and requirements of a supervisor.

Introduction to technologies for teaching and learning Mar 2017
Exploring the possibilities for active and collaborative learning aided by technology.

Introduction to personal tutoring at Imperial Nov 2016
Understanding the role and requirements of a personal tutor.

Managing your first research group Nov 2014
Understanding the challenges of managing students, PDRAs and support staff.

Invited Talks

Since 2016 I have been invited to give talks at **14 international conferences**, detailed below, and **15 international research institutions**.

Catalysis as the fundamental mechanism of information transfer in biology 2020
Mathematical Models in Biology: from Information Theory to Thermodynamics, Banff, Canada.

Biological copying of polymers: a necessarily non-equilibrium process 2019
Interdisciplinary Challenges in Non-Equilibrium Physics, Edinburgh, UK.

Persistent copying in biological Systems 2018
Bits and Biology, New York, USA.

Copying vs self-assembly: What's the fundamental difference? 2018
Beilstein Bozen Symposium 2018, Rüdesheim, Germany.

Evaluating experimental evidence for kinking of double-stranded DNA with a coarse-grained model 2018
Epigenetics and Multiscale Genomics, CECAM Lausanne, Switzerland.

The fundamental importance and consequences of persistence in molecular computation 2018
Computation by natural systems, Kavli Royal Society International Centre, UK.

The thermodynamics of persistent information in biochemical systems 2017
Thermodynamics of Computation in Chemical and Biological Systems, Santa Fe, US

The thermodynamics of persistent information in biochemical systems 2017
Dynamics, thermodynamics and information processing in chemical Networks, Luxembourg.

Finite size effects in self-assembly and polymer copying. 2017
Exploiting finite size effects in simulation, Paris, France.

Precision control of DNA-based molecular reactions 2016
IET/SynbiCITE Engineering Biology conference, London, UK.

The importance of thermodynamics for molecular systems, and the importance of molecular systems for thermodynamics 2016
DNA 22: DNA Computing and Molecular Programming. Munich, Germany.

Molecular nanotechnology: More than just useful! 2016
Foundations of Nanoscience 2016 (prize address). Salt Lake City, US.

Suprises lurking within Origami 2016
"Ten years of DNA origami" Symposium. Caltech, US.

Information and thermodynamics in biochemical systems 2016
Molecular Programming Project Annual Conference. Seattle, US.

Publication summary

I have written 57 articles, listed in full overleaf. I am corresponding author on 28 of these publications, and first author on 15. Publication highlights are indicated by a ♣ symbol.

Citations:

- Eight articles cited more than 100 times (Google Scholar).
- Google Scholar: 2510 citations, including 2106 since 201 (inclusive). H-index of 26.
- Web of Knowledge: 1675 citations, including 1403 since 2015 (inclusive). H-index of 22.

Under review

57. A. Lankinen, I. Mullor Ruiz and **T. E. Ouldridge***. Implementing non-equilibrium networks with active circuits of duplex catalysts. Submitted

♣ **56.** J. M. Poulton and **T. E. Ouldridge***. Edge-effects dominate copying thermodynamics for finite-length molecular oligomers. Submitted (2020); preprint arXiv:2005.11255. ***Corresponding author.**

♣ **55.** J. Cabello-Garcia, W. Bae, G.-B. V. Stan and **T. E. Ouldridge*** and W. Bae. Handhold-mediated strand displacement: a nucleic acid-based mechanism for generating far-from-equilibrium assemblies through templated reactions. Submitted (2020); preprint https://doi.org/10.1101/2020.05.22.108571. ***Corresponding author.**

54. P. Irmisch, **T. E. Ouldridge** and R. Seidel. Modelling DNA-strand displacement reactions in the presence of base-pair mismatches. Submitted (2020).

53. T. Plesa, G.-B. V. Stan, **T. E. Ouldridge** and W. Bae. Robust control of biochemical reaction networks via stochastic morphing. Submitted (2019); preprint arXiv:1908.10779.

52. A. Deshpande and **T. E. Ouldridge***. Optimizing enzymatic catalysts for rapid turnover of substrates with low enzyme sequestration. Submitted (2019); preprint arXiv:1905.00555. ***Corresponding author.**

51. R. M. Harrison, F. Romano, **T. E. Ouldridge**, A. A. Louis and J. P. K. Doye. Coarse-grained modelling of strong DNA bending I: Thermodynamics and comparison to an experimental molecular vice. Submitted (2018); preprint arXiv:1506.09005.

Published

♣ **50.** N. E. C. Haley, **T. E. Ouldridge***, I. Mullor Ruiz, A. Geraldini, A. A. Louis, J. M. Bath and A. J. Turberfield . Design of hidden thermodynamic driving for non-equilibrium systems via mismatch elimination during DNA strand displacement. **Nat. Comm.** 11, 2562 (2020) ***Corresponding author.**

49. T. E. Ouldridge. A biochemical device To demystify a century-old thermodynamics puzzle from theoretical physics. **Research Outreach** 112 (2020).

48. R. M. Harrison, F. Romano, **T. E. Ouldridge**, A. A. Louis and J. P. K. Doye. Identifying Physical Causes of Apparent Enhanced Cyclization of Short DNA Molecules with a Coarse-Grained Model. **J. Chem. Theor. Comput. 15, 4660-4672 (2019)**

47. R. A. Brittain, N. S. Jones and **T. E. Ouldridge***. Biochemical Szilard engines for memory-limited inference. **New. J. Phys.** 21, 063022 (2019). ***Corresponding author.**

46. T. E. Ouldridge*, R. A. Brittain and P. R. ten Wolde. The power of being explicit: demystifying work, heat, and free energy in the physics of computation. In *The energetics of Computing in Life and Machines*, SFI press (2019). ***Corresponding author.**

45. E. Stopnitzky, S. Still, **T. E. Ouldridge** and L. Altenberg. Physical limitations of work extraction from temporal correlations. **Phys. Rev. E** 99, 042115 (2019).

♣ **44.** J. Poulton, P. R. ten Wolde and **T. E. Ouldridge***. Non-equilibrium correlations in minimal dynamical models of polymer copying. **Proc. Nat. Acad. Sci. USA** 116, 1946-1951 (2019). ***Corresponding author.**

43. O. Henrich, Y. A. G. Fosado, T. Curk, and **T. E. Ouldridge**. Coarse-grained simulation of DNA using LAMMPS. **Eur. Phys. J. E** 41:57 (2018).

42. P. Fonseca, F. Romano, J. S. Schreck, **T. E. Ouldridge**, J. P. K. Doye and A. A. Louis. Multi-scale coarse-graining for the study of assembly pathways in DNA-brick self assembly. **J. Chem. Phys.** 148: 134910 (2018).

41. T. E. Ouldridge. The importance of thermodynamics for molecular systems and the importance of molecular systems for thermodynamics. **Nat. Comput.** 17: 3-29 (2018).

40. D. C. Khara, J. S. Schreck, T. E. Tomov, Y. Berger, **T. E. Ouldridge**, J. P. K. Doye and E. Nir. DNA bipedal motor walking dynamics: an experimental and theoretical study of the dependency on step size. **Nucl. Acids Res.** 46: 1553-1561 (2017).

39. R. L. Davidchack, **T. E. Ouldridge*** and M. V. Tretyakov. Geometric Integrator for Langevin Systems with Quaternion-based Rotational Degrees of Freedom and Hydrodynamic Interactions. **J. Chem. Phys.** 147: 224103 (2017). ***Joint corresponding author.**

38. A. Deshpande and **T. E. Ouldridge***. High rates of fuel consumption are not required by insulating motifs to suppress retroactivity in biochemical circuits. **Eng. Biol.** 1: 86-99 (2017). ***Corresponding author**.

37. W. Poole, A. Ortiz-Muñoz, A. Behera, N. S. Jones, **T. E. Ouldridge**, E. Winfree and M. Gopalkrishnan. Chemical Boltzmann machines. **In DNA Computing and Molecular Programming. DNA 2017.** Lecture Notes in Computer Science: 10467: 210-231 (2017).

36. A. Deshpande, M. Gopalkrishnan, **T. E. Ouldridge** and N. S. Jones. Designing the Optimal Bit: Balancing Energetic Cost, Speed and Reliability. **Proc. Roy. Soc. A.**: 473: 20170117 (2017).

35. R. A. Brittain, N. S. Jones and **T. E. Ouldridge***. What we learn from the learning rate **J. Stat. Mech.** 063502 (2017). ***Corresponding author.**

♣ **34. T. E. Ouldridge*** and P. R. ten Wolde. Fundamental costs in the production and destruction of persistent polymer copies. **Phys. Rev. Lett.** 118: 158103 (2017). ***Corresponding author. Selected as editor's suggestion.**

♣ **33. T. E. Ouldridge***, C. C. Govern and P. R. ten Wolde. Thermodynamics of Computational Copying in Biochemical Systems. **Phys. Rev. X** 7: 021004 (2017). ***Corresponding author.**

32. A. Vijaykumar, **T. E. Ouldridge**, P. R. ten Wolde and P. G. Bolhuis. Multiscale simulations of anisotropic particles combining molecular dynamics and Greens function reaction dynamics. **J. Chem. Phys.** 146: 114106 (2017).

♣ **31.** T. McGrath, N. S. Jones, P. R. ten Wolde and **T. E. Ouldridge***. A biochemical machine for the interconversion of mutual information and work. **Phys. Rev. Lett.** 118: 028101 (2017). ***Corresponding author. Selected as editor's suggestion.**

30. P. R. ten Wolde, N. B. Becker, A. Mugler and **T. E. Ouldridge**. Fundamental limits to cellular sensing. **J.Stat. Phys.** 162: 1395-1424 (2016).

29. B. E. K. Snodin, F. Romano, L. Rovigatti, **T. E. Ouldridge**, A. A. Louis and J. P. K. Doye. Direct simulation of the self-assembly of a small DNA origami. **ACS Nano** 10: 1724-1737 (2016).

28. M. Mosayebi, A. A. Louis, J. P. K. Doye and **T. E. Ouldridge***. Force-induced rupture of a DNA duplex. **ACS Nano** 9, 11993-12003 (2015). ***Corresponding author.**

27. F. Dannenberg, K. E. Dunn, J. Bath, M. Kwiatkowska, A. J. Turberfield and **T. E. Ouldridge***. Modelling DNA origami assembly at the domain level. **J. Chem. Phys.** 143, 165102 (2015). ***Corresponding author.**

♣ **26.** K. E. Dunn, F. Dannenberg, **T. E. Ouldridge**, M. Kwiatkowska, A. J. Turberfield and J. Bath. Guiding the folding pathway of DNA origami. **Nature** 525, 82-86 (2015).

25. J. S. Schreck, **T. E. Ouldridge***, F. Romano, L. Shaw, A. A. Louis and J. P. K. Doye. DNA hairpins primarily promote duplex melting rather than inhibiting hybridization. **Nucl. Acids Res.** 43, 6181-6190 (2015). ***Joint corresponding author.**

24. B. E. K. Snodin, F. Randisi, M. Mosayebi, P. Šulc, J. S. Schreck, F. Romano, **T. E. Ouldridge**, R. Tsukanov, E. Nir, A. A. Louis and J. P. K. Doye. Introducing improved structural properties and salt dependence into a coarse-grained model of DNA. **J. Chem. Phys.** 142, 234901 (2015).

23. J. S. Schreck, **T. E. Ouldridge**, F. Romano, A. A. Louis and J. P. K. Doye. Characterizing the bending and flexibility induced by bulges in DNA duplexes. **J. Chem. Phys.** 142, 165101 (2015).

22. R. L. Davidchack, **T. E. Ouldridge*** and M. V. Tretyakov. New Langevin and Gradient Thermostats for Rigid Body Dynamics. **J. Chem. Phys.** 142, 144114 (2015). ***Joint corresponding author**.

21. P. Šulc, **T. E. Ouldridge**, F. Romano, J. P. K. Doye and A. A. Louis, Modelling toehold-mediated RNA strand displacement. **Biophys. J.** 108, 1238-12467 (2015).

20. T .E. Ouldridge. DNA nanotechnology: understanding and optimisation through simulation. **Mol. Phys.** 113, 1-15 (2015).

19. C. Matek, **T. E. Ouldridge**, J. P. K. Doye and A. A. Louis. Plectoneme tip bubbles: Coupled denaturation and writhing in supercoiled DNA. **Sci. Rep.** 5, 7655 (2015).

18. M. Mosayebi, F. Romano, **T. E. Ouldridge**, A. A. Louis, J. P. K. Doye. The role of loop stacking in the dynamics of DNA hairpin formation **J. Phys. Chem. B** 118, 14326-14335 (2014).

♣ **17.** R. R. F. Machinek, **T. E. Ouldridge***, N. E. C. Haley, J. Bath and A. J. Turberfield. Programmable energy landscapes for kinetic control of DNA strand displacement. **Nature Communications** 5, 5324 (2014). ***Joint corresponding author.**

16. T. E. Ouldridge* and P. R. ten Wolde. The robustness of proofreading to crowding-induced pseudo-processivity in the MAPK pathway. **Biophys. J.** 107, 2425-2435 (2014). ***Corresponding author.**

15. P. Šulc, F. Romano, **T. E. Ouldridge**, J. P. K. Doye and A. A. Louis. A nucleotide-level coarse-grained model of RNA. **J. Chem. Phys.** 140, 235102 (2014).

14. P. Šulc, **T. E. Ouldridge**, F. Romano, J. P. K. Doye and A. A. Louis. Simulating a burnt-bridges DNA motor with a coarse-grained DNA model. **Nat. Comput.** 13, 535-547 (2014).

13. J. P. K. Doye, **T. E. Ouldridge**, A. A. Louis, F. Romano, P. Šulc, C. Matek, B. E. K. Snodin, L. Rovigatti, J. S. Schreck, R. M. Harrison and W. P. M. Smith. Coarse-graining DNA for simulations of DNA nanotechnology. **Phys. Chem. Chem. Phys.** 15, 20395-20414 (2013).

♣ **12. T. E. Ouldridge***, P. Šulc, F. Romano, J. P. K. Doye and A. A. Louis. DNA hybridization kinetics: zippering, internal displacement and sequence dependence. **Nucl. Acids Res.** 41, 8886-8895 (2013) ***Corresponding author.**

♣ **11.** N. Srinivas, **T. E. Ouldridge***, P. Šulc, J. M. Schaeffer, B. Yurke, A. A. Louis, J. P. K. Doye and E. Winfree. On the biophysics and kinetics of toehold-mediated DNA strand displacement. **Nucl. Acids Res.** 41, 10641-10658 (2013). ***Joint first and corresponding author.**

♣ **10. T. E. Ouldridge***, R. L. Hoare, J. P. K. Doye, A. A. Louis, J. Bath and A. J. Turberfield. Optimizing DNA nanotechnology through coarse-grained modelling: A two-footed DNA walker. **ACS nano** 7, 2479-2490 (2013). ***Corresponding author.**

9. F. Romano, D. Chakraborty, J. P. K. Doye, **T. E. Ouldridge** and A. A. Louis. Coarse-grained simulations of DNA overstretching. **J. Chem. Phys.** 138, 085101 (2013).

8. P. Šulc, F. Romano, **T. E. Ouldridge**, L. Rovigatti, J. P. K. Doye and A. A. Louis. Sequence-dependent thermodynamics of a coarse-grained DNA model. **J. Chem. Phys.** 137, 135101 (2012).

7. C. Matek, **T. E. Ouldridge**, A. Levy, J. P. K. Doye and A. A. Louis. DNA cruciform arms nucleate through a correlated but non-synchronous cooperative mechanism. **J. Phys. Chem. B** 116, 11616-11625 (2012).

6. T. E. Ouldridge. Inferring bulk self-assembly properties from simulations of small systems with multiple constituent species and small systems in the grand canonical ensemble. **J. Chem. Phys.** 137, 144105 (2012).

5. F. Romano, A. Hudson, J. P. K. Doye, **T. E. Ouldridge** and A. A. Louis. The effect of topology on the structure and free-energy landscape of DNA kissing complexes. **J. Chem. Phys.** 136, 215102 (2012).

♣ **4. T. E. Ouldridge***, A. A. Louis and J. P. K. Doye. Structural, mechanical and thermodynamic properties of a coarse-grained model of DNA. **J. Chem. Phys.** 130, 065101 (2011). ***Corresponding author.**

♣ **3. T. E. Ouldridge**, A. A. Louis and J. P. K. Doye. DNA nanotweezers studied with a coarse-grained model of DNA. **Phys. Rev. Lett.** 104, 178101 (2010).

2. T. E. Ouldridge, A. A. Louis and J. P. K. Doye. Extracting bulk properties of self-assembling systems from small simulations. **J. Phys.: Condens. Matter** 22, 104102 (2010).

1. T. E. Ouldridge, I. G. Johnston, A. A. Louis and J. P. K. Doye. The self-assembly of DNA Holliday junctions studied with a minimal model. **J. Chem. Phys.** 130, 065101 (2009).