

Paolo Perrone

Matematico e insegnante

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Curriculum Vitae

Dati personali

Nome e cognome Paolo Perrone
Data di nascita 10 Novembre 1989
Luogo di nascita Bergamo (Italia)
Nazionalità Italiana
Stato civile celibe

Posizione attuale

Ricerca:

Istituto University of Oxford, Inghilterra (U.K.)
Dipartimento Informatica
Posizione Research associate
ufficiale
Supervisore Sam Staton

Insegnamento (collegio):

Istituto University of Oxford, Inghilterra (U.K.)
Collegio Mansfield College (Oxford)
Corsi Probability I, Probability II, Integration, Integral Transforms

Posizioni passate

2020 **Ricercatore di matematica**, *Massachusetts Institute of Technology (MIT)*,
Cambridge, MA (U.S.A.)
Supervisore: David Spivak. Denominazione ufficiale (in inglese): postdoctoral
associate in Mathematics.

- 2019 **Ricercatore di matematica**, *York University*, Toronto, ON (Canada)
Supervisore: Walter Tholen. Denominazione ufficiale (in inglese): postdoctoral visitor, Mathematics.
- 2019 **Ricercatore di matematica**, *Max Planck Institute for Mathematics in the Sciences*, Lipsia (Germania)
Supervisore: Jürgen Jost. Denominazione ufficiale (in tedesco): Wissenschaftlicher Mitarbeiter im Fachbereich Mathematik.

Istruzione

- 2018 **Dottorato in Matematica**, *Max Planck Institute for Mathematics in the Sciences e Università di Lipsia*, Lipsia (Germania), *Magna cum laude*
Relatore: Jürgen Jost. Denominazione ufficiale (in tedesco): Doktor der Naturwissenschaften (Dr. Rer. Nat.) im Fachbereich Mathematik.
- 2013 **Laurea magistrale in Fisica**, *Università degli Studi di Milano*, Milano (Italia), *110/110 e lode*
Relatore: Guido Parravicini.
- 2012–2013 **Interscambio (programma Erasmus)**, *Fisica, KU Leuven*, Leuven (Belgio)
- 2011 **Laurea Triennale in Fisica**, *Università degli Studi di Milano-Bicocca*, Milano (Italia), *110/110 e lode*
Relatore: Diego Noja.
- 2008 **Diploma**, *Liceo Scientifico Mascheroni*, Bergamo (Italia), *100/100*

Articoli

Pubblicazioni:

- 2023 **T. Fritz, T. Gonda, P. Perrone and E. F. Rischel**, *Representable Markov Categories and Comparison of Statistical Experiments in Categorical Probability*, *Theoretical Computer Science*
- 2023 **C. Constantin, T. Fritz, P. Perrone, B. Shapiro**, *Partial evaluations and the compositional structure of the bar construction*, *Theory and Application of Categories*, vol. 39, n. 11, pp. 322–364
- 2023 **S. Moss und P. Perrone**, *A category-theoretic proof of the ergodic decomposition theorem*, *Ergodic Theory and Dynamical Systems*
- 2022 **S. Moss, P. Perrone**, *Probability monads with submonads of deterministic states*, *Proceedings of LICS*
- 2022 **P. Perrone, W. Tholen**, *Kan extensions are partial colimits*, *Applied Categorical Structures*

- 2021 **T. Fritz, P. Perrone, S. Rezagholi**, *Probability, valuations, hyperspace: Three monads on Top and the support as a morphism*, *Mathematical Structures in Computer Science*, vol. 31, n. 8, pp. 850-897
- 2021 **T. Fritz, T. Gonda, P. Perrone**, *De Finetti's Theorem in Categorical Probability*, *Journal of Stochastic Analysis*, vol. 2, n. 4, art. 6
- 2020 **T. Fritz, P. Perrone**, *Stochastic order on metric spaces and the ordered Kantorovich monad*, *Advances in Mathematics*, vol. 366
- 2020 **T. Fritz, P. Perrone**, *Monads, partial evaluations, and rewriting*, *Proceedings of MFPS 36, ENTCS*
- 2019 **T. Fritz, P. Perrone**, *A Probability Monad as the Colimit of Spaces of Finite Samples*, *Theory and Application of Categories*, vol. 34, n. 7, pp. 170–220
- 2018 **T. Fritz, P. Perrone**, *Bimonoidal Structure of Probability Monads*, *Proceedings of MFPS 34, ENTCS*
- 2016 **P. Perrone, N. Ay**, *Hierarchical Quantification of Synergy in Channels*, *Frontiers in Robotics and AI*

Articoli inviati:

- 2023 **T. Fritz, F. Gadducci, P. Perrone, D. Trotta**, *Weakly affine monads*, preprint su arXiv:2303.14049
- 2022 **P. Perrone**, *Markov Categories and Entropy*, preprint su arXiv:2212.11719
- 2022 **T. Fritz, T. Gonda, N. Gauguin Houghton-Larsen, P. Perrone and D. Stein**, *Dilations and information flow axioms in categorical probability*, preprint su arXiv:2211.02507
- 2021 **P. Perrone**, *Lifting couplings in Wasserstein spaces*, preprint su arXiv:2110.06591
- 2021 **C. Constantin, T. Fritz, P. Perrone, B. Shapiro**, *Weak cartesian properties of simplicial sets*, preprint su arXiv:2105.04775

Tesi di dottorato:

- 2018 **P. Perrone**, *Categorical Probability and Stochastic Dominance in Metric Spaces*, Università di Lipsia, Germania, disponibile online all'indirizzo www.paoloperrone.org/phdthesis.pdf

Appunti, note e altro materiale:

- 2019 **P. Perrone**, *Notes on Category Theory with examples from basic mathematics*, appunti di lezioni, arXiv:1912.10642
- 2018 **T. Fritz, P. Perrone**, *A Criterion for Kan Extensions of Lax Monoidal Functors*

- 2016 **P. Perrone, N. Ay**, *Iterative Scaling Algorithm for Channels*
- 2016 **P. Perrone, N. Ay**, *Decomposition of Markov Kernels*, Proceedings of WUPES 10
- 2015 **P. Perrone**, *Dual Connections and Holonomy*

■ Insegnamento e contributi alla comunità scientifica

Corsi:

- 2022 **Tutor**, *Quantum Computing and Modelling: an Applied Category Theory Perspective*, corso pre-universitario, Cambridge Center for International Research (U.K.)
- 2022 **Tutor**, *Integral Transforms*, corso di laurea triennale, Mansfield College, University of Oxford (U.K.)
- 2022 **Tutor**, *Integration*, corso di laurea triennale, Mansfield College, University of Oxford (U.K.)
- 2022 **Tutor**, *Groups and Group Actions*, corso di laurea triennale, Mansfield College, University of Oxford (U.K.)
- 2022 **Tutor**, *Linear Algebra II*, corso di laurea triennale, Mansfield College, University of Oxford (U.K.)
- 2022 **Docente**, *Teoria delle categorie*, online, in italiano
In collaborazione con il Progetto ItaCa.
- 2021 **Docente**, *Bayesian Statistical Probabilistic Programming*, corso di laurea magistrale, University of Oxford (U.K.)
Insieme a Hugo Paquet e Sam Staton.
- 2021 **Tutor**, *Linear Algebra I*, corso di laurea triennale, Mansfield College, University of Oxford (U.K.)
- 2021 **Docente**, *Applied Category Theory*, corso di laurea magistrale, University of Oxford (U.K.)
- 2021 **Tutor**, *Groups and Group Actions*, corso di laurea triennale, Mansfield College, University of Oxford (U.K.)
- 2020 **Supervisore**, *Categories and gauge theory*, progetto di studio indipendente, Massachusetts Institute of Technology, Cambridge, MA (U.S.A.)
- 2019 **Docente**, *Applied Linear Algebra*, corso di laurea triennale, University of York, Toronto, ON (Canada)
- 2019 **TA**, *Applied Category Theory*, summer school and e seminari online, University of Oxford (U.K.)

2019 **Docente**, *Category theory and applications*, corso di laurea magistrale, Max Planck Institute, Lipsia (Germania)

Organizzazione e assistenza di eventi:

2023 **Organizzatore**, *Oxford Advanced Seminar on Informatic Structures (OASIS)*, seminario di ricerca, University of Oxford (U.K.)

2022 **Co-organizzatore**, *Compositional Robotics: Mathematics and Tools*, ICRA 2022 Workshop, Philadelphia, PA (U.S.A.)
(in collaborazione con Andrea Censi, Gioele Zardini et al.)

2021 **Co-organizzatore**, *Compositional Robotics: Mathematics and Tools*, ICRA 2021 Workshop, ETH, Zurigo (Svizzera) – Spostato online per via del CoViD-19
(in collaborazione con Andrea Censi, Gioele Zardini et al.)

2020 **Co-organizzatore e assistente tecnico**, *MIT Categories Seminar*, seminario di ricerca e didattico, Massachusetts Institute of Technology, Cambridge, MA (U.S.A.) – Spostato online per via del CoViD-19
(in collaborazione con Brendan Fong e David Spivak)

2020 **Organizzatore locale e assistente tecnico**, *Applied Category Theory (ACT)*, conferenza, Massachusetts Institute of Technology, Cambridge, MA (U.S.A.) – Spostata online per via del CoViD-19
(altri organizzatori locali: Brendan Fong, David Myers e David Spivak)

2020 **Organizzatore**, *Applied Category Theory*, summer school e seminari online, Massachusetts Institute of Technology, Cambridge, MA (U.S.A.) – Spostata online per via del CoViD-19
(in collaborazione con Carmen Constantin ed Eliana Lorch)

2020 **Assistente tecnico**, *Categorical Probability and Statistics*, conferenza, University of Ottawa, ON (Canada) – Spostata online per via del CoViD-19
(organizzata da Tobias Fritz e Rory Lucyshyn-Wright)

2015-2018 **Co-organizzatore**, *LikBez seminar, Mathematics*, seminario didattico, Max Planck Institute, Lipsia (Germania)
(in collaborazione con Rostislav Matveev e Sharwin Rezagholi)

Revisioni di articoli:

2022 Journal of the London Mathematical Society

2022 Applied Category Theory (ACT), conferenza con pubblicazioni

2022 Theory and Applications of Categories (TAC), rivista scientifica

2022 Revisione di tesi magistrale per Macquarie University, Sydney (Australia)

2021 Compositionality, rivista scientifica

- 2020 Logic In Computer Science (LICS), conferenza con pubblicazioni
- 2020 Applied Category Theory (ACT), conferenza con pubblicazioni
- 2020 Compositionality, rivista scientifica
- 2019 Applied Category Theory (ACT), conferenza con pubblicazioni

Altre attività:

- 2020 Ricevuto il Kaufman Teaching Certificate dall' MIT
- Attuale Comitato scientifico di ItaCa, associazione italiana di teorici delle categorie
- Attuale Corso online di ItaCa, in italiano, di teoria delle categorie
- Attuale Comitato per etica e valori della conferenza "Applied Category Theory"
- Attuale (Co-)autore di nLab, wiki di teoria delle categorie
- Attuale (Co-)moderatore dello Zulip Category Theory Community Server

Collaborazione con l'industria

- 2022 **Consulenza**, Cavenwell AI, Ottawa (Canada)

Interventi a conferenze e su invito

2023:

- Mag. 2023 **Talk su invito**, *Probability, Symmetry, and Entropy with Markov Categories*, Computational Statistics and Machine Learning Seminar (OxCSML), University of Oxford (U.K.)
- Mag. 2023 **Talk su invito**, *Categorical probability and information theory*, Q-Math Seminar, Universidad Carlos III, Madrid (Spagna)
- Apr. 2023 **Evento su invito**, *Probabilistic programming: its challenges and opportunities*, Alan Turing Institute, Londra (U.K.)
- Gen. 2023 **Evento su invito**, *Research week on Markov categories*, Universität Innsbruck (Austria)

2022:

- Dic. 2022 **SYCO 10**, *Dilations and information flow axioms in categorical probability*, University of Edinburgh (Scozia)
Relatore: Tomáš Gonda (collaborazione).
- Dic. 2022 **Talk su invito**, *GS-monoidal structures and thunkability in Kleisli categories*, Università di Pisa (Italia)
- Nov. 2022 **Talk su invito**, *Introduction to Markov categories*, Sheaf Talk Seminar, University of Oxford (U.K.)

- Nov. 2022 **Talk su invito**, *When measurable spaces don't have enough points*, Theoretical Computer Science Seminar, University of Birmingham (U.K.)
- Sett. 2022 **SYCO 9**, *Lifting weights: enriched lenses between transport plans*, Università dell'Insubria, Como (Italia)
- Ago. 2022 **Logic in Computer Science (LICS)**, *Probability monads with submonads of deterministic states*, Technion, Haifa (Israele)
Relatore: Sean Moss (collaborazione).
- Lug. 2022 **Talk su invito**, *When measurable spaces don't have enough points*, Seminário de Teoria das Categorias, Universidade de Coimbra (Portogallo)
(Evento online.)
- Lug. 2022 **Applied Category Theory 2022**, *A category-theoretic proof of the ergodic decomposition theorem*, University of Strathclyde (Scozia)
- Giu. 2022 **Lezione su invito**, *Introduction to categorical probability*, Applied Category Theory course, University of Oxford (U.K.)
(Evento online.)
- 2021 (quasi tutti gli eventi hanno avuto luogo online):**
- Nov. 2021 **Talk su invito**, *The rise of quantitative category theory*, Topos Colloquium, Topos Institute, Berkeley (U.S.A.)
- Ago. 2021 **Category Theory 2021**, *Kan extensions are partial colimits*, Università di Genova (Italia)
(Evento in presenza.)
- Lug. 2021 **Applied Category Theory 2021**, *De Finetti's theorem in categorical probability*, University of Cambridge (U.K.)
Relatore: Tobias Fritz (collaborazione).
- Giu. 2021 **Keynote talk, Categories and Companions 2021**, *An invitation to categorical probability and statistics with Markov categories*, Macquarie University, Sydney (Australia)
Relatore: Tobias Fritz (collaborazione).
- Giu. 2021 **Categories and Companions 2021**, *Compositional structure of partial evaluations*, Macquarie University, Sydney (Australia)
Relatore: Brandon Shapiro (collaborazione).
- Mag. 2021 **Seminario**, *Weighted limits in metric geometry*, Metric Geometry seminar, Max Planck Institute for Mathematics in the Sciences, Lipsia (Germania)
- Mag. 2021 **Seminario**, *Markov categories: towards a syntax for probability*, Logic and Semantics for Dummies, University of Cambridge (U.K.)

- Mag. 2021 **Talk su invito**, *The law of large numbers in categorical probability*, Topos Colloquium, Topos Institute, Berkeley (U.S.A.)
Relatore: Tobias Fritz (collaborazione).
- Apr. 2021 **Talk su invito**, *The de Finetti theorem in categorical probability*, Cohomology in algebra, geometry, physics and statistics, Institute of Mathematics, Czech Academy of Sciences (Czech Republic)
Relatore: Tobias Fritz (collaborazione).
- Mar. 2021 **Talk su invito**, *Categorical probability, Markov categories and the de Finetti theorem*, New York City Category Theory Seminar, CUNY, New York (U.S.A.)
Relatore: Tobias Fritz (collaborazione).
- Mar. 2021 **Seminario improvvisato**, *Categorical probability, Markov categories and the de Finetti theorem*, New York City Category Theory Seminar, CUNY, New York (U.S.A.)
- Feb. 2021 **Talk su invito**, *Partial evaluations: the results so far*, Seminario de categorías UNAM, Città del Messico (Messico)
- Feb. 2021 **Talk su invito**, *Partial evaluations for monads and 2-monads*, Seminário de Teoria das Categorias, Universidade de Coimbra (Portogallo)
- Feb. 2021 **Talk su invito**, *Kan extensions are partial colimits*, Masaryk University Algebra Seminar, Brno (Rep. Ceca)
- Gen. 2021 **Lezione su invito**, *An introduction to monads*, Applied Compositional Thinking for Engineers, ETH, Zurigo (Svizzera)
- Gen. 2021 **Oxford Quantum Group Workshop**, *Markov categories: randomness and information flow*, University of Oxford (U.K.)
- [2020 \(tutti gli eventi hanno avuto luogo online\):](#)
- Sett. 2020 **Talk su invito**, *Colimits as algebraic operations*, ItaCa Fest III, ItaCa (Italia)
- Sett. 2020 **Talk su invito**, *Compositional structure of partial evaluations*, Massachusetts Institute of Technology (MIT), Cambridge, MA (U.S.A.)
Relatore: Brandon Shapiro (collaborazione).
- Lug. 2020 **Applied Category Theory 2020**, *Distribution functors, second-order stochastic dominance and the Blackwell–Sherman–Stein Theorem in Categorical Probability*, Massachusetts Institute of Technology (MIT), Cambridge, MA (U.S.A.)
Relatore: Tomáš Gonda (collaborazione).
- Lug. 2020 **Tutorial per ACT 2020**, *Monads and Comonads*, Massachusetts Institute of Technology (MIT), Cambridge, MA (U.S.A.)

- Giu. 2020 **Talk su invito**, *Monads, Partial Evaluations, and Rewriting*, POPV Seminar, University of Boston, Boston, MA (U.S.A.)
- Giu. 2020 **Talk su invito**, *Kan extensions are partial colimits*, Massachusetts Institute of Technology (MIT), Cambridge, MA (U.S.A.)
- Giu. 2020 **Workshop Categorical Probability and Statistics**, *Probability monads and stochastic dominance*, University of Ottawa, ON (Canada)
- Giu. 2020 **Tutorial per workshop CPS**, *What is a probability monad?*, University of Ottawa, ON (Canada)
- Giu. 2020 **MFPS 36**, *Monads, Partial Evaluations, and Rewriting*, Université Paris VII, Parigi (Francia)
- Mag. 2020 **Seminario**, *The support as a morphism from probability to possibility*, Tallinn Institute of Technology (TalTech), Tallinn (Estonia)
Relatore: Sharwin Rezagholi (collaborazione).
- Apr. 2020 **Seminario**, *Stochastic orders and Kantorovich duality*, Metric Geometry seminar, Max Planck Institute for Mathematics in the Sciences, Lipsia (Germania)
- Mar. 2020 **Seminario**, *Composing partial evaluations*, Massachusetts Institute of Technology (MIT), Cambridge, MA (U.S.A.)
- 2019:
- Nov. 2019 **Talk su invito**, *The compositional structure of partial evaluations*, University of Ottawa, ON (Canada)
- Lug. 2019 **Applied Category Theory 2019**, *The support is a morphism of monads*, University of Oxford (U.K.)
- Mag. 2019 **SYCO 4**, *Categorical Probability: Results and Challenges*, Chapman University, CA (U.S.A.)
Relatore: Tobias Fritz (collaborazione).
- Mar. 2019 **SYCO 3**, *The support is a morphism of monads*, University of Oxford (U.K.)
Relatore: Sharwin Rezagholi (collaborazione).
- Feb. 2019 **Talk su invito**, *Towards probability theory without measure theory*, Massachusetts Institute of Technology (MIT), Cambridge, MA (U.S.A.)
Relatore: Tobias Fritz (collaborazione).
- 2018:
- Ott. 2018 **Talk su invito**, *Monads, Partial Evaluations, and Martingales*, Massachusetts Institute of Technology (MIT), Cambridge, MA (U.S.A.)

- Sett. 2018 **SYCO 1**, *Monads, Partial Evaluations, and Rewriting*, University of Birmingham (U.K.)
- Lug. 2018 **Category Theory 2018**, *On the Operational Meaning of the Bar Construction*, Universidade dos Açores, Ponta Delgada, Azzorre (Portogallo)
- Giu. 2018 **MFPS 34**, *Bimonoidal Structure of Probability Monads*, Dalhousie University, Halifax, NS (Canada)
- Mag.-Giu. 2018 **FMCS 26**, *A Kantorovich Monad for Ordered Spaces*, Mount Allison University, Sackville, NB (Canada)
- [2014–2017:](#)
- Lug. 2017 **Category Theory 2017**, *The Wasserstein Monad in Categorical Probability*, University of British Columbia, Vancouver, BC (Canada)
- Nov. 2016 **Talk su invito**, *A Conceptual Viewpoint on Information Decomposition*, Perimeter Institute for Theoretical Physics, Waterloo, ON (Canada)
- Sett. 2015 **WUPES 10**, *Decomposition of Markov Kernels*, Moníec (Rep. Ceca)
- Dic. 2014 **GSO 2014**, *Synergy as a Linear Operator*, Albert-Ludwig-Universität, Friburgo (Germania)

Per ulteriori informazioni o materiale vi prego di contattarmi personalmente.

Ultimo aggiornamento: 2023-05-13.