

Subhajit Goswami

CONTACT INFORMATION	The school of Mathematics Tata Institute of Fundamental Research 1, Homi Bhabha Road Colaba, Mumbai 400005, India	Web: https://mathweb.tifr.res.in/~goswami/ E-mail: goswami@math.tifr.res.in
DATE OF BIRTH	June 30, 1988	
CITIZENSHIP	Indian	
CURRENT POSITION	I am currently a Reader in the school of mathematics at the Tata Institute of Fundamental Research (TIFR), Mumbai.	
OTHER POSITIONS	I also hold an associate faculty position at the International Centre for Theoretical Sciences (ICTS), Bangalore.	
PAST POSITIONS	I was a postdoctoral fellow at the Institut des Hautes Études Scientifiques (IHES) from 2017 to 2020.	
EDUCATION	Ph.D., Department of Statistics, University of Chicago , September 2012 - August 2017. Research area: Probability theory Thesis title: <i>Some metric properties of planar Gaussian free field</i> Advisor: Prof. Jian Ding Members of thesis committee: Prof. Jian Ding, Prof. Steven P. Lalley, Prof. Gregory F. Lawler Master of Statistics (M. Stat.), Indian Statistical Institute , July 2009 - May 2011. <i>Passed in First Division with Distinction</i> Specialization: Mathematical Statistics and Probability Masters thesis: <i>Excited random walks in one and higher dimensions</i> Advisor: Prof. Gopal K Basak Bachelor of Statistics (B. Stat.), Indian Statistical Institute , July 2006 - May 2009 <i>Passed in First Division with Distinction</i>	
RESEARCH INTERESTS	Probability theory and its interaction with allied mathematical sciences. My main interest lies in various lattice spin and random graph models arising in Statistical physics and Probability theory. I am also very interested in mathematical statistics, specifically the interface of probability theory, statistics and optimization.	
GRANTS AND AWARDS	<ol style="list-style-type: none">1. Associate of the Indian Academy of Sciences (IASc), 2022 – present.2. Recipient of the SERB research grant SRG/2021/000032.3. Recipient of Department of Statistics consulting award for 2013 – 2014, University of Chicago.4. Recipient of McCormick Fellowship, University of Chicago, 2012 – 2014.	

5. Recipient of Paul Meier Fellowship, Department of Statistics, University of Chicago.
6. Awardee of Dr. Shyama Prasad Mukherjee (SPM) Fellowship, Government of India.
7. Recipient of MA/MSc Scholarship from Department of Atomic Energy, Govt. of India, 2010 – 2011.

PUBLICATIONS

1. S. Chatterjee and S. Goswami. Spatially Adaptive Online Prediction of Piecewise Regular Functions. *Algorithmic Learning Theory 2023*, 35 pp., Proc. Mach. Learn. Res. (PMLR), 201. Preprint is available at arxiv.org/abs/2203.16587.
2. Z. Fan and S. Goswami. Roughness of geodesics in Liouville quantum gravity. *To appear in Ann. Inst. Henri Poincaré Probab. Stat.* Preprint is available at arxiv.org/abs/2205.00676.
3. H. Duminil-Copin, S. Goswami, P-F. Rodriguez and F. Severo. Equality of critical parameters for percolation of Gaussian free field level-sets. *Duke Math. J.* **172** (2023), no. 5, 839–913. Preprint is available at arxiv.org/abs/2002.07735.
4. S. Goswami, P-F. Rodriguez and F. Severo. On the radius of Gaussian free field excursion clusters. *Ann. Probab.* **50** (2022), no. 5, 1675–1724. Preprint is available at arxiv.org/abs/2101.02200.
5. S. Chatterjee and S. Goswami. New Risk Bounds for 2D Total Variation Denoising. *IEEE Trans. Inform. Theory* **67** (2021), no. 6, 4060–4091, DOI: 10.1109/TIT.2021.3059657. Preprint is available at arxiv.org/abs/1902.01215.
6. S. Chatterjee and S. Goswami. Adaptive Estimation of Multivariate Piecewise Polynomials and Bounded Variation Functions by Optimal Decision Trees. *Ann. Stat.* **49** (2021), no. 5, 2531–2551 Preprint is available at arxiv.org/abs/1911.11562.
7. H. Duminil-Copin, S. Goswami, A. Raoufi, F. Severo and A. Yadin. Existence of phase transition for percolation using the Gaussian Free Field. *Duke Math. J.* **169** (2020), no. 18, 3539–3563. Preprint is available at arxiv.org/abs/1806.07733.
8. H. Duminil-Copin, S. Goswami and A. Raoufi. Exponential decay of truncated correlations for the Ising model in any dimension for all but the critical temperature. *Commun. Math. Phys.* **374** (2020), no. 2, 891–921. Preprint is available at arxiv.org/abs/1808.00439.
9. M. Biskup, J. Ding and S. Goswami. Return probability and recurrence for the random walk driven by two-dimensional Gaussian free field. *Commun. Math. Phys.* **373** (2020), no. 1, 45–106. Preprint is available at arxiv.org/abs/1611.03901.
10. J. Ding and S. Goswami. Upper bounds on Liouville first passage percolation and Watabiki’s prediction. *Commun. Pure Appl. Math.* **72** (2019), no. 11, 2331-2384. Preprint is available at arxiv.org/abs/1610.09998.
11. J. Ding and S. Goswami. First passage percolation on the exponential of two-dimensional branching random walks. *Electron. Commun. Probab.* **22** (2017), no. 69. Preprint is available at arxiv.org/abs/1511.06932.
12. J. Ding and S. Goswami. Percolation of averages in the stochastic mean field model: the near-supercritical regime. *Electron. J. Probab.* **20** (2015), no. 124. Preprint is available at arxiv.org/abs/1501.03579.

PREPRINTS

1. H. Duminil-Copin, S. Goswami, P-F. Rodriguez, F. Severo and A. Teixeira. Phase transition for the vacant set of random walk and random interlacements. *Preprint*, available at arxiv.org/abs/2308.07919.
2. H. Duminil-Copin, S. Goswami, P-F. Rodriguez, F. Severo and A. Teixeira. A character-

ization of strong percolation via disconnection. *Preprint*, available at arxiv.org/abs/2308.07920.

3. H. Duminil-Copin, S. Goswami, P-F. Rodriguez, F. Severo and A. Teixeira. Finite range interlacements and couplings. *Preprint*, available at arxiv.org/abs/2308.07303.

4. S. Chatterjee, P-S Dey and S. Goswami. Central Limit Theorem for Gram-Schmidt Random Walk Design. *Preprint*, available at arxiv.org/abs/2305.12512.

5. J. Ding and S. Goswami. Liouville first passage percolation: the weight exponent is strictly less than 1 at high temperature. *Preprint*, available at arxiv.org/abs/1605.08392. This article gives a different proof for a weaker bound on the exponent compared to [arxiv:1610.09998](https://arxiv.org/abs/1610.09998).

6. S. Goswami. Finite size scaling of random XORSAT. *Preprint*, available at arxiv.org/abs/1610.07431.

RECENT TALKS

1. (Invited talk) *Geometry of the trace of random walk on torus and random interlacements*. Department seminar, May 30, 2023, Statistics and Mathematics unit, Indian Statistical Institute, Kolkata, India.

2. (Invited talk) *Geometry of the trace of random walk on torus and random interlacements*. Asia-Pacific Seminar in Probability and Statistics (APSPS), March 22, 2023, Online seminar. The talk can be fetched from the [seminar page](#).

3. (Invited talk) *Roughness of geodesics in Liouville quantum gravity*. Topics in High Dimensional Probability, January 02-13, 2023, International Centre for Theoretical Sciences (ICTS), Bengaluru, India.

4. (Invited talk) *Roughness of geodesics in Liouville quantum gravity*. Department seminar, October 18, 2022, TIFR Centre for Applicable Mathematics (TIFR-CAM), Bengaluru, India.

5. (Invited talk) *Liouville quantum gravity, Liouville first-passage percolation and Watabiki's conjecture*. Department seminar, March 02, 2022, Department of Mathematics, National University of Singapore (NUS), Singapore.

6. (Invited talk) *Level-sets of correlated Gaussian processes: connectivity and local geometry*. Department colloquium, March 18, 2021, School of Mathematics, Tata Institute of Fundamental Research (TIFR), Mumbai, India.

7. (Invited talk) *Adaptive Estimation via Optimal Decision Trees*. ICTS - Advances in Applied Probability II (Online), January 04 - 09, 2021. A link to the talk can be found at the [talks page](#).

8. (Invited talk) *Equality of critical parameters for GFF level-set percolation*. Random Geometry and Statistical Physics Seminar, October 1, 2020. The talk can be viewed at the [seminar channel](#).

9. (Invited talk) *Anomalous diffusion on the GFF landscape*. Meeting of the Swiss Mathematical Society: Recent advances in loop models and height functions, September 2-4, 2019, University of Fribourg, Fribourg, Switzerland.

10. (Invited talk) *Percolation theory: from classical to dependent models*. Special colloquium, August 13, 2019, School of Mathematics, Tata Institute of Fundamental Research (TIFR), Mumbai, India.

11. (Invited talk) *Percolation theory: from classical to dependent models*. Department seminar, July 26, 2019, Department of Mathematics, Indian Institute of Science, Bengaluru, India.

12. (Invited talk) *Percolation theory: from classical to dependent models*. Department colloquium, July 23, 2019, Theoretical Statistics and Mathematics Unit, Indian Statistical Institute,

Bengaluru, India.

13. (Invited talk) *Anomalous diffusion on the GFF landscape*. Probability seminar, July 22, 2019, International Centre for Theoretical Sciences (ICTS), Bengaluru, India.

14. (Invited talk) *Sharpness of level-set percolation for the Gaussian free field*. Stochastic Processes and its Applications Conference (SPA), July 8-12, 2019, Northwestern University, Evanston, IL, USA (could not attend due to visa related problems).

15. (Invited talk) *New Risk Bounds for 2D Total Variation Denoising*. Séminaire de probabilités-statistiques, March 21, 2019, Département de Mathématiques d’Orsay, Orsay, France.

16. (Invited talk) *The truncated correlations of the Ising model in any dimension decay exponentially fast at all but the critical temperature*. Séminaire de probabilités-statistiques, October 18, 2018, Département de Mathématiques d’Orsay, Orsay, France.

17. (Invited talk) *The truncated correlations of the Ising model in any dimension decay exponentially fast at all but the critical temperature*. Probability seminar, March 21, 2018, International Centre for Theoretical Sciences, Bengaluru, India.

18. (Invited talk) *Liouville first-passage percolation and Watabiki’s prediction*. Department seminar, March 19, 2018, Department of Mathematics, Indian Institute of Science, Bengaluru, India.

19. (Invited talk) *Some metric properties of 2-D Gaussian free field*. Séminaire de probabilités et physique statistique de l’IHES, October 31, 2017, Institut des Hautes Études Scientifiques (IHES), Bures-Sur-Yvette, France.

20. (Invited talk) *Liouville first-passage percolation and Watabiki’s prediction*. Oberwolfach Seminar: Scaling Limits of Random Planar Maps and Liouville Quantum Gravity, October 15 – October 21, 2017, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany.

TEACHING

1. Analysis I (Fall 2022, Semester 1) [Course page](#).

I gave an online course titled “Percolation of Level-Sets of the Gaussian Free Field” in the ICTS program on Probabilistic Methods in Negative Curvature (ONLINE) held between March 1-12, 2021. The video lectures can be accessed through the program [talks page](#).

I gave a reading course titled “Percolation on non-Euclidean geometries” in the second semester of the 2020-21 academic year at TIFR.

PEER REVIEW SERVICES

Reviewer for *Mathematical Reviews*, American Mathematical Society. Refereed for *Inventiones Mathematicae*, *Communications in Mathematical Physics (CIMP)*, *International Mathematics Research Notices (IMRN)*, *Probability Theory and Related Fields (PTRF)*, *Annales de l’Institut Henri Poincaré*, *Probabilités et Statistiques (AIHP)*, *Annales Henri Lebesgue (AHL)*, *Electronic Journal of Probability (EJP)*, *Markov Processes and Related Fields*, *Probability and Mathematical Physics* and *SIAM Journal on Discrete Mathematics (SIDMA)*.

OUTREACH ACTIVITIES

I was a co-organizer of the third installment of the bi-annual workshop [Probabilistic Methods in Negative Curvature](#) held between February 27 to March 10, 2023 at the International Centre for Theoretical Sciences (ICTS), Bangalore. The focus areas of the workshop included Probability theory on negatively curved spaces, Ergodic theory and hyperbolic dynamics and hyperbolic geometry.

I was a co-organizer of the [Visiting Students Research Program \(VSRP\)](#) hosted by the School of Mathematics, TIFR, Mumbai from May 15 – June 15, 2021. The goal of the program is to expose advanced undergraduate and Master’s students in Mathematical sciences from all over India to modern research activities in different areas of Mathematics.

I am a member of the Infosys-Chandrasekharan Random Geometry Centre — a cohort of scientists working on several areas of Mathematics, Theoretical Physics and Computer Science broadly unified under the rubric of Random Geometry. As a member of the group, I am involved in organizing weekly colloquium on several topics allied with Random Geometry. An overview of our activities can be found at the [Centre website](#). The video lectures are available at our [youtube channel](#).