# Alessandro Rudi

Professor of Practice, SDA Bocconi School of Management, Bocconi University, Milan
ERC Principal Investigator · Researcher at Inria (on leave)

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**Guarantees for AI: statistical guarantees, certificates of optimality and machine-checked proofs.** Designed FALKON, which made kernel learning with optimal statistical guarantees practical on billions of points; developed kernel sum-of-squares methods that transform non-convex optimization problems into equivalent high-dimensional convex ones, with certificates of optimality. Now working on machine-checked guarantees for AI systems that reason and act: Proof Carrying Contracts (PC2), an open protocol for enforceable agreements between AI agents; formalized mathematics at scale; confidential deployment of language models. 65 peer-reviewed papers, 26 at NeurIPS with three orals; area chair for NeurIPS, ICML and COLT. Industry: VP of AI at Prem AI until June 2026; machine learning for EliseAI, SNCF and LightOn.

## POSITIONS

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| 2024 – present | **Professor of Practice**, SDA Bocconi School of Management, Bocconi University, Milan.<br>Research appointment. Host institution of the ERC Starting Grant REAL and of the research group. |
| 2017 – present | **Researcher**, Inria Paris, SIERRA team at École Normale Supérieure. On leave since 2024.<br>Permanent position from 2019. Led a group of more than ten PhD students and postdocs. |
| Aug 2025 – Jun 2026 | **VP of AI**, Prem AI, Lugano, Switzerland.<br>Confidential AI infrastructure: large language models inside trusted execution environments. |
| 2014 – 2017 | **Postdoctoral fellow**, Laboratory for Computational and Statistical Learning, Istituto Italiano di Tecnologia and Massachusetts Institute of Technology. With L. Rosasco. |
| 2012 – 2013 | **Visiting PhD student**, Center for Biological and Computational Learning, MIT. |
| 2007 – 2009 | **Software engineer**, Easy Automation srl, Italy. |

## EDUCATION

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| 2014 | **PhD**, University of Genoa and Istituto Italiano di Tecnologia; visiting PhD student at MIT, 2012–2013. |
| 2010 | **MSc** in Computer Science, Sapienza University of Rome, cum laude. |

## RESEARCH FUNDING

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| 2026 – 2028 | **AI for Math Fund**, Renaissance Philanthropy and XTX Markets, $1M. *Towards Searchable Formalized Mathematics at Scale*, with C. Ciliberto and F. Zanasi (UCL). One of 22 projects funded in 2026. |
| 2021 – 2027 | **ERC Starting Grant** *REAL: Reliable and cost-effective large-scale machine learning*, €1.5M, principal investigator. Hosted at Inria, then Bocconi. |
| 2024 – | **Fondazione Cariplo, Attrattività ERC**, €300k, principal investigator. Support for the ERC project at Bocconi. |
| 2020 – 2024 | **PRAIRIE chair**, Paris Artificial Intelligence Research Institute. |

## DISTINCTIONS AND SERVICE

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| NeurIPS | Three papers selected for oral presentation (2015, 2017, 2020) and five spotlight papers (2018, 2020, 2021 twice, 2023). |
| Area chair | NeurIPS, ICML, COLT. |
| Reviewer | Journal of Machine Learning Research, Annals of Statistics, Applied and Computational Harmonic Analysis, Machine Learning, Inverse Problems, Electronic Journal of Statistics. |

## INDUSTRY

2019 – 2024 **Machine learning consulting.**

- EliseAI, New York (2023–2024): models of tenant behaviour to reduce delinquency.
- EPHOS, Milan (2022–2024): machine learning for models of photonic quantum chips.
- SNCF, Paris (2022–2023): traffic forecasting for offer optimization.
- LightOn, Paris (2019–2022): faster learning algorithms for optical computing hardware.
- Kamet Ventures, AXA's venture builder, Paris (2019–2020): machine learning for price optimization.

## SOFTWARE

FALKON — Kernel learning with optimal statistical guarantees in $O(n\sqrt{n})$ time and $O(n)$ memory; its open-source multi-GPU library trains on billions of points. github.com/FalkonML/falkon. Library developed with G. Meanti (lead developer), L. Carratino and L. Rosasco. Used in particle physics (new-physics searches), 3D reconstruction (Neural Splines, CVPR 2021) and robotics (iCub); a standard baseline for large-scale kernel solvers.

## SUPERVISION

PhD students — Co-supervised nine PhD theses at Inria and École Normale Supérieure, with F. Bach, F. Krzakala, L. Rosasco, J. Mairal, B. Guedj, C. Ciliberto and P. Gaillard. Now at Meta FAIR (V. Cabannes, 2022), NVIDIA (R. Ohana, 2022), Microsoft Research (L. Carratino, 2020), École des Ponts ParisTech (L. Pillaud-Vivien, 2020), Alice & Bob (G. Beugnot, 2024), Pennylane (T. Cantelobre, 2024), Owkin (A. Nowak-Vila, 2021; U. Marteau-Ferey, 2022) and Capital Fund Management (R. Jézéquel, 2023). Current: A. Basteri, P. Boudart.

Postdocs — B. Muzellec (2020–2021): Google DeepMind. P.-C. Aubin-Frankowski (2021–2023): associate professor, École des Ponts ParisTech. C. Mantoux (2022–2023): SNCF. L. Brogat-Motte (2023–2025): IIT.

## TEACHING (PAST)

2018 – 2024 — Statistical machine learning, École Normale Supérieure, Paris · Kernel methods, Master MVA, ENS Paris-Saclay (2023–2024) · Optimization and machine learning, Master IASD, Université Paris-Dauphine (2018–2022).

## SELECTED INVITED TALKS

2024 — Keynote, MASCOT-NUM annual meeting.

2023 — StatML Summer School in Causality and Statistical Learning, Oxford · 7th London Symposium on Information Theory, UCL · PhD school on PSD models, Scuola Normale Superiore, Pisa · Optimization and Statistical Learning workshop, Les Houches.

2022 — ELLIS Theory Workshop, Arenzano · PRAIRIE colloquium, Paris · S-DCE seminar, Alan Turing Institute, London · Séminaires parisiens de statistique et d'optimisation, Institut Henri Poincaré · Czech-French Workshop in AI, Prague.

2018 – 2019 — Isaac Newton Institute, Cambridge (2018) · Institut Henri Poincaré, Paris (2019).

## SELECTED PUBLICATIONS

65 peer-reviewed papers: NeurIPS 26, COLT 8, AISTATS 6, ICML 5, ALT 1, other conferences 4, journals 15 (including SIAM J. Optimization, JMLR, Mathematical Programming, Foundations of Computational Mathematics). Google Scholar, October 2026: 4,241 citations, h-index 30. Full list at di.ens.fr/~rudi/publications.html.

1. C. Ciliberto, **A. Rudi**, E. Tassi. Proof-Carrying Contracts: commitments AI agents cannot break. *arXiv:2610.28484*, 2026 (preprint).
2. L. Brogat-Motte, **A. Rudi**, R. Bonalli. Safely learning controlled stochastic dynamics. *NeurIPS*, 2025.
3. R. Bonalli, **A. Rudi**. Non-parametric learning of stochastic differential equations with non-asymptotic fast rates of convergence. *Foundations of Computational Mathematics* 26(3), 2026.
4. D. Andreoletti, **A. Rudi**, E. Carpanzano, F. Lelli, T. Leidi. Privacy-preserving LLM inference in practice: a comparative survey of techniques, trade-offs, and deployability. *Cryptology ePrint Archive* 2026/105 (report).
5. **A. Rudi**, U. Marteau-Ferey, F. Bach. Finding global minima via kernel approximations. *Mathematical Programming* 209(1), 2025.
6. G. Beugnot, J. Mairal, **A. Rudi**. GloptiNets: scalable non-convex optimization with certificates. *NeurIPS*, 2023. SPOTLIGHT
7. G. Meanti, L. Carratino, L. Rosasco, **A. Rudi**. Kernel methods through the roof: handling billions of points efficiently. *NeurIPS*, 2020. ORAL
8. C. Ciliberto, L. Rosasco, **A. Rudi**. A general framework for consistent structured prediction with implicit loss embeddings. *Journal of Machine Learning Research* 21, 2020.
9. **A. Rudi**, L. Carratino, L. Rosasco. FALKON: an optimal large scale kernel method. *NeurIPS*, 2017.
10. **A. Rudi**, L. Rosasco. Generalization properties of learning with random features. *NeurIPS*, 2017. ORAL
11. **A. Rudi**, R. Camoriano, L. Rosasco. Less is more: Nyström computational regularization. *NeurIPS*, 2015. ORAL