Curriculum Vitae

Candidature PSL Young Researcher Starting Grant

Louise Budzynski
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1 Research Experience

- **Computer science department of Ecole Normale Supérieure (DI ENS), PSL, Paris, France**
  Maître de conférence (Associate professor) *Septembre 2024 – Now*
- **Physics department, La Sapienza University, Rome, Italy** *April 2023 - August 2024*
  Post-doc position. Supervisors: Prof. F. Ricci-Tersenghi and Prof. E. Marinari
- **Department of Applied Science and Technology (DISAT), Polytechnic University of Turin, Italy** *November 2020- March 2023*
  Post-doc position. Supervisors: Prof. A. Braunstein and Prof. A. Pagnani

2 Education

- **Ph.D. in Statistical Physics** *2017–2020*
  Title: Algorithmic barriers in random Constraint Satisfaction Problems
  At Laboratoire de Physique de l'École Normale Supérieure (LPENS), Paris
  Supervisor: Prof. G. Semerjian.
- **Master in theoretical physics** *2014–2016*
  Master ICFP (International Center for Fundamental Physics) option physique théorique at École Normale Supérieure de Paris.
  - Master thesis *Title: Matrix product states and Temperley-Lieb algebra*,
    At Laboratoire de Physique de l'École Normale Supérieure (LPENS), Paris
    Supervisor: Prof. J. L. Jacobsen
- **Undergraduate program in physics** *2013–2014*
  Licence FIP (Formation Inter-universitaire de Physique) at École Normale Supérieure de Paris

3 Teaching

My teaching experience, in reverse chronological order:

- **Lectures and exercise sessions** for the course *Introduction to algorithms* *year 2024-2025*
  For undergraduate students (L2), Cycle Pluridisciplinaire d'Études Supérieures (CPES), 'Sciences des données, Art et Culture', PSL University.
- **Exercise sessions** for the course *Randomized algorithms* *Fall 2024*
  For undergraduate students (L3) at the Computer Science department of Ecole Normale Supérieure de Paris, (DI ENS)

- **Exercise sessions** for the course *Scientific programming: 'C-language, algorithms and models in science'* *Fall 2023*

  For undergraduate students (L2) at the Physics department of La Sapienza University of Rome

- **Exercise sessions** for the course *Special Relativity and Electromagnetism* *Spring 2019*

  For undergraduate students (L3, Licence FIP) at the Physics department of Ecole Normale Superieure de Paris

4 Supervision

- Spring 2025: **Research Internship** of A. V. Dell'Abate, enrolled in the international master Physics of Complex Systems, co-supervised with Prof. Alfredo Braunstein (DISAT, Polytechnic University of Turin).

5 Scientific talks and seminars

I delivered the following talks:

- Title: *Evidence of Replica Symmetry Breaking under the Nishimori conditions in epidemic inference on graphs*
  Contributed talk at the Conference "Towards a Theory for Typical-Case Algorithmic Hardness", Les Houches, France
  Dates: 27/01/2025 – 07/02/2025

- Title: *Phase transitions in Epidemic Spreading Inference*
  Group seminar at the Laboratoire de Physique Théorique de la Matière Condensée (LPTMC), Paris, France.
  Date: 17/09/2024

- Title: *Statistical mechanics of inference and optimization problems in high dimensions: application to spreading processes on random networks*
  Group seminar at the Physics department of ENS Lyon, team Machine Learning and Signal Processing
  Date: 12/03/2024

- Title: *The Closest Vector Problem: A Constrained Optimization Problem for Lossy Compression.*

  – Contributed talk at the workshop CAMBI (Computational Aspects and Modelling of Biological Information), at Bocconi University, Milan, Italy.
  Organized by R. Mulet, A.P. Muntoni, A. Pagnani, M. Weigt and R. Zecchina
  Dates: 12/12/2022 – 15/12/2022.

  – Group seminar at the Laboratory of Theoretical Physics and Statistical Models (LPTMS), in Orsay, France. *Date: 30/03/2022*

- Title: *Small Coupling Expansion for Multiple Sequence Alignment.*
  Contributed talk at the workshop "Complex networks : from socio-economic systems to biology and the brain" In Lipari Island, Italy.
  Dates: 10/07/2022 – 16/07/2022.

- Title: *Biased landscapes in random Constraint Satisfaction Problems*

  – Contributed talk at the conference "Youth in High-dimensions : Machine Learning, High-dimensional Statistics and Inference for the New Generation", at ICTP, Trieste.
  Organized by F. Krzakala and J. Barbier.
  Dates: 29/06/2020 – 03/07/2020

  – Contributed talk at the Journées de Physique Statistique, Paris, France.
  Dates: 31/01/2019 – 01/02/2019

6 Other working responsibilities

Referee for the following scientific journals:

- PRE - Physical Review E
- SciPost Physics

7 Publications

Publication list in reverse chronological order.

- Alfredo Braunstein, **Louise Budzynski**, Matteo Mariani, Federico Ricci-Tersenghi.
  Evidence of Replica Symmetry Breaking under the Nishimori conditions in epidemic inference on graphs.
  arXiv preprint arXiv:2502.13249 – Submitted to Physical Review E
  https://arxiv.org/abs/2502.13249

- Alfredo Braunstein, **Louise Budzynski**, Matteo Mariani.
  Statistical Mechanics of Inference in Epidemic Spreading.
  Physical Review E 108, 064302 – Published 15 December 2023
  https://doi.org/10.1103/PhysRevE.108.064302

- **Louise Budzynski**, Andrea Pagnani.
  Small Coupling Expansion for Multiple Sequence Alignment.
  Physical Review E 107, 044125 – Published 25 April 2023
  https://doi.org/10.1103/PhysRevE.107.044125

- Alfredo Braunstein, **Louise Budzynski**, Stefano Crotti and Federico Ricci-Tersenghi.
  The closest vector problem and the zero-temperature p-spin landscape for lossy compression.
  Physical Review E 106, 054101 – Published 1 November 2022
  https://doi.org/10.1103/PhysRevE.106.054101

- **Louise Budzynski**, Guilhem Semerjian.
  Biased measures for random constraint satisfaction problems: larger interaction range and asymptotic expansion.
  Journal of Statistical Mechanic: Theory and Experiment 2020 (10), 103406.
  https://doi.org/10.1088/1742-5468/abb8c8

- **Louise Budzynski**, Guilhem Semerjian.
  The Asymptotics of the Clustering Transition for Random Constraint Satisfaction Problems.
  Journal of Statistical Physics 181 (5), 1490–1522 (2020).
  https://link.springer.com/article/10.1007/s10955-020-02635-8

- **Louise Budzynski**, Federico Ricci-Tersenghi and Guilhem Semerjian.
  Biased landscapes for random constraint satisfaction problems.
  Journal of Statistical Mechanics: Theory and Experiment 2019 (2), 023302
  https://doi.org/10.1088/1742-5468/ab02de

- Etienne Granet, **Louise Budzynski**, Jérôme Dubail, and Jesper Lykke Jacobsen.
  Inhomogeneous Gaussian free field inside the interacting arctic curve.
  Journal of Statistical Mechanics: Theory and Experiment 2019 (1), 013102
  https://doi.org/10.1088/1742-5468/aaf71b