

Adeline Fermanian

Education

- 2018-2021 **PhD in statistics**, *Sorbonne Université*, Paris, France
Funded by DIM MathInnov. Title: *Learning time-dependent data with the signature transform*. Supervised by Gérard Biau (Professor, Sorbonne Université), and Benoît Cadre (Professor, Université Rennes 2).
- 2017-2018 **Master of science in statistics**, *ETH*, Zürich, Switzerland
- 2014-2016 **Engineering degree**, *CentraleSupélec*, Châtenay-Malabry, France
- 2012-2014 **Intensive 2-year university level preparation in maths and physics**, *Lycée Henri IV*, Paris, France

Experience

Vocational

- 2022 - Present **Machine learning researcher**, *Califrais*, Paris, France
Leads research activities of the company Califrais inside the Labcom LOPF (Large-scale Optimization of Product Flows). The goal is to create machine learning algorithms and develop environmentally friendly and socially responsible technology to optimize fresh produce logistics flows on a massive scale.
- 2021 - 2022 **Postdoctoral researcher**, *Center for Computational Biology (CBIO) - Mines ParisTech*, Paris, France
Funded by the PRAIRIE Institute. Topic: *High-dimensional inference in genomic data* Supervised by Chloé-Agathe Azencott (Associate Professor, Mines ParisTech, Institut Curie and INSERM)
- 2018 **Master thesis**, *LPSM - Sorbonne Université*, Paris, France
Topic: *The signature method in machine learning*. Supervised by Gérard Biau (Professor, Sorbonne Université), Benoît Cadre (Professor, Université Rennes 2), and Peter Bühlmann (Professor, ETH Zürich)
- 2017 **Graduate researcher**, *Inria - Wolfgang Pauli Institute*, Vienna, Austria
Topic: *Deterministic and stochastic models of division of bacteria*. Supervised by Marie Doumic (Research Scientist, INRIA).
- 2016-2017 **Data Scientist**, *Multiposting group - SAP*, Paris, France
Development of machine learning algorithms for salary prediction using a database of millions of job ads.

Miscellaneous

- 2022 **Scientific Consultant**, *BNP Paribas*, Paris, France
Scientific consulting with the Research and Development team at BNP Paribas to develop market simulators combining generative adversarial networks and signatures.

Computer skills

Languages Python (Pytorch, scikit-learn, pandas, django), R.

Language skills

French	Mother tongue	English	Fluent (C1, TOEFL IBT : 106/120)
German	Intermediate (B1-B2)	Spanish	Elementary (A2)

Publications

Published articles

- 2023 **Learning the Dynamics of Sparsely Observed Interacting Systems**, *Bleistein, L., Fermanian, A., Jannot, A.S., Guilloux, A.*, Proceedings of the 40th International Conference on Machine Learning (ICML 2023)
- 2023 **New Directions in the Applications of Rough Path Theory**, *Fermanian, A., Lyons, T., Morrill, J., Salvi, C.*, IEEE BITS the Information Theory Magazine
- 2022 **Functional linear regression with truncated signatures**, *Fermanian, A.*, Journal of Multivariate Analysis, Vol. 192, 105031
- 2021 **Framing RNN as a kernel method: A neural ODE approach**, *Fermanian, A., Marion, P., Vert, J.P., Biau, G.*, Conference on Neural Information Processing Systems (NeurIPS 2021), oral presentation
- 2021 **Embedding and learning with signatures**, *Fermanian, A.*, Computational Statistics & Data Analysis, Vol. 157, 107148

Conference proceedings and miscellaneous

- 2020 **Learning with signatures**, *Biau, G. and Fermanian, A.*, Functional and High-Dimensional Statistics and Related Fields, pp. 19-26, Springer, Cham.

Preprints

- 2023 **FLASH: a Fast joint model for Longitudinal And Survival data in High dimension**, *Nguyen, V. T., Fermanian, A., Guilloux, A., Barbieri, A., Zohar, S., Jannot, A.-S., Bussy, S.*, Arxiv:2309.03714
- 2023 **The insertion method to invert the signature of a path**, *Fermanian, A., Chang, J., Lyons, T., Biau, G.*, Arxiv:2304.01862
- 2022 **Scaling ResNets in the Large-depth Regime**, *Marion P., Fermanian, A., Biau G., Vert, J.P.*, Arxiv:2206.06929
- 2020 **A Generalised Signature Method for Time Series**, *Morrill, J., Fermanian, A., Kidger, P., Lyons, T.*, Arxiv:2006.00873

Teaching experience

As lecturer

- 2023 **Large-Scale Machine Learning**, *Mines ParisTech*, Paris, France
One introductory session and one session on Natural Language Processing (master level)
- 2022 **Data Science**, *Mines ParisTech*, Paris, France
A course introducing data science to 1st year engineering students (undergraduate level)
- 2019-2022 **Return to graduate studies diploma for exiles**, *Sorbonne Université*, Paris, France
Refresher course on mathematics for continuing education at Sorbonne Université (high school level)

As teaching assistant

- 2020-2021 **Linear models**, *ISUP - Sorbonne Université*, Paris, France
Exercise classes introducing linear models to 2nd year actuarial students (graduate level)
- 2020-2021 **Inferential Statistics**, *ISUP - Sorbonne Université*, Paris, France
Exercices classes introducing first notions of statistics (tests, parametric estimation...) to 1st year actuarial students (graduate level)
- 2020-2021 **Mathematical Statistics**, *Sorbonne Université*, Paris, France
Computer labs in R to introduce basic notions of statistics to master students in applied mathematics (graduate level)

Supervision

- April 2023-present **Co-supervision of the PhD of Van-Tuan Nguyen (Califrais, Université Paris Cité)**, with Agathe Guilloux (Professor, Inria-INSERM HeKA Team). Topic: *Modeling and optimization of large scale constrained flows*

- January 2023-present **Co-supervision of the PhD of Julie Cartier (Centre for Computational Biology (CBIO), Mines Paris, Institut Curie, PSL University)**, with Florian Massip (Assistant Professor, CBIO). Topic: *Transcriptomic analysis of nasal swab for the early detection of lung cancer*
- May-September 2023 **Co-supervision of the master thesis of Sobihan Surendran (Master 2, Sorbonne Université)**, with Sylvain Le Corff (Professor, Sorbonne Université) and Antoine Godichon-Baggioni (Assistant Professor, Sorbonne Université). Topic: *Stochastic Optimization with Monte Carlo methods*
- May-July 2021 **Co-supervision of the master thesis of Nathan Doumèche (Master 2, Ecole Normale Supérieure)**, with Gérard Biau (Professor, Sorbonne Université) and Pierre Marion (PhD student, Sorbonne Université). Topic: *Développement de Taylor signé et applications à l'apprentissage statistique*
- June-July 2020 **Co-supervision of the master thesis of Linus Bleistein (Ecole Normale Supérieure)**, with Gérard Biau (Professor, Sorbonne Université) and Claire Boyer (Assistant Professor, Sorbonne Université). Topic: *SiGANtures: Generating Times Series Using Wasserstein-Generative Adversarial Nets and the Signature Transform*

Scientific activities

- 2018 - Present **Reviewer:** Stochastic Processes and their Applications, Journal of Multivariate Analysis, Comptes Rendus - Mathématique, Statistics & Probability Letters.

Scientific events organization

- 2022 **Co-organizer of a workshop on fairness at the AI Act Day**, *Datacraft and Impact AI*, Paris, France
- 2021 **Co-organizer of the NeurIPS@Paris meeting**, *Sorbonne Université*, Paris, France
- 2021 **Co-organizer of the GDR TRAG Young researchers meeting**, *Institut Henri Poincaré*, Paris, France

Seminars and reading groups organization

- 2020 - 2021 **Co-organizer of a Statistics and machine learning reading group**, *Sorbonne Université*, Paris, France
- 2019 - 2021 **Co-organizer of InfoMaths, a seminar about informatic tools for mathematicians.**, *Sorbonne Université*, Paris, France
- 2019 - 2020 **Co-organizer of the PhD students seminar**, *LPSM, Sorbonne Université*, Paris, France
- 2018 - 2019 **Co-organizer of a reading group on rough paths.**, *LPSM, Sorbonne Université*, Paris, France

Communications

International conferences and workshops

- October 2022 **Learning and Optimization in Luminy workshop**, *Centre International de Rencontres Mathématiques*, Marseille, France
- October 2022 **Non-Linear and High Dimensional Inference**, *Geometry and Statistics in Data Sciences thematic semester, Institut Henri Poincaré*, Paris, France
- September 2022 **London-Paris Bachelier Workshop**, *Institut Henri Poincaré*, Paris, France
- July 2022 **2nd Joint Congress of Mathematics AMS-EMS-SMF**, *Statistical learning session*, Grenoble, France
- July 2022 **2022 SIAM Annual Meeting**, *Signatures, Kernels, and Applications session*, Pittsburgh, Pennsylvania, United States
- June 2022 **IMS Annual Meeting in Probability and Statistics**, *Rough path theory, signatures and applications session*, London, United Kingdom

- August 2021 **Journées MAS**, *Société de Mathématiques Appliquées et Industrielles (SMAI)*, Orléans, France
- July 2021 **Applications of Rough Paths: Computational Signatures and Data Science**, *The Institute for Computational and Experimental Research in Mathematics (ICERM)*, Providence, United States
- March 2021 **Pathwise Stochastic Analysis and Applications**, *Centre International de Rencontres Mathématiques (CIRM)*, Marseille, France
- December 2020 **Workshop New Directions in Rough Path Theory**, *Mathematical Research Institute of Oberwolfach*, Oberwolfach, Germany
- September 2020 **Second Symposium on Machine Learning and Dynamical Systems**, *The Fields Institute for Research in Mathematical Sciences*, Toronto, Canada
- August 2020 **Geometry of curves in time series and shape analysis**, *Max Planck Institute for Mathematics in the Sciences*, Leipzig, Germany
- December 2019 **12th Oxford-Berlin Young Researchers Meeting on Applied Stochastic Analysis**, *University of Oxford*, Oxford, United Kingdom
- October 2019 **Conférence du GDR TRAG 2019**, Nancy, France
- June 2019 **51es Journées de Statistique**, Nancy, France
- Seminars**
- September 2023 **Séminaire de Probabilités et Statistique**, *IMAG, Université de Montpellier*, Montpellier, France
- October 2022 **Séminaire de Probabilités et Statistique du LAMA**, *Université Gustave Eiffel*, Champs-sur-Marne, France
- September 2022 **HeKA Inria team group seminar**, *Inria*, Paris, France
- August 2022 **Stochastic Algorithms and Nonparametric Statistics group seminar**, *Weierstrass Institute*, Berlin, Germany
- June 2022 **Groupe de travail Probas-Stats du LPSM**, *Sorbonne Université*, Paris, France
- April 2022 **Seminar of the Differential Equations and Numerical Analysis group (DNA)**, *NTNU*, Trondheim, Norway
- January 2022 **Séminaire de Statistique, Optimisation et Probabilités**, *Institut de Mathématiques de Toulouse, Université Toulouse III - Paul Sabatier*, Toulouse, France
- January 2022 **Séminaire Parisien de Statistique**, *Institut Henri Poincaré*, Paris, France
- December 2021 **AI seminar**, *UCL Centre for Artificial Intelligence*, London, United Kingdom
- October 2021 **Josef Teichmann's working group seminar**, *ETH Zürich*, Zürich, Switzerland
- June 2021 **AIP seminar**, *RIKEN Center for Advanced Intelligence Project*, Tokyo, Japan
- May 2021 **Séminaire MODAL'X**, *Université Paris Nanterre*, Paris, France
- May 2021 **CRISM (Center for Research in Statistical Methodology) seminar series**, *Department of Statistics, University of Warwick*, Warwick, United Kingdom
- February 2021 **Séminaire du SAMM (Statistique, Analyse et Modélisation Multidisciplinaire)**, *Université Paris 1 Panthéon-Sorbonne*, Paris, France
- January 2021 **Rough Path Interest Group**, *Alan Turing Institute*, London, United Kingdom
- January 2021 **Séminaire de Probabilités et Statistique**, *Laboratoire J.A. Dieudonné, Université Côte d'Azur*, Nice, France
- October 2020 **Algebraic and combinatorial perspectives in the mathematical sciences (ACPMS)**, *virtual*
- June 2020 **Séminaire online du LPSM**, *Sorbonne Université*, Paris, France
- April 2020 **DataSig Seminar Series**, *Alan Turing Institute*, London, United Kingdom

- February 2020 **Seminar of the Institut Denis Poisson**, *Université d'Orléans*, Orléans, France
- January 2020 **Post Graduate seminar of the Chair for Mathematics of Information Processing**, *RWTH Aachen University*, Aachen, Germany
- May 2019 **PhD students seminar of the LPSM**, *Sorbonne Université*, Paris, France
- April 2019 **Rencontre des Jeunes Statisticiens**, Porquerolles, France
- Miscellaneous**
- September 2023 **Soirée CDO & HR - Minimiser son empreinte environnementale : quelles solutions Data/IA utiliser ?**, *Datacraft*, Paris, France

Personal interests and volunteer experience

- 2023 - Present Co-president of an association campaigning for gender equality in religion: coordination of around 50 volunteers, communication on social media, press relations, organization of events...
- 2015 **President of the artistic student association at Centrale Paris**: organized an artistic festival with 1000 participants, managed a 30-persons team.
- 2015 **Assistant head of a food distribution center for the association Août Secours Alimentaire**: supervised a food distribution center for people living in precarious conditions. Managed a team of 20 volunteers, including disabled workers.
- 2002-2012 Municipal Conservatory of Music in Paris 9: piano, solfeggio, and choral singing. Performed many concerts.