

# Nina Holden

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CONTACT INFORMATION	ETH Zürich, Institute for Theoretical Studies +41-78-258-5885	<a href="mailto:nina.holden@eth-its.ethz.ch">nina.holden@eth-its.ethz.ch</a> <a href="https://n.ethz.ch/~holdenn/">https://n.ethz.ch/~holdenn/</a>
RESEARCH INTERESTS	Probability theory, in particular Liouville quantum gravity, Schramm-Loewner evolutions, random planar maps, and statistical mechanics.	
EMPLOYMENT	<b>Department of Mathematics, ETH Zürich</b> , Switzerland. Postdoc, from 1/2021  <b>Institute for Theoretical Studies, ETH Zürich</b> , Switzerland. Junior Fellow, 9/2018-12/2020	
EDUCATION	<b>Massachusetts Institute of Technology</b> , USA Ph.D. in Mathematics, 6/2018 <ul style="list-style-type: none"><li>• Thesis: Cardy embedding of random planar maps and a KPZ formula for mated trees</li><li>• Advisor: Scott Sheffield</li></ul> <b>University of Oslo</b> , Norway M.S. in Applied Mathematics, 12/2010 <ul style="list-style-type: none"><li>• Thesis: Portfolio optimization in a jump-diffusion market with durability and local substitution: A penalty approximation of a singular control problem</li><li>• Advisor: Kenneth Karlsen</li></ul> <b>University of Oslo</b> , Norway B.S. in Mathematics and Computational Science, 6/2008  <b>Oxford University</b> , United Kingdom Visiting Student in Mathematics, 9/2006-6/2007	
PUBLICATIONS	<i>Liouville dynamical percolation</i> , with C. Garban, A. Sepúlveda, and X. Sun. Probability Theory and Related Fields, 2021.  <i>Conformal welding for critical Liouville quantum gravity</i> , with E. Powell. Annales de l'Institut Henri Poincaré, 2021.  <i>Gravitational allocation for uniform points on the sphere</i> , with Y. Peres and A. Zhai. Annals of Probability, 2021.  <i>Joint scaling limit of site percolation on random triangulations in the metric and peanosphere sense</i> , with E. Gwynne and X. Sun. Electronic Journal of Probability, 2021.  <i>An almost sure KPZ relation for SLE and Brownian motion</i> , with E. Gwynne and J. Miller. Annals of Probability, 2020.  <i>A mating-of-trees approach to graph distances in random planar maps</i> , with E. Gwynne	

and X. Sun. Probability Theory and Related Fields, 2020.

*Scaling limits of the Schelling model*, with S. Sheffield. Probability Theory and Related Fields, 2020.

*Lower bounds for trace reconstruction*, with R. Lyons. Annals of Applied Probability, 2020.

*Liouville quantum gravity with central charge in  $(1, 25)$ : a probabilistic approach*, with E. Gwynne, J. Pfeffer, and G. Remy. Communications in Mathematical Physics, 2020.

*Scaling limit of large triangulations of polygons*, with M. Albenque and X. Sun. Electronic Journal of Probability, 2020.

*Communication cost of consensus for nodes with limited memory*, with G. Fanti, Y. Peres, and G. Ranade. Proceedings of the National Academy of Sciences of the United States of America (PNAS), 2020.

*Dimension transformation formula for conformal maps into the complement of an SLE curve*, with E. Gwynne and J. Miller. Probability Theory and Related Fields, 2019.

*How round are the complementary components of planar Brownian motion?* with S. Naçu, Y. Peres, and T. S. Salisbury. Annales de l'Institut Henri Poincaré, 2019.

*SLE as a mating of trees in Euclidean geometry*, with X. Sun. Communications in Mathematical Physics, 2018.

*A distance exponent for Liouville quantum gravity*, with E. Gwynne and X. Sun. Probability Theory and Related Fields, 2018.

*Gravitational allocation on the sphere*, with Y. Peres and A. Zhai. Proceedings of the National Academy of Sciences of the United States of America (PNAS), 2018.

*Negative moments for Gaussian multiplicative chaos on fractal sets*, with C. Garban, A. Sepulveda, and X. Sun. Electronic Communications in Probability, 2018.

*Sparse exchangeable graphs and their limits via graphon processes*, with C. Borgs, J. T. Chayes, and H. Cohn. Journal of Machine Learning Research (JMLR), 2018.

*Trace reconstruction with varying deletion probabilities*, with L. Hartung and Y. Peres. Analytic Algorithmics and Combinatorics (ANALCO), 2018.

*Subpolynomial trace reconstruction for random strings and arbitrary deletion probability*, with R. Pemantle and Y. Peres. Conference On Learning Theory (COLT), 2018.

*Brownian motion correlation in the peanosphere for  $\kappa > 8$* , with E. Gwynne, J. Miller, and X. Sun. Annales de l'Institut Henri Poincaré, 2017.

ACCEPTED PAPERS *Convergence of uniform triangulations under the Cardy embedding*, with X. Sun. To appear in Acta Mathematica.

*Mating of trees for random planar maps and Liouville quantum gravity: a survey*, with E. Gwynne and X. Sun. To appear in Panoramas et Syntheses.

*Percolation on triangulations: a bijective path to Liouville quantum gravity*, with O. Bernardi and X. Sun. To appear in *Memoirs of the American Mathematical Society*.

*Natural parametrization of percolation interface and pivotal points*, with X. Li and X. Sun. ArXiv e-prints, 1804.07286. To appear in *Annales de l'Institut Henri Poincare*.

*Minkowski content of Brownian cut points*, with G. Lawler, X. Li, and X. Sun. ArXiv e-prints, 1803.10613. To appear in *Annales de l'Institut Henri Poincare*.

ARXIV PREPRINTS *Mating of trees for critical Liouville quantum gravity*, with J. Aru, E. Powell, and X. Sun. ArXiv e-prints, 2109.00275.

*Integrability of SLE via conformal welding of random surfaces*, with M. Ang and X. Sun. ArXiv e-prints, 2104.09477.

*Conformal welding of quantum disks*, with M. Ang and X. Sun. ArXiv e-prints, 2009.08389.

*Joint scaling limit of a bipolar-oriented triangulation and its dual in the peanosphere sense*, with E. Gwynne and X. Sun. ArXiv e-prints, 1603.01194.

EMPLOYMENT (NON-ACADEMIC) **Statkraft**, Energy Market Analyst and Graduate Trainee, Norway, Germany, Belgium, and Brazil, 8/2010-6/2013. Modelling and analysis of the European, Asian and South-American power markets, trading, risk analysis.

INTERNSHIPS **Microsoft Research**, Summer Intern, Redmond, WA, 6/2017-8/2017 and 6/2018-8/2018. Trace reconstruction, gravitational allocation, and consensus protocols.

**Microsoft Research**, Consulting Researcher, Redmond, WA, 7/2016-1/2017 (8 weeks). Planar Brownian motion and gravitational allocation.

**Microsoft Research**, Summer Intern, Cambridge, MA, 6/2015-8/2015. Theory of graphons for sparse graphs.

**Sintef**, Summer Intern, Oslo, Norway, 6/2009-8/2009. Vehicle routing optimization problems and heuristic algorithms for the travelling salesman problem.

**CERN**, Technical Student, Geneva, Switzerland, 7/2008-12/2008. Simulation of ion beams in the LHC (Large Hadron Collider).

**Simula Research Laboratory**, Summer Intern, Oslo, Norway, 6/2007-8/2007. Numerical methods for mathematical modelling of heart cells.

**Norwegian Defense Research Establishment**, Horten, Norway, 6/2006-8/2006. Models for underwater transmission of sound with applications to mine sweepers.

HONORS AND AWARDS	2021	Maryam Mirzakhani New Frontiers Breakthrough Prize
	2020	UBC Science Early Career Award
	2020	Bernoulli Society New Researcher Award
	2019	SwissMAP Innovator Prize
	6/2014-10/2017	Scholarship from the Norwegian Research Council
	6/2014-8/2014	Ida M. Green Scholarship from MIT
	2010	McKinsey award for academic results and extracurricular activities
	2005	International Mathematical Olympiad, Honourable mention
	2005	Norwegian Mathematical Olympiad, first place
	TALKS	8/2022
8/2022		Plenary Speaker, European Women in Mathematics General Meeting
7/2022		Probability and Mathematical Physics ICM satellite, Helsinki
12/2021		Pacific Rim Mathematical Association Congress (virtual)
9/2021		Atiyah memorial conference, Cambridge, UK (virtual)
8/2021		Invited Session, Bernoulli-IMS World Congress Prob. & Stat., Seoul (virtual)
8/2021		High Energy Theory Lunch, McGill Physics (virtual)
6/2021		Lattice Paths, Combinatorics and Interactions, CIRM (virtual)
6/2021		SPDE and Friends Conference, Berlin (virtual)
5/2021		Stanford, Theoretical Physics Seminar (virtual)
5/2021		New Developments in Probability, Tulane University (virtual)
4/2021		Bristol Probability Seminar (virtual)
2/2021		Berlin Probability Colloquium (virtual)
1/2021		Hausdorff Colloquium, Bonn (virtual)
1/2021		Oberwolfach, Spatial Networks and Percolation (virtual)
1/2021		Colloquium, Perimeter Institute, Waterloo (virtual)
1/2021		Developments in the Mathematical Sciences, Max Planck Leipzig
12/2020		Mathematics Colloquium, University of British-Columbia (virtual)
12/2020		Stochastic Analysis Seminar, Imperial College (virtual)
11/2020		Math Physics Seminar, Perimeter Institute, Waterloo (virtual)
11/2020		Probability and Math Physics Seminar, Chicago (virtual)
10/2020		Discrete Maths and Probability Seminar, Oxford (virtual)
10/2020		AMS sectional meeting (virtual)
9/2020		Seminar, Max Planck Leipzig
8/2020		Bernoulli-IMS One World Symposium (virtual)
8/2020		Open Online Probability School: SLE mini course (virtual)
4/2020		One World Probability Seminar (virtual)
2/2020		Statistical Physics Conference, Diablerets, Switzerland
2/2020		Theory Seminar, EPFL, Lausanne, Switzerland
12/2019		Mathematical Physics and Analysis Seminar, IAS, Princeton
11/2019		Probability Seminar, University of Münster, Germany
11/2019		Probability Seminar, RUHR-University Bochum, Germany
9/2019		6th SwissMAP General Meeting, Villars-sur-Ollons, Switzerland
8/2019	12th Math Society of Japan, Seasonal Institute, Fukuoka, Japan	
6/2019	Probability Seminar, TU Berlin	
6/2019	Probability and quantum field theory, Porquerolles, France	
6/2019	Dynamics of Random Processes school, SLE mini course, Montreal	
5/2019	Probability Seminar, University of Warwick, UK	
4/2019	Graduate Seminar, NYU Shanghai, China	
4/2019	Probability Seminar, NYU Shanghai, China	
3/2019	Random Walks and Polymers Workshop, Tourtour, France	
2/2019	Special Seminar, Columbia University	

2/2019 Mathematics Department Colloquium, New York University  
 1/2019 Probability Seminar, Columbia University  
 1/2019 Analysis and Geometry of Random Shapes, IPAM, UCLA  
 12/2018 Amir Dembo's birthday conference, Stanford  
 12/2018 French Math Society State of Research: Stat. Mech., IHP, Paris  
 12/2018 Combinatorics Seminar, Paris Nord  
 11/2018 Probability Seminar, Marseille, France  
 11/2018 ITS Fellows Seminar, Zürich, Switzerland  
 10/2018 Reading group on Yang-Mills, ETH Zürich  
 10/2018 Analysis, Probability and Math Physics Seminar, IST Austria  
 10/2018 Probability Seminar, ETH Zürich  
 8/2018 Theory Lunch, University of Washington, Seattle, WA  
 8/2018 Theory Lunch, Microsoft Research, Redmond, WA  
 7/2018 Random Geometry Followup Conference, Cambridge, UK  
 7/2018 COLT, Stockholm, Sweden  
 7/2018 IMS Annual Meeting on Probability and Statistics, Lithuania  
 4/2018 AMS Sectional Meeting, Northeastern University  
 2/2018 Mathematics Department Colloquium, Stanford University  
 2/2018 Probability Seminar, Berkeley  
 12/2017 Workshop on Log-Correlated Random Fields, Columbia University  
 11/2017 Probability Reading Group, ETH Zürich  
 11/2017 Probability Seminar, ENS Lyon  
 11/2017 Probability Seminar, Stanford University  
 11/2017 Analysis Seminar, Stony Brook  
 10/2017 Topics in Probability Seminar, Princeton University  
 7/2017 Theory Lunch, Microsoft Research, Redmond  
 5/2017 Discrete Math Seminar, Brown  
 4/2017 Pure Math Graduate Student Seminar (Pumagrass), MIT  
 4/2017 Probability Seminar, MIT  
 4/2017 AMS Sectional Meeting, Indiana University  
 3/2017 Probability Seminar, Harvard  
 3/2017 SLE, GFF and LQG Conference, Columbia University  
 3/2017 WINRS Conference, Brown  
 2/2017 AMS Grad Student Conference, Analysis and Probability, Brown  
 2/2017 Probability Seminar, University of Chicago  
 1/2017 Probability Seminar, Penn/Temple Universities  
 1/2017 Probability Seminar, University of Washington  
 11/2016 Probability Seminar, Cornell  
 8/2016 Big Data Conference, Harvard  
 6/2016 Recent developments in SLE, Mittag-Leffler, Sweden  
 2/2016 Probability Seminar, Toronto University  
 2/2016 Rainwater Analysis Seminar, University of Washington  
 3/2015 Probability Seminar, Cambridge University

#### TEACHING

Supervision of reading course for ETH master student (Valeria Ambrosio) on Liouville quantum gravity and imaginary geometry (2019)

Massachusetts Institute of Technology: Multivariable Calculus; Probability and Random Variables (2016-17)

University of Oslo: Modelling and Computations; Linear Optimization; Differential equations (2007-10)

(CO-)ORGANIZER	2021	Session on Random planar geometries at Bernoulli-IMS World Congress in Probability and Statistics, Seoul
	2020-	Online seminar series, Random Geometry and Statistical Mechanics
	2020	Working group at ETH Zürich about Liouville quantum gravity
	2018-20	ETH Zürich probability lunch
	2014	MIT pure mathematics graduate student seminar
SERVICE	2021-24	Associate Editor, Annales de l'Institut Henri Poincare
REFEREE		<p>ALEA (quick opinion)</p> <p>Annales de l'Institut Henri Poincare</p> <p>Annales Henri Lebesgue</p> <p>Annals of Applied Probability</p> <p>Annals of Probability</p> <p>Communications in Mathematical Physics</p> <p>Duke</p> <p>Electronic Journal of Probability</p> <p>FOCS</p> <p>Inventiones</p> <p>Journal of Combinatorial Theory A</p> <p>Journal of Statistical Physics</p> <p>Journal of Theoretical Probability</p> <p>Letters in Mathematical Physics</p> <p>Probability Theory and Related Fields</p> <p>Random Structures and Algorithms</p> <p>RANDOM</p> <p>STOC</p> <p>SODA</p> <p>Transactions of the AMS (quick opinion)</p>