

Thomas Mark (Tom) Hutchcroft

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EMPLOYMENT

- 2017- **Herchel Smith Postdoctoral Fellowship.** Department of Pure Mathematics and Mathematical Statistics, University of Cambridge. Three year appointment.
- 2017- **Junior Research Fellow.** Trinity College, Cambridge. Four year appointment.

EDUCATION

- 2013-2017 **PhD** in mathematics, co-supervised by Prof. Omer Angel and Prof. Asaf Nachmias, University of British Columbia (UBC), Canada. Thesis defended June 2017. Degree conferred September 2017.
- 2015, 2016, and 2017 Research intern in the Microsoft Research Theory Group, Redmond, USA. Mentored by Alexander Holroyd and Yuval Peres.
- 2012-2013 **MMath** in mathematics (Part III of the Mathematical Tripos), University of Cambridge, UK. Pass with distinction.
- 2009-2013 **BA** in mathematics, University of Cambridge, UK. First class honours.

PRIZES, SCHOLARSHIPS AND OTHER HONOURS

- 2019 **Rollo Davidson Prize.**
An international prize awarded annually to early-career probabilists by the Rollo Davidson trust.
- 2018 **Governor General's Gold Medal, UBC**
Awarded annually to one graduating doctoral student in the university across all departments.
Canadian Mathematical Society Doctoral Prize
Awarded annually to one doctoral student in mathematics graduating from a Canadian university.
- 2017 **Lorraine Schwartz Prize**
Awarded annually to a graduate or undergraduate student in probability or statistics at UBC.
- 2016 **Microsoft Research PhD Fellowship**
A scholarship for PhD students in mathematics and computer science in the US and Canada, awarded to around ten students annually.
Li Tze Fong Memorial Fellowship (declined)
A scholarship for PhD students in memory of Hong Kong entrepreneur and politician Li Tze Fong.
- 2015 **UBC Graduate Research Award**
Awarded annually to one graduate student in pure and applied mathematics in recognition of research achievements.

SELECTED PUBLICATIONS

Supercritical percolation on nonamenable graphs: Isoperimetry, analyticity, and exponential decay of the cluster size distribution, with Jonathan Hermon. **Inventiones Mathematicae**, 2020.

Kazhdan groups have cost 1, with Gábor Pete. **Inventiones Mathematicae**, 221, 873–891 (2020).

Percolation on hyperbolic graphs. **Geometric and Functional Analysis**, 29(3):766–810, 2019.

Universality of high-dimensional spanning forests and sandpiles. **Probability Theory and Related Fields**, 176(1-2):533–597, 2020.

Geometric and spectral properties of causal maps, with N. Curien and A. Nachmias. **Journal of the European Mathematical Society**, 2020.

Non-uniqueness and mean-field criticality for percolation on nonunimodular transitive graphs. **Journal of the American Mathematical Society**, 33 (2020), 1101-1165.

Hyperbolic and Parabolic Unimodular Random Maps, with O. Angel, A. Nachmias, and G. Ray. **Geometric and Functional Analysis**, 28(4):879–942, 2018.

Critical percolation on any quasi-transitive graph of exponential growth has no infinite clusters, **Comptes Rendus Mathématique**, 354(9):944–947, 2016.

Unimodular Hyperbolic Triangulations: Circle Packing and Random Walk, with O. Angel, A. Nachmias and G. Ray. **Inventiones Mathematicae**, 206 (2016), no. 1, 229–268.

PUBLICATIONS AND PREPRINTS: FULL LIST

(Listed in reverse chronological order by appearance on the arXiv.)

Logarithmic corrections to scaling in the four-dimensional uniform spanning tree, with Perla Sousi. 2020 Submitted.

Collisions of Random Walks in Dynamic Random Environments, with Noah Halberstam. Submitted.

Power-law bounds for critical long-range percolation below the upper-critical dimension. Submitted.

Continuity of the Ising phase transition on nonamenable groups. Submitted.

On the tail of the branching random walk local time, with Omer Angel and Antal Jara. **Probability Theory and Related Fields**, 2020.

Slightly supercritical percolation on nonamenable graphs I: The distribution of finite clusters. Submitted.

Non-intersection of transient branching random walks. **Probability Theory and Related Fields**, 2019 178, 1–23 (2020).

Large, lengthy graphs look locally like lines, with Itai Benjamini. Bulletin of the London Mathematical Society, revisions requested.

Supercritical percolation on nonamenable graphs: Isoperimetry, analyticity, and exponential decay of the cluster size distribution, with Jonathan Hermon. **Inventiones Mathematicae**, 2020.

The L^2 boundedness condition in nonamenable percolation. **Electronic Journal of Probability**, Volume 25, (2020).

New critical exponent inequalities for percolation and the random cluster model. **Probability and Mathematical Physics**, to appear.

Kazhdan groups have cost 1, with Gabor Pete. **Inventiones Mathematicae**, 221, 873–891 (2020). 2018

Indistinguishability of collections of trees in the uniform spanning forest. **Annales de l’Institut Henri Poincaré**, Volume 56, Number 2 (May 2020), 917-927.

No percolation at criticality on certain groups of intermediate growth, with Jonathan Hermon. **International Mathematics Research Notices**, 2019.

Locality of the critical probability for transitive graphs of exponential growth. **Annals of Probability**, Volume 48, Number 3 (2020), 1352-1371.

Anomalous diffusion of random walks on random planar maps, with Ewain Gwynne. **Probability Theory and Related Fields**, 178, 567–611(2020).

Percolation on hyperbolic graphs. **Geometric and Functional Analysis**, 29,766–810(2019).

Universality of high-dimensional spanning forests and sandpiles. **Probability Theory and Related Fields**, 176, 533–597(2020).

- Coalescing random walk on unimodular graphs*, with Eric Foxall and Matthew Junge. **Electronic Communications in Probability**, Volume 23 (2018), paper no. 62, 10 pp.
- Mallows permutations as stable matchings*, with O. Angel, A. Holroyd and A. Levy. **Canadian Journal of Mathematics**, to appear.
- 2017 *Statistical physics on a product of trees*. **Annales de l'Institut Henri Poincaré**, Volume 55, Number 2 (May 2019), 1001-1010.
- Non-uniqueness and mean-field criticality for percolation on nonunimodular transitive graphs*. **Journal of the American Mathematical Society**, 33 (2020), 1101-1165.
- Geometric and spectral properties of causal maps*, with N. Curien and A. Nachmias. **Journal of the European Mathematical Society**, 2020.
- Counterexamples for percolation on unimodular random graphs*, with O. Angel. **Unimodularity in randomly generated graphs**, 11–28, Contemp. Math., 719, Amer. Math. Soc., Providence, RI, 2018.
- Self-avoiding walk on nonunimodular transitive graphs*. **Annals of Probability**, Volume 47, Number 5 (September 2019), 2801-2829.
- The Hammersley-Welsh bound revisited*. **Electronic Communications in Probability**, Volume 23, (2018).
- Finitely Dependent Cycle Coloring*, with A. Holroyd and A. Levy. **Electronic Communications in Probability**, Volume 23 (2018), paper no. 64, 12 pp.
- Harmonic Dirichlet Functions on Planar Graphs*. **Discrete and Computational Geometry**, April 2019, Volume 61, Issue 3, pp 479–506.
- Mallows Permutations and Finite Dependence*, with A. Holroyd and A. Levy. **Annals of Probability**, Volume 48, Number 1 (January 2020), 343-379.
- The Component Graph of the Uniform Spanning Forest: Transitions in Dimensions 9, 10, 11, ...*, with Y. Peres. **Probability Theory and Related Fields**, 175, 141–208(2019).
- 2016 *Hyperbolic and Parabolic Unimodular Random Maps*, with O. Angel, A. Nachmias, and G. Ray. **Geometric and Functional Analysis**, 28, 879–942(2018).
- Critical percolation on any quasi-transitive graph of exponential growth has no infinite clusters*, **Comptes Rendus Mathématique**, 354(9):944–947, 2016.
- Uniform Spanning Forests of Planar Graphs*, with A. Nachmias. **Forum of Mathematics Sigma**, Volume 7, 2019, e29.
- 2015 *Interlacements and the Wired Uniform Spanning Forest*, **Annals of Probability**, Volume 46, Number 2 (March 2018), 1170-1200.
- Boundaries of Planar Graphs: A Unified Approach*, with Y. Peres. **Electronic Journal of Probability**, Volume 22 (2017), paper no. 100, 20 pp.
- Indistinguishability of Trees in Uniform Spanning Forests*, with A. Nachmias. **Probability Theory and Related Fields**, June 2017, Volume 168, Issue 1–2, pp 113–152.
- Collisions of Random Walks in Reversible Random Graphs*, with Y. Peres. **Electronic Communications in Probability**, 20, no. 63, 1-6, 2015.
- Wired Cycle-Breaking Dynamics for Uniform Spanning Forests*. **Annals of Probability**, 44 (2016), no. 6, 3879–3892.
- Unimodular Hyperbolic Triangulations: Circle Packing and Random Walk*, with O. Angel, A. Nachmias and G. Ray. **Inventiones Mathematicae**, 206 (2016), no. 1, 229–268.

SERVICE

- 2020- Co-organizer of the *Percolation Today* webinar jointly with Hugo Duminil-Copin and Vincent Tasion. Starting in April 2020, the seminar has now had over sixteen two-hour sessions with a typical attendance of around forty-fifty people from around the world.

TEACHING

<i>Random walks and uniform spanning trees</i> , Part III Master's course, Cambridge.	2020
Two lecture mini-course ' <i>Percolation and the cost of groups</i> ' Swiss Doctoral Program in Mathematics	
Kervaire Seminar: Groups and dynamics, Les Diablerets, Switzerland.	
Three lecture mini-course, Online Open Probability School.	
Four lecture mini-course ' <i>Scaling exponents in high-dimensional spanning forests and the interlacement Aldous-Broder algorithm</i> ', Fondation des Treilles, France.	2019
Supervisor for courses including Analysis 1, Linear Analysis, Analysis of Functions, Applied Probability, Markov Chains, and Topics in Analysis. Cambridge.	2017-
Instructor, MATH 110, UBC.	2015
MATH 110 Workshop Facilitator, UBC.	2014
Math Learning Centre Tutor, UBC.	2013-2016

INVITED TALKS

Online Open Probability Summer School.	2020
Oxford Discrete Mathematics and Probability Seminar.	
UCLA Probability Seminar.	
UBC Probability Seminar.	
TU Graz Probability Seminar.	
Joint Israeli Probability Seminar.	
Random walks and Polymers: Interacting and folding, Fondation des Treilles, France.	2019
Group Theory Afternoon, ENS Paris.	
Groups, Geometry, and Dynamics Seminar, ENS Lyon.	
Action! Working Group, ENS Lyon.	
Probability Seminar, University of Bristol.	
Stochastic Analysis Seminar, Imperial College London.	
Vienna Probability Seminar, Universität Wien.	
Mathematical Physics Seminar, Université de Genève.	
Analysis and Geometry Seminar, University of Bristol.	
Probability Seminar, University of British Columbia.	
Measurable, Borel, and Topological Dynamics, CIRM.	
Probability Seminar, University of Warwick.	
Pure Mathematics Colloquium, University of Lancaster.	
Probability and Statistics Seminar, University of Sheffield.	
Groups, Dynamics, and Approximation, MFO Oberwolfach, Germany.	
Scaling Limits in Models of Statistical Mechanics, Oberwolfach, Germany.	2018
Random Walks on Symmetric Structures, IIAS, Jerusalem, Israel.	
Canadian Mathematical Society Winter Meeting, Vancouver, Canada.	
Geometric Group Theory Seminar, University of Cambridge.	
Probability Seminar, University of Cambridge.	
Probability Seminar, University of British Columbia.	
Stochastic Processes and Their Applications, Gothenburg, Sweden.	
IMS Annual Meeting on Probability and Statistics, Vilnius, Lithuania.	
RGM Follow Up Workshop, Isaac Newton Institute, Cambridge, UK.	
Combinatorics Seminar, University of Birmingham.	
Combinatorics Seminar, University of Warwick.	
Probability Seminar, Columbia University.	
Probability Seminar, Courant Institute.	
Seminar on Stochastic Processes, ETH Zurich.	
Probability Seminar, Alfred Renyi Institute of Mathematics.	
Probability Seminar, BME Budapest.	
Strongly Correlated Random Interacting Processes, Oberwolfach.	
Combinatorics Seminar, University of Warwick.	
Combinatorics Seminar, University of Birmingham.	
Probability Seminar, University of Cambridge.	2017

- Dynamics on Random Graphs and Maps, CIRM.
 Elegance in Probability (Russell Lyons' 60th birthday conference), Tel Aviv University.
 Mathematical Congress of the Americas, Montreal.
 AMS Sectional Meeting, Session on Probability Theory, Indiana University.
 Probability Seminar, Universite Paris Sud.
- 2016 Probability Seminar, University of British Columbia.
 Northwest Probability Seminar, Microsoft Research.
 Random Spatial Processes and Dynamics, Texas A&M.
 Probability Seminar, University of Bath.
 Probability Workshop, Oxford University.
 Probability Seminar, University of Cambridge.
 Probability Seminar, University of British Columbia.
 Probability and Statistical Physics Seminar, University of Chicago.
- 2015 MSR Talk Series, Microsoft Research.
 Geometric Functional Analysis and Probability Seminar, Weizmann Institute.
 Horowitz Seminar, Tel Aviv University.
- 2014 Groups, Graphs, and Stochastic Processes, Banff International Research Centre.
 Probability Seminar, University of British Columbia.
 Probability on Trees and Planar Graphs, Banff International Research Centre.

CONFERENCES, WORKSHOPS, ETC. ATTENDED

- 2020 Swiss Doctoral Program in Mathematics Kervaire Seminar: Groups and dynamics, Les Diablerets, Switzerland.
- 2019 Random walks and Polymers: Interacting and folding, Fondation des Treilles, France.
 Measurable, Borel, and Topological Dynamics, CIRM.
 Groups, Dynamics, and Approximation, Oberwolfach, Germany.
- 2018 Scaling Limits in Models of Statistical Mechanics, Oberwolfach, Germany.
 Random Walks on Symmetric Structures, IIAS, Jerusalem, Israel.
 Canadian Mathematical Society Winter Meeting, Vancouver, Canada.
 Stochastic Processes and Their Applications, Gothenburg, Sweden.
 IMS Annual Meeting on Probability and Statistics, Vilnius, Lithuania.
 RGM Follow Up Workshop, Isaac Newton Institute, Cambridge.
 Challenges in probability and mathematical physics, Montreal, Canada.
 Strongly Correlated Random Interacting Processes, Oberwolfach.
- 2017 Dynamics on Random Graphs and Maps, CIRM.
 Elegance in Probability (Russel Lyons' 60th birthday conference), Tel Aviv University.
 Mathematical Congress of the Americas, Montreal.
 PIMS Probability Summer School, UBC.
- 2016 Random Growth Problems and Random Matrices, Centre de Recherches Mathématique.
 Random Spatial Processes and Dynamics, Texas A&M.
- 2015 Groups, Graphs, and Stochastic Processes, Banff International Research Centre.
 Random Planar Structures and Statistical Mechanics, Isaac Newton Institute, Cambridge.
- 2014 Probability on Trees and Planar Graphs, Banff International Research Centre.
 PIMS Probability Summer School, UBC.