

# Xin Sun

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## EDUCATION

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<b>Massachusetts Institute of Technology</b>	Cambridge, MA
Ph.D. Mathematics	2017
<b>Peking University</b>	Beijing, China
B.S. Mathematics	2011

## EMPLOYMENT

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<b>Beijing International Center for Mathematical Research, Peking University</b>	Beijing, China
Full Professor	2025-current
<b>Beijing International Center for Mathematical Research, Peking University</b>	Beijing, China
Associate Professor with Tenure	2023-2024
<b>Institute for Advanced Study</b>	Princeton, NJ
Member & Visitor	2022-2023
<b>University of Pennsylvania</b>	Philadelphia, PA
Assistant Professor	2020-2023
<b>Columbia University</b>	New York, NY
Simons Junior Fellow	2017-2020

## RESEARCH INTEREST

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Probability theory and mathematical physics

## HONORS AND AWARDS

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Alibaba Damo Fellowship	2024
Best Paper Award, International Congress of Basic Science	2024
Rollo Davidson Prize	2023
Penn Math Good Teaching Award	2021, 2022
National Science Foundation Career Award	2021-2026
Bernoulli Society New Researcher Award	2020
Junior Fellow, Simons Society of Fellows	2017-2020
Xiaosong Lin Award for Mathematics, Peking University	2011

## PUBLICATIONS

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- Backbone exponent and annulus crossing probability for planar percolation**, Pierre Nolin, Wei Qian, Xin Sun, and Zijie Zhuang. *Physical Review Letters.*, accepted.
- The moduli of annuli in random conformal geometry**, Morris Ang, Guillaume Remy and Xin Sun. *Ann. Sci. Éc. Norm. Supér.*, accepted.
- Boundary touching probability and nested-path exponent for non-simple CLE**, Morris Ang, Xin Sun, Pu Yu, and Zijie Zhuang *Annals of Probability*, accepted.
- Quantum triangles and imaginary geometry flow lines**, Morris Ang, Xin Sun, and Pu Yu. *Ann. Inst. Henri Poincaré Probab. Stat.*, accepted.
- Joint scaling limit of a bipolar-oriented triangulation and its dual in the peanosphere sense**, Ewain Gwynne, Nina Holden and Xin Sun. *Acta Mathematica Sinica, English Series*, accepted

6. **Probabilistic conformal blocks for Liouville CFT on the torus**, Promit Ghosal, Guillaume Remy, Xin Sun and Yi Sun. *Duke Math. J.*, **173** (2024), no. 6, 1085–1175.
7. **Integrability of SLE via conformal welding of random surfaces**, Morris Ang, Nina Holden and Xin Sun. *Communications on Pure and Applied Mathematics*, **77** (2024), no. 5, 2651–2707.
8. **Schnyder woods,  $SLE_{16}$  and Liouville quantum gravity**, Yiting Li, Xin Sun and Samuel Watson. *Trans. Amer. Math. Soc.*, **377** (2024), no. 4, 2439–2493.
9. **The bulk one-arm exponent for the  $CLE_{\kappa'}$  percolations**, Haoyu Liu, Xin Sun, Pu Yu, and Zijie Zhuang. *ArXiv e-prints*, 2024.
10. **Annulus crossing formulae for critical planar percolation**, Shengjing Xu, Xin Sun, and Zijie Zhuang. *ArXiv e-prints*, 2024.
11. **Integrability of the conformal loop ensemble: imaginary DOZZ formula and beyond**, Morris Ang, Gefei Cai, Baojun Wu, and Xin Sun. *ArXiv e-prints*, 2024.
12. **SLE Loop Measure and Liouville Quantum Gravity**, Morris Ang, Gefei Cai, Baojun Wu, and Xin Sun. *ArXiv e-prints*, 2024.
13. **FZZ formula of boundary Liouville CFT via conformal welding**, Morris Ang, Guillaume Remy and Xin Sun. *Journal of the European Mathematical Society*, 2023.
14. **Bootstrap, Markov Chain Monte Carlo, and LP/SDP Hierarchy for the Lattice Ising Model**, Minjae Cho and Xin Sun. *Journal of High Energy Physics*, **11** (2023), no. 47.
15. **Convergence of uniform triangulations under the Cardy embedding**, Nina Holden and Xin Sun. *Acta Mathematica*, Vol. 230, No. 6, 93–203 (2023).
16. **Percolation on triangulations: a bijective path to Liouville quantum gravity**, Olivier Bernardi, Nina Holden and Xin Sun. *Mem. Amer. Math. Soc.*, Vol. 289, No. 1440 (2023).
17. **Baxter permuton and Liouville quantum gravity**, Jacopo Borga, Nina Holden, Xin Sun and Pu Yu *Probab. Theory Relat. Fields*, **186** (2023), no. 3–4, 1225–1273.
18. **Brownian half-plane excursion and critical Liouville quantum gravity**, Juhan Aru, Nina Holden, Ellen Powell and Xin Sun. *Journal of the London Mathematical Society*, 107(1), 441–509 (2023).
19. **Mating of trees for random planar maps and Liouville quantum gravity: a survey**, Ewain Gwynne, Nina Holden and Xin Sun. *Panoramas et Synthèses*, Vol. 59 *Soc. Math. France, Paris*, 2023.
20. **Conformal welding of quantum disks**, Morris Ang, Nina Holden and Xin Sun. *Electronic Journal of Probability*, Vol. 28, 1–50 (2023).
21. **The SLE loop via conformal welding of quantum disks**, Morris Ang, Nina Holden and Xin Sun. *Electronic Journal of Probability*, Vol. 28, 1–20 (2023).
22. **Equivalence of Liouville measure and Gaussian free field**, Nathanael Berestycki, Scott Sheffield and Xin Sun. *Ann. Inst. Henri Poincaré Probab. Stat.*, Vol. 59, No. 2, 795–816 (2023).
23. **Backbone exponent for two-dimensional percolation**, Pierre Nolin, Wei Qian, Xin Sun, and Zijie Zhuang *ArXiv e-prints*, 2023.
24. **Conformal welding of quantum disks and multiple SLE: the non-simple case**, Morris Ang, Nina Holden, Xin Sun, and Pu Yu *ArXiv e-prints*, 2023.
25. **SLE partition functions via conformal welding of random surfaces**, Xin Sun and Pu Yu *ArXiv e-prints*, 2023.
26. **Derivation of all structure constants for boundary Liouville CFT**, Morris Ang, Guillaume Remy, Xin Sun, and Tunan Zhu *ArXiv e-prints*, 2023.
27. **Natural parametrization of percolation interface and pivotal points**, Nina Holden, Xinyi Li and Xin Sun. *Ann. Inst. Henri Poincaré Probab. Stat.*, Vol. 58, No. 1, 7–25 (2022).

28. **Minkowski content of Brownian cut points**, Nina Holden, Greg Lawler, Xinyi Li and Xin Sun. *Ann. Inst. Henri Poincaré Probab. Stat.*, Vol. 58, No. 1, 455-488 (2022).
29. **Permutons, meanders, and SLE-decorated Liouville quantum gravity**, Jacopo Borga, Ewain Gwynne, and Xin Sun. *ArXiv e-prints*, 2022.
30. **Liouville dynamical percolation**, Christophe Garban, Nina Holden, Avelio Sepúlveda and Xin Sun. *Probab. Theory Relat. Fields* (2021).
31. **Joint scaling limit of site percolation on random triangulations in the metric and peanosphere sense**, Ewain Gwynne, Nina Holden and Xin Sun. *Electronic Journal of Probability*, Vol. 26, 1-58, (2021).
32. **Volume of metric balls in Liouville quantum gravity**, Morris Ang, Hugo Falconet and Xin Sun. *Electronic Journal of Probability*, 25 (2020), no. 169, 1-50.
33. **Scaling limit of large triangulations of polygons**, Marie Albenque, Nina Holden and Xin Sun. *Electronic Journal of Probability*, 25 (2020), no. 135, 1-43.
34. **Weak LQG metrics and Liouville first passage percolation**, Julien Dubédat, Hugo Falconet, Ewain Gwynne, Joshua Pfeffer and Xin Sun. *Probab. Theory Relat. Fields*, Vol. 178, 369–436 (2020).
35. **A mating-of-trees approach for graph distances in random planar maps**, Ewain Gwynne, Nina Holden and Xin Sun. *Probab. Theory Relat. Fields*, Vol. 177, 1043–1102 (2020).
36. **Induced graphs of uniform spanning forests**, Russell Lyons, Yuval Peres, and Xin Sun. *Ann. Inst. Henri Poincaré Probab. Stat.*, Vol. 56, No. 4, 2732-2744 (2020).
37. **Occupation measure of random walks and wired spanning forests in balls of Cayley graphs**, Russell Lyons, Yuval Peres, Xin Sun and Tianyi Zheng. *Annales de la Faculté des Sciences de Toulouse*, (2020) no. 1, pp. 97-109.
38. **Four-dimensional loop-erased random walk**, Gregory Lawler, Xin Sun and Wei Wu. *Annals of Probability*, Vol. 47, No. 6, 3866-3910 (2019).
39. **A distance exponent for Liouville quantum gravity**, Ewain Gwynne, Nina Holden and Xin Sun. *Probab. Theory Relat. Fields*, Vol. 173, 931-997 (2019).
40. **Scaling limits for the critical Fortuin-Kasteleyn model on a random planar map I: cone times**, Ewain Gwynne, Cheng Mao and Xin Sun. *Ann. Inst. Henri Poincaré Probab. Stat.*, Vol. 55, No. 1, 1-60 (2019).
41. **Random planar geometry through the lens of uniform spanning tree**, Xin Sun. *Bernoulli News*, Vol. 26, No. 2, 10-13 (2019).
42. **Almost sure multifractal spectrum of SLE**, Ewain Gwynne, Jason Miller and Xin Sun. *Duke Math. J.*, Vol. 167, No. 6, 1099-1237 (2018).
43. **SLE as a mating of trees in Euclidean geometry**, Nina Holden and Xin Sun. *Commun. Math. Phys.*, 364, 171-201 (2018).
44. **Negative moments for Gaussian multiplicative chaos on fractal sets**, Christophe Garban, Nina Holden, Avelio Sepúlveda and Xin Sun. *Electronic Communications in Probability*, 23 (2018), no. 100, 1-10.
45. **Brownian motion correlation in the peanosphere for  $\kappa > 8$** , Ewain Gwynne, Nina Holden, Jason Miller and Xin Sun. *Ann. Inst. Henri Poincaré Probab. Stat.*, Vol. 53, No. 4, 1866-1889 (2017).
46. **Two perspectives of the unit area quantum sphere and their equivalence**, Juhan Aru, Yichao Huang and Xin Sun. *Commun. Math. Phys.*, 356, 261-283 (2017).
47. **Deep Learning with Coherent Nanophotonic Circuits**, Yichen Shen, Nicholas C. Harris, Scott Skirlo, Mihika Prabhu, Tom Baehr-Jones, Micheal Hochberg, Xin Sun, Shijie Zhao, Hugo Larochelle, Dirk Englund and Marin Soljačić. *Nature Photonics*. Vol. 11, Issue 7, 441-446 (2017).
48. **Scaling limits for the critical Fortuin-Kasteleyn model on a random planar map II: local estimates and empty reduced word exponent**, Ewain Gwynne and Xin Sun. *Electronic Journal of Probability*, 22 (2017), no. 45, 1-56.

49. **Fractional Gaussian field: a survey**, Asad Lodhia, Scott Sheffield, Xin Sun and Samuel Watson. *Probability Surveys*, Vol. 13 (2016), 1-56.
50. **Sandpiles and unicyles on random planar maps**, David Wilson and Xin Sun. *Electronic Communications in Probability*, 21 (2016), no. 57, 1-12.
51. **On fluctuations for random band Toeplitz matrices**, Yiting Li and Xin Sun. *Random Matrices: Theory and Applications*, Vol. 4, No.2 (2015).
52. **Scaling limits for the critical Fortuin-Kasteleyn model on a random planar map III: finite volume case**, Ewain Gwynne and Xin Sun. *ArXiv e-prints*, 2015.
53. **Ergodicity of the Airy line ensemble**, Ivan Corwin and Xin Sun. *Electronic Communications in Probability*, 19 (2014), no. 49, 1-11.
54. **Uniform spanning forest and the bi-Laplacian Gaussian field**, Xin Sun and Wei Wu. *ArXiv e-prints*, 2013.
55. **Fluctuations of eigenvalues for random Toeplitz and related matrices**, Dangzheng Liu, Xin Sun and Zhengdong Wang. *Electronic Journal of Probability*, 17 (2012), no. 95, 1-22.
56. **A note on eigenvalues of random block Toeplitz matrices with slowly growing bandwidth**, Yiting Li, Dangzheng Liu, Xin Sun and Zhengdong Wang. *Statistics and Probability Letters*, 08/2011; 81 (12).

## ADVISING AND MENTORING

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Doctoral Thesis Advising:

Da Wu (graduated 2023),      Zijie Zhuang (2021 - present),      Shengjing Xu (2022 - present),  
 Gefei Cai (2023-present),      Haoyu Liu (2023 - present),      Zhuoyan Xie (2024 - present).

Master Thesis Mentoring :

Yuxuan Lin (graduated 2023).

Undergraduate Research Mentoring:

Maxmillian Tjauw (2022 Spring),      Shengjing Xu (2021 Summer),      Yanlin Zhao (2013 Summer),  
 Shengzhi Jin (2024).

## PROFESSIONAL SERVICE

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Editor for:

Frontiers of Mathematics (2025-current)

Reviewer for:

ALEA, Ann. Inst. Henri Poincaré Probab. Stat., Ann. Inst. Henri Poincaré D, Ann. of Math., Ann. Probab.,  
 Comm. Math. Phys., Duke Math. J., ESAIM: P&S, Forum Math. Sigma, Forum Math. Pi, Int. Math. Res. Not,  
 Invent. Math., Journal of the AMS, J. Funct. Anal., MathSciNet, Mem. Amer. Math. Soc., PMP, Proc. London  
 Math. Soc., Probab. Theory Related Fields, Publications IHES, Scientific Reports, Trans. Amer. Math. Soc.

Co-organizer for:

Two dimensional random geometry workshop, IMSI, UChicago, 7/2024

KPZ meets KPZ workshop, Fields Institute (3/2024)

New directions in conformal field theory conference, Fields Institute (3/2024)

Workshop on Schramm-Loewner evolution at University of Pennsylvania (2/2023).

Random geometry and statistical physics workshop at University of Pennsylvania (10/2022).

Penn/Temple Probability Seminar (9/2021 - Present).

Random geometry and statistical physics online seminar (9/2020 - Present).

Integrability in Conformal Probability workshop (10/2021)

Columbia Probability Seminar (9/2017-6/2020), Columbia-Princeton Probability Day (4/2018).

Committee member/Panelist for:

Review panels for National Science Foundation (twice in 2021, once in 2022).

Dissertation defense committee for Jiaming Xia (2022); Mateo Wirth (2021).

Tutorial committee for *Seminar on Stochastic Processes* (2021).

(Last updated: February 25, 2025)