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) *Oct. 2022 - Present*
Rudolf Peierls Centre for Theoretical Physics, Department of Physics, University of Oxford

Junior Research Fellow, New College, Oxford. *Oct. 2022 - Present*

Part-time consultant, Scroll Prize, Inc. *Sept. - Dec. 2024*
Contributing to the Vesuvius challenge. Image reconstruction of ancient papyri (pre-79 AD).

Ph.D. in Theoretical Physics, Université Paris-Saclay *Oct. 2019 - June 2022*
Laboratory of Theoretical Physics and Statistical Models (LPTMS), Orsay.
Supervisor: Satya Majumdar.
Title: *Extreme value statistics of stochastic processes: from Brownian motion to active particles*.

TEACHING

Qualification aux fonctions de maître de conférences *2024*
Accredited to hold lecturer positions in the French university. (Section 28 - Theoretical Physics)

Stipendiary Lecturer, New College (Oxford) *2023*
Mathematical Methods, Thermal Physics.

Tutor, Oxford Study Abroad Program *2023*
Biological Physics.

Teaching assistant, Université Paris-Saclay *2021 - 2022*
Computer Science, Statistical Physics.

FUNDING

Lockey Fund Award (USA) (£ 1000) *Travel award to attend scientific conferences in the USA.* *2024*

Lockey Fund Award (Europe) (£ 500) *Travel award to attend scientific conferences in Europe.* *2024*

Astor Travel Scholarship (£ 1,500) *Travel fund for visits to the USA.* *2024*

Leverhulme-Peierls Fellowship (£ 210,000) *2022*
"intended to support the most talented theoretical physicists worldwide at an early stage of their careers"
One of three top candidates among more than 100 applicants.

New College JRF Travel Allowance (£ 4,500) *2022*

AWARDS

Université Paris-Saclay International Master's Scholarship (€ 10,000) *2018*
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

Thomas Weatherbee (Oxford master's) *2025*
Co-supervised with Nayara Fonseca and Ard Louis.

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

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) *Dec. 2022*
Undergraduate Physics admissions

Organizer, Cross-TP discussions *Oct. 2022 - Mar. 2023*

Journal club across all areas of Theoretical Physics in Oxford

Organizer, Fête de la science (outreach activity for high-school students) *Oct. 2021*

PUBLICATIONS (* KEY PAPERS)

22. **(*) F. Mori**, S. Sarao Mannelli, and F. Mignacco. "Optimal Protocols for Continual Learning via Statistical Physics and Control Theory," ICLR 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", to appear in J. R. Soc. Interface (2025). arXiv:2311.18813

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

Paris Biological Physics Community Day *2024*
École normale supérieure (Paris)

Workshop: Stochastic Systems in Active Matter *2024*
Isaac Newton Institute (Cambridge).

Workshop: New Vistas in Stochastic Resetting *2024*
The Higgs Centre for Theoretical Physics (Edinburgh).

Saturday Mornings of Theoretical Physics (outreach activity for Oxford Physics alumni) *2023*
Oxford University (United Kingdom).

Theoretical Physics Colloquium *2022*
Oxford University (United Kingdom).

Large Deviations, Extremes and Anomalous Transport in Non-equilibrium Systems *2022*
The Erwin Schrödinger International Institute for Mathematics and Physics (Austria).

Nordita Scientific Program "Are there universal laws in nonequilibrium physics" *2022*
Nordita Institute, Stockholm (Sweden).

INVITED SEMINARS

ML Nosh Lunch Seminar *2025*
University of Oxford.

Soft Matter Group Away Day *2024*
University of Oxford.

Soft Matter Seminar *2023*
University of California, Santa Barbara.

Soft Condensed Matter Seminar *2023*
New York University.

IPhT Seminar *2023*
Institut de Physique Théorique, Saclay.

LOMA Seminar *2023*
Laboratoire Ondes et Matière d'Aquitaine, Bordeaux.

Disordered System Seminar *2022*

King's College London.

Statistical Physics and Complexity Webinar Series *2022*
University of Edinburgh.

LuxStatMech seminar *2022*
University of Luxembourg.

LPTMC seminars *2022, 2023, and 2024*
Laboratoire de Physique Théorique de la Matière Condensée, Paris.

SIFS Young Seminar *2022*
Italian Society of Statistical Physics.

ICTS Statistical Physics Journal Club *2021*
International Centre for Theoretical Sciences, Bangalore.

CONTRIBUTED TALKS

Journée "Physique et Vivant" *2023*
Institut Jacques Monod (Paris).

Nordita Workshop: Fluctuations and First-Passage Problems *2023*
Nordita Institute, Stockholm (Sweden).

4th Course on Multiscale Integration in Biological Systems *2021*
Institut Curie, Paris (France).

Journée Systèmes & Matière Complexes *2021*
Université Paris-Saclay, Paris (France).

CONFERENCES AND SCIENTIFIC PROGRAMS

KITP program: Deep Learning from the Perspective of Physics and Neuroscience *2024*
KITP, Santa Barbara (USA).

APS March Meeting *2024*
Minneapolis (USA).

Computational and Systems Neuroscience (COSYNE) *2023*
Montréal (Canada).

SUMMER SCHOOLS

Cargese summer school: Energy, Information and Evolution in Biology *2024*
Cargese Institute for Scientific Studies (France)

Les Houches summer school: Theoretical Biophysics *2023*
Les Houches Physics School (France)

Les Houches summer school: Statistical Physics & Machine learning *2022*
Les Houches Physics School (France)

Beg Rohu Summer School: Statistical mechanics & emergent phenomena in biology *2021*
Beg Rohu (France)

Fundamental Problems in Statistical Physics XV *2021*
Brunico (Italy)

Spring College on the Physics of Complex Systems *2019*

ICTP (Trieste, Italy)