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

Cargese summer school on statistical physics and machine learning (invited speaker)	2023
Porquerolles Workshop on High Dimensional Statistics and Random Matrices (short talk)	2023
Mean field analysis of a single index model	
Princeton Workshop on Physics for Neural Networks (invited speaker)	2023
Highdimensional dynamics of first order algorithms through Gaussian conditioning	
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 (invited 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	

33rd Conference on Learning Theory	2020
Exact asymptotics 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 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.

- **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, Fall 2023

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. *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.

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)