Curriculum Vitae

Prakash Panangaden

6th February 2025

Personal

Born 11 March 1954 in Puné, India.
Citizen of Canada and of the USA

Positions Held

- Sept 2018 - Aug 2024: Core member of Montreal Institute of Learning Algorithms (MILA).
- Dec 1996 - Aug 2024 : Professor, School of Computer Science, McGill University.
- July 1990 - Nov 1996: Associate Professor, School of Computer Science, McGill University.
- Jan 1990 - June 1990: Associate Professor, Department of Computing and Information Science, Queen's University.
- Aug 1985 - Dec 1989: Assistant Professor, Department of Computer Science, Cornell University.
- Jan 1985 to July 1985: Research Associate, Department of Computer Science, Cornell University.
- 1983-1984: Instructor, Department of Computer Science, University of Utah.
- Jan-June 1983: Associate Instructor, Department of Computer Science, University of Utah.
- 1980-1982: Research Associate, Department of Physics, University of Utah.

Education

- M.S. in Computer Science, University of Utah, August 1985. Research Area: Semantics of Nondeterminism. Thesis adviser: Robert M. Keller.
- Ph.D. in Physics, University of Wisconsin - Milwaukee, Summer 1980. Research Area: Quantum Field Theory in Curved Spacetime. Thesis adviser: Leonard Parker.
- M.S. in Physics, University of Chicago, Spring 1978. Research Area: Radiation from Black Holes. Adviser: Robert M. Wald.
- M.Sc. in Physics, Indian Institute of Technology, Kanpur, Spring 1975.

Visiting Positions

1. Jan 2023 - April 2023: Strategic Talent Visitor, School of Informatics, University of Edinburgh.
2. Jan 2022 - April 2022: Strategic Talent Visitor, School of Informatics, University of Edinburgh.
3. May 2018 to June 2018: Visiting Fellow, The Alan Turing Institute, London, U.K.
4. Jan 2018 to Feb 2018: Distinguished Visiting Professor, Fondation Sciences Mathématiques de Paris.
5. Jan 2012 to Dec 2014: Honorary Professor, University of Edinburgh.
6. July 2011: SICSA Distinguished Fellow, University of Edinburgh.
7. Sept 2010 to Aug 2011: EPSRC Visiting Fellow, Department of Computer Science, Oxford University.
8. April 2006: Professeur Invité, Université Paris, VII (Denis Diderot).
9. Aug 2003 to July 2004: EPSRC Visiting Fellow, Oxford University Computing Laboratory.
10. Aug 2003 to July 2004: Visiting Scholar, Wolfson College, Oxford.
11. May 2002: Professeur Invité, Université Paris, VII.
12. Aug 1996 to June 1997: Visiting Professor, Basic Research Institute in Computer Science, Aarhus University.
13. Jan 1987 to June 1987: Visiting Research Associate, Computer Laboratory, University of Cambridge.
14. August 1990: Visiting Scientist, Mathematics and Computer Science Institute (CWI), Amsterdam.

15. Feb 1991: Consultant, XEROX Corporation, Palo Alto Research Center.
16. May 1992: Visiting Scientist, Mathematics and Computer Science Institute (CWI), Amsterdam.

Grant Committees

- Member, NSERC Grant Selection Committee, 1992-95.
- Member, FCAR Selection Committee for Nouveau Chercheur 1998 - 2001.
- Member, NSF (USA) Selection Panel for Faculty Early Career Development Program, Oct 1998.
- Member, NSF (USA) Selection Panel for Software Engineering and Languages Jan 2001.

Editorial Boards

1. Editorial board of Mathematical Structures in Computer Science; Cambridge University Press.
2. Editorial board of Information and Computation; Elsevier.
3. Editorial board of Proceedings of the Royal Society A.
4. Editorial board of Journal of Computer and System Sciences; Elsevier. *Retired 2023*
5. Editorial board of Acta Informatica; Springer-Verlag. *Retired 2023*
6. Editorial board of Computers: an open access journal. *Retired 2023*
7. Editorial board of the Journal of Logic and Algebraic Programming, Elsevier. *Retired 2023*
8. Editorial board of Computability, the Journal of the Association of Computability in Europe. *Retired 2023*
9. Area Editor for Logic and Probability for Logical Methods in Computer Science; an on line open access journal. *Retired 2023*
10. Editorial board of Computational Inteligence 2008 - 2011.

Guest Editorships

1. Guest Editor, Information and Computation, Special Issue for selected papers from QPL 2011-2013.

2. Guest Editor, New Generation Computing, Special Issue for the 2014 QPL workshop.
3. Guest Editor, Foundations of Physics, Special Issue for the 2010 QPL Workshop.
4. Guest Editor, Mathematical Structures In Computer Science, Special issue for the DCM Workshop 2010.
5. Guest editor, 2008-2009, Special issue of Performance.
6. Guest editor, 2008, Special issue of Theoretical Computer Science, vol 405 (1-2), on papers from a Dagstuhl meeting.
7. Guest editor, May 2003, Nordic Journal of Computing.
8. Guest editor, May 2002, Nordic Journal of Computing.

Honours

Strachey Lecturer, Department of Computer Science, Oxford University, November 2024.

Test of Time Award 2022: one of two most significant papers from LICS 2002.

Class of 1890 Outstanding Teaching Award of the Faculty of Engineering, McGill University, 2022.

Milner Lecturer, School of Informatics, University of Edinburgh, 2021.

Elected Fellow of the Association for Computing Machinery in 2020.

Test of Time Award 2017: one of two most significant papers from LICS 1997.

Principal's Prize for Excellence in Teaching, 2016.

Three-day Symposium to commemorate my 60th birthday held at Oxford University, May 2014.

Elected Fellow of the Royal Society of Canada, Academy of Science, 2013.

Leo Yaffe Award for Outstanding Undergraduate Teaching, Faculty of Science, McGill University, 1999.

Graduate Students and Postdocs Supervised

Post-doctoral Fellows

1. Dr. Clara Lacroce 2022-23. Funded by my research grant.
2. Dr. Florence Clerc, 2021-2023. IVADO funded.
3. Dr. Borja Balle, 2013-2015. Jointly funded by members of the RL Lab.
4. Dr. Kamil Bradler, 2009-2012. ONR funded.
5. Dr. Sami Zhioua, 2008-2009. FQRNT funded.
6. Dr. Gavin Seal, 2005-2006. Funded by a Swiss government fellowship.
7. Dr. Sergey Slavnov, 2005, Partially funded by my NSERC grant.
8. Dr. Ivan T. Ivanov, 2002-2003. Funded by my NSERC grant.
9. Dr. Josee Desharnais, 2000-2001. Funded by my NSERC grant.
10. Dr. Franck van Breugel, 1998. Funded by my NSERC grant.
11. Dr. Franck van Breugel, 1995-96. Funded by a Dutch government fellowship.

	Graduated PhD students	
Name	Thesis Title	Degree Date
Avishek Bose	*A Geometric Perspective to Deep Generative Models*	Oct 2023
Clara Lacroce	*The approximate minimization problem of weighted automata...*	Aug 2022
Florence Clerc	*Bisimulation and behavioural equivalences for continuous-time Markov processes*	Aug 2021
Gheorghe Comanici	*Markov decision processes, bisimulation and approximation*	April 2016
Anusar Farooqi	*Geometrically-induced Spin Precession in Kerr Geometry*	Dec 2015
Pablo Castro	*Planning, prediction and knowledge transfer in fully and partially observable Markov decision processes*	Sept 2011
Yannick Delbecque	*Quantum Games as Quantum Types*	June 2009
Norm Ferns	*State-similarity metrics for Markov decision processes*	Feb 2008
Ellie D'Hondt	*Distributed quantum computation*	Oct 2005
Josée Desharnais	*Labelled Markov Processes*	Nov 1999
Clark Verbrugge	*Parallel Solution Strategies for Irregular Dynamic Problems*	1996
Marija Cubric	*The Behaviour of Bounded-buffer Dataflow Networks*	1994
Carol Critchlow	*Inhibition and Consistency in Asynchronous Protocols*	1991
Radhakrishnan Jagadeesan	*Investigations into Abstraction and Concurrency*	1991
Charles Elkan	*Adaptive Database Locking*	1991
Kimberly Taylor	*Knowledge, Causality and Inhibition in Asynchronous Systems*	1990
Vasant Shanbhogue	*The Expressiveness of Indeterminate Dataflow Primitives*	1990
James Russell	*Full Abstraction and Fixed-Point Principles for Indeterminate Computation*	1990
Anne Neirynck	*Static Analysis of Aliases and Side Effects in a Higher-order Language*	1988
Michael Schwartzbach	*A Category-theoretic Analysis of Predicative Type Theories*	1987

	Graduated MSc (Thesis) students	
Name	Thesis Title	Grad. Date
Rosie Zhao	*Continuous homomorphisms and leveraging symmetries in policy gradient algorithms for Markov decision processes*	Aug 2022
Tyler Kastner	*State similarity metrics in reinforcement learning*	May 2022
Ariella Smofsky	*Variational autoencoders for simplicial complexes*	Aug 2021
Gavin McCracken	*Using exact models to analyze policy gradient algorithms*	Aug 2021
Alika Utepova	*Metrics for learning automata*	May 2021
Vincent Luczkow	*Structural causal models for reinforcement learning*	Jan 2021
Philip Amortila	*Couplings in reinforcement learning*	August 2019
Nicolas Gagné	*Entropy in computation*	May 2018
Ira Kones	*Two-player binary tree games*	May 2018
Harrison Humphrey	*A bicategory of Markov processes*	Aug 2017
Pascale Gourdeau	*A bisimulation metric for WFAs*	Aug 2017
Costin Badescu	*Quantum alternation*	Aug 2015
Julia Evans	*The algebra of topological quantum computing*	Dec 2011
Maja Frydrychowicz	*An epistemic analysis of authentication*	Aug 2010
Caitlin Phillips	*An Algebraic Approach to Dynamic Epistemic Logic*	Nov 2009
Kamal al Marhubi	*Duality and Finality for Deterministic and Probabilistic Automata*	Nov 2009
Philippe Chaput	*Approximating Markov Processes by Averaging*	Nov 2009
Sophia Knight	*Epistemic Strategies and Games on Concurrent Processes*	Nov 2009
Brendan Cordy	*Canonical Models for Coalgebraic Transition Systems*	Nov 2008
Jonathan Taylor	*Lax Probabilistic Bisimulation*	Nov 2008
Pablo Castro	*Bayesian Exploration in Markov Decision Processes*	June 2007
Norm Ferns	*Metrics for Reward-based Markov Decision Processes*	June 2004
Jacob Eliosoff	*Calculating the probability of LTL Formulas in a Markov Chain*	Sept 2003
William Renner	*Acausal Belief Propagation*	Dec 2002
Ernesto Posse	*Expressiveness of Concurrent Calculi*	Sept 2000
Patrick Lam	*Flow Analysis of Concurrent Programs*	Sept 2000
Yun-Jae Gil	*Verification of Safety-Critical Software by Model Checking*	Apr 2000
Abbas Mahayari	*Compiling Timed Automata to Posix Threads*	Feb 2000
James Wu	*A Comparative Analysis of Ada, CML and Java for Concurrent Programming*	Nov 1999
Riccardo Pucella	*Expressiveness of Dataflow Primitives*	Aug. 1996

	Graduated MSc (Thesis) students	
Name	Thesis Title	Grad. Date
D. Goswami	*Data Parallel Solution Strategies for Irregular Problems*	Jan 1995
Vipul Jain	*VSH: A multiparadigm framework for conformance testing*	Jan 1995
Clément Pellerin	*Taskell a Concurrent Constraint Programming Language*	November 1991

	Current MSc students	
Name	Thesis Topic	Enroll. Date
Jonathan Colaço Carr	Reinforcement Learning	May 2023

Publications

Books

1. Labelled Markov Processes by Prakash Panangaden, *Imperial College Press*, London, U.K. 2009.
2. Implementing Mathematics with the Nuprl Proof Development System, by R. L. Constable et. al., Prentice-Hall, New York, 1986.

Refereed Journal Articles

1. Probability Distribution for Radiation from a Black Hole in the Presence of Incoming Radiation, by P. Panangaden and R. M. Wald, Phys.Rev.D 16, 1977, pp. 929-932.
2. Positive and Negative Frequency Decompositions in Curved Spacetimes, by P. Panangaden, J.Math.Phys. 20,1979, pp. 2506-2510.
3. Renormalization of $\lambda\phi^4$ Theory in Curved Spacetimes I, by T.S.Bunch, P. Panangaden and L.Parker, J.Phys. A 13,1980, pp. 901-918.
4. Renormalization of $\lambda\phi^4$ Theory in Curved Spacetimes II, by T.S.Bunch and P. Panangaden, J.Phys. A 13, 1980, pp. 919-932.
5. One-Loop Renormalization of Quantum Electrodynamics in Curved Spacetime, by P. Panangaden, Phys.Rev.D 23, 1981, pp. 1735-1746.
6. Scaling Behavior of Interacting Quantum Fields in Curved Spacetime, by B. Nelson and P. Panangaden, Phys.Rev.D 25, 1982, pp. 1019-1027.
7. Scaling Behavior of Semiclassical Gravity, Journal of General Relativity and Gravitation, by B. Nelson and P. Panangaden 16,7, 1984, pp. 625-643.
8. Universality and Quantum Gravity, by B. Nelson and P. Panangaden, Phys. Rev. D 29, 1984, pp. 2759-2762.
9. Semantics of Digital Networks Containing Indeterminate Modules, by R. M. Keller and P. Panangaden, Distributed Computing, 1, 4, 1986, pp. 235-245.
10. Type Theory and Concurrency by R. Cleaveland and P. Panangaden, International Journal of Parallel Programming, 17, 2, 1988, pp. 153-206.
11. Effect Analysis in Higher-Order Languages by A. Neirynck, P. Panangaden and A. J. Demers, International Journal of Parallel Programming, 18, 1, 1989, pp. 1-37.
12. On the Expressive Power of Delay Operators in SCCS, by C. M. Critchlow and P. Panangaden, Acta Informatica, 28, 1991, pp. 447-452.

13. A Fully Abstract Model of a Functional Language with Logic Variables, by R. Jagadeesan, K. Pingali and P. Panangaden, ACM Transactions On Programming Languages And Systems, 13, 4, Oct 1991, pp. 577-625.

14. The Expressiveness of Indeterminate Dataflow Primitives, by P. Panangaden and V. Shanbhogue, Information and Computation, 98, 1, 1992, pp. 99-131.

15. Concurrent Common Knowledge, by P. Panangaden and K. E. Taylor, Distributed Computing, 6, 1, 1992, pp. 73-93.

16. A Logic for Reasoning About Security, by Janice Glasgow, Glenn MacEwen and Prakash Panangaden, ACM Transactions on Computer Systems, 10, 3, 1992, pp. 226-264.

17. Nonexpressibility of Signaling and Fairness, by David MacAllester, P. Panangaden and Vasant Shanbhogue, Journal of Computer and System Sciences, 47, 2, 1993, pp. 287-321.

18. Reverse Engineering and Re-engineering of User Interfaces, by E. Merlo, Pierre-Yves Gagne, J. F. Girard, K. Kontogiannis, L.Hendren, P. Panangaden, R. De Mori, IEEE Software, 1995, pp. 64-73.

19. A Logical View of Concurrent Constraint Programming, by Nax P. Mendler, Prakash Panangaden, P. J. Scott and R. A. G. Seely, Nordic Journal of Computing, 2, 1995, pp. 182-221.

20. The Category of Markov Processes, Prakash Panangaden, ENTCS, Vol 22, 1999. `http://www.elsevier.nl/locate/entcs/volume22.html`, 17 pages.

21. Nuclear and Trace Ideals in $\otimes -*$-categories, Samson Abramsky, Richard Blute and Prakash Panangaden, Journal Of Pure And Applied Algebra, Vol: 143, Issue: 1-3, 1999, pp. 3-47.

22. Generating Irregular Partitionable Data-Structures, by Prakash Panangaden and Clark Verbrugge, Theoretical Computer Science, 238, pp. 31-80, 2000.

23. Measure and Probability for Concurrency Theorists, Prakash Panangaden, Theoretical Computer Science, 253, pp. 287-309, 2001.

24. On the Expressive Power of First-order Boolean Functions in PCF, Riccardo Pucella and Prakash Panangaden, Theoretical Computer Science, 266, pp. 543-567, 2001.

25. Bisimulation for Labeled Markov Processes, Josée Desharnais, Abbas Edalat and Prakash Panangaden, Information and Computation, 179(2), pp. 163-193, Dec, 2002.

26. Approximating Labelled Markov Processes, Josée Desharnais, Vineet Gupta, Radha Jagadeesan and Prakash Panangaden, Information and Computation, 184(1), pp. 160-200, July 2003.

27. Continuous Stochastic Logic Characterizes Bisimulation for Continuous-time Markov Processes by Josée Desharnais and Prakash Panangaden. Journal of Logic and Algebraic Progamming special issue on Probabilistic Techniques for the Design and Analysis of Systems, 56 (2003) 99-115.

28. Discrete Quantum Causal Dynamics by Richard Blute, Ivan T. Ivanov and Prakash Panangaden; International Journal of Theoretical Physics, 42(9), September 2003, pp. 2025-2041. Available as gr-qc/0109053 from xxx.lanl.gov.

29. A Metric for Labelled Markov Processes, by Josée Desharnais, Vineet Gupta, Radhakrishnan Jagadeesan and Prakash Panangaden, Theoretical Computer Science, 318(3), pp. 323-354, June 2004.

30. A Relational Model for Nondeterministic Dataflow, by Thomas Hildebrandt, Prakash Panangaden and Glynn Winskel, Mathematical Structures in Computer Science, 14(5), pp. 613-649, October 2004.

31. Parsimonious and robust realizations of unitary maps in the one-way model by Vincent Danos, Elham Kashefi and Prakash Panangaden, Physical Review A 72, 064301, Dec 2005.

32. The Computational Power of the W and GHZ States by Ellie D'Dondt and Prakash Panangaden, Quantum Information and Computation, Vol. 6, No. 2, 2006, 173-183.

33. Approximate reasoning for real-time probabilistic processes by Vineet Gupta, Radha Jagadeesan and Prakash Panangaden; Logical Methods in Computer Science, Volume 2, Issue 1, Paper 4, 2006.

34. Quantum weakest preconditions, Ellie D'Hondt and Prakash Panangaden, Mathematical Structures in Computer Science, Volume 16, Issue 03, June 2006, pp. 429-451.

35. Bisimulation and Cocongruence for Probabilistic Systems by Vincent Danos, Josée Desharnais, François Laviolette and Prakash Panangaden; Information and Computation, Volume 204, Issue 4, pp. 503-523 2006.

36. A Domain of Spacetime Intervals in General Relativity by Keye Martin and Prakash Panangaden, Communications in Mathematical Physics, Volume 267, Number 3, pp. 563-586, November, 2006.

37. The Measurement Calculus by Vincent Danos, Elham Kashefi and Prakash Panangaden, Journal of the Association of Computing Machinery, Volume 52, Issue 2, article 8, April 2007.

38. Anonymity Protocols as Noisy Channels by Konstantinos Chatzikokolakis, Catuscia Palmidessi and Prakash Panangaden, Information and Computation, volume 206, issues 2-4, February-April 2008, pages 378-401.

39. On the Bayes Risk in Information-Hiding Protocols by Konstantinos Chatzikokolakis,

Catuscia Palamidessi and Prakash Panangaden, Journal of Computer Security, 16(5)531-571, 2008.

40. Private Communication via the Unruh Effect by Kamil Bradler, Patrick Hayden and Prakash Panangaden, Journal of High Energy Physics, JHEP08, August 2009, 074 doi:10.1088/1126-6708/2009/08/074.

41. Weak Bisimulation is Sound and Complete for PCTL* by Josée Desharnais, Vineet Gupta, Radha Jagadeesan and Prakash Panangaden, Information and Computation, volume 208, number 2, pp. 203-219, Feb 2010; available electronically Nov 2009, doi:10.1016/j.ic.2009.11.002.

42. Bisimulation Metrics for Continuous Markov Decision Processes by Norm Ferns, Prakash Panangaden and Doina Precup, SIAM Journal of Computing, volume 40, number 6, pp. 1662-1714, 2011.

43. Deep Inference and Probabilistic Coherence Spaces by Richard Blute, Prakash Panangaden and Sergey Slavnov, Applied Categorical Structures, volume 20, pp. 209-228, 2012.

44. Quantum Communication in Rindler Spacetime by Kamil Bradler, Patrick Hayden and Prakash Panangaden, Communications of Mathematical Physics, volume 312, issue 2, pp. 361-398, 2012.

45. Epistemic strategies and games on concurrent processes by Sophia Knight, Konstantinos Chatzikokolakis, Catuscia Palamidessi and Prakash Panangaden, ACM Transactions on Computational Logic, Vol 13, No. 4, pp. 1-40, 2012.

46. Algebra-coalgebra Duality in Brzozowski's Minimization Algorithm by Filippo Bonchi, Marcello M. Bonsangue, Helle H. Hansen, Prakash Panangaden, Jan Rutten and Alexandra Silva, ACM Transactions on Computational Logic, Vol. 19(1) Article 3, 29 pages, 2014.

47. Approximating Markov Processes by Averaging by Philippe Chaput, Vincent Danos, Prakash Panangaden and Gordon Plotkin, Journal of the Association of Computing Machinery, Vol 61, No. 1, Article 5, 45 pages; January 2014.

48. Causality in Physics and Computation by Prakash Panangaden, Theoretical Computer Science, Vol. 546, pp. 10-16, March 2014, dx.doi.org/10.1016/j.Theoretical Computer Science.2014.02.041.

49. An exact expression for photon polarization in Kerr geometry by Anusar Farooqui, Niky Kamran and Prakash Panangaden, Advances in Theoretical and Mathematical Physics, Vol. 8, Num. 3, 657-684, 2014.

50. Free complete Wasserstein algebras by Radu Mardare, Prakash Panangaden, Gordon D. Plotkin; Logical Methods in Computer Science, volume 14, number 3, 2018. Furio Honsell Festschrift.

51. Expressiveness of probabilistic modal logics: a gradual approach by Florence Clerc, Nathanaël Fijalkow, Bartek Klin and Prakash Panangaden, Information and Computation, 267: 145-163, 2019.

52. Singular value automata and approximate minimization by Borja Balle, Prakash Panangaden and Doina Precup, Mathematical Structures in Computer Science, 29(9), 1444-1478, 2019, doi:10.1017/S0960129519000094.

53. Weighted automata are compact and actively learnable by Artem Kaznatcheev and Prakash Panangaden: Inf. Process. Lett. 171: 106133 (2021).

54. Bisimulation metrics and norms for real-weighted automata by Borja Balle, Pascale Gourdeau and Prakash Panangaden, Information and Computation, 282: 104649 (2022).

55. Behavioural equivalences for continuous-time Markov processes by Linan Chen, Florence Clerc and Prakash Panangaden, Mathematical Structures in Computer Science, vol 33, number 4-5, pp. 222-258, 2023.

56. A Kernel Perspective on Behavioural Metrics for Markov Decision Processes by Pablo Samuel Castro, Tyler Kastner, Prakash Panangaden and Mark Rowland; Transactions on Machine Learning Research, 36 pages, June 2023.

57. A Categorical Characterization of Relative Entropy on Standard Borel Spaces by Nicolas Gagné and Prakash Panangaden, Logical Methods in Computer Science, Vol 19, Issue 4, pp. 10:1 - 10:18, 2023.

58. Policy Gradient Methods in the Presence of Symmetries and State Abstractions by Prakash Panangaden, Sahand Rezaei-Shoshtari, Rosie Zhao, David Meger and Doina Precup, Journal of Machine Learning Research, vol 25, pp. 1-57, 2024.

59. Sum and Tensor of Quantitative Effects by Giorgio Bacci, Radu Mardare, Prakash Panangaden and Gordon Plotkin, Logical Methods in Computer Science, Vol 20(4), 2024.

60. Optimal Approximate Minimization of One-Letter Weighted Finite Automata by Clara Lacroce, Borja Balle, Prakash Panangaden, Guillaume Rabusseau, Mathematical Structures in Computer Science, First View, published online 8^{th} November, 2024, pp. 1-27.

Refereed Conference Publications

1. Stream-Based Execution of Logic Programs, by G. Lindstrom and P. Panangaden, First International Logic Programming Conference, Atlantic City, 1984, pp. 168-176.

2. Semantics of Networks Containing Indeterminate Operators, by R. M. Keller and P. Panangaden in Seminar on Concurrency, S. D. Brookes, A. W. Roscoe and G. Winskel eds., Lecture Notes In Computer Science 197, 1985, pp. 479-496.

3. Abstract Interpretation and Indeterminacy, by P. Panangaden. in Seminar on Concurrency, S. D. Brookes, A. W. Roscoe and G. Winskel eds., Lecture Notes In Computer Science 197, 1985, pp. 497-511.

4. Infinite Objects in Type Theory by N. P. Mendler, P. Panangaden and R. Constable, in Proceedings of the IEEE Symposium on Logic in Computer Science, Cambridge, MA, June 16-19, 1986, pp. 249-255.

5. Verifying Systolic Arrays: a Stream-functional Approach, by S. Rajopadhye and P. Panangaden, Proceedings of the International Conference on Parallel Processing, 1986, pp. 778-782.

6. Computation of Aliases and Support Sets, by A. Neirynck, P. Panangaden and A. J. Demers, Proceedings of the Fourteenth Annual ACM Symposium on Principles of Programming Languages, 1987, pp. 274-283.

7. Expressiveness Bounds for Completeness in Trace-based Network Proof Systems, by J. Widom and P. Panangaden, Proceedings of CAAP 88, Lecture Notes in Computer Science 299,eds. M Dauchet and M. Nivat, 1988, pp. 200-214.

8. Computations, Residuals and the Power of Indeterminacy, by P. Panangaden and E. W. Stark, Proceedings of ICALP 1988, ed. T. Lepisto and A. Salomaa, Lecture Notes in Computer Science 317, pp. 439-454.

9. Concurrent Common Knowledge, by P. Panangaden and K. E. Taylor, Proceedings of ACM Symposium on Principles of Distributed Computing, 1988, pp. 197-209.

10. Nonexpressibility of Signaling and Fairness, by D. MacAllester, P. Panangaden and V. Shanbhogue, Proceedings of the 29th Annual IEEE Symposium on Foundations of Computer Science 1988, pp. 377-386.

11. McCarthy's Amb Cannot Implement Fair Merge, by P. Panangaden and V. Shanbhogue, Proceedings of the 8th Conference on Foundations of Software Technology and Theoretical Computer Science, Pune, India, 1988, Lecture Notes in Computer Science 338, pp. 348-363.

12. A Category-theoretic Semantics for Unbounded Indeterminacy by P. Panangaden and J. R. Russell, Proceedings of the 5th Conference on Mathematical Foundations of Programming Semantics, New Orleans, 1989, Lecture Notes In Computer Science 442, pp. 319-332.

13. A Fully Abstract Semantics for a Functional Language with Logic Variables by R. Jagadeesan, P. Panangaden and K. Pingali, Proceedings of the 4th Annual IEEE Symposium on Logic in Computer Science, 1989, pp. 294-303.

14. A Category-theoretic Analysis of Recursively Defined Types, by P. Panangaden, N. P. Mendler and M. I. Schwartzbach, in *Resolution of Equations in Algebraic Structures I*, eds. H. Ait-Kaci and M. Nivat, Academic Press, 1989, pp. 369-410.

15. Sequentiality and Stability in Dataflow Networks, by P. Panangaden, V. Shanbhogue and E. W. Stark, Proceedings of the 17th International Colloquium on Automata Languages and Programming, Warwick, 1990, Lecture Notes in Computer Science 443, pp. 308-321.

16. A Domain-theoretic Model of a Higher-order Process Calculus, by R. Jagadeesan and P. Panangaden, Proceedings of the 17th International Colloquium On Automata Languages and Programming, Warwick, 1990, Lecture Notes in Computer Science 443, pp. 181-194.

17. A Mechanically Assisted Proof in Category Theory, by J. A. Altucher and P. Panangaden, Proceedings of the 10th Conference on Automated Deduction, Karlsruhe, West Germany, July 1990, pp. 500-513.

18. Fair Merge as a Colimit, by D. B. Benson, P. Panangaden and J. R. Russell, Proceedings of the BCS-FACS workshop on Concurrency, Leicester, 1990, pp. 175-184.

19. The Semantic Foundations of Concurrent Constraint Programing by V. Saraswat, M. Rinard and P. Panangaden, Proceedings Of The Eighteenth Annual ACM Symposium On Principles Of Programming Languages, Jan 1991, pp. 333-352.

20. The Common Order-theoretic Structure of Version Spaces and ATMS by C. Gunter, T. H. Ngair, P. Panangaden and D. Subramaniam, Proceedings of the 1991 AAAI Conference, pp. 500-505.

21. Old Foundations for Linear Logic by R. Blute, P. Panangaden and R. Seely, Proceedings of the 9th Symposium on Mathematical Foundations of Programming Semantics, April 1993. LNCS 802, pp. 474-512.

22. Reverse Engineering of User Interfaces, by Merlo E., Girard J. F., Kontogiannis K., Panangaden P., De Mori R., Working Conference on Reverse Engineering, May 21-23, 1993, Baltimore, Maryland, pp. 171-179.

23. Minimal Memory Schedules for Dataflow Networks by Marija Cubric and Prakash Panangaden, Proceedings of CONCUR 93, ed. Eike Best, August 1993, Lecture Notes In Computer Science 715, pp. 368-383.

24. Bisimulation for Labelled Markov Processes by Richard Blute, Joseé Desharnais, Abbas Edalat and Prakash Panangaden, Proceedings of the Twelfth IEEE Symposium on Logic in Computer Science, Warsaw, Poland, 1997.

25. A Logical Characterization of Bisimulation for Labelled Markov Processes, Joseé Desharnais, Abbas Edalat and Prakash Panangaden, Proceedings of the Thirteen Annual IEEE Symposium on Logic in Computer Science, Indianapolis, USA, 1998.

26. A Relational Model of Nondeterminate Dataflow, by T. Hildebrandt, P. Panangaden and G. Winskel, Proceedings of CONCUR 98, eds. R de Simone and D. Sangiorgi, Lecture Notes In Computer Science 1466, pp. 613-628, Nice, France, 1998.

27. Stochastic Processes as Concurrent Constraint Programs, by Vineet Gupta, Radhakrishnan Jagadeesan and Prakash Panangaden, Proceedings of POPL 99, San Antonio, USA, January 1999, pp. 189-202.

28. A Metric for Labelled Markov Processes, by Josée Desharnais, Vineet Gupta, Radhakrishnan Jagadeesan and Prakash Panangaden, Proceedings of 10th International Conference on Concurrency Theory, Eindhoven, The Netherlands, August 1999, Lecture Notes In Computer Science 1664, eds. Jos C. M. Baeten and S. Mauw, pp. 258-273.

29. Approximating Labeled Markov Processes, by Josée Desharnais, Vineet Gupta, Radhakrishnan Jagadeesan and Prakash Panangaden, Proceedings of the Fifteenth Annual IEEE Symposium on Logic in Computer Science, Santa Barbara, California, USA, June 2000, pp. 95-106.

30. The Metric Analogue of Weak Bisimulation for Probabilistic Processes by Josée Desharnais, Vineet Gupta, Radha Jagadeesan and Prakash Panangaden, Seventeenth Annual IEEE Symposium on Logic in Computer Science, Copenhagen, Denmark, July 2002; pp. 413-422.

31. Weak bisimulation is sound and complete for $pCTL*$ by Josée Desharnais, Vineet Gupta, Radha Jagadeesan and Prakash Panangaden, Proceedings of 13th International Conference on Concurrency Theory, CONCUR02, Brno, Czech Republic, August 2002; Lecture Notes In Computer Science 2421, pp. 355-370.

32. Conditional Expectation and the Approximation of Labeled Markov Processes by Vincent Danos, Josée Desharnais and Prakash Panangaden, Proceedings of the 14th International Conference on Concurrency Theory, CONCUR03, Marseilles, France, September 2003. Lecture Notes In Computer Science 2761 pp. 477-491.

33. Metrics for Finite Markov Decision Precesses by Norm Ferns, Prakash Panangaden and Doina Precup, Proceedings of the 20th Conference on Uncertainty in Artificial Intelligence, pp. 162-169, Banff, Canada, July 2004.

34. Approximate reasoning for real-time probabilistic processes by Vineet Gupta, Radha Jagadeesan and Prakash Panangaden; 1st International Conference on Quantitative Evaluation of Systems, QEST04, Enschede, the Netherlands, September 2004, pp. 304-313.

35. Metrics for Markov Decision Processes with Infinite State Spaces by Norm Ferns, Prakash Panangaden and Doina Precup; Proceedings of the 21st Conference on Uncertainty in Artificial Intelligence, pp. 201-208, Edinburgh, U.K., July 2005.

36. An approximation algorithm for labelled Markov processes: towards realistic approximation, by Alexandre Bouchard, Norm Ferns, Prakash Panangaden and Doina Precup, Proceedings of the 2nd International Conference on the Quantitative Evaluation of Systems (QEST), Torino, September, 2005, pp. 54-61.

37. Reasoning about quantum knowledge, Ellie D'Hondt and Prakash Panangaden, Proceedings of the 25th Conference on Foundations of Software Technology and Theoretical Computer Science, Hyderabad, India, Dec 2005, pp. 553-564, Lecture Notes In Computer Science 3821.

38. Methods for Computing State Similarity in Markov Decision Processes, Proceedings on the Conference on Uncertainty in AI (UAI) by Ferns, N., Castro, P., Precup, D., Panangaden, P., 2006, 8 pages.

39. Representing Systems with Hidden State, Proceedings of the Twenty-First National Conference on Artificial Intelligence (AAAI 2006) by Christopher Hundt, Prakash Panangaden, Joelle Pineau, and Doina Precup, 2006, 8 pages.

40. Anonymity Protocols as Noisy Channels, by K. Chatzikokolakis, C. Palamidessi, P. Panangaden. Post-conference proceedings of the Second Symposium on Trustworthy Global Computing, TGC'06, Lecture Notes In Computer Science 4661, pp. 281-300, 2007.

41. Probability of Error in Information-Hiding Protocols, by K. Chatzikokolakis, C. Palamidessi and P. Panangaden, Proc. of the 20th IEEE Computer Security Foundations Symposium; pp. 341-354, July 2007.

42. Game Semantics for Quantum Stores by Yannick Delbecque and Prakash Panangaden, 24th Annual Conference on Mathematical Foundations Of Programming Semantics, Philadelphia, Pennsylvania, May 2008. Published in Electronic Notes in Theoretical Computer Science, pp. 153-170.

43. A Technique for Verifying Measurements by Keye Martin and Prakash Panangaden. 24th Annual Conference on Mathematical Foundations Of Programming Semantics, Philadelphia, Pennsylvania, May 2008. Published in Electronic Notes in Theoretical Computer Science, pp. 261-273.

44. Bounding Performance Loss in Approximate MDP Homomorphisms by Jonathan Taylor, Doina Precup and Prakash Panangaden, Proceedings of NIPS 2008, pp. 1649-1656.

45. Epistemic Strategies and Games on Concurrent Processes by Konstantinos Chatzikokolakis, Sophia Knight and Prakash Panangaden, Proceedings of the 35th Conference on Current Trends in Theory and Practice of Computer Science (SOFSEM), Czech Republic, Jan 2009, Lecture Notes In Computer Science 5404, pp. 153-166.

46. Approximating Markov Processes by Averaging by Philippe Chaput, Vincent Danos, Prakash Panangaden and Gordon Plotkin, Proceedings of the 37th International Colloquium On Automata Languages And Programming (ICALP) Rhodes, Greece, July 2009, Lecture Notes In Computer Science 5556, pp. 127-138.

47. Equivalence Relations in Fully and Partially Observable Markov Decision Processes by Pablo Castro, Prakash Panangaden and Doina Precup, Proceedings of the Twenty-

first International Joint Conference on Artificial Intelligence (IJCAI-09), July 2009, pp. 1653-1658.

48. An algebraic approach to dynamic-epistemic logic, Prakash Panangaden, Caitlin Phillips, Doina Precup and Mehrnoosh Sadrzadeh, Proceedings of the 23rd International Workshop on Description Logics, May 2010, CEUR Workshop Proceedings, volume 573, pp. 451-463.

49. Learning in a changing world, an algebraic modal logic approach, by Prakash Panangaden and Mehrnoosh Sadrzadeh, 13th International Conference on Algebraic Methodology and Software Technology, AMAST, Lecture Notes In Computer Science, volume 6486, 2011, pp. 128-141.

50. Combining Epistemic Logic and Hennessy-Milner Logic, by Sophia Knight, Radu Mardare and Prakash Panangaden, in *Logic and Program Semantics - Essays Dedicated to Dexter Kozen on the Occasion of his 60th Birthday*, Lecture Notes In Computer Science, volume 7230, 2012, pp. 219-243.

51. On-the-Fly Algorithms for Bisimulation Metrics, by Gheorghe Comanici, Prakash Panangaden and Doina Precup, Proceedings of the 9th International Conference on Quantitative Analysis of Systems (QEST), IEEE Computer Society, 2012, pp. 94-103.

52. Spatial and Epistemic Modalities in Constraint-based Process Calculi, by Sophia Knight, Catuscia Palamidessi, Prakash Panangaden and Frank Valencia, Proceedings of the 23rd International Conference on Concurrency Theory, Lecture Notes In Computer Science 7454, pp. 317-332, 2012.

53. Minimization via Duality by Nick Bezhanishvili, Clemens Kupke and Prakash Panangaden, Proceedings of the 19th Workshop on Logic, Language, Information and Computation, Lecture Notes In Computer Science 7456, pp. 191-205, 2012.

54. Taking it to the Limit: Approximate Reasoning for Markov Processes by Kim G. Larsen, Radu Mardare and Prakash Panangaden, Proceedings of the 37th International Symposium on the Mathematical Foundations of Computer Science, Lecture Notes In Computer Science 7464, pp. 681-692, 2012.

55. The Duality of State and Observation in Probabilistic Transition Systems by Monica Dinculescu, Christopher Hundt, Prakash Panangaden, Joelle Pineau and Doina Precup; in Language, Logic and Computation, revised selected papers from the 9th International Tbilisi Symposium TbiLLC 2011, Kutaisi, Georgia, Sept. 26-30, 2011. Lecture Notes In Computer Science 7758, pages 206-230, 2013.

56. Stone Duality for Markov Processes, by Dexter Kozen, Kim G. Larsen, Radu Mardare and Prakash Panangaden, Proceedings of the ACM-IEEE Symposium On Logic in Computer Science 2013, pp. 321-330.

57. Strong Completeness for Markovian Logics by Dexter Kozen, Radu Mardare and

Prakash Panangaden, in Proceedings of the 38th International Symposium on Mathematical Foundations of Computer Science, Austria, August 2013; Lecture Notes In Computer Science 8087, pp. 655-666.

58. Fair Reactive Programming by Andrew Cave, Francisco Ferreira, Prakash Panangaden and Brigitte Pientka, Proceedings of the 41st Annual ACM Symposium on Principles of Programming Languages, January 2014, pp. 361-372.

59. A Metrized Duality Theorem for Markov Processes by Dexter Kozen, Radu Mardare and Prakash Panangaden, Proceedings of the 30th Conference on Mathematical Foundations of Programming Semantics, Ithaca, New York, June 2014, pp. 215-231.

60. Representation Discovery for MDPs Using Bisimulation Metrics, Sherry Shanshan Ruan, Gheorghe Comanici, Prakash Panangaden and Doina Precup, Proceedings of the Twenty-Ninth AAAI Conference on Artificial Intelligence, 2015, pp. 3578-3584.

61. On the Formal Verification of Optical Quantum Gates in HOL, by M. Y. Mahmoud, P. Panangaden and S. Tahar; Formal Methods for Industrial Critical System , Lecture Notes in Computer Science Volume 9128, 2015, pp 198-211.

62. A Canonical Form for Weighted Automata and Applications to Approximate Minimization, Borja Balle, Prakash Panangaden and Doina Precup, Proceedings of the Thirtieth Annual ACM-IEEE Symposium on Logic in Computer Science, pp. 701-712, Kyoto, Japan, July 2015.

63. Quantum Alternation; Problems and Prospects, Costin Badescu and Prakash Panangaden, Proceedings of the Workshop on Quantum Physics and Logic, pages 33-42, Oxford, UK, July 2015.

64. Basis refinement strategies for linear value function approximation in MDPs Gheorghe Comanici, Doina Precup, Prakash Panangaden, Proceedings of NIPS, pages 2881–2889, Montré al, Qué bec, Canada, December 2015.

65. Quantitative algebraic reasoning by Radu Mardare, Prakash Panangaden and Gordon Plotkin; ACM-IEEE Symposium on Logic in Computer Science, New York, 2016, pp. 700-709.

66. A categorical characterization of relative entropy on standard Borel spaces, Nicolas Gagné and Prakash Panangaden, Proceedings of the 33rd Conference on Mathematical Foundations of Programming Semantics, 2017.

67. Unrestricted Stone duality for Markov processes, Robert Furber, Dexter Kozen, Kim Larsen, Radu Mardare and Prakash Panangaden. Proceedings of the ACM-IEEE Symposium on Logic in Computer Science, Reykjavik, 2017.

68. On the axiomatizability of quantitative algebras, Radu Mardare, Prakash Panangaden and Gordon Plotkin. Proceedings of the ACM-IEEE Symposium on Logic in Computer Science, Reykjavik, 2017.

69. Expressiveness of probabilistic modal logics revisited, Nathanaël Fijalkow, Bartek Klin and Prakash Panangaden. Proceedings of the International Colloquium On Automata Languages and Programming, Warsaw, pp. 105:1-12, 2017.

70. Bisimulation metrics for weighted finite automata, Borja de Balle, Pascale Gourdeau and Prakash Panangaden. Proceedings of the International Colloquium On Automata Languages and Programming, Warsaw, pp. 103:1-14, 2017.

71. Bicategories of Markov processes, Florence Clerc, Harrison Humphrey and Prakash Panangaden. Models, Logics, Algorithms and Tools: Kim Larsen Festschrift; Lecture Notes in Computer Science 10460, Springer-Verlag, pp. 112-124, 2017.

72. Boolean-valued semantics for the stochastic λ-calculus by Giorgio Bacci, Robert Furber, Dexter Kozen, Radu Mardare, Prakash Panangaden and Dana Scott; Proceedings of the ACM-IEEE Symposium on Logic in Computer Science 2018, pp. 669-678.

73. An algebraic theory of Markov processes by Giorgio Bacci, Radu Mardare, Prakash Panangaden and Gordon D. Plotkin; Proceedings of the ACM-IEEE Symposium on Logic in Computer Science 2018; pp. 679-688.

74. Bisimulation for Feller-Dynkin Processes by Linan Chen, Florence Clerc and Prakash Panangaden, Proceedings of the Thirty-Fifth Conference on the Mathematical Foundations of Programming Semantics, MFPS 2019, London, UK, June 4-7, 2019; ENTCS, volume 347, pages 45–63.

75. A Distributional Analysis of Sampling-based Reinforcement Learning Algorithms by Philip Amortila, Doina Precup, Prakash Panangaden and Marc Bellemare, proceedings of The 23rd International Conference on Artificial Intelligence and Statistics (AISTATS) 2020.

76. Latent Variable Modelling with Hyperbolic Normalizing Flows by Joey Bose, Ariella Smofsky, Renjie Liao, Prakash Panangaden and Will Hamilton in the Proceedings of the Thirty-seventh International Conference on Machine Learning (ICML), 2020.

77. Towards a Classification of Behavioural Equivalences in Continuous-time Markov Processes by Linan Chen, Florence Clerc and Prakash Panangaden in the Proceedings of the 36th International Conference on Mathematical Foundations of Programming Semantics (MFPS) 2020.

78. Fixed points for Quantitative Equational Logics by Radu Mardare, Prakash Panangaden and Gordon Plotkin; Proceedings of the 2021 ACM-IEEE Symposium on Logic in Computer Science.

79. Universal Semantics for the Stochastic λ-Calculus by Pedro H. Azevedo de Amorim, Dexter Kozen, Radu Mardare, Prakash Panangaden and Michael Roberts; Proceedings of the 2021 ACM-IEEE Symposium on Logic in Computer Science.

80. Optimal Spectral-Norm Minimization of Weighted Finite-Automata by Borja Balle,

Clara Lacroce, Prakash Panangaden, Doina Precup and Guillaume Rabusseau; Proceedings of the International Colloquium on Automata Languages and Programming, 2021.

81. Tensor of Quantitative Equational Theories by Giorgio Bacci, Radu Mardare, Prakash Panangaden and Gordon Plotkin; Proceedings of the Ninth Conference on Algebra and Coalgebra in Computer Science (CALCO), Salzburg, Austria, 2021.

82. Extracting Weighted Automata for Approximate Minimization in Language Modelling, by Clara Lacroce, Prakash Panangaden, Guillaume Rabusseau; Proceedings of the Fifteenth International Conference on Grammatical Inference, published as Proceedings of Machine Learning Research 153:92-112, 2021.

83. MICo: Improved representations via sampling-based state similarity for Markov decision processes, by Pablo Samuel Castro, Tyler Kastner, Prakash Panangaden and Mark Rowland; proceedings of the Thirty-Fifth Conference on Neural Information Processing Systems (NeurIPS), 2021.

84. Riemannian diffusion models, by Chin-Wei Huang, Milad Aghajohari, Joey Bose, Prakash Panangaden and Aaron Courville; proceedings of the Thirty-sixth Conference on Neural Information Processing Systems (NeurIPS), 2022.

85. Continuous MDP Homomorphisms and Homomorphic Policy Gradient by Sahand Rezaei-Shoshtari, Rosie Zhao, Prakash Panangaden, David Meger, Doina Precup; proceedings of the Thirty-sixth Conference on Neural Information Processing Systems (NeurIPS), 2022.

86. Propositional Logics for the Lawvere Quantale by Giorgio Bacci, Radu Mardare, Prakash Panangaden and Gordon Plotkin, Proceedings of the XXXIXth Conference on Mathematical Foundations Of Programming Semantics, Bloomington, Indiana, June 2023.

87. Conditions on Preference Relations that Guarantee the Existence of Optimal Policies. Jonathan Colaço-Carr, Prakash Panangaden and Doina Precup, in Proceedings of the 27th International Conference on Artificial Intelligence and Statistics (AISTATS), May 2024, Valencia, Spain.

88. Studying the Interplay Between the Actor and Critic Representations in Reinforcement Learning, by Samuel Garcin, Trevor McInroe, Pablo Samuel Castro, Christopher G. Lucas, David Abel, Prakash Panangaden and Stefano V Albrecht, accepted in International Conference in Representation Learning (ICLR), 2025.

89. A behavioural pseudometric for continuous-time Markov processes by Linan Chen, Florence Clerc and Prakash Panangaden, accepted in the 28th International Conference on Foundations of Software Science and Computation Structures (FoSSaCS), 2025.

Other Publications

1. Minimisation in logical form Nick Bezanishvili et al.,in Samson Abramsky on Logic and Structure in Computer Science and Beyond, pp. 89-128, Outstanding Contributions to Logic 25, eds. Alessandra Palmigiano and Mehrnoosh Sadrzadeh, Springer-Verlag, 2023

2. Structure in machine learning Prakash Panangaden in Samson Abramsky on Logic and Structure in Computer Science and Beyond, pp. 1147-1157, Outstanding Contributions to Logic 25, eds. Alessandra Palmigiano and Mehrnoosh Sadrzadeh, Springer-Verlag, 2023.

3. Quantitative equational reasoning by Giorgio Bacci, Radu Mardare, Prakash Panangaden and Gordon Plotkin, Chapter 10 in *Foundations of Probabilistic Programming* edited by Gilles Barthe, Joost-Pieter Katoen and Alexandra Silva, pp. 333-360, Cambridge University Press, 2020.

4. A Logical Basis for Quantum Evolution and Entanglement by Richard Blute, Alessio Guglielmi, Ivan T. Ivanov, Prakash Panangaden, Lutz Straßburger, in *Categories and Types in Logic, Language, and Physics 2014* 90-107, Lecture Notes In Computer Science 8222.

5. Duality in Logic and Computation, by Prakash Panangaden, invited lecture the Proceedings of the IEEE Symposium on Logic in Computer Science 2013.

6. Reconstruction of spacetime geometry from causal structure and a measurement; by Keye Martin and Prakash Panangaden, Proceedings of the Clifford Lectures 2008, Proceedings of Symposia in Applied Mathematics, AMS, Volume 71, 2012, pages 213-232.

7. Probabilistic bisimulation in *Advanced Topics in Bisimulation and Coinduction*, Cambridge Tracts in Theoretical Computer Science, eds. Davide Sangiorgi and Jan Rutten, CUP, 2011, pp. 290-322.

8. Dagger categories and formal distributions by Richard Blute and Prakash Panangaden in New Structures for Physics ed. Bob Coecke, Lecture Notes In Physics 813, Springer-Verlag, pp. 421-436, 2011.

9. Proof nets as formal Feynman diagrams. by Richard Blute and Prakash Panangaden in New Structures for Physics ed. Bob Coecke, Lecture Notes In Physics 813, Springer-Verlag, pp. 437-466, 2011.

10. Domains in general relativity by Keye Martin and Prakash Panangaden in New Structures for Physics ed. Bob Coecke, Lecture Notes In Physics 813, Springer-Verlag, pp. 687-704, 2011.

11. A categorical view of computing with anyons by Prakash Panangaden and Eric Paquette in New Structures for Physics ed. Bob Coecke, Lecture Notes In Physics 813,

Springer-Verlag, pp. 983-1022, 2011.

12. Extended Measurement Calculus by Vincent Danos, Elham Kashefi, Prakash Panangaden and Simon Perdrix, in Semantic Techniques for Quantum Computation edited by Simon Gay and Ian Mackie, Cambridge University Press, Nov 2009, pp. 235-310.

13. Knowledge and Information in Probabilistic Systems, Prakash Panangaden, Proceedings of the International Conference on Concurrency Theory, (CONCUR) August 2008, Lecture Notes In Computer Science 5201, page 4. Abstract of an invited talk.

14. Domain Theory and the Causal Structure of Space-Time, Keye Martin and Prakash Panangaden, Computability in Europe, July 2008, Athens, Greece, Lecture Notes In Computer Science 5028, pp. 428-430. Abstract of an invited talk.

15. Distributed Measurement-based Quantum Computation, Vincent Danos, Ellie D'Hondt, Elham Kashefi and Prakash Panangaden, Electr. Notes Theor. Comput. Sci. 170: 73-94 (2007)

16. Conformal Field Theory as a Nuclear Functor, Richard Blute, Prakash Panangaden and Dorette Pronk, Electr. Notes Theor. Comput. Sci. 172: 101-132 (2007). From the Plotkin Festschrifft.

17. Labelled Markov Processes: Stronger and Faster Approximations by Vincent Danos and Josée Desharnais and Prakash Panangaden; Electronic Notes in Theoretical Computer Science, 87, pp. 157-203, Nov 2004.

18. Quantum Weakest Preconditions, Ellie D'Hondt and Prakash Panangaden, Second Workshop on Quantum Programming Languages, July 2004, Turku, Finland.

19. The Essence of CML, Prakash Panangaden and John Reppy, in *Concurrency With ML*, edited by F. Nielson, Springer-Verlag, 1997.

20. The Expressive Power of Asynchronous Communication Primitives, by Prakash Panangaden, Invited Lecture, Proceedings of the 15th Annual Conference on Foundations of Software Technology and Theoretical Computer Science, Bangalore India, December 1995, Lecture Notes in Computer Science 1026, pp. 124-150.

21. A Hyperdoctrinal View of Concurrent Constraint Programming, P. Panangaden, V. Saraswat, P. Scott and R. Seely, Proceedings of the REX Workshop, June 1992, Lecture Notes In Computer Science 666, pp. 457-476.

22. Reasoning About Knowledge and Permission in Secure Distributed Systems by J. I. Glasgow, G. H. MacEwen and P. Panangaden, Proceedings of the Computer Security Foundations Workshop, Franconia, June 1988, pp. 139-146.

Distinguished Invited Lectures

1. Milner Lecture: From bisimulation to representation learning via metrics, University of Edinburgh, September 2021.
2. Strachey Lecture: Probabilistic bisimulation, history and applications, Oxford University, November 2024.

Invited Lectures at Conferences and Workshops

1. Approximating Markov processes by averaging, workshop on Categorical Probability and Statistics, Perimeter Institute, held online, June 2020.
2. A categorical view of conditional expectation, UC Riverside Seminar on Applied Category Theory, held online, April 2020.
3. A bisimulation metric for weighted automata, invited lecture, workshop on Learning Automata, affiliated with ACM-IEEE Symposium on Logic in Computer Science, Vancouver, June 2019.
4. Equational resoning for probabilistic programs, a series of 3 lectures at the Summer School on Probabilistic Programming Languages, Braga, Portugal, May 2017.
5. Analysis of Probabilistic Systems, a series of 5 lectures at the boot camp of the program *Logical Structures in Computation*, held at the Simons Institute, University of California, Berkeley, August 2016.
6. Tsinghua Software Day, Invited Lecture, April 2015, Beijing, China.
7. Tutorial on Markov Processes, Annual ACM Symposium on Principles of Programming Languages, January 2015, Mumbai, India.
8. Duality in Logic and Computation, Asian Logic Conference, Mumbai, India, January 2015, invited plenary lecture.
9. Labelled Markov Processes, Invited tutorial lectures at the Estonian Winter Schools in Computer Science, March 2015.
10. Probabilistic Concurrent Constraint Programming, Mathematical Foundations Of Programming Semantics, Ithaca, NY, June 2014, invited plenary lecture.
11. Stone, Gelfand and Pontryagin Duality, Lecture Series (3 lectures) at the Spring School on Quantum Structures, Oxford University, May 2014.
12. Minimization of Automata by Duality, Verification, Model Checking and Abstract Interpretation, San Diego, Jan 2014, invited plenary lecture.
13. Duality in Logic and Computation, IEEE Symposium on Logic in Computer Science, New Orleans, June 2013, invited plenary lecture.

14. Approximating Markov processes, 3 invited lectures at "Interaction Weeks" Luminy, France, February 2012.

15. Duality for automata, Tbilisi Conference on Language, Logic and Information, Kutaisi, Georgia, September 2011, invited plenary lecture.

16. Quantum communication in Rindler Spacetime, Computability in Europe, special session, Sofia, Bulgaria, June 2011.

17. Tutorial on semantics, IEEE Symposium on Logic in Computer Science, Toronto, Ontrio, June 2011, invited tutorial lecture.

18. Epistemic strategies and games on concurrent processes, ICE workshop, Reykjavik, Iceland, June 2011.

19. Epistemic strategies and games on concurrent processes, British colloquium on Theoretical Computer Science, Birmingham, U.K., April 2011, invited plenary lecture.

20. On prediction and planning in partially observable Markov decision processes with large observation sets, Workshop on Quantitative Aspects of Programming Languages, Saarbrucken, Germany, April 2011, invited lecture.

21. The search for structure in quantum computation, FOSSACS 2011, Saarbrucken, Germany, March 2011, invited plenary lecture.

22. Q-deformed oscillators and topological quantum computing, Clifford Lectures, Tulane University, New Orleans, March 2011.

23. Labelled Markov processes, IM-CPS 2010 The International Symposium on Interdisciplinary Modelling of Cyber Physical Systems, Manchester, U.K., November 2010.

24. Tutorial Lecture on Markov Chains, SFM Summer School, Bertinoro, Italy, June 2010.

25. Tutorial Lecture on Topological Quantum Computation, QICS Spring School, Oxford, UK, May 2010.

26. Tutorial Lecture on Verification, Mathematical Foundations Of Programming Semantics, Ottawa, Ontario, May 2010.

27. Black Holes and Information, Workshop on Informatic Phenomena, New Orleans, Oct 2009.

28. Approximating Labelled Markov Processes, Again!, International Conference on Algebra and Coalgebra in Computer Science, Udine, Italy, September 2009, invited plenary lecture.

29. Anyons, Braids and Topological Quantum Computing, Workshop on Development of Computational Models, Rhodes, Greece, July 2009.

30. Discrete Quantum Causal Evolution, Workshop on Categories, Quanta and Concepts, Perimeter Institute, Waterloo, Canada, June 2009.

31. Proof nets as formal Feynman diagrams, Workshops on Logics Inspired by Quantum Computation, Indiana, May 2009.

32. Knowledge and Information in Probabilistic Systems, Joint CONCUR - PODC invited plenary lecture, Toronto, August 2008.

33. Approximating Labelled Markov Processes, Workshop on Approximate Behavioural Equivalences affiliated with CONCUR 2008, Toronto, Ontario, 18th August 2008.

34. Domain Theory and the Causal Structure of Spacetime, Computability in Europe, Athens, June 2008, invited plenary lecture.

35. Domain Theory and the Causal Structure of Spacetime, Invited talk, part of the Clifford Lectures series, Department of Mathematics, Tulane University, 13th March 2008.

36. Labelled Markov Processes, 4 lectures at the Second Indian Winter School on Logic, I.I.T Kanpur, India, January 2008, invited lecture series.

37. Traced Monoidal Categories of Kahn Networks, Workshops on Traced Monoidal Categories and Network Algebra, Wroclaw, Poland, July 2007.

38. Internal Traces, Workshop on Traces, Ottawa, Ontario, April 2007.

39. The One Way to Quantum Computation, International Colloquium On Automata Languages And Programming XXXIII, Venice, Italy, July 2006, invited plenary lecture.

40. Duality for Probabilistic Automata, Conference on Mathematical Foundations Of Programming Semantics XXII, Genoa, Italy, May 2006, invited plenary lecture.

41. New Directions for Concurrency Theory, Workshop on Distributed Algorithms meet Concurrency Theory, San Francisco, August 2005.

42. A Domain-Theoretic Approach to the Causal Structure of Spacetime, Seventh Workshop on Geometric and Topological Methods in Concurrency, San Francisco, August 2005.

43. Domains Theory and Approximation of Probabilistic Processes, International Symposium on Domain Theory, Xi'an, China, May 2004, invited plenary lecture.

44. Probabilistic Bisimulation revisited, Coalgebraic Methods in Computer Science, Barcelona, Spain, March 2004.

45. Metrics for Labelled Markov Processes, Quantitative Aspects of Programming languages, Barcelona, Spain, March 2004.

46. Domains for Probabilistic Processes, Workshop on Domains, Birmingham, U. K., Sept. 2002.

47. Approximation of Probabilistic Processes, Mathematical Foundations Of Programming Semantics, Aarhus, Denmark, May 2001.

48. From Logic to Stochastic Processes, Principles and Practices of Declarative Programming, Montréal, Québec, Canada, September 2000, invited plenary lecture.

49. The Expressive Power of Asynchronous Communication Primitives, FSTTCS 1995, India, invited plenary lecture.

50. Invited Lecture, A Logical view of Concurrent Constraint Programming, CONCUR 94, Sweden, invited plenary lecture.

51. "Concurrent Constraint Programming : A Hyperdoctrinal View", REX workshop, Netherlands, June 1992.

52. "Concurrent Constraint Program : A Hyperdoctrinal View", invited lecture at the workshop on Mathematical Aspects of Information Structures, Abingdon, England, April 1992.

53. "The Semantic Foundations of Concurrent Constraint Programming", invited lecture at the Montreal Workshop on Programming Languages, Montreal, April 1991.

54. "Indeterminate Dataflow, Recent Developments", the fifth workshop on the Mathematical Foundations of Programming Semantics, Kingston, May 1990, invited plenary lecture.

Program Committee Chair

1. Program Committee co chair of QPL 2017, Nijmegen, Netherlands, July 2017.

2. Program Committee co chair of QPL 2014, Kyoto, Japan, June 2014.

3. Program Committee co chair of QPL 2012, Brussels, Belgium, October 2012.

4. Program Committee co Chair of DCM 2010, Edinburgh, UK, July 2010.

5. Program Committee co Chair of QPL 2010, Oxford UK, May 2010.

6. Program Committee co Chair of QPL 2009, Oxford, UK, April 2009.

7. Program Committee co Chair of QEST 2008: September 2008, Saint Malo, France.

8. Program Committee co Chair of SecCo 2008 Fourth International Workshop on Security Issues in Concurrency, affiliated with CONCUR 2008, Toronto Ontario, August 2008.

9. Program Committee co Chair of QPL-DCM 2008, joint workshop on Quantum Physics and Logic and Development of Computational Models, affiliated with International Colloquium On Automata Languages And Programming, July 2008, Rejkavik, Iceland.

10. Program Committee co Chair of FICS 2008 The First International Conference on Foundations of Informatics, Computing and Software, Shanghai, China, June 2008.
11. Program Committee Chair, IEEE Symposium on Logic in Computer Science, Chicago, U.S.A., June 2005.
12. Workshop Chair, Causality in Computer Science and Physics, IEEE Symposium on Logic in Computer Science affiliated workshop, Ottawa, June 2003.
13. Workshop Chair, Domain theoretic methods for probabilistic processes, Bellairs, Barbados, April 2003.
14. Program Committee Co-chair, Mathematical Foundations Of Programming Semantics, Montreal, March 2003.
15. Workshop Chair, Mathematical Aspects of Systems Theory, Montreal, Canada, Oct 2002.
16. Program Committee Co-chair, EXPRESS, Brno, Czech Republic, August 2002.
17. Program Committee Co-chair, EXPRESS, Aalborg, Denmark, August 2001.

Program Committee Memberships

1. Program Committee member of International Conference on Mathematical Foundations of Programming Semantics, June 2025, Glasgow, UK.
2. Program Committee member of ACM-IEEE Symposium on Logic in Computer Science, August 2022, Haifa, Israel.
3. Program Committee member of International Colloquium on Automata Languages and Programming, July 2022, Paris, France.
4. Program Committee member of Quantum Physics and Logic June 2021, Gdansk, Poland.
5. Program Committee member of the Annual Conference on Computer Science Logic, January 2020, Barcelona, Spain.
6. Program Committee member of International Conference on Foundations of Software Science and Computation Structures, originally scheduled for April 2020 in Dublin, cancelled because of the COVID-19 pandemic.
7. Program Committee member of International Conference on Mathematical Foundations of Programming Semantics, June 2020, online.
8. Program Committee member of International Conference on Mathematical Foundations of Programming Semantics, June 2019, London U.K.

9. Program Committee member of ACM-IEEE Symposium on Logic in Computer Science June 2019, Vancouver, Canada.
10. Program Committee member of the Conference on Uncertainty in Artificial Intelligence (UAI), Tel Aviv, Israel, July 2019.
11. Program Committee member of 42nd International Symposium on Mathematical Foundations of Computer Science, August 2017, Aalborg, Denmark.
12. Program Committee Member of Mathematical Foundations of Programming Semantics XXXIV June 2017, Ljubljana, Slovenia.
13. Program Committee Member of Mathematical Foundations of Programming Semantics XXXIII June 2016, Pittsburgh, USA.
14. Program Committee member ACM Symposium on Principles of Programming Languages, St. Petersburg, Florida, USA, 2016.
15. Program Committee member of International Colloquium on Automata Languages and Programming, Kyoto, Japan, July 2015.
16. Program Committee member of the 10th International Computer Science Symposium in Russia, July 2015.
17. Program Committee Member of the 12th International Colloquium on Theoretical Aspects of Computing (ICTAC 2015), Cali (Colombia), October, 2015.
18. Program Committee Member of the 40th International Symposium on Mathematical Foundations of Computer Science, August, 2015, Milano, Italy.
19. Program Committee Member of Mathematical Foundations of Programming Semantics XXXI June 2015, Nijmegen, Netherlands.
20. Program committee member of The 12th International Workshop on Quantum Physics and Logic, Oxford, UK, July 2015.
21. Program Committee Member of the Seventh Conference on Topology, Algebra and Categories in Logic, Ischia, Italy, June 2015.
22. Program committee member of CONCUR, Buenos Aires, Argentina, Sept. 2013.
23. Program Committee member of Mathematical Foundations of Programming Semantics, New Orleans, USA, 2013.
24. Program Committee member of CALCO, Warsaw, Poland, 2013.
25. Program Committee member of TbiLLC, Gudauri, Georgia, 2013.
26. Program committee member of Computer Science Logic, Fontainebleau, France, 2012.

27. Program committee member of Computability in Europe, the Turing Centenary Conference, Cambridge, U.K. 2012.

28. Program committee member of Development of Computational Models, Cambridge, U.K., 2012.

29. Program committee member of Mathematical Foundations of Programming Semantics XXVIII, Bath, U.K., 2012.

30. Program committee member of Coalgebraic Methods in Computer Science, Talinn, Estonia, 2012.

31. Program committee member of the 8th workshop on Quantum Physics and Logic, Nijmegen, the Netherlands, 2011.

32. Program committee member of International Colloquium on Automata Languages And Programming, Zurich, Switzerland, 2011.

33. Program committee member of Mathematical Foundations of Programming Semantics XXVII, Pittsburgh, U.S.A., 2011.

34. Program committee member of the 18th Workshop on Logic, Language, Information and Computation, Philadelphia, U.S.A., 2011.

35. Program committee member of Principles of Programming Languages, Austin, Texas, Jan 2011.

36. Program committee member of Foundations of Software Technology and Theoretical Computer Science (FSTTCS) 2010, Chennai, India, December 2010.

37. Program committee member CONCUR 2010: 21st International Conference on Concurrency Theory, Paris, France, Sept 2010.

38. Program committee member of CSL 2010: International Conference on Computer Science Logic, Brno, Czech Republic, August 2010.

39. Program committee member of FoSSaCS 2009: Twelfth International Conference on Foundations of Software Science and Computation Structures, March 2009, York, UK.

40. Program committee member of Mathematical Foundations Of Programming Semantics April 2009, Oxford, UK.

41. Program committee member of IEEE Symposium on Logic in Computer Science August 2009, Los Angeles, USA.

42. Program committee member of Computability in Europe 2009, Heidelburg, Germany.

43. Program committee member of FoSSaCS 2008: Eleventh International Conference on Foundations of Software Science and Computation Structures, March 29 - April 6, 2008, Budapest, Hungary.

44. Program committee member of QAPL 2008 Budapest, Hungary, March 29-30.

45. Program Committee of the 2nd Conference on Algebra and Coalgebra in Computer Science August 20-24, 2007, Bergen, Norway.

46. Program Committee of the 14th Workshop on Logic, Language, Information and Computation (WoLLIC'2007) Rio de Janeiro, Brazil, July 2-5, 2007.

47. Program Committee of Structural Operational Semantics 2007 (SOS 2007), July 9, 2007, Wroclaw, Poland.

48. Program Committee of the Fourth International Conference on Quantitative Evaluation of Systems, Edinburgh, Scotland, Sept 2007.

49. Program Committee of the Twnty-Sixth International Conference on Foundations of Software Technology and Theoretical Computer Science, Kolkata, India, December 2006.

50. Program Committee of Third International Conference on Quantitative Evaluation of Systems, Riverside, California, September 2006.

51. Organizer, Dagstuhl Seminar 06341 on Computational Structures for Modelling Space, Time and Causality, Dagstuhl, Germany, August 2006.

52. Program Committee of the Fourth International Workshop on Quantum Programming Languages, Oxford, U.K., July 2006.

53. Program Committee of the Twenty Second Annual Conference on Mathematical Foundations Of Programming Semantics, Genoa, Italy, May 2006.

54. Program Committee and Local Arrangements Committee of the Association of Symbolic Logic, Annual Meeting, Montreal, Canada, May 2006.

55. Program Committee of the 4th Workshop on Quantitative Aspects of Programming Languages (QAPL 2006), Vienna, Austria, April 2006.

56. Program Committee Member, International Conference on Concurrency Theory, CONCUR, San Francisco, U.S.A., August 2005.

57. Program Committee Member, CONCUR 2005.

58. Program Committee Member, LICS 2004.

59. Program Committee Member, ICALP 2003.

60. Program Committee Member, IFIP TCS Conference, 2002.

61. Program Committee Member, CONCUR 2002.

62. Program Committee Member, PAPM 2002.

63. Program Committee Member, PAPM 2000.

64. Program Committee Member, CONCUR 2000.
65. Program Committee Member, CONCUR 1998.
66. Program Committee Member, LICS 1996.
67. Program Committee Member, MFPS 1995.
68. Program Committee Member, AMAST 1995.
69. Program Committee Member, Canada-France Parallel Processing Conference, 1994.
70. Program Committee Member, LICS 1994.
71. Program Committee Member, ATABLE 1992.

Other Professional Activities

1. Chair of Committee for the "Test of Time" award of the IEEE Symposium on Logic in Computer Science, 2025.
2. Co-organizer of the thematic program *Logical Structures in Computation*, Simons Institute, University of California, Berkeley, Fall 2016.
3. Chair of Special Interest Group of the ACM on Logic and Computation (SIGLOG). Founding chair 2014-16. Elected for a 3 year term 2016-19.
4. Board of governors of the journal Logical Methods In Computer Science.
5. Chair of Committee for the "Test of Time" award of the IEEE Symposium on Logic in Computer Science, 2013.
6. Steering Committee of Mathematical Foundations of Programming Semantics, since 2007.
7. Advisory board of IEEE Symposium on Logic in Computer Science, 2011- present.
8. Steering committee of IEEE Symposium on Logic in Computer Science: 1993-1996 and 2005-2008.
9. Organizing Committee, CRM Année Thematique, Special Year on Theoretical Computer Science, Montreal, 2002-2003.
10. Workshops Chair, IEEE Symposium on Logic in Computer Science 2002-2003.
11. Conference Chair, 8th Annual IEEE Symposium on Logic in Computer Science, Montreal, Quebec, 1993.
12. Member
    (a) Association of Computing Machinery
    (b) Special Interest Group on Logic and Computation
    (c) Special Interest Group on Programming Languages

(d) Special Interest Group on Algorithms and Complexity Theory

(e) Canadian Mathematical Society

(f) American Mathematical Society