Étienne Fodor

Oppenheimer Research Fellow

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https://efodorphysics.github.io

DAMTP
Centre for Mathematical Sciences
University of Cambridge
Wilberforce Road, CB3 0WA

Education and scientific positions

2016–20 **Postdoctoral Research Associate**, DAMTP, University of Cambridge

2013–16 **PhD in Theoretical Physics**, Université Paris Diderot | Summa cum laude
Tracking nonequilibrium in living matter and self-propelled systems
Main topics | Nonequilibrium statistical mechanics, Biophysics, Active matter
Supervisors | Paolo Visco, Frédéric van Wijland

2012–13 **Master in Physics – 2nd year**, École Normale Supérieure de Paris
ICFP - Macroscopic Physics and Complexity

2011–12 **Agrégation de Physique**, École Normale Supérieure de Cachan
Competitive training for teaching Physics at College level

2010–11 **Master in Physics – 1st year**, École Normale Supérieure de Lyon

2009–10 **Bachelor in Physics**, École Normale Supérieure de Lyon

Research and teaching experience

Since 2017 **PhD co-supervision**, DAMTP, University of Cambridge
Students | Oyvind Borthne, Timothy Ekeh

2019–20 **Part III project supervision**, DAMTP, University of Cambridge | 8 months
Part III student | Jacob W. Knight (University of Cambridge) | BP Nevill Mott Prize

2019 **Research visit** James Franck Institute, University of Chicago | 2 weeks
Host researcher | Suriyanarayanan Vaikuntanathan

2017–18 **Part III project supervision**, DAMTP, University of Cambridge | 8 months
Part III student | Timothy Ekeh (University of Cambridge)

2016–17 **Internship supervision**, DAMTP, University of Cambridge | 5 months
Master student | David Martin (École Normale Supérieure de Paris)

2015–16 **Research visit**, YITP, Kyoto University | 2 months/year
Host researcher | Hisao Hayakawa

2013–16 **Tutorials in medical Physics**, Université Paris Diderot | 64 hours/year

2013 **Master internship – 2nd year**, Université Paris Diderot | 16 weeks
Supervisors | Paolo Visco, Frédéric van Wijland

2012–13 **Physics tutorials at College level**, Lycée Fénelon, Paris | 23 hours

2011 **Master intership – 1st year**, University of Oxford | 12 weeks
Supervisors | Adam S. Wyatt, Ian A. Walmsley

2010–11 **Physics tutorials at College level**, Lycée la Martinière Monplaisir, Lyon | 60 hours

2010 **Bachelor internship**, Université de Genève | 8 weeks
Supervisors | Jérôme Extermann, Luigi Bonacina, Jean-Pierre Wolf

Scholarships, fellowships and awards

2017–20 **Oppenheimer Research Fellowship**, University of Cambridge
Junior Research Fellowship, St Catharine's College, Cambridge

2017 **PhD prize**, Institut des Systèmes Complexes, Paris (3rd prize)
Best talk prize, SIAM-IMA Annual Conference, University of Cambridge

2015 **Best talk prize**, Active Liquids Conference, Lorentz Center, Leiden University

2013–16 **Teaching Assistantship**, Université Paris Diderot
PhD Scholarship, École Normale Supérieure de Cachan

2011–13 **Master Scholarship**, École Normale Supérieure de Cachan

Scientific production

[**20**] T. Ekeh, M. E. Cates, and É. Fodor, *Thermodynamic cycles with active matter*, to appear in arXiv

[**19**] É. Fodor, T. Nemoto, and S. Vaikuntanathan, *Dissipation controls transport and phase transitions in active fluids: Mobility, diffusion and biased ensembles*, New J. Phys. **22**, 013052 (2020)

[**18**] P. Pietzonka, É. Fodor, C. Lohrmann, M. E. Cates, and U. Seifert, *Autonomous engines driven by active matter: Energetics and design principles*, Phys. Rev. X **9**, 041032 (2019)

[**17**] L. Tociu, É. Fodor, T. Nemoto, and S. Vaikuntanathan, *How dissipation constrains fluctuations in nonequilibrium liquids: Diffusion, structure and biased interactions*, Phys. Rev. X **9**, 041026 (2019)

[**16**] V. Démery and É. Fodor, *Driven probe under harmonic confinement in a colloidal bath*, J. Stat. Mech. **2019**, 033202 (2019)

[**15**] T. Nemoto, É. Fodor, M. E. Cates, R. L. Jack, and J. Tailleur, *Optimizing active work: Dynamical phase transitions, collective motion and jamming*, Phys. Rev. E **99**, 022605 (2019)

[**14**] É. Fodor, H. Hayakawa, J. Tailleur, and F. van Wijland, *Non-Gaussian noise without memory in active matter*, Phys. Rev. E **98**, 062610 (2018)

[**13**] É. Fodor and M. Cristina Marchetti, *The statistical physics of active matter: From self-catalytic colloids to living cells*, Physica A **504**, 106 (2018)

[**12**] D. Martin, C. Nardini, M. E. Cates, and É. Fodor, *Extracting maximum power from active colloidal heat engines*, EPL (Europhys. Lett.) **121**, 60005 (2018) | Editor's choice | Highlights of 2018

[**11**] W. W. Ahmed,* É. Fodor,* M. Almonacid,* M. Bussonnier, N. S. Gov, M.-H. Verlhac, P. Visco, F. van Wijland, and T. Betz, *Active mechanics reveal molecular-scale force kinetics in living oocytes*, Biophys. J. **114**, 1667 (2018)

[**10**] É. Fodor,* V. Mehandia,* J. Comelles, R. Thiagarajan, N. S. Gov, P. Visco, F. van Wijland, D. Riveline, *Spatial fluctuations at vertices of epithelial layers: Quantification of regulation by Rho pathway*, Biophys. J. **114**, 939 (2018)

[**9**] C. Nardini, É. Fodor, E. Tjhung, F. van Wijland, J. Tailleur, and M. E. Cates, *Entropy production in field theories without time-reversal symmetry: Quantifying the non-equilibrium character of active matter*, Phys. Rev. X **7**, 021007 (2017)

[**8**] É. Fodor,* W. W. Ahmed,* M. Almonacid,* M. Bussonnier, N. S. Gov, M.-H. Verlhac, T. Betz, P. Visco, and F. van Wijland, *Nonequilibrium dissipation in living oocytes*, EPL (Europhys. Lett.) **116**, 30008 (2016)

[**7**] É. Fodor, C. Nardini, M. E. Cates, J. Tailleur, P. Visco, and F. van Wijland, *How far from equilibrium is active matter?*, Phys. Rev. Lett. **117**, 038103 (2016) | Editor's suggestion | Physics (2016)

[**6**] É. Fodor, H. Hayakawa, P. Visco, and F. van Wijland, *Active cage model of glassy dynamics*, Phys. Rev. E **94**, 012610 (2016)

[**5**] E. Ben Isaac, É. Fodor, P. Visco, F. van Wijland, and N. S. Gov, *Modeling the dynamics of a tracer particle in an elastic active gel*, Phys. Rev. E **92**, 012716 (2015)

[**4**] W. W. Ahmed, É. Fodor, and T. Betz, *Active cell mechanics: Measurement and theory*, Biochimica et Biophysica Acta - Mol. Cell Res. **1853**, 3083 (2015)

[**3**] É. Fodor,* M. Guo,* N. S. Gov, P. Visco, D. A. Weitz, and F. van Wijland, *Activity-driven fluctuations in living cells*, EPL (Europhys. Lett.) **110**, 48005 (2015) | Editor's choice | Europhysics News 46/5 (2015)

[**2**] É. Fodor, D. S. Grebenkov, P. Visco, and F. van Wijland, *Generalized Langevin equation with hydrodynamic backflow: Equilibrium properties*, Physica A **422**, 107 (2015)

[**1**] É. Fodor, K. Kanazawa, H. Hayakawa, P. Visco, and F. van Wijland, *Energetics of active fluctuations in living cells*, Phys. Rev. E **90**, 042724 (2014)

* Equal contribution of these authors to this work

Scientific presentations, organized events, and review service

Invited conference talks

2020 *Japan-France Joint Seminar*, Kyoto University
Frontiers in Non-Equilibrium Physics Workshop, Kyoto University

2018 *Why Measure Entropy Production?*, Princeton University
Active Matter Session, University of California, Berkeley

Contributed conference talks

2020 *Motile Active Matter Conference*, Bonn

2019 *StatPhys – Out-of-equilibrium aspects*, Buenos Aires
International Soft Matter Conference, Edinburgh
Statistical Physics of Complex Systems, Nordita, Stockholm

2018 *Nonequilibrium Collective Dynamics*, Technische Universität Berlin
Fundamental Problems in Active Matter, Aspen Center for Physics

2017 *SIAM-IMA Annual Conference*, University of Cambridge
Edwards Centre Mini Conference, University of Cambridge
Open Statistical Physics, Milton Keynes

2016 *StatPhys – Biological Physics*, Lyon
Non-Gaussian Workshop, Kyoto University

2015 *Lorentz Center – Active Liquids*, Leiden University

2014 *Condensed Matter in Paris*, Université Paris Descartes
ESPCI – Journées de Physique Statistique, Paris

Invited seminars

2020 *Department of Physics*, University of Bath

2019 *ICTP – Quantitative Life Sciences Group*, Trieste
James Franck Institute – Department of Chemistry, University of Chicago
Physics of Living Systems, Massachusetts Institute of Technology
Physics and Materials Science Research Unit, University of Luxembourg
Institute of Physics – Computational Soft Matter, University of Amsterdam

2018 *LiPhy Laboratory*, Université Grenoble Alpes
Charles Coulomb Laboratory, Université de Montpellier
ESPCI – Gulliver Laboratory, Paris
St Catharine's College – Graduate Research Seminars, Cambridge
Research Colloquium Series, California State University, Fullerton

2017 *DAMTP – Soft Matter Seminar*, University of Cambridge
DAMTP – BioLunch Seminar, University of Cambridge

2016 *School of Mathematical Sciences*, Queen Mary University of London
DAMTP – Soft Matter Seminar, University of Cambridge
MSC Laboratory Seminar, Université Paris Diderot
Yukawa Institute for Theoretical Physics, Kyoto University

2015 *LiPhy Laboratory*, Université Grenoble Alpes
Physics-Biology Interface Seminar, Université Paris Sud
DAMTP – Soft Matter Seminar, University of Cambridge
Yukawa Institute for Theoretical Physics, Kyoto University

2014 *MSC Laboratory – Physique du vivant*, Université Paris Diderot
MSC Laboratory – Theory Group, Université Paris Diderot

Organized events

2019 *Colloids as a Toolbox for Statistical Mechanics*, University of Cambridge

2018 *World Congress of Biomechanics – Non-equilibrium Biomechanics session*, Dublin

Review service Nat. Phys., Phys. Rev. (Letters, X, E), J. Stat. Mech., New J. Phys., EPL