

# Raphaël Berthier

## Curriculum Vitae

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🌐 <https://raphael-berthier.github.io/>

### Research

- 2021 - ... **Post-doctoral researcher in the Collaboration on the Theoretical Foundations of Deep Learning (funded by the National Science Foundation and the Simons Foundation), hosted at EPFL (Lausanne, Switzerland), in collaboration with Emmanuel Abbe and Andrea Montanari.**
- 2018-2021 **PhD in the SIERRA team (INRIA, DI ENS, CNRS, in Paris) under the supervision of Francis Bach and Pierre Gaillard**  
Subject: Analysis and Acceleration of Gradient Descents and Gossip Algorithms.
- Spring 2017 **Internship in Stanford University, under the supervision of Andrea Montanari, 4 months**  
Subject: Compressed Sensing and Approximate Message Passing algorithms.

### Studies

- 2014-2018 **Studies at the Ecole Normale Supérieure Ulm (Paris)**
- 2016-2017 **Master 2 in probabilities and statistics, University Paris-Sud (Orsay)**
- 2015-2016 **Master 1 in fundamental mathematics, ENS Ulm**
- Summer 2015 **Internship at Qucit (start-up in Bordeaux, France), 2 months**  
Subject: statistical inference of urban movements, in particular using databases of bicycle-sharing systems.
- 2014-2015 **Bachelor of Science in mathematics and in computer science, "Licence" in french, ENS Ulm**
- July 2014 **Admitted to the Ecole Normale Supérieure (Paris), competitive exam, section mathematics - physics - computer science**
- 2012-2014 **Preparation for the competitive exam of the ENS, Mathematics and physics section, Preparation school of the Lycée Marcelin Berthelot, Saint-Maur-des-Fossés**
- 2012 **Baccalauréat (french high-school degree), Scientific and international english sections**

### Publications and preprints

- 2022 **R. Berthier, Incremental Learning in Diagonal Linear Networks, preprint**
- 2022 **R. Berthier, M. Li, Acceleration of Gossip Algorithms through the Euler-Poisson-Darboux Equation, IMA Journal of Applied Mathematics**
- 2021 **C. Gerbelot, R. Berthier, Graph-based Approximate Message Passing Iterations, preprint**

- 2021 **M. Even, R. Berthier, F. Bach, N. Flammarion, P. Gaillard, H. Hendrikx, L. Massoulié and A. Taylor**, *A Continuized View on Nesterov Acceleration for Stochastic Gradient Descent and Randomized Gossip*, Outstanding paper award and oral at Advances in Neural Information Processing Systems (NeurIPS)
- 2020 **R. Berthier, F. Bach and P. Gaillard**, *Tight Nonparametric Convergence Rates for Stochastic Gradient Descent under the Noiseless Linear Model*, Advances in Neural Information Processing Systems (NeurIPS)
- 2020 **R. Berthier, F. Bach and P. Gaillard**, *Accelerated Gossip in Networks of Given Dimension using Jacobi Polynomial Iterations*, SIAM Journal on Mathematics of Data Science
- 2018 **R. Berthier, A. Montanari and P.-M. Nguyen**, *State Evolution for Approximate Message Passing with Non-Separable Functions*, Information and Inference: a Journal of the IMA

## Research talks

- Dec. 2022 **MILES team seminar**, LAMSADE, Dauphine university, Paris
- Oct. 2022 **“Learning and Optimization in Luminy” conference**, CIRM, Marseille
- Apr. 2022 **Mathematical Engineering department (INMA) seminar**, UC Louvain, Louvain-la-Neuve
- Feb. 2022 **Information Systems Laboratory Colloquium**, Stanford University
- Dec. 2021 **NeurIPS oral**, *A Continuized View on Nesterov Acceleration for Stochastic Gradient Descent and Randomized Gossip*, joint work with M. Even, F. Bach, N. Flammarion, P. Gaillard, H. Hendrikx, L. Massoulié and A. Taylor
- Dec. 2021 **Deep Learning Theory Symposium**, Simons institute, Berkeley
- Oct. 2021 **FLAIR meeting**, EPFL, Lausanne
- Aug. 2020 **Bernoulli-IMS One World Symposium 2020**
- Aug. 2020 **“Statistical physics and machine learning” summer school**, Les Houches, France
- Nov. 2019 **MIC group meeting**, New York University
- Nov. 2017 **Golosino seminar**, École Normale Supérieure, Paris
- Nov. 2017 **SMILE seminar**, Institut Henri Poincaré, Paris
- Oct. 2017 **Seminar of the SIERRA team**, INRIA Paris

## Teaching

- 2022 **Lecturer in inference on graphs**, *doctoral level*, EPFL, Lausanne
- 2022 **Lecturer in probability and statistics theory**, *bachelor level*, EPFL, Lausanne
- 2019-2021 **Teaching assistant in statistical learning**  
Ecole Normale Supérieure, Paris
- 2019-2020 **Lecturer in linear algebra**  
Pluridisciplinary Cycle in Economics and Social sciences, PSL Research University, Paris

2014-2017 **Oral examinations in mathematics in "classe préparatoire" (equivalent to first and second year university students in mathematics)**

at the school Louis-le-Grand, in Paris,

at the school Marcelin Berthelot, in Saint-Maur-des-Fossés, France.