Raphaël Berthier

Curriculum Vitae

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Research

Since 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

2023 **P. Marion and R. Berthier**, *Leveraging the two timescale regime to demonstrate convergence of neural networks*, preprint arXiv 2304.09576

2023 **R. Berthier, A. Montanari and K. Zhou**, *Learning Time-Scales in Two-Layers Neural Networks*, preprint arXiv 2303.00055

2022 **R. Berthier**, *Incremental Learning in Diagonal Linear Networks*, preprint HAL hal-03764301, submitted.

2022 **R. Berthier and M. Li**, *Acceleration of Gossip Algorithms through the Euler-Poisson-Darboux Equation*, IMA Journal of Applied Mathematics, 87(6):985–1009

2021 **C. Gerbelot and R. Berthier**, *Graph-based Approximate Message Passing Iterations*, accepted for publication in Information and Inference: a Journal of the IMA, preprint arXiv 2109.11905.

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, 2(1):24–47.

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, 9(1):33–79.

Invited seminars

Oct. 2022 **CIRM, Marseille**, *"Learning and Optimization in Luminy" conference*

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

Aug. 2020 **Les Houches, France**, *"Statistical physics and machine learning" summer school*

Research talks

Apr. 2023 **University of Toronto**, *Seminar of the team of Murat Erdogdu (virtual)*

Jan. 2023 **Laboratoire de Mathématiques d'Orsay, Université Paris-Saclay**, *Seminar of the statistics team*

Jan. 2023 **Télécom Paris**, *Seminar of the team "Signal, Statistique et Apprentissage" (S2A)*

Dec. 2022 **LAMSADE, Dauphine university, Paris**, *MILES team seminar*

Apr. 2022 **UC Louvain, Louvain-la-Neuve**, *Mathematical Engineering department (INMA) seminar*

Feb. 2022 **Stanford University**, *Information Systems Laboratory Colloquium*

Dec. 2021 **Simons institute, Berkeley**, *Deep Learning Theory Symposium*

Oct. 2021 **EPFL, Lausanne**, *FLAIR meeting*

Aug. 2020 **Bernoulli-IMS One World Symposium 2020**

Nov. 2019 **New York University**, *MIC group meeting*

Nov. 2017 **École Normale Supérieure, Paris**, *Golosino seminar*

Nov. 2017 **Institut Henri Poincaré, Paris**, *SMILE seminar*

Oct. 2017 **INRIA Paris**, *Seminar of the SIERRA team*

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.