Dr. ROSNA PAUL

rosna.paul@fernuni-hagen.de

Research Experience:

Research Assistant | FernUniversität in Hagen, Germany | 2025 - present

- Conducting research and teaching related activities in the faculty of Discrete Mathematics and Optimization.

University Project Assistant | TU Graz, Austria | 2019 - 2023

- Conducted extensive research in graph drawing and flag algebra including programming in C++.
- Published findings in reputable journals and presented at international conferences.
- Collaborated with interdisciplinary groups to advance research in graph drawings, 6+ months of research abroad stays.

INSPIRE Fellow | 2014 – 2016

- Conducted a research work, as part of summer project funded by INSPIRE Scholarship during (2014 - 2016), titled as “Spectral Graph Theory” under the guidance of Dr. A. Vijayakumar, CUSAT, India. The work was concentrated on determining the spectrum of Petersen graph by utilizing line graph and the properties of strongly regular graph.

Education:

Doktoratsstudium der technischen WissenschaftenTechnische Mathematik (Dr. techn.) | TU Graz, Austria | 2019 - 2023

- Thesis: "Substructures in Simple and Geometric Drawings of Complete and Complete Bipartite Graphs". Research was under the doctoral program "Discrete Mathematics" funded by the Austrian Science Fund (FWF) and supervised by Assoc.-Prof. Dipl.Ing. Dr.techn. Oswin Aichholzer.
- Grade: 1 (excellence)

Master of Philosophy (M.Phil.) in Mathematics | CUSAT, India | 2017 – 2018

- Thesis: “A study on Dirac’s theorem on chordal graphs and Alexander duality”. The broader topic of the research was ‘Combinatorial Commutative Algebra’ and was supervised by Dr. Ambily A. A.
- Grade: 9.22/10 (excellence)

Master of Science (M.Sc.) in Mathematics (University First Rank) | CUSAT, India | 2015 – 2017

- Completed course works on: Linear algebra | Abstract Algebra | Real Analysis | Ordinary and partial differential equations | Functional Analysis | Complex Analysis | Probability theory | Operations Research | Coding and Cryptography | Commutative Algebra
- Grade: 9.89/10 (excellence)

Bachelor of Science (B.Sc.) in Mathematics (University First Rank) | MG University, India | 2012 – 2015

- Core subjects: Mathematics, Statistics and Physics.
- Grade: 3.92/4 (excellence)

Publications

Publications are arranged as per the timeline and in the format - title, authors, journal/proceedings, and url/doi. The co-authors are also ordered alphabetically, following the customary practice in discrete and computational geometry (note that first author may not be the corresponding author). Some topics have multiple presentations, in which case we include the latest venue where they were published.

Journal publications / Conference proceedings

- **On the Rectilinear Crossing Number of Complete Balanced Multipartite Graphs and Layered Graphs**. Ruy Fabila-Monroy, Rosna Paul, Jenifer Viafara-Chanchi and Alexandra Weinberger. Computational Geometry (Volume 130, Issue 2, announced to appear in 2026) https://www.sciencedirect.com/science/article/pii/S0925772125000379
- **Rotation Systems and Simple Drawings in Surfaces**. Rosna Paul, Gelasio Salazar and Alexandra Weinberger. The Electronic Journal of Combinatorics Electronic Journal of Combinatorics 13.2 (2024): P2.53.1-21. https://doi.org/10.37236/11368
- **Perfect Matchings with Crossings**. Oswin Aichholzer, Ruy Fabila-Monroy, Philipp Kindermann, Irene Parada, Rosna Paul, Daniel Perz, Patrick Schnider and Birgit Vogtenhuber. Algorithmica, 2023. https://doi.org/10.1007/s00453-023-01147-7
- **Flipping Plane Spanning Paths**. Oswin Aichholzer, Kristin Knorr, Wolfgang Mulzer, Johannes Obenaus, Rosna Paul and Birgit Vogtenhuber. WALCOM: Algorithms and Computation. WALCOM 2023. Lecture Notes in Computer Science, vol 13973. Springer, Cham. https://doi.org/10.1007/978-3-031-27051-2_5
- **Bichromatic Perfect Matchings with Crossings**. Oswin Aichholzer, Stefan Felsner, Rosna Paul, Manfred Scheucher and Birgit Vogtenhuber. In: Graph Drawing and Network Visualization: 31st International Symposium:(GD 2023). Lecture Notes in Computer Science, vol 14465. Springer, Cham. https://doi.org/10.1007/978-3-031-49272-3_9
- **Edge Partitions of Complete Geometric Graphs**. Oswin Aichholzer, Johannes Obenaus, Joachim Orthaber, Rosna Paul, Patrick Schnider, Raphael Steiner, Tim Taubner and Birgit Vogtenhuber. In: Proceedings of the 38th International Symposium on Computational Geometry:(SoCG 2022). 2022, pp.6:1-16. https://doi.org/10.4230/LIPIcs.SoCG.2022.6
- **Compatible Spanning Trees in Simple Drawings of K_n**. Oswin Aichholzer, Kristin Knorr, Wolfgang Mulzer, Nicolas El Maalouly, Johannes Obenaus, Rosna Paul, Meghana M. Reddy, Birgit Vogtenhuber and Alexandra Weinberger. In: Graph Drawing and Network Visualization: 30th International Symposium:(GD 2022). Lecture Notes in Computer Science, vol 13764. Springer, Cham. https://doi.org/10.1007/978-3-031-22203-0_2
- **Dominect: a simple yet deep 2-player board game**. Oswin Aichholzer, Maarten Löffler, Jayson Lynch, Zuzana Masárová, Joachim Orthaber, Irene Parada, Rosna Paul, Daniel Perz, Birgit Vogtenhuber and Alexandra Weinberger. In: Proceedings of the 23rd Thailand-Japan Conference on Discrete and Computational Geometry, Graphs, and Games. 2021, pp.112-113. https://www.math.science.cmu.ac.th/tjcdcggg/Book-abstract.pdf#page=119
- **Plane Spanning Trees in Edge-Colored Simple Drawings of K_n**. Oswin Aichholzer, Michael Hoffmann, Johannes Obenaus, Rosna Paul, Daniel Perz, Nadja Seiferth, Birgit Vogtenhuber and Alexandra Weinberger. In: Graph Drawing and Network Visualization: 28th International Symposium:(GD 2020). Lecture Notes in Computer Science, vol 12590. Springer, Cham. https://doi.org/10.1007/978-3-030-68766-3_37

Scholarships and Professional Achievements:

- Best presentation award at 28th International symposium on graph drawings and network visualization (GD20) for the paper titled "Plane spanning trees in the edge-colored simple drawings of K_n".
- Qualified Joint CSIR-UGC National Eligibility Test (NET) for Junior Research Fellowship (JRF) held on 16th December 2018, with all India rank -112 in Mathematical Sciences.
- Selected for Innovation in Science Pursuit for Inspired Research (INSPIRE) Fellowship in India– 2019.
- Selected for Kerala State Council for Science, Technology and Education (KSCSTE) Research Fellowship for conducting research in Kerala, India, from 2018-2019.
- INSPIRE SHE Scholarship during M.Sc. Mathematics by Department of Science and Technology, Government of India, from 2015-2017.
- INSPIRE SHE Scholarship during B.Sc. Mathematics by Department of Science and Technology, Government of India, from 2012-2015.
- District Merit Scholarship by State Govt. of Kerala for high school students in 2010.

Scientific Visits:

- Visited Prof. Dr. Wolfgang Mulzer at FU Berlin from 1st October to 17th December, 2021.
- Visited Dr. Ruy Fabila Monroy at CINVESTAV and Prof. Dr. Gelasio Salazar at UASLP from 10th January to 10th March, 2022.
- Visited Prof. Dr. Stefan Felsner at TU Berlin from 2nd May to 19th June, 2022.
- Visited Dr. Ruy Fabila Monroy at CINVESTAV and Prof. Dr. Gelasio Salazar at UASLP from 18th July to 27th August, 2022.

Language Skills:

- English: C1 - German: B1 - Malayalam: Mother tongue

Professional Memberships:

- Member of Austrian Association of Women in Mathematics. https://sites.google.com/view/a2wim/home
- Member of Ramanujan Mathematical Society. http://www.ramanujanmathsociety.org/
- Member of Kerala Mathematical Association. https://keralamathematicalassociation.in/

Invited Talks:

- Talk titled "Bicolored Points and Drawings" was given at Cochin University of Science and Technology as part of International Conference on Discrete Mathematics (ICDM 2025) on June 08, 2025.
- Talk titled "A Short Primer on Graph Drawings" was given at New York Combinatorics Seminar sponsored by the CUNY Graduate Center's Math Department and Computer Science Department, on Nov 22, 2024.
- Talk titled "A brief introduction to Graph Drawings" was given as a part of the International Lecture Series organized by the Department of Mathematics, Bharat Mata College, Kerala, India, on Jan 23, 2024.

- Talk titled “Compatibility Graph of Spanning trees in Simple Drawings” was given at Copenhagen-Jerusalem Combinatorics Seminar. https://www.youtube.com/watch?v=TuhBM_UavJQ
- Invited talk at the two-week international virtual workshop on " Mathematics: Some Concepts and Application" on the topic “Simple drawings of graphs”.
- As part of DK project, I gave a talk titled “Perfect matchings with crossings” at the Advance topics seminar on Jan 14, 2022.
- As part of PhD requirements, I gave a talk titled “Straight-line subdrawings with crossings” at the Doctoral school seminar on Jan 28, 2022.
- During the research visit, I gave a talk titled “Perfect matchings with crossings” at CINVESTAV, Mexico. https://www.youtube.com/watch?v=Yqeb-bXBpIk&t=1s
- During the research visit, I gave a talk titled “Point sets maximizing the number of perfect cross-matchings” at the noon seminar of the FU Berlin Mathematics group.
- During the research visit I gave a talk titled “Perfect matchings with crossings” at the noon seminar of the TU Berlin Mathematics group.

Conferences Attended:

- The 21st Annual Conference of the Academy of Discrete Mathematics and its Applications (ADMA) and International Conference on Discrete Mathematics (ICDM), India from June 7-10, 2025 (ADMA-ICDM 2025), gave an invited talk at this conference.
- The 31st International Symposium on Graph Drawings and Network Visualization held at Palermo, Italy from September 20-22, 2023 (GD 2023), presented the paper titled “Bichromatic Perfect Matchings with Crossings” at this conference.
- The 39th European Workshop on Computational Geometry held at Barcelona, Spain from March 29-31, 2023 (EuroCG 2023), presented the extended abstract of the paper titled “Bichromatic Perfect Matchings with Crossings” at this conference.
- The 38th European Workshop on Computational Geometry held at Perugia, Italy from March 14-16, 2022 (EuroCG 2022). The paper titled “Flipping Plane Spanning Paths” got accepted at this conference.
- The 33rd International Workshop on Combinatorial Algorithms held at University of Trier, Germany, from June 7-10, 2022 (IWOCA 2022), presented the paper titled “Perfect Matchings with crossings” at this conference.
- The 30th International Symposium on Graph Drawings and Network Visualization held at Tokyo, Japan from September 13-16, 2022 (GD 2022), presented the paper titled “Compatible Spanning Trees in Simple Drawings of K_n” at this conference.
- Final RISE-CONNECT conference held at Schloss Sankt Martin, Graz, Austria from June 27-July 2, 2022, presented the paper titled “Rotation systems and simple drawings in surfaces” at this conference.
- International Conference on Number Theory and Discrete Mathematics held at Kerala, India from December 11-14, 2020.
- The 28th International Symposium on Graph Drawings and Network Visualization held online from September 16-18, 2020 (GD 2020). I, together with Alexandra Weinberger and Johannes Obenaus, we presented the paper titled “Plane Spanning Trees in Edge-Colored Simple Drawings of K_n” at this conference and we won the best presentation award.
- International conference on Discrete and Applied Mathematics held at Thrissur, India, from September 18-19, 2020.