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Jian Ding

Contact Information

Department of Statistics, The Wharton School, University of Pennsylvania
457 Jon M. Huntsman Hall, 3730 Walnut Street, Philadelphia, PA 19104
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Citizenship

Chinese; U.S. permanent resident.

Education

Ph.D. in Statistics/Probability theory
UC Berkeley, Berkeley, CA, 2006-2011
Advisor: Yuval Peres

B.S. in Mathematics
Peking University, Beijing, China, 2002-2006

Employment

Gilbert Helman Professor,
Professor at Department of Statistics and Data Science, The Wharton School,
University of Pennsylvania, Philadelphia, PA, US, Since July 2021.

Associate Professor at Department of Statistics, The Wharton School,
University of Pennsylvania, Philadelphia, PA, US, July 2017 – June 2021.
Secondary appointment in Department of Mathematics at Penn, since December 2019.

Associate Professor at Department of Statistics, University of Chicago,
Chicago, IL, US, July 2016 – June 2017.

Assistant Professor at Department of Statistics, University of Chicago,
Chicago, IL, US, September 2012 – June 2016.

Visiting Researcher at Microsoft Research
Redmond, WA, US, Summer 2012, 2014.

Postdoctoral Fellow at MSRI
Berkeley, CA, US, January 2012 – May 2012.

Szegő Assistant Professor at Department of Mathematics, Stanford University,
Stanford, CA, US, September 2011 – June 2012.

Postdoctoral position at University of Washington,
Seattle, WA, US, June 1 – August 31, 2011.
Mentor: James Lee

Research Intern at Microsoft Research New England,
Cambridge, MA, US, May 24 – August 13, 2010.
Mentor: Jennifer Chayes

Research Interests

Probability theory with focus on interactions with statistical physics and theory of computer science: random walks, Gaussian processes, random constraint satisfaction problems, random planar geometry, spin models, random Schrödinger operators, etc.

AWARDS

Invited Lecture in International Congress of Mathematicians (joint with Julien Dubédat and Ewain Gwynne), 2022.
Invited Address in AMS Sectional Meeting, Boston 2018.
Rollo Davidson Prize, 2017 (shared with Nike Sun).
Alfred P. Sloan Fellowship, 2015-2019 (NCE).
NSF Career Award, 2015-2021 (NCE).

PUBLICATIONS

[1] J. Ding, E. Lubetzky and Y. Peres. The mixing time evolution of Glauber dynamics for the mean-field Ising model, *Communications in Mathematical Physics*, 289(2): 725–764 (2009).

[2] J. Ding, E. Lubetzky and Y. Peres. Censored Glauber Dynamics for the mean field Ising Model. *Journal of Statistical Physics*, 137(3): 407–458 (2009).

[3] J. Ding, E. Lubetzky and Y. Peres. Total-variation cutoff in birth-and-death chains. *Probability Theory and Related Fields*, 146(1-2):61–85 (2010).

[4] J. Ding, E. Lubetzky and Y. Peres. Mixing time of critical Ising model on trees is polynomial in the height. *Communications in Mathematical Physics*, 295(1):161-207 (2010).

[5]J. Ding, J.H. Kim, E. Lubetzky and Y. Peres. Anatomy of a young giant component in the random graph. *Random Structures and Algorithms*, 39(2): 139–178 (2011).

[6] J. Ding, J.H. Kim, E. Lubetzky and Y. Peres. Diameters in supercritical random graphs via first passage percolation. *Combinatorics, Probability and Computing*, 19 (5-6): 729–751 (2010).

[7] M.T. Barlow, J. Ding, A. Nachmias and Y. Peres. The evolution of the cover time. *Combinatorics, Probability and Computing*, 20(3): 331-345(2011).

[8] C. Borgs, J. Chayes, J. Ding and B. Lucier. The Hitchhiker's Guide to Affiliation Networks: A Game-Theoretic Approach. *Innovations in Computer Science*, 389–400 (2011).

[9] J. Ding and Y. Peres. Mixing time for the Ising model: a uniform lower bound for all graphs. *Annales de l'Institut Henri Poincaré - Probabilités et Statistiques*, 47(4): 1020-1028 (2011).

[10] J. Ding, E. Lubetzky and Y. Peres. Mixing time of near-critical random graphs. *Annals of Probability*, 40 (3): 979-1008 (2012).

[11] J. Ding, J. Lee and Y. Peres. Cover times, blanket times, and majorizing measures. Conference version at STOC 2011; Journal version in *Annals of Mathematics*, 175(3) : 1409–1471 (2012).

[12] J. Ding. On cover times for 2D lattices. *Electronic Journal of Probability*, 17(45): 1–18, (2012).

[13] J. Ding and O. Zeitouni. A sharp estimate for cover times on binary trees. *Stochastic Processes and Applications*, 122 (5) : 2117–2133, (2012).

[14] J. Ding. Scaling window for mean-field percolation of averages. *Annals of Probability*, Volume 41, Number 6 (2013), 3697-4427.

[15] A. Dembo, J.Ding, F. Gao. Persistence of iterated partial sums. *Annales de l' Institut Henri Poincare*, Volume 49, Number 3 (2013), 873–884.

[16] J. Ding. Exponential and double exponential tails for maximum of two-dimensional discrete Gaussian free field. *Probability Theory and Related Fields*, Volume 157, Issue 1-2 (2013), 285–299.

[17] P. Cuff, J. Ding, O. Louidor, E. Lubetzky, Y. Peres and A. Sly. Glauber Dynamics for the mean-field Potts Model. *Journal of Statistical Physics*, Volume 149 (2012), Issue 3, 432–477.

[18] J. Ding, E. Lubetzky and Y. Peres. Anatomy of the giant component: The strictly supercritical regime. *European Journal of Combinatorics*, Volume 35(2014), 155-168.

[19] J.Ding, J. Lee and Y. Peres. Markov type and threshold embeddings. *Geometric and Functional Analysis*, Volume 23 (2013), Issue 4,1207-1229.

[20] J. Ding and Y. Peres. Sensitivity of mixing times. *Electronic Communications in Probability*, 18 (2013), no. 88, 1–6.

[21] J. Ding. Asymptotics of cover times via Gaussian free fields: bounded-degree graphs and general trees. *Annals of Probability*, 2014, 42(2), 464–496.

[22] J.Ding and O. Zeitouni. Extreme values for two-dimensional discrete Gaussian free field. *Annals of Probability*, 42(2014), 1480–1515.

[23] J. Ding and E. Mossel. Mixing under monotone censoring. *Electronic Communications in Probability*, 19(2014), no. 46, 1–6.

[24] O. Dekel, J. Ding, T. Koren and Y. Peres. Bandits with Switching Costs: $T^{2/3}$ Regret. *Proceedings of the 2014 ACM Symposium on Theory of Computing (STOC 2014)*, 459–467.

[25] J. Ding, R. Eldan and A. Zhai. On multiple peaks and moderate deviations for the supremum of a Gaussian field, *Annals of Probability*, 43(2015), 6:3468–3493.

[26] M. Bramson, J. Ding and O. Zeitouni. Convergence in law of the maximum of the two-dimensional discrete Gaussian free field. *Communications on Pure and Applied Mathematics*, 69(2016), 1:62-123.

[27] J. Ding, A. Sly and N. Sun. Satisfiability threshold for random regular NAE-SAT. Conference version at *STOC' 14*, journal version in *Communications in Mathematical Physics* 341(2016), 2: 435-489.

[28] S. Bubeck, J. Ding, R. Eldan and M. Rácz. Testing for high-dimensional geometry in random graphs. *Random Structures and Algorithms*, 49 (2016), 3: 503–532.

[29] J. Ding and S. Goswami. Percolation of averages in the stochastic mean field model: the near-supercritical regime. *Electronic Journal of Probability*, 20(2015), no.124, 1-21.

[30] J. Ding, A. Sly and N. Sun. Maximum independent sets on random regular graphs, *Acta Mathematica*, 217 (2016), 2:263–340.

[31] M. Bramson, J. Ding and O. Zeitouni. Convergence in law of the maximum of

nonlattice branching random walk. *Annales de l' Institut Henri Poincare*, Volume 52, Number 4 (2016), 1897–1924.

[32] J. Ding, R. Roy and O. Zeitouni. Convergence of the centered maximum of log-correlated Gaussian fields. *Annals of Probability*, 45 (2017), no. 6A, 3886–3928.

[33] J. Ding, and F. Zhang. Non-universality for first passage percolation on the exponential of log-correlated Gaussian fields. *Probability Theory and Related Fields*, 171 (2018), no. 3–4, 1157–1188.

[34] J. Ding and S. Goswami. First passage percolation on the exponential of two-dimensional branching random walk. *Electronic Communication in Probability*, 22 (2017), no. 69, 14 pp.

[35] J. Ding and A. Dunlap. Liouville first-passage percolation: subsequential scaling limit at high temperature. *Annals of Probability*, 47 (2019), no. 2: 690–742.

[36] J. Ding and L. Li. Chemical distances for percolation of planar Gaussian free fields and critical random walk loop soups. *Communications in Mathematical Physics*, 360 (2018), 2: 523–553.

[37] J. Ding and J. Shen. Three favorite sites occurs infinitely often for one-dimensional simple random walk. *Annals of Probability*, Volume 46, Number 5 (2018), 2545–2561.

[38] J. Ding, O. Zeitouni and F. Zhang. On the Liouville heat kernel for k-coarse MBRW. *Electronic Journal of Probability*, 23 (2018), no. 62, 20 pp.

[39] J. Blasiok, J. Ding, and J. Nelson. Continuous Monitoring of ℓ_p Norms in Data Streams. APPROX/RANDOM 2017.

[40] J. Ding and F. Zhang. Liouville first passage percolation: geodesic length exponent is strictly larger than 1 at high temperatures. *Probability Theory and Related Fields*, Volume 174 (2019), Issue 1–2.

[41] J. Ding and C. Xu. Poly-logarithmic localization for random walks among random obstacles. *Annals of Probability*, Volume 47, Number 4 (2019), 2011–2048.

[42] J. Ding, Y. Peres, G. Ranade and A. Zhai. When Multiplicative Noise Stymies Control. *Annals of Applied Probability*, Volume 29, Number 4 (2019), 1963–1992.

[43] J. Ding and S. Goswami. Upper bounds on Liouville first-passage percolation and Watabiki's prediction. *Communications on Pure and Applied Mathematics*, Volume 72, Issue 11, 2331–2384 2019.

[44] A. Dembo, J. Ding, J. Miller and Y. Peres. Cut-off for lamplighter chains on tori: dimension interpolation and phase transition. *Probability Theory and Related Fields*, Volume 173, Issue 1-2, pp 605–650, 2019.

[45] J. Ding, N. Sun. Capacity lower bound for the Ising perceptron. Proceedings of the 51st Annual ACM SIGACT Symposium on Theory of Computing (STOC), 816–827, 2019.

[46] J. Ding, O. Zeitouni, F. Zhang. Heat kernel for Liouville Brownian motion and Liouville graph distance. *Communications in Mathematical Physics*, Volume 371, 561–

618 (2019).

[47] V. Bagaria, J. Ding, D. Tse, Y. Wu, J. Xu. Hidden Hamiltonian Cycle Recovery via Linear Programming. *Operations Research*, Volume 68, Issue 1, 2020.

[48] J. Ding, C. Smart, Localization near the edge for the Anderson Bernoulli model on the two dimensional lattice. *Inventiones*, Volume 219, 467–506 (2020).

[49] M. Biskup, J. Ding and S. Goswami. Return probability and recurrence for the random walk driven by two-dimensional Gaussian free field. *Communications in Mathematical Physics*, Volume 373, 45–106 (2020).

[50] J. Ding, E. Gwynne. The fractal dimension of Liouville quantum gravity: universality, monotonicity, and bounds. *Communications in Mathematical Physics*, Volume 374, 1877–1934 (2020).

[51] J. Ding, C. Xu. Localization for random walks among random obstacles in a single Euclidean ball. *Communications in Mathematical Physics*, Volume 375, 949–1001(2020).

[52] J. Ding, A. Dunlap. Subsequential scaling limits for Liouville graph distance. *Communications in Mathematical Physics*, Volume 376, 1499–1572 (2020).

[53] J. Ding, M. Wirth. Percolation for level-sets of Gaussian free fields on metric graphs. *Annals of Probability*, 48 (3): 1411–1435, 2020.

[54] J. Ding, R. Fukushima, R. Sun, C. Xu. Geometry of the random walk range conditioned on survival among Bernoulli obstacles. *Probability Theory and Related Fields*, 177: 91–145 (2020).

[55] J. Ding, R. Fukushima, R. Sun, C. Xu. Biased random walk conditioned on survival among Bernoulli obstacles: subcritical phase. *Communications in Mathematical Physics*, volume 376, 2161–2195 (2020).

[56] J. Ding, J. Dubédat, A. Dunlap, H. Falconet. Tightness of Liouville first passage percolation for $\gamma \in (0, 2)$. *Publ. Math. IHÉS*, 132: 353–403(2020).

[57] J. Ding, R. Fukushima, R. Sun, C. Xu. Distribution of the random walk conditioned on survival among quenched Bernoulli obstacles. *Annals of Probability*, 49(1): 206-243 (2021).

[58] J. Ding, Z. Ma, Y. Wu, J. Xu. Efficient random graph matching via degree profiles. *Probability theory and related fields*, Volume 179, 29–115 (2021).

[59] J. Ding, J. Xia. Exponential decay of correlations in the two-dimensional random field Ising model. *Inventiones*, Volume 224, 999–1045 (2021).

[60] J. Ding, Y. Wu, J. Xu, D. Yang. Consistent recovery threshold of hidden nearest neighbor graphs. Conference version in COLT 2020; journal version in *IEEE Transactions on Information Theory*, 67 (8): 5211–5229 (2021).

FORTHCOMING

[61] J. Ding, N. Sun and D.B. Wilson. Supercritical minimum mean-weight cycles. *Transactions in AMS*, to appear.

[62] J. Ding and E. Gwynne. Tightness of supercritical Liouville first passage percolation, *Journal of European Mathematical Society*, to appear.

[63] J. Ding, M. Wirth, H. Wu. Crossing estimates from metric graph and discrete GFF, *Annales de l' Institut Henri Poincare*, to appear.

[64] J. Ding, E. Gwynne and A. Sepúlveda. The distance exponent for Liouville first passage percolation is positive, *Probability theory and related fields*, accepted.

PREPRINTS

[65] J. Ding and A. Sly. Distances in critical long range percolation. submitted.

[66] J. Ding, A. Sly and N. Sun. Proof of the satisfiability conjecture for large k. Conference version in STOC 2015; full version in revision.

[67] J. Ding and M. Wirth. Correlation length of two-dimensional random field Ising model via greedy lattice animal, submitted.

[68] J. Ding, Y. Wu, J. Xu and D. Yang. The planted matching problem: Sharp threshold and infinite-order phase transition. submitted.

[69] J. Ding and E. Gwynne. Regularity and confluence of geodesics for the supercritical Liouville quantum gravity metric. submitted.

[70] J. Ding, J. Song and R. Sun. A New Correlation Inequality for Ising Models with External Fields. submitted.

[71] J. Ding and E. Gwynne. Up-to-constants comparison of Liouville first passage percolation and Liouville quantum gravity. submitted.

[72] J. Ding and E. Gwynne. The critical Liouville quantum gravity metric induces the Euclidean topology. submitted.

[73] J. Ding, J. Dubédat and E. Gwynne. Introduction to the Liouville quantum gravity metric. submitted to ICM proceeding.

[74] J. Ding and E. Gwynne. Uniqueness of the critical and supercritical Liouville quantum gravity metrics. submitted.

[75] J. Ding and Z. Zhuang. Long range order for random field Ising and Potts models. submitted.

MANUSCRIPT

[76] A. Dembo, J. Ding, J. Yan. Persistence versus stability for auto-regressive processes, preprint to be submitted.

UNPUBLISHED

[77] S. Chatterjee, A. Dembo and J. Ding. On level sets of Gaussian fields.

GRADUATE STUDENTS (DISSERTATION ADVISOR)

Linjun Li, current student, University of Pennsylvania.

Mateo Wirth, Ph.D. 2021, University of Pennsylvania, now at Facebook.

Changji Xu, Ph.D. 2020 at University of Chicago, now postdoc at Harvard.

Jianfei Shen: Master 2017 at University of Chicago, now at Alibaba.

Li Li: Ph.D 2017 at University of Chicago.

Subhajit Goswami: Ph.D 2017 at University of Chicago, assistant professor at TIFR since October 2020.

Rishideep Roy: Ph.D 2016 at University of Chicago, now assistant professor at IIM Bangalore.

Postdocs

Fan Yang: Fall 2019 – present.

Conferences Talks

Various international conferences and workshops; probability seminars in various universities including ETH, Harvard, MIT, NYU, Princeton, Stanford, UC Berkeley, UCLA, IAS, etc.

Teaching @ UPenn

STAT 430, Probability, Fall 2017, Spring and Fall 2019.

Teaching @ U. Chicago

STAT 383, Measure Theoretical Probability Theory II, Spring 2013, 2016.

STAT 381, Measure Theoretical Probability Theory I, Winter 2014.

STAT 386, Social Networks: Probability, Learning, and Game Theory, Winter 2014.

STAT 251, Introduction to Mathematical Probability, Spring 2013, 2014, 2015.

STAT 312, Introduction to Stochastic Processes, Fall 2014.

Teaching @ Stanford

MATH 51, Linear Algebra and Multivariable Calculus, Fall 2011.

MATH 136/STAT 219, Stochastic Processes, Fall 2011.

Community Service

Associate Editor for Journal of American Mathematical Society, 2/1/2022–1/31/2026.

Co-Chair for Contribution session sub-committee of IMS World Congress, June 2022.

Associate Editor for Annals of Probability since January 2021.

Associate Editor for Communications in Mathematical Physics since October 2019.

Associate Editor for Annals of Applied Probability since January 2019.

Editorial board on Science in China Mathematics since January 2018.

Served as grant reviewer or panel member for NSF, Simons-MSRI, NSA, ISF, Swiss NSF, Royal Society.

Co-organizer for workshop "Random media and large deviations", New York, October 2021.

Co-organizer for Simons program "Probability, geometry, and computation in high dimensions", Fall 2020.

Co-local-organizer for Stochastic Processes and their Applications 2019, Evanston, July 2019.

Co-organizer of AMS special Session on The Gaussian Free Field and Random Geometry, Boston, April 2018.

Co-organizer of AIM workshop on Phase transitions in randomized computational problems, June, 2017.

Co-organizer of AMS Special Session on Probability Theory, 2015, Chicago.

Departmental Services

Ph.D. coordinator, 2020.

Hiring committee for faculty search, 2020.

Diversity advisor of Statistics Department for faculty hiring, 2019–2020.

Admissions committee for graduate students, 2019 (chair), 2020, 2021.

Co-organizer for Penn-Temple Probability Seminar, since Spring 2019.

Coordinator for Wharton Statistics Seminar, Spring and Fall 2019.

Grant Activity

Current Grant

Name of Grant	**Funding Agency**
CAREER: Stochastic processes in statistical physics and optimization	National Science Foundation Division of Mathematical Sciences
Period of Grant	**Type of Grant**
Jul. 2015 – Jun. 2021 (NCE)	Continuing Grant
Role in Grant	**Award Amount**
$497,773	Principal Investigator

Name of Grant	**Funding Agency**
Geometric, Optimizational and Spectral Problems in Large Random Structures	National Science Foundation Division of Mathematical Sciences
Period of Grant	**Type of Grant**
Sept. 2020 – Aug. 2023	Continuing Grant
Award Amount	**Role in Grant**
$375,294	Principal Investigator

Past grant

Name of Grant	**Funding Agency**
Extreme values for random processes of tree structure	National Science Foundation Division of Mathematical Sciences
Period of Grant	**Type of Grant**
Aug. 2012 – Jul. 2015	Standard Grant
Award Amount	**Role in Grant**
$131,850	Principal Investigator

Name of Grant		**Funding Agency**
Alfred P. Sloan Fellowship		Alfred P. Sloan Foundation
Period of Grant	**Award Amount**	**Role in Grant**
Jul. 2015 – Sept. 2019 (NCE)	$50000	Principal Investigator