

Étienne Fodor

Physics of Active Matter

Assistant Professor, ATTRACT Fellow

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Dept of Physics and Materials Science

University of Luxembourg

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Scientific positions and education

Since 2020 **Assistant Professor**, Dept of Physics and Materials Science, University of Luxembourg

2017–20 **Oppenheimer Research Fellow**, DAMTP, University of Cambridge

2016–17 **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

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, supervision and teaching experience

Since 2020 **Group supervision**, Dept of Physics and Materials Science, University of Luxembourg

Postdoc | Luke K. Davis

PhD students | Yiwei Zhang, Atul Tanaji Mohite

Since 2017 **PhD co-supervision**, DAMTP, University of Cambridge

Students | Øyvind L. 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

2020–25 **ATTRACT Fellowship**, Fonds National de la Recherche, Luxembourg

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)

- 2015 **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 presentations, organized events, and review service

Invited conference talks

- 2020 **Symmetry, Thermodynamics and Topology in Active Matter**, KITP online
- 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

- 2021 **Centre de Physique Théorique**, Aix-Marseille Université
- 2020 **School of Physics and Astronomy**, University of Edinburgh
- 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

2018–20 **Statistical Physics and Soft Matter Seminars**, DAMTP, University of Cambridge

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

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

Review service EPL, Nat Phys, New J Phys, Phys Rev (Lett, X, E, Res), PNAS, J Stat Mech

Scientific production

- [25] **Inferring dissipation from static structure in active matter**
L Tociu, G Rassolov, ÉF, and S Vaikuntanathan, arXiv:2012.10441
- [24] **Collective motion in large deviations of active particles**
Y-E Keta, ÉF, F van Wijland, ME Cates, and RL Jack, arXiv:2009.07112
- [23] **Statistical mechanics of active Ornstein Uhlenbeck particles**
D Martin, J O’Byrne, ME Cates, ÉF, C Nardini, J Tailleur, and F van Wijland, arXiv:2008.12972
- [22] **Thermodynamics of active field theories: Energetic cost of coupling to reservoirs**
T Markovich, ÉF, E Tjhung, and ME Cates, arXiv:2008.06735
- [21] **Time-reversal symmetry violations and entropy production in field theories of polar active matter**
ØL Borthne, ÉF, and ME Cates, New J Phys **22**, 123012 (2020)
- [20] **Thermodynamic cycles with active matter**
T Ekeh, ME Cates, and ÉF, Phys Rev E **102**, 010101(R) (2020)
- [19] **Dissipation controls transport and phase transitions in active fluids: Mobility, diffusion and biased ensembles**
ÉF, T Nemoto, and S Vaikuntanathan, New J Phys **22**, 013052 (2020)
- [18] **Autonomous engines driven by active matter: Energetics and design principles**
P Pietzonka, ÉF, C Lohrmann, ME Cates, and U Seifert, Phys Rev X **9**, 041032 (2019)
- [17] **How dissipation constrains fluctuations in nonequilibrium liquids: Diffusion, structure and biased interactions**
L Tociu, ÉF, T Nemoto, and S Vaikuntanathan, Phys Rev X **9**, 041026 (2019)
- [16] **Driven probe under harmonic confinement in a colloidal bath**
V Démery and ÉF, J Stat Mech **2019**, 033202 (2019)
- [15] **Optimizing active work: Dynamical phase transitions, collective motion and jamming**
T Nemoto, ÉF, ME Cates, RL Jack, and J Tailleur, Phys Rev E **99**, 022605 (2019)
- [14] **Non-Gaussian noise without memory in active matter**
ÉF, H Hayakawa, J Tailleur, and F van Wijland, Phys Rev E **98**, 062610 (2018)
- [13] **The statistical physics of active matter: From self-catalytic colloids to living cells**
ÉF and M Cristina Marchetti, Physica A **504**, 106 (2018)
- [12] **Extracting maximum power from active colloidal heat engines**
D Martin, C Nardini, ME Cates, and ÉF, EPL **121**, 60005 (2018)
Editor’s choice | Highlights of 2018
- [11] **Active mechanics reveal molecular-scale force kinetics in living oocytes**
WW Ahmed,* ÉF,* M Almonacid,* M Bussonnier, NS Gov, M-H Verlhac, P Visco, F van Wijland, and T Betz, Biophys J **114**, 1667 (2018)
- [10] **Spatial fluctuations at vertices of epithelial layers: Quantification of regulation by Rho pathway**
ÉF,* V Mehandia,* J Comelles, R Thiagarajan, NS Gov, P Visco, F van Wijland, D Riveline
Biophys J **114**, 939 (2018)

- [9] **Entropy production in field theories without time-reversal symmetry: Quantifying the non-equilibrium character of active matter**
C Nardini, ÉF, E Tjhung, F van Wijland, J Tailleur, and ME Cates, Phys Rev X **7**, 021007 (2017)
 - [8] **Nonequilibrium dissipation in living oocytes**
ÉF,* WW Ahmed,* M Almonacid,* M Bussonnier, NS Gov, M-H Verlhac, T Betz, P Visco, and F van Wijland, EPL **116**, 30008 (2016)
 - [7] **How far from equilibrium is active matter?**
ÉF, C Nardini, ME Cates, J Tailleur, P Visco, and F van Wijland, Phys Rev Lett **117**, 038103 (2016)
Editor's suggestion | Physics (2016)
 - [6] **Active cage model of glassy dynamics**
ÉF, H Hayakawa, P Visco, and F van Wijland, Phys Rev E **94**, 012610 (2016)
 - [5] **Modeling the dynamics of a tracer particle in an elastic active gel**
E Ben Isaac, ÉF, P Visco, F van Wijland, and NS Gov, Phys Rev E **92**, 012716 (2015)
 - [4] **Active cell mechanics: Measurement and theory,**
WW Ahmed, ÉF, and T Betz, Biochimica et Biophysica Acta - Mol Cell Res **1853**, 3083 (2015)
 - [3] **Activity-driven fluctuations in living cells**
ÉF,* M Guo,* NS Gov, P Visco, DA Weitz, and F van Wijland, EPL **110**, 48005 (2015)
Editor's choice | Europhysics News 46/5 (2015)
 - [2] **Generalized Langevin equation with hydrodynamic backflow: Equilibrium properties**
ÉF, DS Grebenkov, P Visco, and F van Wijland, Physica A **422**, 107 (2015)
 - [1] **Energetics of active fluctuations in living cells**
ÉF, K Kanazawa, H Hayakawa, P Visco, and F van Wijland, Phys Rev E **90**, 042724 (2014)
- * Equal contribution of these authors to this work