CEDRIC GERBELOT-BARRILLON

251 Mercer Street ⋄ New York, 10012 NY, USA
cedric.gerbelot@cims.nyu.edu ⋄ https://cgerbelo.github.io/

RESEARCH INTERESTS

Probability and statistics in high dimension, statistical physics of disordered systems, machine learning theory

ACADEMIC POSITIONS

Courant Instructor - Courant Institute of Mathematical Sciences, New York, USA 2022-now
Research and teaching in mathematics and computer science.

EDUCATION

PhD - Ecole Normale Supérieure de Paris, France 2022
Mathematical physics and computer science.
Thesis : *Statistical learning in high dimensions : a rigorous statistical physics approach*
Advisors : Pr. Florent Krzakala (ENS-EPFL) and Pr. Marc Lelarge (ENS-INRIA).

MSc in Applied Mathematics - Ecole Normale Supérieure de Paris-Saclay, France 2019
Mathematiques, Vision, Apprentissage - Highest honors (mention très bien).

Engineer degree - Ecole Supérieure de Physique et de Chimie Industrielle, Paris, France 2019
Highest honors (mention très bien).

PUBLICATIONS

- Ben Arous, G., Gerbelot, C. and Piccolo, V., Dynamics of optimization in the multi-rank spiked tensor model, *To appear* (2024)
- Gerbelot, C., Avetik Karagulyan, Stefani Karp, Kavya Ravichandran, Menachem Stern and Nathan Srebro (2023) Applying statistical learning theory to deep learning, *Journal of Statistical Mechanics : Theory and Experiment, Special Issue Les Houches 2022 Lecture Notes*
- Gerbelot, C., Troiani, E., Mignacco, F., Krzakala, F., Zdeborova, L. (2024) Rigorous dynamical mean field theory for stochastic gradient descent methods. *SIAM Journal on Mathematics of Data Science (SIMODS)*
- Daniels, M., Gerbelot, C., Krzakala, F., Zdeborova, L. (2022). Multi-layer State Evolution Under Random Convolutional Designs, *Advances in Neural Information Processing Systems (Neurips)*
- Cornacchia, E., Mignacco, F., Veiga, R., Gerbelot, C., Loureiro, B., Zdeborova, L. (2022). Learning Curves for the Multiclass Teacher-Student Perceptron. *Machine Learning: Science and Technology.*
- Loureiro, B., Gerbelot, C., Refinetti, M., Krzakala, F, Zdeborova, L. (2022). Fluctuations, Bias, Variance & Ensemble of Learners: Exact Asymptotics for Convex Losses in High-Dimension. *International Conference on Machine Learning (ICML).*
- Gerbelot, C. and Berthier, R. (2023). Graph-based approximate message passing iterations. *Information and Inference : a Journal of the IMA.*

- Loureiro, B., Sicuro, G., Gerbelot, C.,Pacco, A., Krzakala, F, Zdeborova, L. (2021). Learning Gaussian Mixtures with Generalized Linear Models : Precise Asymptotics in High-dimensions. *Advances in Neural Information Processing Systems (Neurips)*, *Spotlight presentation.*
- Loureiro, B., Gerbelot, C, Cui, H, Goldt, S, Mezard, M, Krzakala, F, Zdeborova, L (2021). Capturing the learning curves of realistic data sets with a teacher-student model. *Advances in Neural Information Processing Systems (Neurips).*
- Gerbelot, C., Abbara, A., & Krzakala, F. (2020). Asymptotic errors for teacher student convex generalized linear models (Or: How to prove Kabashima's replica formula). *IEEE Transactions on Information Theory.*
- Gerbelot, C., Abbara, A., & Krzakala, F. (2020). Asymptotic errors for convex penalized linear regression beyond Gaussian matrices. *Conference On Learning Theory (COLT).* PMLR, vol 125,1682-1713
- Ilton, M., Couchman, M. M., Gerbelot, C., Benzaquen, M., Fowler, P. D., Stone, H. A., ... & Salez, T. (2016). Capillary leveling of freestanding liquid nanofilms. *Physical review letters*, 117(16), 167801.

SEMINARS, CONFERENCES AND SUMMER SCHOOLS

Joint Statistical Meetings (JSM), Portland, USA August 2024
Conference - invited speaker
EPFL workshop on Machine Learning Theory, Lausanne, Switzerland May 2024
Conference - invited speaker
NYU students and postdocs probability seminar, New York, USA April 2024
Harvard Probability and Statistics seminar series, Cambridge, USA March 2024
Summer school on statistical physics and machine learning, Cargese, Corsica August 2023
Conference - invited speaker
High Dimensional Statistics and Random Matrices, Porquerolles, France June 2023
Conference - invited short talk
Princeton Workshop on Physics for Neural Networks, Princeton, USA April 2023
Conference - invited speaker
NYU working group on generative models seminar November 2022
NYU CDS group seminar October 2022
NYU Courant postdoc seminar October 2022
Summer School on Statistical Physics and Machine Learning, Les Houches, France August 2022
DYOGENE group seminar, INRIA, Paris, France March 2022
Neurips 2021 (virtual) December 2021
Contributed talk
Neurips@Paris workshop, Sorbonne Universite December 2021
DeepMath 2021 Conference, virtual October 2021
Contributed talk
Workshop on Stochastic and Learning Algorithms, CIRM, Luminy, France September 2021
Theory of Deep Learning Workshop, Isaac Newton Institute, (virtual) August 2021
Contributed talk
ICTP Youth in High Dimensions conference, Trieste, Italy April 2021
Conference - invited speaker
EPFL, Spoc+IdePhics+Pcsl group seminar, Lausanne, Switzerland March 2021
Workshop on Statistical Physics and Machine Learning, Les Houches, France August 2020
Summer workshop - participant and contributed talk
ICTP Quantitative life sciences/Mathematics seminar, Trieste (virtual) November 2020
SPHINX group seminar, Ecole Normale Supérieure, Paris, France October 2020
33rd Conference on Learning Theory, Graz, Austria (virtual) July 2020
Conference - contributed talk

ICTP Workshop Youth in High Dimensions, Trieste, Italy (virtual) April 2020
Conference - participant
PRAIRIE AI Summer School, INRIA, Paris, France October 2019
NTT Basic Research Labs seminar, Atsugi, Japan August 2017

MACHINE LEARNING CONFERENCES

Advances in Neural Information Processing Systems (Neurips) 2021/2022
International Conference on Machine Learning (ICML) 2021
Conference on Learning Theory (COLT) 2020

VISITS AND INTERNSHIPS

Guest Scientist, ICTP Trieste Summer 2021
Work on the cavity method for rotationally invariant models, with Dr. Jean Barbier
Guest PhD Student, EPFL, Information, Physics and Computation Lab 2020-2022
Information, Physics and Computation Lab, with Pr. Florent Krzakala
Invited researcher, The University of Tokyo, LIMMS laboratory Summer 2019
Stochastic modeling of electron transfer between moving molecules, with Dr. Nicolas Clément.
Research Intern, Ecole Normale Superieure de Paris Spring 2019
Statistical learning, inference and statistical physics, with Pr. Florent Krzakala.
Visiting Student Research Collaborator, Princeton University Spring 2018
Viscous eddies in biharmonic axisymmetric flows, with Pr. Jens Eggers and Pr. Howard Stone.
Research Intern, NTT Basic Research Labs Atsugi Summer/Fall 2017
Full counting statistics of electron transport between moving molecules, with Dr. Nicolas Clément.
Research Intern CNRS Gulliver Laboratory Paris Summer 2016
Capillary levelling of freestanding liquid nanofilms, with Pr. Elie Raphael and Dr. Thomas Salez.

REVIEWING

- **Journals** - Journal of Statistical Mechanics: Theory and Experiment, IEEE Transactions on Information Theory, The Annals of Statistics, Information and Inference : a journal of the IMA, Journal of Machine Learning Research, Physical Review E.
- **Conferences** - Advances in Neural Information Processing Systems (Neurips) 2021/2022, International Conference on Machine Learning (ICML) 2022/2023

TEACHING (INSTRUCTOR)

NYU - Undergraduate Mathematical Statistics Spring 2024
NYU - Graduate Essentials of Probability Spring 2023
NYU - Graduate Computational Statistics Fall 2022, Fall 2023

AWARDS AND FELLOWSHIPS

- Courant Instructor fellowship 2022-2025, Courant Institute of Mathematical Sciences
- Neurips 2021 Outstanding Reviewer Award
- EDPIF (Ecole Doctorale de Physique en Ile-de-France) doctoral fellowship 2019-2022
- ESPCI Alumni - Best Industrial Research Internship Award 2018

LANGUAGES

French (native), **English** (fluent), **German** (intermediate)