CEDRIC GERBELOT-BARRILLON

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ACADEMIC POSITIONS

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

EDUCATION

PhD - Ecole Normale Supérieure de Paris, Paris, France 2019-2022
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 - Ecole Normale Supérieure de Paris-Saclay, Saclay, France 2018-2019
Applied mathematics and machine learning. Highest honors (mention très bien).

Engineer degree - Ecole Supérieure de Physique et de Chimie Industrielle, Paris, France 2015-2019
Statistical, quantum and macroscopic physics, applied mathematics. Highest honors (mention très bien).

TALKS, SEMINARS AND WORKSHOPS

NYU CDS lunch seminar 2022
NYU Courant postdoc seminar 2022
Les Houches Summer School on Statistical Physics and Machine Learning 2022
Graph-based approximate message passing iterations
INRIA/DYOGENE group seminar 2022
Statistical physics of learning, a mathematical perspective
Neurips@Paris 2021 2021
Learning Gaussian Mixtures with Generalised Linear Models: Precise Asymptotics in High-dimensions
DeepMath 2021 Conference 2021
Learning Gaussian Mixtures with Generalised Linear Models: Precise Asymptotics in High-dimensions
CIRM workshop, On Future Synergies for Stochastic and Learning Algorithms 2021
Graph-based approximate message passing iterations
Isaac Newton Institute for Mathematical Science workshop, Theory of Deep Learning 2021
Capturing the learning curves of realistic data sets with a teacher-student model
ICTP Youth in High Dimensions conference (speaker) 2021
Beyond i.i.d. Gaussian models : exact asymptotics with realistic data
EPFL, Spoc+IdePhics+Pcsl group seminar 2021
Approximate message passing for Gaussian mixture models
Les Houches Summer Workshop on Statistical Physics and Machine Learning 2020 2020
How to prove Kabashima's replica formula
ICTP seminar 2020
Rigorous results of statistical physics of simple machine learning models
Ecole Normale Supérieure, Paris, SPHINX group seminar 2020
Asymptotic errors for convex penalized linear regression beyond Gaussian matrices
ICTP Workshop Youth in high-dimensions 2020
PRAIRIE AI Summer School 2019
NTT Basic Research Labs seminar, Japan
Full Counting statistics of Electron Transport in a Biological Motor 2017

Gulliver Laboratory seminar, ESPCI Paris
Capillary leveling of freestanding liquid nanofilms 2016

CONFERENCES

Neurips 2021/2022, **ICML** 2021, **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 Raphal 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
- **Conferences** - Advances in Neural Information Processing Systems (Neurips) 2021/2022, International Conference on Machine Learning (ICML) 2022/2023

TEACHING

NYU - Graduate Essentials of Probability Spring 2023
NYU - Graduate Computational Statistics Fall 2022

PUBLICATIONS

- Gerbelot, C., Troiani, E., Mignacco, F., Krzakala, F., Zdeborova, L. (2022) Rigorous dynamical mean field theory for stochastic gradient descent methods. Preprint
- 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. (2021). Graph-based approximate message passing iterations. In review.
- 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.

AWARDS AND FELLOWSHIPS

- Courant Instructor fellowship 2022-2024, 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, TOEIC maximal score), **German** (working proficiency)