

# Étienne Fodor

Postdoctoral Research Associate

✉ [e.fodor@damtp.cam.ac.uk](mailto:e.fodor@damtp.cam.ac.uk)  
📄 [efodorphysics.github.io](https://github.com/efodorphysics)  
French | Born on January, 6 1990

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



## Education

- 2013 – 2016 **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 – 2013 **Master in Physics – 2<sup>nd</sup> year**, École Normale Supérieure de Paris.  
ICFP - Macroscopic Physics and Complexity
- 2011 – 2012 **Agrégation de Physique**, École Normale Supérieure de Cachan.  
National competitive exam for teachers in classes préparatoires and in first years of French Universities
- 2010 – 2011 **Master in Physics – 1<sup>st</sup> year**, École Normale Supérieure de Lyon.
- 2009 – 2010 **Bachelor in Physics**, École Normale Supérieure de Lyon.

## Research

### Selected papers

- 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)
- 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)
- 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)  
Selected as Editor's Suggestion – Highlighted in Physics (2016)
- 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)
- 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)  
Selected as editor's choice – Highlighted in Europhysics News 46/5 (2015)

\* Equal contribution of these authors to this work

## Preprints

- P. Pietzonka, É. Fodor, C. Lohrmann, M. E. Cates, U. Seifert  
*Autonomous engines driven by active matter: Energetics and design principles*  
arXiv:1905.00373
- L. Tociu, É. Fodor, T. Nemoto, and S. Vaikuntanathan  
*How dissipation constrains fluctuations in driven liquids: Diffusion, structure and biased interactions*  
arXiv:1808.07838

## Complete list of publications

- [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)  
Selected as editor's choice – Featured in 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, and 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)  
Selected as Editor's Suggestion – Highlighted in 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)  
Selected as editor's choice – Highlighted in 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)

#### Conferences, seminars and summer schools

- 2019 **StatPhys – Out-of-equilibrium aspects**, Buenos Aires | Contributed talk.  
**International Soft Matter Conference**, Edinburgh | Contributed talk.  
**Statistical Physics of Complex Systems Conference**, Nordita, Stockholm | Contributed talk.  
**Institute of Physics – Computational Soft Matter**, University of Amsterdam | Seminar.  
**Colloids as a Toolbox for Statistical Mechanics**, University of Cambridge | Co-organizer.
- 2018 **LiPhy Laboratory**, Université Grenoble Alpes | Seminar.  
**Charles Coulomb Laboratory**, Université de Montpellier | Seminar.  
**ESPCI – Gulliver Laboratory**, Paris | Seminar.  
**Why Measure Entropy Production?**, Princeton University | Invited talk.  
**Nonequilibrium Collective Dynamics**, Technische Universität Berlin | Contributed talk.  
**Stochastic Thermodynamics: Experiment and Theory**, MPI, Dresden | Poster.  
**World Congress of Biomechanics – Non-equilibrium Biomechanics**, Dublin | Co-chair.  
**St Catherine's College – Graduate Research Seminars**, Cambridge | Seminar.  
**Fundamental Problems in Active Matter**, Aspen Center for Physics | Contributed talk.  
**Research Colloquium Series**, California State University, Fullerton | Seminar.  
**Statistical Mechanics Meeting**, University of California, Berkeley | Poster.  
**Active Matter Session**, University of California, Berkeley | Invited talk.
- 2017 **DAMTP – Soft Matter Seminar**, University of Cambridge | Seminar.  
**Stochastic Thermodynamics, Active and Driven Systems**, ICTS, Bangalore | Poster.

**Fundamental Problems in Statistical Physics summer school**, Bruneck.  
**SIAM-IMA Annual Conference**, University of Cambridge | Contributed talk.  
**Edwards Centre Mini Conference**, University of Cambridge | Contributed talk.  
**Open Statistical Physics**, Milton Keynes | Contributed talk.  
**DAMTP – BioLunch Seminar**, University of Cambridge | Seminar.  
**Edwards Centre Mini Conference**, University of Cambridge | Poster.

2016 **School of Mathematical Sciences**, Queen Mary University of London | Seminar.  
**DAMTP – Soft Matter Seminar**, University of Cambridge | Seminar.  
**StatPhys – Biological Physics**, Lyon | Contributed talk.  
**MSC Laboratory Seminar**, Université Paris Diderot | Seminar.  
**Yukawa Institute for Theoretical Physics**, Kyoto University | Seminar.  
**Non-Gaussian Workshop**, Kyoto University | Contributed talk.

2015 **LiPhy Laboratory**, Université Grenoble Alpes | Seminar.  
**Physics-Biology Interface Seminar**, Université Paris Sud | Seminar.  
**DAMTP – Soft Matter Seminar**, University of Cambridge | Seminar.  
**Lorentz Center – Active Liquids**, Leiden University | Contributed talk.  
**Yukawa Institute for Theoretical Physics**, Kyoto University | Seminar.  
**Kyoto Winter School for Statistical Mechanics**, Kyoto University.  
**Luxembourg out of Equilibrium**, University of Luxembourg | Poster.

2014 **MSC Laboratory – Physique du vivant**, Université Paris Diderot | Seminar.  
**Beg Rohu summer school**, Saint-Pierre Quiberon.  
**Condensed Matter in Paris**, Université Paris Descartes | Contributed talk.  
**Physics and Biological Systems**, Université Paris Sud | Poster.  
**MSC Laboratory – Theory Group**, Université Paris Diderot | Seminar.  
**ESPCI – Journées de Physique Statistique**, Paris | Contributed talk.  
**Mini Stat Mech Meeting**, University of California, Berkeley | Poster.

#### Research associate visits

2019 **James Franck Institute**, University of Chicago | 2 weeks.  
Inviting professor | Suriyanarayanan Vaikuntanathan

2015 – 2016 **Yukawa Institute for Theoretical Physics**, Kyoto University | 2 months/year.  
Inviting professor | Hisao Hayakawa

#### Internships

2013 **Master – 2<sup>nd</sup> year**, Université Paris Diderot | 16 weeks.  
*Modeling active forces in living cells*  
Supervisors | Paolo Visco, Frédéric van Wijland

2011 **Master – 1<sup>st</sup> year**, University of Oxford | 12 weeks.  
*Complete characterization and control of extreme ultraviolet pulses from high harmonic generation*  
Supervisors | Adam S. Wyatt, Ian A. Walmsley

2010 **Bachelor**, Université de Genève | 8 weeks.  
*CARS microspectroscopy using a single laser source*  
Supervisors | Jérôme Extermann, Luigi Bonacina, Jean-Pierre Wolf

#### Teaching and supervision

2017 – 2018 **Part III project**, DAMTP – University of Cambridge | 8 months.  
*Designing a macroscopic active heat engine*  
Part III student | Timothy Ekeh (University of Cambridge)

2016 – 2017 **Internship supervision**, DAMTP – University of Cambridge | 5 months.

*Tracer dynamics in an active medium*

Master student | David Martin (École Normale Supérieure de Paris)

2013 – 2016 **Physics tutorials**, Université Paris Diderot | 64 hours/year.

First-year University training in medical Physics

2012 – 2013 **Physics tutorials**, Lycée Fénélon, Paris | 23 hours.

Classes préparatoires

2010 – 2011 **Physics tutorials**, Lycée la Martinière Monplaisir, Lyon | 60 hours.

Classes préparatoires

## Computing experience

Linux systems, Mathematica,  $\text{\LaTeX}$ , Programming in C and PYTHON

## Review service

EPL - J. Stat. Mech. - Nat. Phys. - New J. Phys. - Phys. Rev. E - Phys. Rev. Lett. - Phys. Rev. X

## Scholarships, fellowships and prizes

2017 – 2020 **Junior Research Fellowship**, St Catherine's College, Cambridge.

2017 – 2020 **Oppenheimer Research Fellowship**, University of Cambridge.

2017 **3<sup>rd</sup> PhD prize** | **Institut des Systèmes Complexes**, Paris.

2017 **Best talk prize** | **SIAM-IMA Annual Conference**, University of Cambridge.

2015 **Best talk prize** | **Lorentz Center – Active Liquids**, Leiden University.

2013 – 2016 **Teaching Assistantship**, Université Paris Diderot.

2013 – 2016 **PhD Scholarship**, École Normale Supérieure de Cachan.

2011 – 2013 **Master Scholarship**, École Normale Supérieure de Cachan.

## Academic references

### Prof. Michael E. Cates

DAMTP, Centre for Mathematical Sciences  
University of Cambridge  
Wilberforce Road  
CB3 0WA, United Kingdom  
m.e.cates@damtp.cam.ac.uk

### Prof. Frédéric van Wijland

Laboratoire Matière et Systèmes Complexes  
UMR 7057 CNRS/P7, Université Paris Diderot  
10, rue Alice Domon et Léonie Duquet  
75205 Paris Cédex 13, France  
fww@univ-paris-diderot.fr

### Dr. Julien Tailleur

Laboratoire Matière et Systèmes Complexes  
UMR 7057 CNRS/P7, Université Paris Diderot  
10, rue Alice Domon et Léonie Duquet  
75205 Paris Cédex 13, France  
julien.tailleur@univ-paris-diderot.fr

### Dr. Suriyanarayanan Vaikuntanathan

James Franck Institute  
Department of Chemistry  
University of Chicago  
Chicago, IL 60637  
svaikunt@uchicago.edu