

Experience

- 2023- **Flatiron Research Fellow**, *Flatiron Institute*, Simons Foundation, New York, US.
In the Center for Computational Mathematics, working in AI for Physics.
- 2021-2023 **Lecturer in Mathematics**, *CPES*, PSL University, Paris, France.
Teaching Fundamental Mathematics at undergraduate level.
- 2019-2021 **Main organizer of the "Challenge Data"**, Paris, France.
A French competition over data challenges gathering more than 10 000 participants.
- 2019-2020 **Research Engineer**, *École Normale Supérieure*, PSL University, Paris, France.
Under the supervision of Stéphane Mallat in close collaboration with Jean-Philippe Bouchaud.
- Apr.-Sep. 2019 **Equity Derivatives Strat Intern**, *Morgan Stanley*, Exotic derivatives team, London, UK.
Pricing models, statistical tools, new payoffs.

Education

- 2020-2023 **PhD student**, *École Normale Supérieure*, PSL University, Center for Data Science, Paris, France.
On compact models of multi-scale processes, with application to Physics, Seismology and Finance.
Under the supervision of Stéphane Mallat, in close collaboration with Jean-Philippe Bouchaud.
- 2018-2019 **MSc in Mathematics**, *Sorbonne Université*, Paris, France.
One of the top-ranking MSc in Probability and Finance (ex DEA El Karoui).
With highest honours, rank: 1st/80.
- 2018 **"Agrégation" in Mathematics**, *major in Probability and Statistics*, France.
The highest competitive exam in Mathematics in France.
Rank: 6th (315 admitted, 1529 candidates).
- 2015-2018 **École Normale Supérieure of Rennes, Department of Mathematics**, *Rennes, France*.
University preparing to research and innovation.
-MSc in Mathematics, with highest honours, rank: 1st/50.
-BSc in Mathematics, with highest honours, rank: 1st/132.

Publications

- 2025 **Rudy Morel**, Francesco Pio Ramunno, Jeff Shen, et al.,
"Predicting partially observable dynamical systems via diffusion models with a multiscale inference scheme."
Advances in Neural Information Processing Systems 38.
- 2025 **Rudy Morel**, Jiequn Han, Edouard Oyallon.
"DISCO: learning to DISCover an evolution Operator for multi-physics-agnostic prediction."
International Conference on Machine Learning 43.
- 2025 Cécilia Aubrun*, **Rudy Morel***, Michael Benzaquen, Jean-Philippe Bouchaud.
"Identifying new classes of financial price jumps with wavelets."
Proceedings of the National Academy of Sciences.
- 2025 **Rudy Morel**, Gaspar Rochette, Roberto Leonarduzzi, Jean-Philippe Bouchaud, Stéphane Mallat.
"Scale Dependencies and Self-Similar Models with Wavelet Scattering Spectra."
Applied and Computational Harmonic Analysis.
- 2025 Minjie Lei, Susan Clark, **Rudy Morel**, Erwan Allys, et al.
"Neutral gas phase distribution from HI morphology: phase separation with scattering spectra and

variational autoencoders.”

The Astrophysical Journal.

- 2025 Ali Siahkoohi, **Rudy Morel**, Randall Balestrieri, Erwan Allys, et al.
“*Martian time-series unraveled: A multi-scale nested approach with factorial variational autoencoders.*”
IEEE Transactions on Geoscience and Remote Sensing.
- 2025 Liam Parker, François Lanusse, Jeff Shen, et al.
“*AION-1: Omnimodal Foundation Model for Astronomical Sciences.*”
Advances in Neural Information Processing Systems 38.
- 2024 **Rudy Morel**, Stéphane Mallat, Jean-Philippe Bouchaud.
“*Path Shadowing Monte-Carlo.*”
Quantitative Finance 24.
- 2024 Ruben Ohana*, Michael McCabe*, Lucas Meyer, **Rudy Morel**, et al.
“*The Well: a Large-Scale Collection of Diverse Physics Simulations for Machine Learning.*”
Advances in Neural Information Processing Systems 37.
- 2024 Sihao Cheng, **Rudy Morel**, Erwan Allys, Brice Ménard, Stéphane Mallat.
“*Scattering Spectra Models for Physics.*”
PNAS Nexus 3.
- 2024 Liam Parker, François Lanusse, Siavash Golkar, Leopoldo Sarra, Miles Cranmer, et al.
“*AstroCLIP: a cross-modal foundation model for galaxies.*”
Monthly Notices of the Royal Astronomical Society 531.
- 2023 Ali Siahkoohi, **Rudy Morel**, Maarten de Hoop, Erwan Allys, Grégory Sainton, Taichi Kawamura.
“*Unearthing InSights into Mars, unsupervised source separation with limited data.*”
International Conference on Machine Learning 41.

Talks and Posters

- Jul. 2025 **U. Chicago AI&Science summer school**, Paris, France
- Jul. 2025 **AI&Science summer school**, Caen, France
- Jun. 2025 **M2LInES annual meeting**, New York, US
- May 2025 **Foundation Model for Science conference**, New York, US
- Apr 2025 **Foundation Models of the Physical Universe symposium**, Palo Alto, US
- Dec. 2024 **M2LInES seminar**, New York, US
- Dec. 2024 **NeurIPS 2024 (poster)**, Vancouver, Canada
- Oct. 2024 **Bloomberg BBQ seminar**, New York, US
- Sep. 2024 **Center for Computational Astrophysics**, New York, US
- Aug. 2024 **Bruno Dupire’s team (Bloomberg)**, New York, US
- Jul. 2024 **Advances in Risk Modelling workshop**, Vienna, Austria
- Jul. 2024 **SaIAI4Science workshop**, Palaiseau, France
- Jun. 2024 **AI & Science workshop**, Berkeley, US
- Oct. 2023 **Oxford Mathematical Finance seminar**, Oxford, UK
- Aug. 2023 **ICIAM 2023 minisymposium on volatility modeling**, Tokyo, Japan
- Mar. 2023 **LPSM seminar on Numerical Probabilities**, Paris, France
- Sep. 2022 **SIAM Mathematics of Data Science conference (poster)**, San Diego, US
- Sep. 2022 **FARF4 conference on fractals and related fields**, Porquerolles, France
- Jun. 2022 **Princeton Machine Learning Theory summer school (poster)**, Princeton, US

Languages

- French Mother tongue
- Anglais Fluent, written and spoken

Espagnol Basic communication skills

Computer skills

Python Very good

Matlab Basic

C++ Basic

Java Basic

Software

scatspectra https://github.com/RudyMorel/scattering_spectra

shadowing <https://github.com/RudyMorel/shadowing>

the_well https://github.com/PolymathicAI/the_well