

Cedric Gerbelot-Barrillon

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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 (ENS), Pr. Marc Lelarge (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

- 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 - "Beyond i.i.d. Gaussian models : exact asymptotics with realistic data"
- 2021 EPFL group seminar - "Learning Gaussian mixtures with Generalized Linear 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 Golosino seminar, Ecole Normale Supérieure, Paris, "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 Seminar at NTT Basic Research Labs, Japan, "Full Counting statistics of Electron Transport in a Biological Motor"
- 2016 Seminar at Gulliver Laboratory, ESPCI, Paris, "Capillary leveling of freestanding liquid nanofilms"

Publications

- 2021 Gerbelot, C. and Berthier, R. Graph-based approximate message passing iterations. Preprint.
- 2021 Loureiro, B., Sicuro, G., Gerbelot, C., Pocco, A., Krzakala, F, Zdeborova, L. Learning Gaussian Mixtures with Generalized Linear Models : Precise Asymptotics in High-dimensions. Advances in Neural Information Processing Systems (Neurips) 2021, *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) 2021.
- 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). Submitted.
- 2020 Gerbelot, C., Abbara, A., & Krzakala, F. (2020). Asymptotic errors for convex penalized linear regression beyond Gaussian matrices. Conference On Learning Theory (COLT) 2020. 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

Journal of Statistical Mechanics: Theory and Experiment (JSTAT), IEEE Transactions on Information Theory, Advances in Neural Information Processing Systems (Neurips)

Awards and Fellowships

- 2018 ESPCI Alumni - Best Industrial Research Internship Award 2018 - 2000€
- 2019-2022 EDPIF (Ecole Doctorale de Physique en Ile-de-France) doctoral fellowship
- 2021 Neurips 2021 Outstanding Reviewer Award

Languages

French (native), **English** (fluent), **German** (working proficiency)