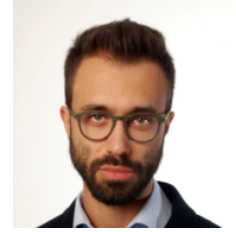


# Matteo D'Achille

## CURRICULUM VITÆ



### Address and contacts

Laboratoire de Mathématiques d'Orsay - LMO (UMR 8628)  
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Personal website: <https://matteodachille.github.io>

### Main research interests

Statistical and Mathematical Physics, Probability, Random Geometry

### Current position

2022- Postdoctoral Fellow, Laboratoire de Mathématiques d'Orsay (LMO, UMR 8628), université Paris-Saclay, with Nicolas Curien and Nathanaël Enriquez

### Past affiliations

2020-2022 Research and Teaching Assistant, Laboratoire d'Analyse et de Mathématiques Appliquées (LAMA), UMR 8050 CNRS, Université Paris-Est Créteil (UPEC), with Arnaud Le Ny

2019-2020 Associated Member, Laboratoire d'Informatique de Paris Nord (LIPN), UMR 7030 CNRS, Université Sorbonne Paris Nord (Paris XIII), with Andrea Sportiello

### Education

2020 **Ph.D.** Paris-Saclay University  
Thesis title: *Statistical Properties of the Euclidean Random Assignment Problem*  
Supervisors: William Jalby, Olivier Rivoire and Andrea Sportiello  
Thesis Defended on October 16, 2020 before the Committee composed by: Michel Ledoux (president), Charles Bordenave (referee), Massimiliano Gubinelli (referee), Guilhem Semerjian (examiner), Lenka Zdeborová (examiner), Sergio Caracciolo (invited member)

2016 **M.Sc.** University of Milan, 110/110 summa cum laude  
Thesis title: *On two linear assignment problems: random assignment and Euclidean bipartite matching*  
Supervisor: Sergio Caracciolo  
Assistant Supervisor: Gabriele Sicuro

2012 **B.Sc.** University of Milan, 110/110  
 Thesis title: *La teoria di Schwarz-Christoffel e il Biliardo Quantistico Poligonale*  
 Supervisor: Luca Guido Molinari

### Long Scientific Stays

2021 One week visit (22/11-29/11), Pisa Mathematics Department, Italy. Host: Dario Trevisan.  
 Two weeks visit (09/09-24/09), CASA, TU/E, Eindhoven, Netherlands. Host: Oliver Tse.  
 2018 Two weeks visit (18/02-04/03), Banach Center; Polish Academy of Sciences, Warsaw, Poland.  
 Host: Jacek Mięksisz.

### Publications

#### *Preprints*

2023 1. “Ideal Poisson-Voronoi tessellations on hyperbolic spaces, I”, with N. Curien, N. Enriquez, R. Lyons and M. Ünel. arXiv: [2303.16831 \[math-pr\]](#)

#### *Published in peer-reviewed journals*

2022 8. “Decimations for Two Dimensional Ising and Rotator Models II: Continuous versus Discrete Symmetries”, with A. van Enter and A. Le Ny, *Journal of Mathematical Physics* **63** 63, 123506, doi: [10.1063/5.0103163](#)  
 7. “Decimations for Two-dimensional Ising and Rotator Models”, with A. van Enter and A. Le Ny, *Journal of Mathematical Physics* **63** 63, 033506. doi: [10.1063/5.0057174](#)  
 6. “Almost Gibbsian Measures on a Cayley Tree”, with A. Le Ny, *Markov Processes and Related Fields* **28**, pp. 245–273. arXiv: [2105.05767 \[math-ph\]](#)  
 2021 5. “Random Assignment Problems on  $2d$  Manifolds”, with D. Benedetto, E. Caglioti, S. Caracciolo, G. Sicuro and A. Sportiello, *Journal of Statistical Physics* **183**, art. 34, doi: [10.1007/s10955-021-02768-4](#)  
 2020 4. “The Dyck bound in the concave 1-dimensional random assignment model”, with S. Caracciolo, V. Erba and A. Sportiello, *Journal of Physics A: Mathematical and Theoretical* **53** (6), 064001 doi: [10.1088/1751-8121/ab4a34](#)  
 2018 3. “Anomalous scaling of the optimal cost in the one-dimensional random assignment problem”, with S. Caracciolo and G. Sicuro, *Journal of Statistical Physics* **174** (4), 846–864, doi: [10.1007/s10955-018-2212-9](#)  
 2017 2. “Random Euclidean matching problems in one dimension”, with S. Caracciolo and G. Sicuro, *Physical Review E* **96** (4), 42102, doi: [10.1103/PhysRevE.96.042102](#)  
 1. “Finite-size corrections in the random assignment problem”, with S. Caracciolo, E.M. Malatesta and G. Sicuro, *Physical Review E* **95** (5), 52129, doi: [10.1103/PhysRevE.95.052129](#)

Talks in presence (P) or in visioconference (V)

2023	17/01 - Random Geometry - Géométrie Aléatoire, CIRM Marseilles Luminy ( <a href="#">website</a> ) <i>ERAPs: state of art in 1d and future perspectives</i> , 60 min	P
2022	06/12 - Probability and Statistics Seminar, LAGA, Sorbonne Paris Nord ( <a href="#">site web</a> ) <i>Decimation and the spin-flop transition in the XY model on <math>Z^2</math></i> , 50 min	P
	22/09 - Back-to-school day of probastat team of LMO, université Paris-Saclay ( <a href="#">website</a> ) <i>La fonction <math>\vartheta_4</math> de Jacobi dans l'ERAP sur le cercle unitaire</i> , 30 min	P
	06/09 - Optimal Transport & Uncertainty - 2 <sup>nd</sup> Edition, University of Naples, IT ( <a href="#">site web</a> ) <i>Lattice Helmholtz decomposition in a two-dimensional ERAP</i> , 45 min	P
	20/06 - DYOGENE Seminar, INRIA and École Normale Supérieure ( <a href="#">website</a> ) <i>Back and forth between the beta distribution and edge stochastic domination in ERAPs</i> , 60 min	P
	08/03 - Séminaire de probabilité de Créteil, université Paris-Est Créteil, FR ( <a href="#">website</a> ) <i>Décimation dans les modèles d'Ising et XY à <math>d \leq 2</math></i> , 60 min	P
	18/02 - Les probas du vendredi, Sorbonne Université, Paris, FR ( <a href="#">website</a> ) <i>ERAP : du pont brownien à la fonction <math>\vartheta_4</math> de Jacobi</i> , 60 min	P
2021	26/11 - Optimal Transport & Uncertainty, Pisa University, IT ( <a href="#">website</a> ) <i>Euclidean Random Assignment Problems, old and new</i> , 45 min	P
	14/09 - SPOR Seminar, EURANDOM, TU/E, Eindhoven, NL ( <a href="#">website</a> ) <i>One dimensional ERAPs: anomalous scaling and critical hyperbolae</i> , 45 min	P
	07/07 - Franco-Dutch meeting, CNRS IRP, Institut Henri Poincaré, Paris, FR ( <a href="#">website</a> ) <i>On the phase diagram of Euclidean Random Assignment Problems at low dimensions</i> , 40 min	P
	23/06 - 1 <sup>st</sup> Italian Society of Statistical Physics (SIFS) conference, Parma, IT ( <a href="#">recording</a> ) <i>Consequences of Weyl's law in low-dimensional Euclidean Random Assignment Problems</i> , 12 min	V
	21/06 - Journées de Probabilités 2021, Guidel Plages, FR ( <a href="#">website</a> ) <i>Euclidean Random Assignment Problems: origin, state of the art and some open problems in one dimension</i> , 40 min	P

- 18/03 - ALÉA Days 2021, CIRM Marseilles Luminy, FR ([website](#)) V  
*Multiple zeta-star values in the one dimensional ERAP with stretched-exponentially distributed points*, 20 min
- 21/02 - Laboratoire Painlevé, Université de Lille, Lille, FR ([website](#)) V  
*Différences d'énergie asymptotique dans l'ERAP sur des variétés bidimensionnelles*, 45 min
- 2020 10/11 - Probability and Statistics Seminar, Université Paris-Est Créteil, Créteil, FR ([website](#)) P  
*Le problème d'assignation aléatoire euclidienne: état de l'art et quelques problèmes ouverts en dimension  $d \leq 2$* , 45 min
- 16/10 - PhD Thesis Defense, Université Paris-Saclay, FR V  
*Statistical properties of the Euclidean random assignment problem*, 45 min
- 14/01 - Combinatorics Seminar, Université Sorbonne Paris Nord, Villataneuse, FR ([website](#)) P  
*Le problème d'assignation aléatoire euclidienne: état de l'art et quelques résultats récents en dimension  $d = 1$* , 45 min

### Students supervision

- 2022 April 11st - July 11st : Yuqi LIU  
M2 research Stage, M2 Mathématiques et Applications, université Paris-Est Créteil  
Project title : *Two-dimensional Euclidean Random Assignment Problems with two kinds of points having different distributions*  
Yuqi's stage is supported by a stipend from université Paris-Est Créteil.
- 2022 February-May: Yilun LI, Mouad HAÏ  
"Travaux d'Etude et Recherche" (TER), M1 Mathématiques et Applications, université Paris-Est Créteil  
Report title : *Équations de Mathieu et ERAPs sur des domaines elliptiques à  $p = 2$*
- 2021 February-May : Moustapha Mouhamadou BA, Yuqi LIU, Issa Konate SY  
"Travaux d'Etude et Recherche" (TER), M1 Mathématiques et Applications, université Paris-Est Créteil  
Report title : *Universalité dans le problème d'assignation aléatoire euclidienne en dimension  $d = 1$*

### Referee activity in peer-reviewed journals

- 2017- Chaos (AIP), Electronic Journal of Probability (IMS), Physical Review X (APS), IEEE Transactions on Information Theory

### (Co-)Organization of scientific activities

- 2022- Co-organizer of the recurring conference "**Les Probabilités de Demain**", at Institut Henri Poincaré in Paris. With Q. Berger, H. Halconruy, Ł. Mańdry, A. Ocello and Y. Wan  
Website : <https://www.lesprobabilitesdedemain.fr/>

- 2022 Co-organizer of the conference “**The many facets of Statistical Field Theory**” in honor of Sergio Caracciolo 70th birthday, SISSA - International School for Advanced Studies, Trieste, Italie. With P. Calabrese, A. Gambassi, M. Gherardi, E. Malatesta, L. Molinari, P. Rotondo, G. Sicuro and C. Vanoni.  
Website : <https://sites.google.com/view/the-many-facets-of-sft> - [YouTube channel](#)
- 2021- Co-organizer of the webinar “**Seed Seminar of Mathematics and Physics**”. With A. El Fardi and E. Kilinçarslan  
Website : <https://seedseminar.apps.math.cnrs.fr/> - [YouTube channel](#)

#### Membership of Scientific Societies

- 2019- Italian Society of Statistical Physics (SIFS), voting member  
2017- European Physical Society (EPS), individual member  
2013- Italian Physical Society (SIF), voting member

#### Other memberships

- 2019- Member of the WIMS EDU association ([website](#))

#### Participation in Evaluation Committees

- 2021 TER M1 committee, Université Paris-Est Créteil.  
*Composition:* MD'A, Raphaël Danchin, Stéphane Sabourau, Etienne Sandier, Stéphane Seuret, Julien Sohier.

## Teaching activities

- 2020-current Teaching Assistant (Mathematics), Université Paris-Est Créteil (~192 hours for 2<sup>nd</sup>-3<sup>rd</sup> year Bachelor students in Economics, *ongoing*)
- Spring Term 2022: Tutorials/Course, “**Statistical Inference**” by S. Laruelle.  
*Program:* point estimators, confidence interval estimators, statistical tests, least squares.
- Fall Term 2021: Tutorials, “**Mathematics for Dynamical Systems**” by A. Deshayes.  
*Program:* sequences, 1st and 2nd order recurrent equations, 1st and 2nd order ODEs, higher order ODEs, recurrent systems.  
 Tutorials/Course, “**Probability**” by S. Laruelle.  
*Program:* Introduction to Probability, discrete and continuous random variables, convergence of random variables, limit theorems.
- Spring Term 2021: Tutorials/Course, “**Statistical Inference**” by S. Laruelle.  
*Program:* point estimators, confidence interval estimators, statistical tests, least squares.
- Fall Term 2020: Tutorials, “**Mathematics for Dynamical Systems**” by A. Le Ny.  
*Program:* dynamical systems in discrete time dynamical systems in continuous time, applications to models in Economics.
- 2019-2020 *Lecturer (Mathematics)*, Paris-Saclay University (Orsay) (15 hours for 1<sup>st</sup> year Bachelor students in Mathematics, Physics and Informatics)
- Spring Term 2020: WIMS, “**Remédiation en Mathématiques (OuiSi)**” by G. Moreau.  
*Program:* basic operations, Euclidean geometry, trigonometry, functions, complex numbers, mean value theorem, integral calculus.
- 2018-2019 *Tutor (Mathematics)*, Paris-Saclay University (Orsay) (65 hours for 1<sup>st</sup> year Bachelor students in Mathematics, Physics and Informatics, and dual Bachelor “Physico-Chimie”)
- Spring Term 2019: Tutorials+WIMS, “**Remédiation en Mathématiques (OuiSi)**” by G. Moreau.  
*Program:* basic operations, Euclidean geometry, trigonometry, functions, complex numbers, mean value theorem, integral calculus.
- Fall Term 2018: Tutorials, “**Calculus Math 151**” by G. David.  
*Program:* functions, limits and continuity, Taylor expansion, derivative, parametric curves, behaviors of functions over a closed and bounded interval, Taylor expansion of order  $\geq 2$ , ODEs, primitives and integrals, functions of several variables.

Participation as auditor to research schools, conferences, seminars, workshops

- 2023 Inhomogeneous Random Systems, IHP and Institut Curie, Paris ([website](#))
- 2022 Journée cartes, ENS Lyon, FR ([website](#))
- Journées Postdoc de la Fondation Mathématique Jacques Hadamard, IHES, FR ([website](#))
- Lille Days in Point Processes and Stochastic Geometry, IMT Nord Europe, Lille, FR ([website](#))
- Journée Aleatoire 2022, Institut Henri Poincaré, Paris ([website](#))
- Journées MAS 2022, Rouen, FR ([website](#))
- Random Point Processes in Statistical Physics, Harnack-Haus, Berlin, DE ([site web](#))
- 10th Anniversary of the Bézout Labex, université Gustave Eiffel, Champs-sur-Marne, FR ([website](#))
- 100 (102!) Years of the Ising Model, IHES, Bures-sur-Yvette, FR ([website](#))
- 2022 Random matrices meet random permutations, Lille, FR ([website](#))
- Journées ALEA 2022, CIRM Luminy, FR ([website](#))
- Quantization, Location, Sampling and Matching, Centre Lagrange, Paris ([website](#))
- Inhomogeneous Random Systems, IHP and Institut Curie, Paris ([website](#))
- 2021 Optimal Transport and Uncertainty, Pisa, IT ([website](#))
- Stochastic Geometry Days Dunkerque, FR ([website](#))
- Franco-Dutch meeting Bézout-Eurandom IHP, Paris ([website](#))
- Journées Processus de Hawkes, IHP, Paris ([website](#))
- Journées de probabilités 2021, Guidel, FR ([website](#))
- Theory of Probability and Its Applications: P.L. Chebyshev - 200, Moscow, RU ([website](#))
- Journées Aléa 2021, Research School, CIRM Marseilles Luminy, FR, ([website](#))
- Inhomogeneous Random Systems, IHP and Institut Curie, Paris ([website](#))

- 2020 Integrable Probability Online Summer School, Clay Mathematics Institute & Heilbronn Institute for Mathematical Research, Zoom virtual sessions ([website](#))
- Journées de combinatoire de Bordeaux 2020, LaBRI, Université de Bordeaux, FR ([website](#))
- 2019 Combinatorics and Arithmetic for Physics: special days meeting, Marilyn and James Simons Conference Center, IHES, Le Bois-Marie, Bures-sur-Yvette, FR ([website](#))
- Journées MathSTIC 2019 – Probabilités et Combinatoire workshop, Bâtiment Galilée, Université Paris 13, Villetaneuse, FR ([website](#))
- 2018 Paths in Statistical Physics, Physics Department, Université Paris Diderot, FR ([website](#))
- Information transmission in biological systems conférence, Simons Semester on Mathematical Biology, Mathematical Research and Conference Center, Będlewo, Poland ([website](#))
- 2016 Optimal Transport and Applications, Scuola Normale Superiore, Pisa, IT ([website](#))
- 2014 Mathematical Physics, Analysis and Stochastics, Universität Heidelberg, DE ([website](#))

### Languages

Italian (native), French (advanced), English (advanced), Spanish (beginner)

### Programming languages and computer skills of everyday use

C++, Python, Wolfram Language<sup>™</sup>  
 L<sup>A</sup>T<sub>E</sub>X, HTML, CSS