

Curriculum Vitae

Personal Data

Name: **Siamak Taati**
Date of Birth: May 26, 1979
Citizenship: Iranian (Canadian permanent resident)
Address: 85 Brunswick Avenue, Apt. 2B
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Education

2009 PhD in Mathematics (with honours)
University of Turku, Turku, Finland
Advisor: Prof. Jarkko Kari
Thesis: *Conservation Laws in Cellular Automata*

2004 MSc in Computer Science
Sharif University of Technology, Tehran, Iran

2002 BSc in Electrical Engineering
Sharif University of Technology, Tehran, Iran

Employment

9.2016–8.2017 *Research Associate*
Department of Mathematics, University of British Columbia
Vancouver, Canada

5.2014–8.2016 *Post-doctoral Researcher*
Mathematical Institute, Leiden University, Leiden, The Netherlands

9.2012–4.2014 *Junior Assistant Professor*
Mathematical Institute, Utrecht University, Utrecht, The Netherlands

9.2010–8.2012 *Post-doctoral Researcher*
Mathematical Institute, Utrecht University, Utrecht, The Netherlands
and
Johann Bernoulli Institute, University of Groningen, Groningen,
The Netherlands

2.2009–8.2010 *Post-doctoral Researcher*
Laboratoire d'Informatique, Signaux et Systèmes de Sophia-Antipolis
Université de Nice–Sophia Antipolis, Nice, France

Teaching and Supervision

Supervision

2016 Co-supervision of *bachelor thesis* (with Luca Avena)
(Twan Koperberg, on matchings and couplings)
Leiden University, Leiden, The Netherlands

2015–2016 Co-supervision of *master thesis* (with Luca Avena)
(Alwin Peters, on Markov chains, electric networks and random spanning trees)
Leiden University, Leiden, The Netherlands

2013–2014 Supervision of *bachelor thesis*
(Remie Janssen, on dynamical properties of cellular automata)
Utrecht University, Utrecht, The Netherlands

Master level courses

2013 and 2014 *Modern Theory of Markov Chains*
(7.5 ECTS, for an inter-university master program)
Utrecht University, Utrecht, The Netherlands

Bachelor level courses

2017 *Introduction to Complex Variables*
(3 credits, introductory complex analysis with applications)
University of British Columbia, Vancouver, Canada

2016 *Differential Calculus with Applications to Physical Sciences and Engineering*
(3 credits, limits and derivatives for science and engineering students)
University of British Columbia, Vancouver, Canada

2015 and 2016 *Statistics* (5 ECTS, introductory course for a Liberal Arts and Sciences program)
Leiden University College, The Hague, The Netherlands

2014 *Introduction to Probability and Statistics*
(2.5 ECTS, two-week intensive course for a Liberal Arts and Sciences program)
Utrecht University College, Utrecht, The Netherlands

2011 *Mathematics for Chemical Engineering*
(5 ECTS, differential equations and numerical methods for engineers)
University of Groningen, Groningen, The Netherlands

2009 *Applied Probability*
(discrete probability for few talented computer science students)
Université de Nice Sophia Antipolis, Nice, France

Tutorials

2012–2013 Exercise classes for a variety of first- and second-year mathematics courses
Utrecht University, Utrecht, The Netherlands

Invited Talks

7.2018 School on *Mathematical physics of non-periodic structures*, Będlewo, Poland

1.2018 Probability seminar, Department of Mathematics and Statistics, York University
Toronto, Canada

5.2016 Workshop on *Trends in Mathematical Crystallisation*, University of Warwick,
Coventry, UK

4.2016 Workshop on *Metastability*, TU Eindhoven, Eindhoven, The Netherlands

12.2015 Institut Elie Cartan de Lorraine, Université de Lorraine, Nancy, France

5.2014 Department of Mathematics, University of Turku, Turku, Finland

3.2014 Staff Colloquium, Mathematical Institute, Utrecht University, The Netherlands

12.2013 LIAFA, Université Paris Diderot - Paris 7, Paris, France

11.2013 *Numbers in Ergodic Theory* (one-day meetings), Leiden, The Netherlands

6.2013 Workshop on *Probabilistic Cellular Automata*, EURANDOM, Eindhoven,
The Netherlands

- 1.2012 Leiden Probability Seminar, Institute of Mathematics, Leiden University, Leiden, The Netherlands
- 5.2009 LIF, Centre de Mathématiques et Informatique (CMI), Marseille, France

Community Services

- 2017 Member of the *program committee* of AUTOMATA 2017
University of Milano–Bicocca, Milan, Italy
- 2010 Member of the *program committee* of Journées Automates Cellulaires
University of Turku, Turku, Finland
- 2001–current *Paper review* for a number of journals and conferences, including
- Theoretical Computer Science
 - Journal of Statistical Physics
 - Ergodic Theory and Dynamical Systems
 - Stochastic Processes and their Applications
 - Mathematical Foundations of Computer Science (MFCS)
 - Symposium on Theoretical Aspects of Computer Science (STACS)
- 2000 Member of the *organizing committee* of the International Millennium Seminar on Electrical Engineering (co-sponsored by the IEEE)
Sharif University of Technology, Tehran, Iran

Preprints

- [1] Sebastián Barbieri, Ricardo Gómez Aíza, Brian Marcus, and Siamak Taati. Relative version of Dobrushin–Lanford–Ruelle theorem. In preparation.
- [2] Siamak Taati. Quasicrystal phases at positive temperature in a finite-range lattice gas model. In preparation.
- [3] Sem Borst, Frank den Hollander, Francesca Nardi, and Siamak Taati. Hitting-time asymptotics in bipartite hard-core interaction models with time-varying rates. In preparation.
- [4] Irène Marcovici and Siamak Taati. Recovering tilings from noise using cellular automata. In preparation.
- [5] Irène Marcovici, Mathieu Sablik, and Siamak Taati. Ergodicity of some classes of cellular automata subject to noise. *Preprint*, 2017. [[arXiv:1712.05500](https://arxiv.org/abs/1712.05500)].
- [6] Frank den Hollander, Francesca Nardi, and Siamak Taati. Metastability of hard-core dynamics on bipartite graphs. *Submitted*, 2017. [[arXiv:1710.10232](https://arxiv.org/abs/1710.10232)].

Publications

- [7] Siamak Taati. Statistical equilibrium in deterministic cellular automata. In P.-Y. Louis and F. R. Nardi, editors, *Probabilistic Cellular Automata: Theory, Applications and Future Perspectives*. Springer, 2018. [[arXiv:1505.06464](https://arxiv.org/abs/1505.06464)].
- [8] Silvio Capobianco, Jarkko Kari, and Siamak Taati. Post-surjectivity and balancedness of cellular automata over groups. *Discrete Mathematics & Theoretical Computer Science*, 19(3), 2017. [[arXiv:1507.02472](https://arxiv.org/abs/1507.02472)].
- [9] Nazim Fatès, Irène Marcovici, and Siamak Taati. Two-dimensional traffic rules and the density classification problem. In *Proceedings of the 22nd International Workshop on Cellular Automata and Discrete Complex Systems (AUTOMATA 2016)*, volume 9664 of LNCS, pages 135–148, 2016.
- [10] Silvio Capobianco, Jarkko Kari, and Siamak Taati. An “almost dual” to Gottschalk’s conjecture. In *Proceedings of the 22nd International Workshop on Cellular Automata and Discrete Complex Systems (AUTOMATA 2016)*, volume 9664 of LNCS, pages 77–89, 2016.

- [11] Siamak Taati. Restricted density classification in one dimension. In *Proceedings of the 21st International Workshop on Cellular Automata and Discrete Complex Systems (AUTOMATA 2015)*, volume 9099 of *LNCS*, pages 238–250, 2015. [[arXiv:1502.06471](#)].
- [12] Jarkko Kari and Siamak Taati. Statistical mechanics of surjective cellular automata. *Journal of Statistical Physics*, 160(5):1198–1243, 2015. [[arXiv:1311.2319](#)].
- [13] Amir Daneshgar, Alireza Rahimi, and Siamak Taati. Function simulation, graph grammars and colourings. *International Journal of Computer Mathematics*, 90(7):1334–1357, 2013.
- [14] Aernout van Enter, Giulio Iacobelli, and Siamak Taati. Potts model with invisible colours: Random-cluster representation and Pirogov-Sinai analysis. *Reviews in Mathematical Physics*, 24(2):1250004, 2012. [[arXiv:1109.0189](#)].
- [15] Jarkko Kari and Siamak Taati. Conservation laws and invariant measures in surjective cellular automata. In *Proceedings of the 17th International Workshop on Cellular Automata and Discrete Complex Systems (AUTOMATA 2011)*, *DMTCS*, pages 113–122, 2012.
- [16] Siamak Taati, Enrico Formenti, Jean-Paul Comet, and Gilles Bernot. On the impact of distance between two genes on their interaction curve. *Journal of Mathematical Biology*, 64(1–2):131–147, 2012.
- [17] Siamak Taati. Conservation laws in cellular automata. In G. Rozenberg, T. H. W. Bäck, and J. N. Kok, editors, *Handbook of Natural Computing*, volume I, pages 259–286. Springer, 2012.
- [18] Aernout van Enter, Giulio Iacobelli, and Siamak Taati. First-order transition in Potts models with “invisible” states: Rigorous proofs. *Progress of Theoretical Physics*, 126(5):983–991, 2011.
- [19] Enrico Formenti, Jarkko Kari, and Siamak Taati. On the hierarchy of conservation laws in a cellular automaton. *Natural Computing*, 10(4):1275–1294, 2011.
- [20] Gilles Bernot, Jean-Paul Comet, Enrico Formenti, and Siamak Taati. Gene regulatory networks: The impact of distance between genes. In *Proceedings of the 19th International Symposium on Mathematical Theory of Networks and Systems (MTNS 2010)*, Budapest, Hungary, 2010.
- [21] Amir Daneshgar, Hossein Hajiabolhassan, and Siamak Taati. On the complexity of unique list colourability and the fixing number of graphs. *Ars Combinatoria*, 97, 2010.
- [22] Jarkko Kari and Siamak Taati. Combinatorics of conservation laws. *Bulletin of the European Association for Theoretical Computer Science*, 95:183–197, June 2008.
- [23] Jarkko Kari and Siamak Taati. A particle displacement representation for conservation laws in two-dimensional cellular automata. In B. Durand, editor, *Proceedings of Journées Automates Cellulaires (JAC 2008)*, pages 65–73, 2008. [[hal-00273943](#)].
- [24] Enrico Formenti, Jarkko Kari, and Siamak Taati. The most general conservation law for a cellular automaton. In E. A. Hirsch, A. A. Razborov, A. Semenov, and A. Slissenko, editors, *Proceedings of the 3rd International Computer Science Symposium in Russia (CSR 2008)*, volume 5010 of *LNCS*, pages 194–203, 2008.
- [25] Tim Boykett, Jarkko Kari, and Siamak Taati. Conservation laws in rectangular CA. *Journal of Cellular Automata*, 3(2):115–122, 2008.
- [26] Siamak Taati. Cellular automata reversible over limit set. *Journal of Cellular Automata*, 2(2):167–177, 2007.

Remark on publications. My PhD research was mainly on the combinatorial [25, 23, 22], computation-theoretic [24, 19] and ergodic-theoretic aspects [26, 19, 15] of cellular automata. Since then, my research has further developed towards probability theory and its applications [20, 16, 14, 11, 9, 6, 5, 4, 3, 2], statistical mechanics [18, 14, 12, 7, 6, 2, 1] and ergodic theory [12, 10, 8, 7, 5, 1]. During my master studies, I worked on the computational complexity of graph coloring problems [21, 13].

Work in Progress

- ▷ Generalizations of Dobrushin–Lanford–Ruelle theorem
(with *Sebastián Barbieri*, *Ricardo Gómez Aíza* and *Brian Marcus*)
- ▷ Continuity properties of lexicographic conditional probabilities under Gibbs measures
(with *Raimundo Briceño*, *Ricardo Gómez Aíza* and *Brian Marcus*)
- ▷ Metastability in random-access wireless networks
(with *Sem Borst*, *Frank den Hollander* and *Francesca Nardi*)
- ▷ Quasi-crystal phases in lattice gas models (with *Aernout van Enter*)
- ▷ Noise in cellular automata and tilings (with *Irène Marcovici* and *Mathieu Sablik*)
- ▷ Statistical mechanics of cellular automata

Research Interests

Interplay between probability theory, ergodic theory, symbolic dynamics, combinatorics and computation theory, with applications in statistical physics, computer science, biology and nanotechnology.

Languages English (fluent), Persian (mother-tongue), Dutch (basic), Finnish (elementary), Esperanto (elementary)

Other Skills Standard First Aid with CPR C certificate

References Available upon request.

Toronto, February 18, 2018