

SERGIO CRISTANCHO

Email: sergio[dot]cris[at]princeton[dot]edu

Languages: Spanish (native), English (fluent), German, Italian (intermediate).

Citizenship: Colombian.

PERSONAL STATEMENT

I am a third year graduate student in Applied and Computational Mathematics at Princeton University. My interests lie in the intersection of algebra, geometry and combinatorics, and applications.

EDUCATION

Princeton University

P.h.D. in Applied Mathematics,

Princeton, New Jersey

Ongoing

Universidad de los Andes

M.S. in Mathematics,

Bogotá, Colombia

B.S. in Physics,

2023

B.S. in Mathematics,

2021

2020

RESEARCH

Publications:

Harmonic Hierarchies for Polynomial Optimization. With Mauricio Velasco. 2024. SIAM Journal on Optimization 2024 34:1, 590-615. <https://doi.org/10.1137/22M1484511>

Preprints:

Extremal Graphs for the Lights Out Problem. With Julien Codsi, Alexander Divoux and Varun Sivashankar. 2026. <https://arxiv.org/abs/2602.07241>

Tree metrics and log-concavity for matroids. With Federico Ardila, Graham Denham, Chris Eur, June Huh and Botong Wang. 2026. <https://arxiv.org/abs/2601.02547>

Talks:

Lorentzian polynomials and triangular hyperfields. *Arbeitsgemeinschaft: Combinatorial Hodge Theory*, Mathematisches Forschungsinstitut Oberwolfach, October 2025.

Inequalities for metric trees and matroids. *Discrete Math Seminar*, University of Massachusetts Amherst, September 2025.

Three proofs of the reverse Khovanskii-Teissier Inequality. *Special Year Seminar*, Institute for Advanced Study, January 2025.

Harmonic Hierarchies for Polynomial Optimization on Homogeneous Spaces. *SIAM Conference on Applied Algebraic Geometry 2023 (SIAM AG23)*, Eindhoven University of Technology, July 2023.

Harmonic Hierarchies for Polynomial Optimization. *International Conference on Continuous Optimization (ICOPT 2022)*, Lehigh University, July 2022.

Harmonic Hierarchies for Polynomial Optimization. *Conferencia Colombiana de Matemáticas Aplicadas e Industriales (MAPI 2)*, June 2022.

TEACHING & COMMUNITY INVOLVEMENT

Teaching Assistant

Abstract Algebra,
Honors Linear Algebra,
Applied Algebra

Princeton University

Teaching Assistant

Real Analysis,
Abstract Algebra,
Enumerative Combinatorics,
Linear Algebra

Universidad de los Andes

Mentor for the Directed Reading Program

Princeton University

INDUSTRY EXPERIENCE

Research and Development

Mathematical model developer.

Melius I+D

Nov. 2020 - Jul. 2023