Paulina Hoyos

Department of Mathematics
The University of Texas at Austin
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Education

Ph.D. Student in Mathematics
Fall 2021 - Spring 2026 (Expected)
The University of Texas at Austin.

M.S. in Mathematics, April 2021
Universidad Nacional de Colombia, Medellín.

B.S. in Physics, April 2016
Universidad de los Andes, Bogotá.

Publications

5. P. Hoyos and J. Kileel. *Diffusion Maps for Group-Invariant Manifolds.* arXiv: 2303.16169.

4. C. Cadavid, P. Hoyos, J. Jorgenson, L. Smajlović, and J. Vélez. *Discrete diffusion-type equation on regular graphs and its applications.* Journal of Difference Equations and Applications, 29:4, 455-488, 2023.

3. C. Cadavid, P. Hoyos, J. Jorgenson, L. Smajlović, and J. Vélez. *On an approach for evaluating certain trigonometric character sums using the discrete time heat kernel.* European Journal of Combinatorics, Volume 108, 2023.

2. C. Cadavid, P. Hoyos, J. Jorgenson, L. Smajlović, and J. Vélez. *An integer factorization algorithm which uses diffusion as a computational engine.* arXiv:2104.11616.

1. N. Morales-Durán, A.F. Vargas, P. Hoyos-Restrepo, and P. Bargueño. *Simple regular black hole with logarithmic entropy correction.* Eur. Phys. J. C, **76**: 559, 2016.

Presentations

10. *Solving Large-Scale and Multi-Modal Systems.* Workshop for Women in Data Science and Mathematics. IPAM, UCLA. August 2023

9. *Manifold Learning with Symmetries.* SLMath Summer Graduate School on Mathematics of Big Data: Sketching and (Multi-)linear Algebra. IBM Almaden. July 2023.

8. *Trigonometric identities from the Heat Kernel on graphs.* Texas Women in Math Symposium (TWIMS), The University of Texas at Austin. March 2023.

7. *Fourier Analysis on Finite Groups Minicourse.* Summer Minicourses 2022, Department of Mathematics, The University of Texas at Austin. July 5-15.

6. *The discrete-time heat equation on graphs as a computational tool.* Data and Algebra Seminar, Department of Mathematics, The University of Texas at Austin. February 2022.

5. *The Heat equation and minimal Morse functions.* Uniandes SRI on Geometry and Theoretical Physics, Villa de Leyva, Colombia. July 2019.

4. *The Heat equation and minimal Morse functions.* Segundo Encuentro de Algebra y Topología, Universidad Nacional de Colombia, Medellín. May 2019.

3. *The Ayón-Beato–García regular black hole and topology change.* Latino-American Workshop on High Energy Physics: Particles and Strings II, La Habana, Cuba. July 2016.

2. *The Ayón-Beato–García regular black hole and topology change.* Eighth Mathematical Physics School: Random Geometries, Universidad de los Andes, Bogotá, Colombia. May 2016.

1. *The GNS construction.* Workshop on the mathematical structure and foundations of quantum physics, Universidad de los Andes, Bogotá, Colombia. June 2015.

Academic Events

8. Collaborative Research Workshop for Women in Data Science and Mathematics. IPAM, UCLA. August 2023

7. Mathematics of Big Data: Sketching and (Multi-) Linear Algebra. SLMath Summer Graduate School. IBM, Almaden. July 2023.

6. Joint Mathematics Meeting: AMS Special Sessions on i) Tensor Representation, Completion, Modeling and Analytics of Complex Data, ii) Polynomial Systems, Homotopy Continuation and Applications II, and iii) Topology, Algebra, and Geometry in the Mathematics of Data Science. Boston. January 2023.

5. Combinatorial, Computational and Applied Algebraic Geometry. University of Washington, Seattle. June 2022.

4. Noncommutative geometry and Poisson geometry around groupoids, School and Conference. Villa de Leyva, Colombia. June 2018.

3. IMPA Summer Program (Course: Fundamental Group and Covering Spaces).Univ Rio de Janeiro, Brazil. January 2 - March 2, 2018.

2. Noncommutative Geometry, School and Conference, Villa de Leyva, Colombia. June 2016.

1. Geometric, Algebraic and Topological Methods for Quantum Field Theory, Villa de Leyva Summer School, Colombia. July 2015.

Teaching Experience

Teaching Assistant for M358K Applied Statistics, The University of Texas at Austin, Spring 2023.

Teaching Assistant for M427J Differential Equations with Linear Algebra, The University of Texas at Austin, Fall 2022.

Teaching Assistant for M362k Probability I, The University of Texas at Austin, Spring 2022.

Teaching Assistant for M362k Probability I, The University of Texas at Austin, Fall 2021.

Instructor of Differential Calculus, Universidad Nacional de Colombia, Medellín, September 2019 - January 2020.

Instructor of Differential Calculus, Universidad Nacional de Colombia, Medellín, January - April, 2020.

Instructor of Differential Calculus, Universidad Nacional de Colombia, Medellín, August - December, 2018.

Instructor of Basic Mathematics (Precalculus), Universidad Nacional de Colombia, Medellín, February - June, 2018.

Teaching Assistant for Differential Calculus, Universidad Nacional de Colombia, Medellín, July - December, 2017.

Instructor of Prephysics (recitation course), Universidad de los Andes, Colombia, January - May 2016.

Teaching assistant at *Clínica de Problemas de Física*, Universidad de los Andes, Colombia, July - December 2014.

Mentoring

1. Directed Reading Program (DRP) in Mathematics mentor for undergraduate sophomore student. Topic: Randomized Algorithms in Numerical Linear Algebra. Fall 2023.

2. Directed Reading Program (DRP) in Mathematics mentor for undergraduate sophomore student. Topic: Introduction to graph theory. Spring 2023.

Outreach

4. Volunteer, Department of Mathematics Stand, Girl Day at UT Austin. February 2023.

3. *Introduction to Quantum Computing: What is and what isn't a quantum computer?* Sunday Morning Math Group (SMMG), The University of Texas at Austin. January 2023.

2. *Random Walks on Graphs.* Sunday Morning Math Group (SMMG), The University of Texas at Austin. November 2022.

1. *Random Walks on Graphs.* Research in Math Club, LASA High School. October 2022.

Honors and Awards

University of Texas at Austin Graduate School Summer Fellowship. Summer 2023.

Laureate distinction for M.Sc. thesis "On the discrete Heat equation and Kolmogorov complexity theory". Universidad Nacional de Colombia. February 2021.

Half-tuition waiver for academic excellence. Facultad de Ciencias, Universidad Nacional de Colombia, Medellín. April 2019.

2018 Summer Program Scholarship. IMPA, Rio de Janeiro, Brazil. January 2018.

Bachilleres por Colombia "Mario Galán Gómez" scholarship for undergraduate studies. Ecopetrol S.A., Colombia. August 2011.

References

Joe Kileel, Assistant Professor
Department of Mathematics and Oden Institute
The University of Texas at Austin
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Jay Jorgenson, Professor and Graduate Chair
Department of Mathematics
The City College of New York
jjorgenson@ccny.cuny.edu

Pedro Bargueño, Distinguished Researcher
Department of Applied Physics
Universidad de Alicante, España
pedro.bargueno@ua.es