

FRANCESCO MORI

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PROFESSIONAL SUMMARY

I am a theoretical physicist at the University of Oxford. My research spans nonequilibrium statistical physics, active matter, animal navigation, and machine learning. My work has resulted in 20 publications and 2 preprints, including articles in leading journals such as *Physical Review Letters*. I have served as a Lecturer at New College (Oxford), where I taught undergraduate physics tutorials.

RESEARCH EXPERIENCE

Leverhulme-Peierls Fellow (independent postdoctoral position) Rudolf Peierls Centre for Theoretical Physics, Department of Physics, University of Oxford	Oct. 2022 - Present
Junior Research Fellow , New College, Oxford.	Oct. 2022 - Present
Research Visitor , City University of New York.	Feb. 2025 - Present
Part-time consultant , Scroll Prize, Inc. Contributing to the Vesuvius challenge . Image reconstruction of ancient papyri (pre-79 AD).	Sept. - June. 2025
Ph.D. in Theoretical Physics , Université Paris-Saclay Laboratory of Theoretical Physics and Statistical Models (LPTMS), Orsay. Supervisor: Satya Majumdar. Title: <i>Extreme value statistics of stochastic processes: from Brownian motion to active particles.</i>	Oct. 2019 - June 2022

TEACHING

Abilitazione Scientifica Nazionale Accredited to hold Associate Professor positions in Italian universities. (Sections 02/A2 and 02/B2)	2025
Qualification aux fonctions de maître de conférences Accredited to hold lecturer positions in French universities. (Section 28 - Theoretical Physics)	2024
Stipendiary Lecturer , New College (Oxford) Mathematical Methods, Thermal Physics.	2023
Tutor , Oxford Study Abroad Program Biological Physics.	2023
Teaching assistant , Université Paris-Saclay Computer Science, Statistical Physics.	2021 - 2022

FUNDING

Lockey Fund Award (USA) (£ 1000) <i>Travel award to attend scientific conferences in the USA.</i>	2024
Lockey Fund Award (Europe) (£ 500) <i>Travel award to attend scientific conferences in Europe.</i>	2024
Astor Travel Scholarship (£ 1,500) <i>Travel fund for visits to the USA.</i>	2024
Leverhulme-Peierls Fellowship (£ 210,000) <i>"intended to support the most talented theoretical physicists worldwide at an early stage of their careers"</i> One of three top candidates among more than 100 applicants.	2022
New College JRF Travel Allowance (£ 4,500)	2022

AWARDS

Université Paris-Saclay International Master's Scholarship (€ 10,000)	2018
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1-year master program at Paris-Saclay University.

Erasmus Scholarship (€ 4,000) 2018
6-month exchange program at Paris-Saclay University.

Alta Scuola Politecnica (€ 3,000) 2017
Excellence path for the top 1% of master students of Politecnico di Torino and Milano.

Physics of Complex Systems Travel Grant (€ 2,000) 2017
6-month exchange program at SISSA and ICPT (Trieste, Italy).

Young Talent Project Travel Grant (€ 3,000) 2016
6-month exchange program at Lund University (Sweden)

Young Talent Project (€ 4,500) 2014
Excellence program for the top 5% of bachelor students of Politecnico di Torino.

EDUCATION

M. Sc. in Physics of Complex Systems, Université Paris-Saclay Sept. 2018 - Jul. 2019
Ranking: 1/42, GPA: 18.6/20

M. Sc. in Physics of Complex Systems, Politecnico di Torino Oct. 2017 - Jul. 2019
GPA: 30.00/30, Final mark: 110/110 cum laude.

M. Sc. in Engineering Physics, Politecnico di Milano Oct. 2017 - Jul. 2019
Final mark: 110/110 cum laude.

Intern Student, LPTMS, Orsay (with Satya Majumdar). Mar. 2019 - Jun. 2019

iMat Project (Project on natural language processing and materials science) Jun. 2018 - Sept. 2019
European Materials Modelling Council, Alta Scuola Politecnica.

Visiting student, SISSA and ICTP (Trieste, Italy). Sept. 2017 - Feb. 2018

Visiting student, Lund University (Sweden). Aug. 2016 - Feb. 2017

B. Sc. in Applied Mathematics, Politecnico di Torino Oct. 2014 - Jul. 2017
GPA: 29.29/30, Final mark: 110/110 cum laude.

MENTORSHIP

Yaprak Onder (Oxford undergraduate) 2023
Currently Master's student at the University of Oxford.

Costantino Di Bello (Université Paris-Saclay master's) 2021
Currently Ph.D. student at the University of Potsdam.
This internship resulted in the publication Phys. Rev. E **108**, 014112 (2023).

Marco Biroli (École normale supérieure de Paris master's) 2021
Currently Ph.D. student at Paris-Saclay University.
This internship resulted in the publication J. Phys. A **55**, 244001 (2022).

ACADEMIC SERVICE AND OUTREACH

Volunteer, Squishy Science Sunday (outreach activity at the APS March Meeting) Mar. 2025

Assessor for master project Apr. 2024
Oxford Interdisciplinary Bioscience DTP

Reviewer Mar. 2021 - Present
SciPost, Cambridge University Press, Nat. Commun., PRL, PRE, J. Phys. A: Math. Theor., J. Stat. Mech, Physica A.

Interviewer, University College (Oxford)
Undergraduate Physics admissions

Dec. 2022

Organizer, Cross-TP discussions
Journal club across all areas of Theoretical Physics in Oxford

Oct. 2022 - Mar. 2023

Organizer, Fête de la science (outreach activity for high-school students)

Oct. 2021

PUBLICATIONS (* KEY PAPERS)

25. (*) F. Mignacco and **F. Mori**, "A statistical physics framework for optimal learning", preprint arXiv:2507.07907 (2025).
24. R. J. Ewart, P. Reichherzer, S. Ren, S. Majeski, **F. Mori**, M. L. Nastac, A. F. A. Bott, M. W. Kunz, A. A. Schekochihin, "Cosmic-ray transport in inhomogeneous media", preprint arXiv:2507.19044 (2025).
23. **F. Mori** and F. Mignacco. "Analytic theory of dropout regularization", preprint arXiv:2505.07792 (2025).
22. (*) **F. Mori**, S. Sarao Mannelli, and F. Mignacco. "Optimal Protocols for Continual Learning via Statistical Physics and Control Theory," ICLR 2025 and J. Stat. Mech. 084004 (2025).
 - Accepted for poster presentation at the NeurIPS 2024 workshop Mathematics of Modern Machine Learning.
 - Accepted for poster presentation at COSYNE 2025.
21. (*) **F. Mori** and L. Mahadevan, "Optimal switching strategies for navigation in stochastic settings", J. R. Soc. Interface 22 (227), 20240677 (2025).
20. **F. Mori**, S. N. Majumdar, and P. Vivo. "Cost of excursions until first crossing of the origin for random walk and Lévy flights: An exact general formula", Phys. Rev. Research **6**, 043053 (2024).
19. K. S. Olsen, D. Gupta, **F. Mori**, S. Krishnamurthy, "Thermodynamic cost of finite-time stochastic resetting", Phys. Rev. Research **6**, 033343 (2024).
18. A. Mummery, **F. Mori**, and S. Balbus, "The dynamics of accretion flows near to the innermost stable circular orbit", Mon. Not. R. Astron. Soc. **529**, 1900 (2024).
17. (*) **F. Mori**, S. Bhattacharyya, J. M. Yeomans, and S. P. Thampi, "Viscoelastic confinement induces periodic flow reversals in active nematics", Phys. Rev. E **108**, 064611 (2023).
16. S. N. Majumdar, **F. Mori**, and P. Vivo, "Nonlinear-Cost Random Walk: exact statistics of the distance covered for fixed budget", Phys. Rev. E **108** (6), 064122 (2023).
15. C. Di Bello, A. K. Hartmann, S. N. Majumdar, **F. Mori**, A. Rosso, and G. Schehr, "Current fluctuations in stochastically resetting particle systems", Phys. Rev. E **108**, 014112 (2023). **Highlighted as an Editors' Suggestion.**
14. S. N. Majumdar, **F. Mori**, and P. Vivo, "The cost of diffusion: nonlinearity and giant fluctuations", **Phys. Rev. Lett.** **130**, 237102 (2023).
13. (*) B. De Bruyne and **F. Mori**, "Resetting in Stochastic Optimal Control", Phys. Rev. Research **5**, 013122 (2023).
12. (*) **F. Mori**, K. S. Olsen, and S. Krishnamurthy, "Entropy production of resetting processes", Phys. Rev. Res. **5**, 023103 (2023).
11. **F. Mori**, S. N. Majumdar, and G. Schehr, "Time to reach the maximum for a stationary stochastic process", Phys. Rev. E **106**, 054110 (2022).

10. M. Biroli, **F. Mori**, and S. N. Majumdar, "Number of distinct sites visited by a resetting random walker", J. Phys. A: Math. Theor. **55**, 244001 (2022).
9. **F. Mori**, G. Gradenigo, and S. N. Majumdar, "First-order condensation transition in the position distribution of a run-and-tumble particle in one dimension ", J. Stat. Mech. 103208 (2021).
8. (*) **F. Mori**, S. N. Majumdar, and G. Schehr, "Distribution of the time of the maximum for stationary processes", Europhys. Lett. **135**, 30003 (2021). **Highlighted as an Editors' Choice.**
7. **F. Mori**, P. Le Doussal, S. N. Majumdar, and G. Schehr, "Condensation transition in the late-time position of a run-and-tumble particle", Phys. Rev. E **103**, 062134 (2021).
6. S. N. Majumdar, **F. Mori**, H. Schawe, and G. Schehr, "Mean perimeter and area of the convex hull of a planar Brownian motion in the presence of resetting", Phys. Rev. E **103**, 022135 (2021).
5. **F. Mori**, P. Le Doussal, S. N. Majumdar, and G. Schehr, "Universal properties of a run-and-tumble particle in arbitrary dimension", Phys. Rev. E **102**, 042133 (2020). **Highlighted as an Editors' Suggestion.**
4. B. Lacroix-A-Chez-Toine, **F. Mori**, "Universal survival probability for a correlated random walk and applications to records" J. Phys. A: Math. Theor. **53**, 495002 (2020).
3. (*) **F. Mori**, P. Le Doussal, S. N. Majumdar, and G. Schehr, "Universal survival probability for a d -dimensional run-and-tumble particle", **Phys. Rev. Lett.** **124**, 090603 (2020).
2. **F. Mori**, S. N. Majumdar, and G. Schehr, "Distribution of the time between maximum and minimum of random walks", Phys. Rev. E **101**, 052111 (2020).
1. (*) **F. Mori**, S. N. Majumdar, and G. Schehr, "Time between the maximum and the minimum of a stochastic process", **Phys. Rev. Lett.** **123**, 200201 (2019).

INVITED TALKS

Statistical Physics & Machine Learning: moving forward Institut d'Études Scientifiques de Cargèse (France).	2025
Paris Biological Physics Community Day École normale supérieure (Paris).	2024
Workshop: Stochastic Systems in Active Matter Isaac Newton Institute (Cambridge).	2024
Workshop: New Vistas in Stochastic Resetting The Higgs Centre for Theoretical Physics (Edinburgh).	2024
Saturday Mornings of Theoretical Physics (outreach activity for Oxford Physics alumni) University of Oxford.	2023
Theoretical Physics Colloquium University of Oxford.	2022
Large Deviations, Extremes and Anomalous Transport in Non-equilibrium Systems The Erwin Schrödinger International Institute for Mathematics and Physics (Austria).	2022
Nordita Scientific Program "Are there universal laws in nonequilibrium physics" Nordita Institute, Stockholm (Sweden).	2022

INVITED SEMINARS

Mathematical Physics Group Seminar University of Bologna.	2025
Disordered System Seminar	2022 and 2025

King's College London.

Condensed Matter Seminar

University of Massachusetts Amherst.

2025

Soft Matter Seminar

University of California, Berkeley.

2025

ML Nosh Lunch Seminar

University of Oxford.

2025

Soft Matter Group Away Day

University of Oxford.

2024

Soft Matter Seminar

University of California, Santa Barbara.

2023

Soft Condensed Matter Seminar

New York University.

2023

IPhT Seminar

Institut de Physique Théorique, Saclay.

2023

LOMA Seminar

Laboratoire Ondes et Matière d'Aquitaine, Bordeaux.

2023

Statistical Physics and Complexity Webinar Series

University of Edinburgh.

2022

LuxStatMech seminar

University of Luxembourg.

2022

LPTMC seminars

Laboratoire de Physique Théorique de la Matière Condensée, Paris.

2022, 2023, and 2024

SIFS Young Seminar

Italian Society of Statistical Physics.

2022

ICTS Statistical Physics Journal Club

International Centre for Theoretical Sciences, Bangalore.

2021

CONTRIBUTED TALKS

Journée "Physique et Vivant"

Institut Jacques Monod (Paris).

2023

Nordita Workshop: Fluctuations and First-Passage Problems

Nordita Institute, Stockholm (Sweden).

2023

4th Course on Multiscale Integration in Biological Systems

Institut Curie, Paris (France).

2021

Journée Systèmes & Matière Complexes

Université Paris-Saclay, Paris (France).

2021

CONFERENCES AND SCIENTIFIC PROGRAMS

APS March Meeting

Anaheim (USA).

2025

KITP program: Deep Learning from the Perspective of Physics and Neuroscience

2024

KITP, Santa Barbara (USA).

APS March Meeting

Minneapolis (USA).

2024

Computational and Systems Neuroscience (COSYNE)

Montréal (Canada).

2023

SUMMER SCHOOLS

Cargese summer school: Energy, Information and Evolution in Biology

Cargese Institute for Scientific Studies (France)

2024

Les Houches summer school: Theoretical Biophysics

Les Houches Physics School (France)

2023

Les Houches summer school: Statistical Physics & Machine learning

Les Houches Physics School (France)

2022

Beg Rohu Summer School: Statistical mechanics & emergent phenomena in biology

Beg Rohu (France)

2021

Fundamental Problems in Statistical Physics XV

Brunico (Italy)

2021

Spring College on the Physics of Complex Systems

ICTP (Trieste, Italy)

2019