

# Paolo Perrone

*Mathematician & math teacher*

University of Oxford  
Dept. of Computer Science  
Wolfson Building, Parks Road  
Oxford, OX1 3QD, U.K.  
✉ [paolo.perrone@cs.ox.ac.uk](mailto:paolo.perrone@cs.ox.ac.uk)  
🌐 [www.paoloperrone.org](http://www.paoloperrone.org)

## *Curriculum Vitae*

### Personal data

Name Paolo Perrone  
Date of birth 10th November 1989  
Place of birth Bergamo (Italy)  
Nationality Italian  
Marital status single

### Current position

#### Research:

Institution University of Oxford, England (U.K.)  
Department Computer Science  
Position Research associate  
Group leader Sam Staton

#### Teaching (college):

Institution University of Oxford, England (U.K.)  
College Mansfield College (Oxford)  
Course Groups and Group Actions

#### Teaching (university):

Institution University of Oxford, England (U.K.)  
Department Mathematics  
Course Applied Category Theory

---

## Past positions

- 2020 **Postdoctoral associate, Mathematics**, *Massachusetts Institute of Technology (MIT)*, Cambridge, MA (U.S.A.).  
Group leader: David Spivak.
- 2019 **Postdoctoral visitor, Mathematics**, *York University*, Toronto, ON (Canada).  
Group leader: Walter Tholen.
- 2019 **Postdoctoral researcher, Mathematics**, *Max Planck Institute for Mathematics in the Sciences*, Leipzig (Germany).  
Group leader: Jürgen Jost. Official German name: Wissenschaftlicher Mitarbeiter im Fachbereich Mathematik.

---

## Education

- 2018 **PhD in Mathematics**, *Max Planck Institute for Mathematics in the Sciences and University of Leipzig*, Leipzig (Germany), *Magna cum laude*.  
Supervisor: Jürgen Jost. Official German name: Doktor der Naturwissenschaften (Dr. Rer. Nat.) im Fachbereich Mathematik.
- 2013 **Master of Science in Physics**, *Università degli Studi di Milano*, Milan (Italy), *110/110 cum laude*.  
Supervisor: Guido Parravicini. Official Italian name: Laurea Magistrale in Fisica.
- 2012–2013 **Exchange year, Physics**, *KU Leuven*, Leuven (Belgium).
- 2011 **Bachelor of Science in Physics**, *Università degli Studi di Milano-Bicocca*, Milan (Italy), *110/110 cum laude*.  
Supervisor: Diego Noja. Official Italian name: Laurea Triennale in Fisica.
- 2008 **Scientific High School Diploma**, *Liceo Scientifico Mascheroni*, Bergamo (Italy), *100/100*.  
Official Italian name: Diploma di Liceo Scientifico.

---

## Articles

### Published:

- 2020 **T. Fritz and P. Perrone**, *Stochastic order on metric spaces and the ordered Kantorovich monad*, *Advances in Mathematics*, vol. 366.
- 2020 **T. Fritz and P. Perrone**, *Monads, partial evaluations, and rewriting*, *Proceedings of MFPS 36, ENTCS*.
- 2019 **T. Fritz and P. Perrone**, *A Probability Monad as the Colimit of Spaces of Finite Samples*, *Theory and Application of Categories*, vol. 34, n. 7, pages 170–220.

2018 **T. Fritz and P. Perrone**, *Bimonoidal Structure of Probability Monads*, Proceedings of MFPS 34, ENTCS.

2016 **P. Perrone and N. Ay**, *Hierarchical Quantification of Synergy in Channels*, Frontiers in Robotics and AI.

**Submitted:**

2021 **C. Constantin, T. Fritz, P. Perrone and B. Shapiro**, *Weak cartesian properties of simplicial sets*, preprint at arXiv:2105.04775.

2021 **T. Fritz, T. Gonda and P. Perrone**, *De Finetti's Theorem in Categorical Probability*, preprint at arXiv:2105.02639.

2021 **P. Perrone and W. Tholen**, *Kan extensions are partial colimits*, preprint at arXiv:2101.04531.

2020 **T. Fritz, T. Gonda, P. Perrone and E. F. Rischel**, *Representable Markov Categories and Comparison of Statistical Experiments in Categorical Probability*, preprint at arXiv:2010.07416.

2020 **C. Constantin, T. Fritz, P. Perrone and B. Shapiro**, *Partial evaluations and the compositional structure of the bar construction*, preprint at arXiv:2009.07302.

2019 **T. Fritz, P. Perrone and S. Rezagholi**, *Probability, valuations, hyperspace: Three monads on Top and the support as a morphism*, preprint at arXiv:1910.03752.

**PhD Thesis:**

2018 **P. Perrone**, *Categorical Probability and Stochastic Dominance in Metric Spaces*, University of Leipzig, Germany, Available online at [www.paoloperrone.org/phdthesis.pdf](http://www.paoloperrone.org/phdthesis.pdf).

**Lecture notes, conference papers and other material:**

2019 **P. Perrone**, *Notes on Category Theory with examples from basic mathematics*, lecture notes, arXiv:1912.10642.

2018 **T. Fritz and P. Perrone**, *A Criterion for Kan Extensions of Lax Monoidal Functors*.

2016 **P. Perrone and N. Ay**, *Iterative Scaling Algorithm for Channels*.

2016 **P. Perrone and N. Ay**, *Decomposition of Markov Kernels*, Proceedings of WUPES 10.

2015 **P. Perrone**, *Dual Connections and Holonomy*.

---

## Teaching and community work

### Courses:

- 2020 **Teacher**, *Categories and gauge theory*, reading seminar, Massachusetts Institute of Technology, Cambridge, MA (U.S.A.).
- 2019 **Lecturer**, *Applied Linear Algebra*, undergraduate course, University of York, Toronto, ON (Canada).
- 2019 **Teaching assistant**, *Applied Category Theory*, summer school and online seminars, University of Oxford (U.K.).
- 2019 **Lecturer**, *Category theory and applications*, graduate course, Max Planck Institute, Leipzig (Germany).

### Organizing and supporting events:

- 2021 **Co-organizer**, *Compositional Robotics: Mathematics and Tools*, ICRA 2021 Workshop, ETH Zürich (Switzerland) – Moved online due to CoViD-19 outbreak.  
(co-organized by Andrea Censi, Gioele Zardini et al.)
- 2020 **Co-organizer and technical support**, *MIT Categories Seminar*, research and graduate seminar, Massachusetts Institute of Technology, Cambridge, MA (U.S.A.) – Moved online due to CoViD-19 outbreak.  
(co-organized by Brendan Fong and David Spivak)
- 2020 **Local organizer and technical support**, *Applied Category Theory (ACT)*, conference, Massachusetts Institute of Technology, Cambridge, MA (U.S.A.) – Moved online due to CoViD-19 outbreak.  
(other local organizers: Brendan Fong, David Myers and David Spivak)
- 2020 **Organizer**, *Applied Category Theory*, summer school and online seminars, Massachusetts Institute of Technology, Cambridge, MA (U.S.A.) – Moved online due to CoViD-19 outbreak.  
(together with Carmen Constantin and Eliana Lorch)
- 2020 **Technical support**, *Categorical Probability and Statistics*, conference, University of Ottawa, ON (Canada) – Moved online due to CoViD-19 outbreak.  
(organized by Tobias Fritz and Rory Lucyshyn-Wright)
- 2015-2018 **Co-organizer**, *LikBez seminar, Mathematics*, reading seminar, Max Planck Institute, Leipzig (Germany).  
(together with Rostislav Matveev and Sharwin Rezagholi)

### Reviews:

- 2020 Logic In Computer Science (LICS), conference and proceedings

2020 Applied Category Theory (ACT), conference and proceedings

2020 Compositionality, journal

2019 Applied Category Theory (ACT), conference and proceedings

#### Other activities:

2020 Obtained Kaufman Teaching Certificate Program at MIT

Current Scientific committee of ItaCa, association of Italian category theorists

Current Applied Category Theory Ethics and Values committee

Current (Co-)author of nLab, category theory wiki

Current (Co-)moderator of Zulip Category Theory Community Server, collaboration, learning, and discussion forum

---

## Conference and invited talks

### 2021 (all events held online):

June 2021 **Keynote talk, Categories and Companions 2021**, *An invitation to categorical probability and statistics with Markov categories*, Macquarie University, Sydney (Australia).  
Speaker: Tobias Fritz (joint work).

June 2021 **Categories and Companions 2021**, *Compositional structure of partial evaluations*, Macquarie University, Sydney (Australia).  
Speaker: Brandon Shapiro (joint work).

May 2021 **Seminar talk**, *Weighted limits in metric geometry*, Max Planck Institute for Mathematics in the Sciences, Leipzig (Germany).

May 2021 **Seminar talk**, *Markov categories: towards a syntax for probability*, Logic and Semantics for Dummies, University of Cambridge (U.K.).

May 2021 **Seminar talk**, *The law of large numbers in categorical probability*, Topos Colloquium, Topos Institute, Berkeley (U.S.A.).  
Speaker: Tobias Fritz (joint work).

Apr. 2021 **Seminar talk**, *The de Finetti theorem in categorical probability*, Cohomology in algebra, geometry, physics and statistics, Institute of Mathematics, Czech Academy of Sciences (Czech Republic).  
Speaker: Tobias Fritz (joint work).

Mar. 2021 **Seminar talk**, *Categorical probability, Markov categories and the de Finetti theorem*, New York City Category Theory Seminar, CUNY, New York (U.S.A.).  
Speaker: Tobias Fritz (joint work).

- Mar. 2021 **Impromptu seminar talk**, *Categorical probability, Markov categories and the de Finetti theorem*, New York City Category Theory Seminar, CUNY, New York (U.S.A.).
- Feb. 2021 **Seminar talk**, *Partial evaluations: the results so far*, Seminario de categorías UNAM, Mexico City (Mexico).
- Feb. 2021 **Seminar talk**, *Partial evaluations for monads and 2-monads*, Seminário de Teoria das Categorias, Universidade de Coimbra (Portugal).
- Feb. 2021 **Seminar talk**, *Kan extensions are partial colimits*, Masaryk University Algebra Seminar, Brno (Czech Republic).
- Jan. 2021 **Invited lecture**, *An introduction to monads*, Applied Compositional Thinking for Engineers, ETH, Zürich (Switzerland).
- Jan. 2021 **Oxford Quantum Group Workshop**, *Markov categories: randomness and information flow*, University of Oxford (United Kingdom).
- [2020 \(all events held online\):](#)
- Sept. 2020 **Invited talk**, *Colimits as algebraic operations*, ItaCa Fest III, ItaCa (Italy).
- Sept. 2020 **Seminar talk**, *Compositional structure of partial evaluations*, Massachusetts Institute of Technology (MIT), Cambridge, MA (U.S.A.).  
Speaker: Brandon Shapiro (joint work).
- July 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.).  
Speaker: Tomáš Gonda (joint work).
- July 2020 **Tutorial talk for ACT 2020**, *Monads and Comonads*, Massachusetts Institute of Technology (MIT), Cambridge, MA (U.S.A.).
- June 2020 **Invited talk**, *Monads, Partial Evaluations, and Rewriting*, POPV Seminar, University of Boston, Boston, MA (U.S.A.).
- June 2020 **Seminar talk**, *Kan extensions are partial colimits*, Massachusetts Institute of Technology (MIT), Cambridge, MA (U.S.A.).
- June 2020 **Categorical Probability and Statistics workshop**, *Probability monads and stochastic dominance*, University of Ottawa, ON (Canada).
- June 2020 **Tutorial talk for the CPS workshop**, *What is a probability monad?*, University of Ottawa, ON (Canada).
- June 2020 **MFPS 36**, *Monads, Partial Evaluations, and Rewriting*, Université Paris VII, Paris (France).

May 2020 **Seminar talk**, *The support as a morphism from probability to possibility*, Tallinn Institute of Technology (TalTech), Tallinn (Estonia).  
Speaker: Sharwin Rezagholi (joint work).

April 2020 **Seminar talk**, *Stochastic orders and Kantorovich duality*, Max Planck Institute for Mathematics in the Sciences, Leipzig (Germany).

March 2020 **Seminar talk**, *Composing partial evaluations*, Massachusetts Institute of Technology (MIT), Cambridge, MA (U.S.A.).

#### 2019:

Nov. 2019 **Invited talk**, *The compositional structure of partial evaluations*, University of Ottawa, ON (Canada).

July 2019 **Applied Category Theory 2019**, *The support is a morphism of monads*, University of Oxford (United Kingdom).

May 2019 **SYCO 4**, *Categorical Probability: Results and Challenges*, Chapman University, CA (U.S.A.).  
Speaker: Tobias Fritz (joint work).

March 2019 **SYCO 3**, *The support is a morphism of monads*, University of Oxford (United Kingdom).  
Speaker: Sharwin Rezagholi (joint work).

Feb. 2019 **Invited talk**, *Towards probability theory without measure theory*, Massachusetts Institute of Technology (MIT), Cambridge, MA (U.S.A.).  
Speaker: Tobias Fritz (joint work).

#### 2018:

Oct. 2018 **Invited talk**, *Monads, Partial Evaluations, and Martingales*, Massachusetts Institute of Technology (MIT), Cambridge, MA (U.S.A.).

Sept. 2018 **SYCO 1**, *Monads, Partial Evaluations, and Rewriting*, University of Birmingham (United Kingdom).

July 2018 **Category Theory 2018**, *On the Operational Meaning of the Bar Construction*, Universidade dos Açores, Ponta Delgada, Azores (Portugal).

June 2018 **MFPS 34**, *Bimonoidal Structure of Probability Monads*, Dalhousie University, Halifax, NS (Canada).

May-June 2018 **FMCS 26**, *A Kantorovich Monad for Ordered Spaces*, Mount Allison University, Sackville, NB (Canada).

#### Earlier:

July 2017 **Category Theory 2017**, *The Wasserstein Monad in Categorical Probability*, University of British Columbia, Vancouver, BC (Canada).

- Nov. 2016 **Invited talk**, *A Conceptual Viewpoint on Information Decomposition*, Perimeter Institute for Theoretical Physics, Waterloo, ON (Canada).
- Sept. 2015 **WUPES 10**, *Decomposition of Markov Kernels*, Moníec (Czech Republic).
- Dec. 2014 **GSO 2014**, *Synergy as a Linear Operator*, Albert-Ludwig-Universität, Freiburg (Germany).



For further information or material about any of the above, please contact me directly.

Last update: 2021-06-12.