

# FRANCESCO MORI

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[francescomori.github.io](https://francescomori.github.io)

## PROFESSIONAL SUMMARY

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I am a theoretical physicist at Harvard University, supported by the Center of Mathematical Sciences and Applications and a Shuman Educational Research Grant. My research spans nonequilibrium statistical physics, active matter, animal navigation, and machine learning.

## RESEARCH EXPERIENCE

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### Research Associate

Sept. 2025 - Present

Center of Mathematical Sciences and Applications, Harvard University.

### Leverhulme-Peierls Fellow (independent postdoctoral position)

Oct. 2022 - Sept. 2022

Rudolf Peierls Centre for Theoretical Physics, Department of Physics, University of Oxford

### Junior Research Fellow, New College, Oxford.

Oct. 2022 - Sept. 2022

### Research Visitor, City University of New York.

Feb. 2025 - Present

### Part-time consultant, Scroll Prize, Inc.

Sept. - June. 2025

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

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### Abilitazione Scientifica Nazionale

2025

Accredited to hold Associate Professor positions in Italian universities. (Sections 02/A2 and 02/B2)

### Qualification aux fonctions de maître de conférences

2024

Accredited to hold lecturer positions in French universities. (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

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### Shuman Educational Research Grant (€ 38,000) 9-month research grant.

2025

### 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

<b>Université Paris-Saclay International Master's Scholarship</b> (€ 10,000) 1-year master program at Paris-Saclay University.	2018
<b>Erasmus Scholarship</b> (€ 4,000) 6-month exchange program at Paris-Saclay University.	2018
<b>Alta Scuola Politecnica</b> (€ 3,000) Excellence path for the top 1% of master students of Politecnico di Torino and Milano.	2017
<b>Physics of Complex Systems Travel Grant</b> (€ 2,000) 6-month exchange program at SISSA and ICTP (Trieste, Italy).	2017
<b>Young Talent Project Travel Grant</b> (€ 3,000) 6-month exchange program at Lund University (Sweden)	2016
<b>Young Talent Project</b> (€ 4,500) Excellence program for the top 5% of bachelor students of Politecnico di Torino.	2014

## EDUCATION

<b>M. Sc. in Physics of Complex Systems</b> , Université Paris-Saclay Ranking: 1/42, GPA: 18.6/20	Sept. 2018 - Jul. 2019
<b>M. Sc. in Physics of Complex Systems</b> , Politecnico di Torino GPA: 30.00/30, Final mark: 110/110 cum laude.	Oct. 2017 - Jul. 2019
<b>M. Sc. in Engineering Physics</b> , Politecnico di Milano Final mark: 110/110 cum laude.	Oct. 2017 - Jul. 2019
<b>Intern Student</b> , LPTMS, Orsay (with Satya Majumdar).	Mar. 2019 - Jun. 2019
<b>iMat Project</b> (Project on natural language processing and materials science) European Materials Modelling Council, Alta Scuola Politecnica.	Jun. 2018 - Sept. 2019
<b>Visiting student</b> , SISSA and ICTP (Trieste, Italy).	Sept. 2017 - Feb. 2018
<b>Visiting student</b> , Lund University (Sweden).	Aug. 2016 - Feb. 2017
<b>B. Sc. in Applied Mathematics</b> , Politecnico di Torino GPA: 29.29/30, Final mark: 110/110 cum laude.	Oct. 2014 - Jul. 2017

## MENTORSHIP

<b>Yaprak Onder</b> (Oxford undergraduate) Currently Master's student at the University of Oxford.	2023
<b>Costantino Di Bello</b> (Université Paris-Saclay master's) Currently Ph.D. student at the University of Potsdam. This internship resulted in the publication Phys. Rev. E <b>108</b> , 014112 (2023).	2021
<b>Marco Biroli</b> (École normale supérieure de Paris master's) Currently Ph.D. student at Paris-Saclay University. This internship resulted in the publication J. Phys. A <b>55</b> , 244001 (2022).	2021

## ACADEMIC SERVICE AND OUTREACH

<b>Volunteer</b> , Squishy Science Sunday (outreach activity at the APS March Meeting)	Mar. 2025
<b>Assessor for master project</b> Oxford Interdisciplinary Bioscience DTP	Apr. 2024

## 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)

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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

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

## INVITED SEMINARS

<b>Mathematical Physics Group Seminar</b>	2025
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University of Bologna.

**Disordered System Seminar**

2022 and 2025

King's College London.

**Condensed Matter Seminar**

2025

University of Massachusetts Amherst.

**Soft Matter Seminar**

2025

University of California, Berkeley.

**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.

**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**

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**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**

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**APS March Meeting**

2025

Anaheim (USA).

<b>KITP program: Deep Learning from the Perspective of Physics and Neuroscience</b> KITP, Santa Barbara (USA).	2024
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<b>APS March Meeting</b> Minneapolis (USA).	2024
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<b>Computational and Systems Neuroscience (COSYNE)</b> Montréal (Canada).	2023
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## SUMMER SCHOOLS

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<b>Cargese summer school: Energy, Information and Evolution in Biology</b> Cargese Institute for Scientific Studies (France)	2024
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<b>Les Houches summer school: Theoretical Biophysics</b> Les Houches Physics School (France)	2023
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<b>Les Houches summer school: Statistical Physics &amp; Machine learning</b> Les Houches Physics School (France)	2022
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<b>Beg Rohu Summer School: Statistical mechanics &amp; emergent phenomena in biology</b> Beg Rohu (France)	2021
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<b>Fundamental Problems in Statistical Physics XV</b> Brunico (Italy)	2021
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<b>Spring College on the Physics of Complex Systems</b> ICTP (Trieste, Italy)	2019
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