Cedric Gerbelot-Barrillon

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LinkedIn, Personal webpage, Github

PhD student in statistical learning and mathematical physics

Education

Sept.2019– **PhD Statistical Learning and Mathematical Physics**, Ecole Normale Superieure, Paris.
Advisors : Pr. Florent Krzakala (EPFL), Pr. Marc Lelarge (ENS/INRIA). Funded by EDPIF fellowship.

2018–2019 **MSc MVA Applied Mathematics and Machine Learning**, Ecole Normale Superieure, Paris-Saclay.
Optimization, graphical models, kernel methods and statistical learning. Mention "Tres Bien" (summa cum laude).

2015–2019 **ESPCI Engineer Degree**, ESPCI, Paris.
Statistical, quantum, macroscopic physics and mathematical methods. Mention "Tres Bien" (summa cum laude).

2013–2015 **Preparatory Classes**, Lycee Lakanal, Sceaux.
Admitted to ESPCI after nationwide exam.

Visits and Internships

2021 **Guest Scientist**, ICTP *Trieste*, summer.
Working on high-dimensional interpolation methods, with Dr. Jean Barbier

2020-2022 **Guest PhD Student**, EPFL, *Electrical Engineering Department*.
Information, Physics and Computation Lab, with Pr. Florent Krzakala

2019 **Research Intern**, Ecole Normale Superieure, Paris, France, 4.5months.
Statistical learning and statistical physics. Replica method and message-passing algorithms for high dimensional regression beyond Gaussian matrices. Advisor : Pr. Florent Krzakala

2019 **Invited researcher**, University of Tokyo, *LIMMS laboratory, August*.
Continued work with Dr. Nicolas Clement

2018 **Visiting Student Research Collaborator**, Princeton University, Princeton USA, 3 months.
Applied and computational mathematics for fluid dynamics. Viscous eddies formation in biharmonic axisymmetric flows. Advisors : Pr. Howard Stone, Pr. Jens Eggers

2017 **Research Intern**, NTT Basic Research Labs, Atsugi, Japan, 6 months.
Theoretical and computational physics. Full counting statistics of electron transport between moving molecules.
Advisors : Dr. Nicolas Clement, Dr. Akira Fujiwara

2016 **Research Intern**, CNRS Gulliver Laboratory, Paris, France, summer.
Theoretical and computational physics. Capillary levelling of polymer nanofilms.
Advisors : Dr. Thomas Salez, Pr. Elie Raphael

Talks, Seminars and workshops

2022 **INRIA/DYOGENE group seminar** - " Statistical physics of learning, a mathematical perspective"

2021 **Neurips@Paris 2021** - "Learning Gaussian Mixtures with Generalised Linear Models: Precise Asymptotics in High-dimensions" 15min Spotlight talk

2021 **Neurips 2021** - "Learning Gaussian Mixtures with Generalised Linear Models: Precise Asymptotics in High-dimensions" Spotlight paper (poster and recording)

2021 **DeepMath 2021 Conference** - "Learning Gaussian Mixtures with Generalised Linear Models: Precise Asymptotics in High-dimensions" (poster)

2021 **CIRM "On Future Synergies for Stochastic and Learning Algorithms" workshop** - "Graph-based approximate message passing iterations" (poster)

2021 **Isaac Newton Institute for Mathematical Science "Theory of Deep Learning" workshop** - "Capturing the learning curves of realistic data sets with a teacher-student model" (poster)

2021 **ICTP "Youth in High Dimensions" conference** (speaker) - "Beyond i.i.d. Gaussian models : exact asymptotics with realistic data"

2021 **EPFL group seminar** - "Approximate message passing for Gaussian mixture models"

2020 **Les Houches Summer School on Statistical Physics and Machine Learning** - "How to prove Kabashima's replica formula"

2020 **ICTP seminar**, (video due to COVID-19 confinement) - "Rigorous results of statistical physics of simple machine learning models"

2020 **Ecole Normale Superieure, Paris**, group seminar - "Asymptotic errors for convex penalized linear regression beyond Gaussian matrices"

2020 **ICTP Workshop "Youth in high-dimensions"** (attended)

2019 **PRAIRIE AI Summer School** (attended)

2017 **NTT Basic Research Labs, Japan**, group seminar - "Full Counting statistics of Electron Transport in a Biological Motor"

2016 **Gulliver Laboratory, ESPCI Paris**, group seminar - "Capillary leveling of freestanding liquid nanofilms"

Publications

2022 Cornacchia, E., Mignacco, F., Veiga, R., Gerbelot, C., Loureiro, B., Zdeborova, L. Learning Curves for the Multiclass Teacher-Student Perceptron. Preprint.

2022 Loureiro, B., Gerbelot, C., Refinetti, M., Krzakala, F, Zdeborova, L. Fluctuations, Bias, Variance & Ensemble of Learners: Exact Asymptotics for Convex Losses in High-Dimension. Preprint.

2021 Gerbelot, C. and Berthier, R. Graph-based approximate message passing iterations. In review.

2021 Loureiro, B., Sicuro, G., Gerbelot, C.,Pacco, A., Krzakala, F, Zdeborova, L. Learning Gaussian Mixtures with Generalized Linear Models : Precise Asymptotics in High-dimensions. *Advances in Neural Information Processing Systems (Neurips)*, *Spotlight presentation*.

2021 Loureiro, B., Gerbelot, C, Cui, H, Goldt, S, Mezard, M, Krzakala, F, Zdeborova, L. Capturing the learning curves of realistic data sets with a teacher-student model. *Advances in Neural Information Processing Systems (Neurips)*.

2020 Gerbelot, C., Abbara, A., & Krzakala, F. (2020). Asymptotic errors for teacher student convex generalized linear models (Or: How to prove Kabashima's replica formula). In review.

2020 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

2016 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.

Reviewing

Journals Journal of Statistical Mechanics: Theory and Experiment, IEEE Transactions on Information Theory, Annals of Statistics

Conferences Advances in Neural Information Processing Systems (Neurips) 2021, International Conference on Machine Learning (ICML) 2022

Awards and Fellowships

2018 ESPCI Alumni - Best Industrial Research Internship Award 2018

2019-2022 EDPIF (Ecole Doctorale de Physique en Ile-de-France) doctoral fellowship

2021 Neurips 2021 Outstanding Reviewer Award

Computer skills

Languages Python, Matlab, LaTeX

Languages

French (native), **English** (fluent, TOEIC maximal score), **German** (working proficiency)

Personal Interests and Volunteer Experience

- **Judo** - black belt, former competitor, participation in regional and national level tournaments, teaching assistant

2015-2016 **Chairman of ESPCI student sports union** - management of a team of approx. 30 representatives, scheduling and organization of training sessions for ESPCI students, tournaments with other French "Grandes Ecoles", communication and booking of sports facilities with the administration of the City of Paris. Negociated partnership with major French bank (Societe Generale) and sponsors. 150000€ turnover.

- **Other** - Outdoor sports (hiking, skiing, sailing), japanese culture and philosophy