Yogeshwaran D

Theorestical Statistics and Mathematics Unit, Indian Statistical Institute, Bangalore.

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Research Interests

Applied Probability, Stochastic Geometry, Random topology.

Employment

Indian Statistical Institute — *Bangalore, India.*
Faculty, Theoretical Statistics and Mathematics Unit — *Aug 2014 - present*

Associate Professor from Sep '18 to present.

Assistant Professor from Aug '14 to Aug '18.

Technion - Israel Institute of Technology — *Haifa, Israel*
Post-doctoral Researcher at Faculty of Electrical Engineering. — *Sep 2011 - Jun 2014*

Mentor : Prof. Robert Adler

Ecole Normale Superieure - INRIA — *Paris, France*
Post-doctoral Researcher at Network Theory and Communications (TREC) Team — *Jan 2011 - Jun 2011*

Mentors : Profs. François Baccelli and Bartek Błaszczyszyn

Education

Université Pierre et Marie Curie (University of Paris 6) — *Paris, France*
Ph.D. in Applied Mathematics — *Jan 2007 - Nov 2010*

- Advisers : Profs. François Baccelli and Bartek Błaszczyszyn
- Thesis Title : Stochastic geometric networks : connectivity and comparison
- Referees : Profs. Mathew Penrose and André Goldman
- Defended on 24th November 2010. Jury members : Profs. Francis Comets, Irina Kourkova, André Goldman, Pierre Calka and Laurent Massoulié

Indian Institute of Science — *Bangalore, India*
M. S. (Mathematics) — *Aug 2003 - Jul 2006*

Integrated Ph. D. Programme, IISc-TIFR.

- M. S. Thesis Title : Connectivity and tracking problems in wireless sensor networks
- Adviser : Prof. Srikanth K. Iyer
- C.G.P.A. : 6.4 (out of 8.00) [inclusive of Project Grade of 8/8]

Sri Sathya Sai Institute of Higher Learning, Prashanthi Nilayam, India. — *Puttaparthi, India*
B.Sc(Hons) in Mathematics — *Jun 2000 - Mar 2003*

- C.G.P.A. : 4.73 (out of 5.00)

Publications

Pre-prints are available on arxiv and on my website.

JOURNALS AND BOOK CHAPTERS

1. with Z. Wei and T. Owada.
   Limit theorems for critical faces above the vanishing threshold.
   accepted at Hom. Hom. Applns. (2024).

2. with A. Banerjee
   Edge ideals of Erdös–Rényi random graphs : Linear resolution, unmixedness and regularity. J. Alg. Comb. (2023).

3. with S. Athreya and P. Gupta
   Volume approximation of strongly $\mathbb{C}$-Convex domains by random polyhedra.
   Adv. Math. (2023).

4. with P. Skraba
   Central limit theorem for Euclidean minimal spanning acycles.
   accepted in J. Top. Anal. (2023).

5. with B. R. Vinay Kumar and N. Kashyap
   An Analysis of Probabilistic Forwarding of Coded Packets on Random Geometric Graphs.
   Performance Evaluation. (2023).

6. with G. Last and G. Peccati
   Phase transitions and noise sensitivity on the Poisson space via stopping sets and decision trees. Rand. Struct. Alg. (2023)

7. with O. Bobrowski and M. Schulte
   Poisson process approximation under stabilization and Palm coupling.
   Ann. Hen. Leb. (2022).

8. with T. Owada
   Sub-tree counts on hyperbolic random geometric graphs. Adv. Appl. Prob. (2022).

9. with G. Last and R. Szekli
   Some remarks on associated random fields, random measures and point processes.
   ALEA (2020).

10. with S. Athreya
    Central limit theorem for statistics of subcritical configuration models.
    J. Ram. Math. Soc. (2020).

11. with S. K. Iyer
    Thresholds for vanishing of `Isolated' faces in random Čech and Vietoris-Rips complexes. Ann. Inst. Hen. Poin. (2020).

12. with M. Klatt and G. Last
    Hyperuniform and number rigid stable matchings. Rand. Struct. Alg. (2020).

13. with P. Skraba and G. Thoppe
    Random k-complexes : Persistence diagrams and spanning acyles. El. J. Comb. (2020).

14. with S. Shukla
    Spectral bounds for vanishing of cohomology and the neighborhood complex of a random graph. J. Comb. Th. : Series (A) (2020).

15. with B. Blaszczyszyn and J. E. Yukich
    Limit theory for geometric statistics of point processes having fast decay of correlations. Ann. Prob. (2019).

16. Geometry and topology of the boolean model on a stationary point processes : A brief survey. Proc. INSA (2018).

17. with A. Tulasi Ram Reddy and S. Vadlamani
    Central limit theorem for quasi-local statistics of spin models on Cayley graphs. J. Stat. Phys : Special issue on complex networks (2018).

18. with R. J. Adler and E. Subag
    Random geometric complexes in the thermodynamic regime. Prob. Th. Rel. Fields (2017).

19. with G. Thoppe and R. J. Adler
    On the topology of dynamic Erdös-Renyi graphs. Adv. Appl. Prob. (2016).

20. with R. J. Adler
    On the topology of random complexes built over stationary point processes. Ann. Appl. Prob. (2015).

21. with B. Błazczyszyn
    Clustering, percolation and comparison of point processes.
    Stochastic Geometry, Spatial Statistics and Random Fields: Analysis, Modeling and Simulation of Complex Structures. Ed. Schmidt, V., Lecture Notes in Mathematics, Springer (2015).

22. with B. Błazczyszyn
    On comparison of clustering properties of point processes. Adv. Appl. Prob. (2014).

23. with B. Błazczyszyn
    Clustering and percolation of point processes. Elect. J. Prob. (2013).

24. with S. K. Iyer
    Percolation and connectivity in AB random geometric graphs. Adv. Appl. Prob. (2012).

25. with B. Błaszczyszyn
    Directionally convex ordering of random measures, shot noise fields and some applications to wireless communications Adv. Appl. Prob. (2009).

26. with S. K. Iyer and D. Manjunath
    Limit laws for k-coverage of paths by a Markov-Poisson-Boolean model
    Stoch. Models (2008).

27. S. Sundhar Ram, D. Manjunath, S. K. Iyer and D. Yogeshwaran
On the path sensing properties of random sensor networks.
IEEE Transactions on Mobile Computing (2006).

CONFERENCE PROCEEDINGS

28. with B. R. Vinay Kumar and N. Kashyap
An Analysis of Probabilistic Forwarding of Coded Packets on Random Geometric Graphs.
In Proceedings of the Nineteenth International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt-21) (2021).

29. B. Błaszczyszyn and D. Yogeshwaran
Connectivity in sub-Poisson networks.
The 48th Allerton conference on communication, control and computing (Allerton-10), Urbana-Champaign, USA (2010).

30. N. Karamchandani, D. Manjunath, D. Yogeshwaran and S. K. Iyer
Evolving random geometric graph models for mobile wireless networks.
In Proceedings of the Fourth International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt-06), Boston USA (2006).

PREPRINTS

31. with S. Kanazawa and K. D. Trinh.
Normal approximation for statistics of randomly weighted complexes.
arXiv:2312.07771 (2023).

32. with R. Lachièze-Rey.
Hyperuniformity and optimal transport of point processes.
arXiv:2402.13705 (2024).

33. with C. Bhattacharjee and G. Peccati.
Spectra of Poisson functionals and applications in continuum percolation.
arXiv:2407.13502 (2024).

Honours, Fellowships and Grants

2024-2027	**CORE Grant** w/ Mathew Joseph ; Science Education & Research Board, India
2023-now	**Member of Editorial Board** Infinite Dimensional Analysis, Quantum Probability and Related Topics
2023	**CNRS 'Postes Rouges'-Visiting Position** Univ. Paris Cité, Paris, France
2021-2024	**MATRICS Grant** Science Education & Research Board, India
2019-now	**Member of Editorial Board** Journal of Applied and Computational Topology
2018-2021	**IFCAM Joint Project** Indo-French Centre for Applied Mathematics
2017	**Young Scientist Award** Indian National Science Academy, India
2016	**Associate** Indian Academy of Sciences, India
2014-2019	**INSPIRE Faculty Fellowship** Dept. Science & Technology, India
2005	**Junior Research Fellowship and Lecturership** CSIR-UGC, India
2006	**All India Rank 13** Graduate Aptitude Test in Engineering, India
2003-2006	**Research Scholarship** Ministry of Human Resources and Development, India

Invited Talks in Conferences and Workshops

- Aug 2024 : Special Contributed Session on 'Hyperuniformity', Bernoulli-IMS World Congress, Bochum, Germany.
- Feb 2024: Challenges in Networks, Bangalore.
- Jan 2023 : Topics in High Dimensional Probability, Bangalore.
- Dec 2022 : International Indian Statistical Association Conference, Bangalore.
- Sep 2022 : The Statistical Physics of Continuum Particle Systems with Strong Interactions, Singapore.
- Feb 2022 : TDA week, Japan (online).
- Jan 2022 : LMS Workshop on Applied Topology. U.K. (online).
- Sep 2021 : VII Mexican Workshop on Geometric and Topological Data Analysis, Mexico (online).
- Mar 2021 : Set Estimation: a Bridge between Spatial Statistics and Stochastic Geometry, France (online).
- Mar 2021 : National Workshop on Data Science and Advanced Computing, VIT-AP University, Amaravati, India (online).
- Feb 2021 : High dimensional spatial random systems, Germany (online).
- Dec 2019 : IFCAM School on Graphs and Random Processes, Pune, India.
- Jun 2019 : 20th Workshop on Stochastic Geometry, stereology and image analysis, Denmark
- May 2019 : Singapore-Abu Dhabi-Shanghai-India Probability Meeting, Singapore.
- June 2018 : ISI-NETWORKS Meeting in Probability, Leiden University, Leiden.
- June 2018 : Stochastic Models VI, Bedlewo, Poland.
- May 2018 : Stochastic Geometry Days, Paris V, Paris.
- Jan 2018 : ISI-NETWORKS Conference in Probability, ISI, Kolkata.
- Nov 2017 : Indian Academy of Sciences Annual Meeting, Shillong.
- Aug 2017 : Workshop on Topological Data Analysis : Developing Abstract Foundation, Banff, Canada.
- Sep 2016 : Stochastic Models V, Bedlewo, Poland.
- Aug 2016 : Workshop on Geometry and Stochastics of Nonlinear, Functional and Graph Data, Bornholm, Denmark.

- Feb 2016 : Workshop on Random and Statistical Topology, Japan.
- Jun 2015 : Extreme Value Analysis and Applications, Ann Arbor, USA.
- Jan 2013 : Conference on limit theorems in probability, Indian Institute of Science, Bangalore.
- June 2010 : Workshop in Stochastic Processes and Communication Sciences for Young Researchers, ICMS, Edinburgh, UK.
- Oct 2008 : 2nd Workshop on Stochastic Geometry, Wroclaw, Poland.

Research Visits

- Queen Marys University of London. Hosts : Profs. Primoz Skraba and Omer Bobrowski. May 2024.
- University of Paris Cite. Host: Prof. Raphael Lachieze-Rey. April-July 2023.
- Karlsruhe Institute of Technology, Germany. Host : Prof. Guenter Last. Aug 2024, March 2020, Nov 2018, May 2018, Nov 2015 and June 2013.
- Luxembourg University, Luxembourg; Host : Giovanni Peccati. July 2022 and March 2020.
- Leiden University, Netherlands. Host : Frank den Hollander. June 2022, Feb 2020 and June 2018.
- DYOGENE, INRIA, Paris. Host : Prof. Bartlomiej Blaszczyszyn. May 2018, March 2019 and Nov 2019.
- University of Bern, Switzerland. Host : Dr. Matthias Schulte. Oct 2018.
- Purdue University, USA. Host : Dr. Takashi Owada. July 2017.
- Technion, Israel. Host : Prof. Robert Adler. Dec 2016 and Jul 2015.
- Mathematisches Forschungsinstitut, Oberwolfach, Germany for research in pairs programme with Prof. Primoz Skraba and Dr. Gugan Thoppe. Nov 2015.
- Jozef Stefan Institute, Slovenia. Host : Prof. Primoz Skraba. Mar 2015.
- Lehigh University, USA. Host : Prof. Joseph Yukich. Oct 2013.
- Institute of Mathematics and Applications, Minneapolis in connection with the thematic program on “Scientific and Engineering Applications of Algebraic Topology”. Oct-Nov 2013.
- Dept. of Mathematics, University of Bath, U. K.. Host : Prof. Mathew Penrose. March 2011.
- Summer internship on “SINR coverage processes” with Prof. François Baccelli and Prof. Bartek Błaszczyszyn at INRIA-Ecole Normale Superieure, Paris. May-July 2006.

Synergistic Activities

Committees

- Technical Programme Committee: Workshop on Spatial Stochastic Models for Wireless Networks (2016).
- Scientific committee: Conference on Algebraic Topology: Methods, Computation, and Science (2016)
- Guest Editor for Special Issue on Random Topology in Journal of Applied and Computational Topology. `https://link.springer.com/collections/bdgddefcgg`

Refereed papers for

Annals of Applied Probability, Advances in Applied Probability, Computer Communications Discrete and Computational Geometry, Discrete Mathematics, Elec. Communications in Probability, Elec. Journal of Probability, Elec. Journal of Statistics, Foundations of Computational Mathematics,

J. of Statistical Physics, J. of Applied Probability, J. of Theoretical Probability,
J. of Applied and Computational Topology, Mathscinet Reviews,
Probability Theory and Related Fields, Proceedings - Mathematical Sciences,
Random structures and algorithms, Sankhya A, Statistics and Probability Letters,
Stochastic Processes and Applications Stochastic Models, Resonance,
IEEE Trans. on Information Theory, IEEE Trans. on Wireless Communications.

Ph.D. Students

- Kuldeep Guha Mazumder, (ongoing) 5th Year, ISI Bangalore.
- Ritaman Ghosh, (ongoing) 4th year, ISI Bangalore ; jointly with Srikanth K. Iyer (IISc, Bangalore).

Master students

- Akshay Sateesh Hegde. Title : Sharp phase transition in some percolation models via randomized algorithms. Jun 2020 - May 2021. (2 Semesters)
- Rahul Raphael Kanekar. Title : Branching random walks and geometry of graphs. Jun 2020 - May 2021. (2 Semesters)
- Prabhanka Deka. Title : Connectivity of inhomogeneous random graphs. Jul - Nov 2018. (1 Semester)
- Tejaswi Tripathi. Title : Chaining and interpolation for stochastic processes. Jul - Nov 2018. (1 Semester)
- Agniva Roy. Title : Topology of random clique complexes. Jan - Apr 2017. (1 Semester)

Post-doctoral researchers mentored

- Akshay Goel. November 2019 - Aug 2020. Current Position : Faculty at DIT University, Dehradun.
- Samir Shukla. August 2017 - July 2018. Current Position : Faculty at IIT, Mandi.
- Gugan Thoppe. July-August 2015. Current Position : Faculty at IISc, Bangalore.

Organization of Conferences and Seminars

- ”A Discussion meeting on probability, convex geometry and complex variables” at TIFR-CAM Bangalore from Jan 04-10, 2024.
- “A Discussion meeting on Stochastic Analysis, geometry and random fields” at ISI, Bangalore from Jan 06-10, 2020.
- “A Probability Meeting to be named later” at ISI, Bangalore from May 12-14, 2017.
- Co-Organized Ashok Maitra Memorial Lectures at the Indian Statistical Institute from 2021-2025.
- Co-organizer of Bangalore Probability Seminar from Jan 2016-Dec 2022.
- Co-organizer of Asia-Pacific Seminar on Applied Topology and Geometry from Aug 2020-now.
- Co-organizer of Colloquium of Stat-Math unit, ISI-Bangalore from Oct 2020-now.
- Organizer of ”ISI Math Day” in Jan 2018.
- Organizer of ’Student Colloquium’ at ISI-Bangalore from 2017-2019.
- Have co-organized the following reading groups/seminars: ‘Convex Geometry’, ‘Stochastic processes on random graphs’, ‘Interacting particle systems and point processes’, ‘Geometric group theory and probability’, ‘Stein-Malliavin method’.

Teaching

- Undergraduate Courses: Basic Probability, Differential equations, Discrete Mathematics and Stochastic

Processes.

- Postgraduate Courses: Topology, Topics in Combinatorial Topology, Markov chains, Measure-theoretic probability, Topics in Discrete probability, Topics in Gaussian processes, Advanced Probability, Random graphs and limits, Random walks on graphs.

Other Duties at ISI-Bangalore

- Convenor of B.Math Syllabus revision committee, (2019).
- Member of M.Math syllabus revision committee (2021) and JRF syllabus and rules revision committee (2022).
- Have served in B.Math, M.Math and JRF(Math) Entrance exam committees including Chair of JRF(Math) in 2020.
- Member of RFAC Committee from 2015-2019.
- Member of Computer committee from 2016-2017.
- Chair of Outreach Committee, 2024 - now.