

Nina Holden

CONTACT INFORMATION	ETH Zürich, Institute for Theoretical Studies +41-78-258-5885	nina.holden@eth-its.ethz.ch https://n.ethz.ch/~holdenn/
RESEARCH INTERESTS	Probability theory, in particular Liouville quantum gravity, Schramm-Loewner evolutions, random planar maps, and statistical mechanics.	
EMPLOYMENT	Institute for Theoretical Studies, ETH Zürich , Switzerland. Junior Fellow, 9/2018-12/2020 or 9/2018-8/2021 (current position) Courant Institute of Mathematical Sciences, New York University , USA. Associate Professor, from 1/2021 or 9/2021 (future position)	
EDUCATION	Massachusetts Institute of Technology , USA Ph.D. in Mathematics, 6/2018 <ul style="list-style-type: none">• Thesis: Cardy embedding of random planar maps and a KPZ formula for mated trees• Advisor: Scott Sheffield University of Oslo , Norway M.S. in Applied Mathematics, 12/2010 <ul style="list-style-type: none">• Thesis: Portfolio optimization in a jump-diffusion market with durability and local substitution: A penalty approximation of a singular control problem• Advisor: Kenneth Karlsen University of Oslo , Norway B.S. in Mathematics and Computational Science, 6/2008 Oxford University , United Kingdom Visiting Student in Mathematics, 9/2006-6/2007	
PUBLICATIONS	<i>Mating of trees for random planar maps and Liouville quantum gravity: a survey</i> , with E. Gwynne and X. Sun. To appear in <i>Panoramas et Syntheses</i> . <i>Gravitational allocation for uniform points on the sphere</i> , with Y. Peres and A. Zhai. To appear in <i>Annals of Probability</i> . <i>An almost sure KPZ relation for SLE and Brownian motion</i> , with E. Gwynne and J. Miller. <i>Annals of Probability</i> , 2020. <i>A mating-of-trees approach to graph distances in random planar maps</i> , with E. Gwynne and X. Sun. <i>Probability Theory and Related Fields</i> , 2020. <i>Scaling limits of the Schelling model</i> , with S. Sheffield. <i>Probability Theory and Related Fields</i> , 2020. <i>Lower bounds for trace reconstruction</i> , with R. Lyons. <i>Annals of Applied Probability</i> , 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.

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. Sepúlveda, 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.

ARXIV PREPRINTS *Scaling limit of large triangulations of polygons*, with M. Albenque and X. Sun. ArXiv e-prints, 1910.04946.

Joint scaling limit of site percolation on random triangulations in the metric and peanosphere sense, with E. Gwynne and X. Sun. ArXiv e-prints, 1905.06757.

Liouville dynamical percolation, with C. Garban, A. Sepúlveda, and X. Sun. ArXiv e-prints, 1905.06940.

Conformal welding for critical Liouville quantum gravity, with E. Powell. ArXiv e-prints, 1812.11808.

Percolation on triangulations: a bijective path to Liouville quantum gravity, with O. Bernardi and X. Sun. ArXiv e-prints, 1807.01684.

Natural parametrization of percolation interface and pivotal points, with X. Li and X. Sun. ArXiv e-prints, 1804.07286.

Minkowski content of Brownian cut points, with G. Lawler, X. Li, and X. Sun. ArXiv e-prints, 1803.10613.

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	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	8/2021	Invited Session, Bernoulli-IMS World Congress Prob. & Stat., Seoul
	1/2021	Developments in the Mathematical Sciences, Max Planck Leipzig
	12/2020	Stochastic Analysis Seminar, Imperial College (virtual)
	11/2020	Mathematics Colloquium, University of British-Columbia (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 Institute, 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)										
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>STOC</p> <p>SODA</p> <p>Transactions of the AMS (quick opinion)</p>										
(CO-)ORGANIZER	<table border="0"> <tr> <td style="padding-right: 20px;">2021</td> <td>Session on Random planar geometries at Bernoulli-IMS World Congress in Probability and Statistics, Seoul</td> </tr> <tr> <td>2020-</td> <td>Online seminar series, Random Geometry and Statistical Mechanics</td> </tr> <tr> <td>2020</td> <td>Working group at ETH Zürich about Liouville quantum gravity</td> </tr> <tr> <td>2018-20</td> <td>ETH Zürich probability lunch</td> </tr> <tr> <td>2014</td> <td>MIT pure mathematics graduate student seminar</td> </tr> </table>	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
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