Bruno Loureiro

Personal Information

Dr. Bruno Loureiro
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orcid.org/0000-0002-6327-4688
Member of the PR[AI]RIE-PSAI cluster and the ELLIS Paris unit.

Employment history

09.2024–present **Université Paris Sciences et Lettres**, *Professeur Attaché*.

10.2022–present **École Normale Supérieure - Département d'Informatique**, *CNRS researcher*.

09.2020–09.2022 **École Polytechnique Fédérale de Lausanne**, *Postdoctoral researcher*.
Advisor: Prof. Florent Krzakala

07.2018–08.2020 **Institut de Physique Théorique**, *Postdoctoral researcher*.
Advisor: Prof. Lenka Zdeborová

04.2018–08.2018 **BTG Pactual UK**, *Data Science Intern*.

01.2011–06.2011 **University of Paris 7 - Department of Physics**, *Assistant librarian*.

Education

09.01.2026 **HDR in Informatics**, *École Normale Supérieure – Université PSL*.
Title: *Statistical Physics of two-layer neural networks: from kernels to feature learning*
Jury: Gérard Ben Arous, Jamal Najim, Nathan Srebro, Francis Bach, Julie Delon, Rémi Gribonval, Julia Kempe, Marc Mézard, Gabriel Peyré.

10.2014–06.2018 **PhD in Physics**, *University of Cambridge*.
Title: *Disorder in holographic field theories: inhomogeneous geometries, momentum relaxation and SYK models*
Advisor: Prof. A.M. García-García

10.2013–07.2014 **MASt in Applied Mathematics**, *University of Cambridge*, *Merit*.
Master Thesis: *Integrability and Self-Duality*,
Advisor: Dr. Maciej Dunajski

06.2012–07.2012 **Internship**, *Laboratoire de physique nucléaire et des hautes énergies*.
Project: *Non-gaussianities in the CMB*
Advisor: Dr. Pierre Astier

09.2011–08.2013 **BSc Mathematics and Physics**, *King's College London*, *First Class Honours*.
BSc Thesis: *Non-gaussianities in the CMB*
Advisor: Prof. Eugene Lim

09.2010–08.2011 **BSc Physics**, *University of Paris 7 – Denis Diderot*, *Result – 16.674/20*.

08.2008–04.2010 **Internship**, *Fundaçao Oswaldo Cruz*.
Project: *Characterization of the Oligopeptidase B2 of Leishmania Amazonensis*
Advisor: Prof. Herbert Guedes

Funding

2026–2030 **PEPR IA, Project *MAGICALL***, *622k €*.
with Giulio Biroli, Marylou Gabrié and Anna Korba

10.2025–09.2027 **ANR *Jeunes Chercheuses et Jeunes Chercheurs* (JCJC)**, *300k €*.

11.2022–10.2026 **SNF Ambizione grant**, *785k CHF (≈ 815k €)*, Declined.

10.2022–09.2027 **Choose France - CNRS AI Rising Talents**, *1M €*.

Scientific Reviewing

Editor
TMLR (Action editor), PRE (Associate Editor)

Reviewer
- **Machine Learning conferences:** NeurIPS, ICML, ICLR, AISTATS, ALT, MSML, UAI.
- **Machine Learning workshops:** TOPML, SEDL.
- **Machine Learning journals**: JMLR, TMLR (Action editor), MLST, IEEE TNNLS, IEEE TIT.
- **Physics journals**: Nature Communications, JSTAT, PRE, PRX,PRL, JSP, Physica A.
- **Other journals**: PNAS, CPAM, Bernouilli.

Scientific Organisation

Conferences and workshops

20-24.04.2026 **3rd Lausanne event on machine learning & neural network theory, Bernouilli Centre (EPFL)**, *co-organised with Florent Krzakala*.

6-7.12.2025 **1st Workshop on Principles of Generative Modeling (PriGM), EurIPS 2025**, *co-organised with F Cagnetta, E Cornacchia, V De Bortoli, SH Lim, P Marion, A Orvieto*.

28.10.2025 **Thematic day on phase transitions in high-dimensional inference**, *co-organised with Marylou Gabrié*.

18.07.2025 **3rd Workshop on High-dimensional Learning Dynamics (HiLD), ICML 2025**, *co-organised with A. Agarwala, I. Seroussi, A. Jagannath, J. Lee*.

12-16.05.2025 **2nd Lausanne event on machine learning & neural network theory, Bernouilli Centre (EPFL)**, *co-organised with Noam Levi, Mathieu Wyart and Florent Krzakala*.

27-29.05.2024 **1st Lausanne event on machine learning & neural network theory**, *co-organised with Vittorio Erba and Florent Krzakala*.

26.03.2024 **AI & Physics track, Applied Machine Learning Days (AMLD)**, *co-organised with Jonathan Dong and Christian Keup*.

23-25.10.2023 **Analytical Approaches for Neural Network Dynamics, Institut Henri Poincaré**, *Co-organised with Stefano Sarao and Gabriele Sicuro*.

31.07-12.08.2023 **Statistical Physics and Machine Learning back together, again, Cargèse**, *Co-organised with Florent Krzakala, Lenka Zdeborová, Vittorio Erba and Damien Barbier*.

03.2022 **AI & Physics track, Applied Machine Learning Days (AMLD)**, *Co-organised with Jonathan Dong and Vittorio Erba.*

Schools

02-06.03.2026 **Statistical Physics and Machine Learning, PSL Intensive Week**, *co-organised with Antoine Maillard.*

27.02-07.03.2025 **Towards a theory for typical-case algorithmic hardness, École de Physique des Houches**, *co-organised with Vittorio Erba.*

25-29.11.2024 **Statistical Physics and Machine Learning, PSL Intensive Week**, *co-organised with Giulio Biroli and Francis Bach.*

04-08.03.2024 **Statistical Physics and Machine Learning, PSL Intensive Week**, *co-organised with Giulio Biroli and Francis Bach.*

Seminars, colloquiums

10.2023–Current **ENS Data Science Colloquium**, *Co-organised with Giulio Biroli, Stephane Mallat, Gabriel Peyré and Christian Lorenzi.*

05.2023–Current **Statistical Physics & Machine Learning Journal club**, *Co-organised with Giulio Biroli.*

11.2021–09.2022 **Foundations of Learning and AI Research (FLAIR), Junior meetings**, *Organiser.*

06.2021–11.2021 **Theory of Neural Nets Seminar**, *Organiser.*

09.2020–09.2022 **SPOC+IdePHICS+PCLS Joint group meeting**, *Organiser.*

Research interests

I am interested in theoretical problems in high-dimensional Statistics which are motivated by practical challenges in Statistical Inference, Signal Processing and Machine Learning, e.g. low-rank matrix factorisation, phase retrieval and learning in neural networks, to cite a few. My approach to these problems leverage techniques originally developed in the context of Statistical Physics and Disordered Systems to address questions of interest in these fields. As an example, two questions often motivating my works are: what is the typical algorithmic complexity of an inference task? How many samples are needed for a neural network to learn a target rule?

Numerical Skills

Python, Mathematica, LaTeX.

Languages

English (Fluent), French (Fluent), Italian (Intermediate), Portuguese (Native).