Emanuel Juliano

Ph.D. Student

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Education

Jul 2023–Present — **Ph.D. in Computer Science**, *Federal University of Minas Gerais*
Research Interests: Algebraic Graph Theory, Extremal Combinatorics, Graph Eigenvalues, Semidefinite Programming, and Quantum Computing.
Supervisor: Gabriel Coutinho **Expected Completion**: Jul 2027

2019–2023 — **B.S. in Computer Science**, *Federal University of Minas Gerais*
Coursework: Quantum Information Theory; Graph Theory; Semidefinite Programming.
GPA: 93/100 **Final Project**: Quantum Walks in Subdivided Trees

Research Visits

Fall 2026 — **Visiting Researcher**, *University of Waterloo*, Canada
Department of Combinatorics and Optimization. Collaborating with Chris Godsil.

2025 — **Research Visitor**, *Eindhoven University of Technology*, The Netherlands
Combinatorial Optimization Group. Collaborated with Aida Abiad.

Jun 2024 — **Ph.D. Visitor**, *IMPA*, Rio de Janeiro, Brazil
Combinatorics Group. Supervised by Robert Morris. Subjects: Random Graphs and the Probabilistic Method.

Publications

Published and Forthcoming

2027 A. Abiad, N. van de Berg, E. Juliano, H. Reijnders, R. Simoens, T. van Veluw, J. Wittebol. The edge-isoperimetric number of graphs and their powers. *Discrete Mathematics* 350(2), Article 115442 (forthcoming).

2026 E. Juliano. Tightness of a MaxCut Lower Bound via Vector Chromatic Number. *The Electronic Journal of Combinatorics* 33(3), Paper P3.69.

2026 P. M. S. Fialho, E. Juliano, A. Procacci. On the zero-free region for the chromatic polynomial of graphs with maximum degree Δ and girth g. *Discrete Mathematics* 349(3), Article 114825.

2025 P. M. S. Fialho, E. Juliano, A. Procacci. A remark on the Whitney Broken Circuit Theorem. *Computational and Applied Mathematics* 44(6), Article 298.

2025 G. Coutinho, E. Juliano, T. J. Spier. The spectrum of symmetric decorated paths. *Linear Algebra and its Applications* 711, pp. 17–39.

2025 T. Assis, G. Coutinho, E. Juliano. Spectral upper bounds for the Grundy number of a graph. *Discrete Mathematics* 348(3), Article 114326.

2024 G. C. M. Gomes, E. Juliano, G. Martins, V. F. dos Santos. Matching (Multi)Cut: Algorithms, Complexity, and Enumeration. *19th International Symposium on Parameterized and Exact Computation (IPEC 2024), LIPIcs* 321, pp. 25:1–25:15.

2024 G. Coutinho, E. Juliano, T. J. Spier. No perfect state transfer in trees with more than 3 vertices. *Journal of Combinatorial Theory, Series B* 168, pp. 68–85.

2023 G. Coutinho, E. Juliano, T. J. Spier. Strong cospectrality in trees. *Algebraic Combinatorics* 6(4), pp. 955–963.

2022 G. Coutinho, C. Godsil, E. Juliano, C. M. van Bommel. Quantum walks do not like bridges. *Linear Algebra and its Applications* 652, pp. 155–172.

Accepted

2026 A. Abiad, G. Coutinho, E. Juliano, V. F. dos Santos, S. Zeijlemaker. Computing fixed point free automorphisms of graphs. Accepted to *LATIN 2026*. arXiv:2603.26006.

2026 A. Abiad, G. Coutinho, E. Juliano, H. Reijnders. A graph energy conjecture through the lenses of semidefinite programming. Accepted for publication in *SIAM Journal on Optimization (SIOPT)*. arXiv:2509.05814.

Preprints

2026 A. Abiad, G. Coutinho, H. Kumar, E. Juliano, M. Tait. Clique and chromatic numbers of graph powers: spectral bounds and anticodes. Submitted. arXiv:2610.13852.

2024 E. Juliano. Forbidden subdivision in integral trees. arXiv:2405.08028.

Awards

2025 **Google PhD Fellowship**, *Google*
Research area: Algorithms and Optimization.

2023–2024 **Latin American Champion**, *ICPC 2024*, Team: UFMG - teambrbr002
Brazilian Subregionals: **rank 1**/726 Brazilian Finals: **rank 4**/64 Latin America Finals: **rank 1**/40
World Finals (Astana): rank 73/141

2022–2023 **Gold Medal**, *ICPC 2023 (Regionals)*, Team: UFMG - Humuhumunukunukuapua'a
Brazilian Subregionals: **rank 2**/524 Brazilian Finals: **rank 2**/60 **World Finals (Luxor)**: rank 98/130

2021–2022 **Gold Medal**, *ICPC 2022 (Regionals)*, Team: UFMG - Summergimurne?
Brazilian Subregionals: **rank 2**/513 Brazilian Finals: **rank 2**/55 **Qualified for the World Finals (Luxor)**

Presentations

Oct 2026 **On the connection between max-cuts, the vector chromatic number, and random sphere graphs**, *Graphs and Matroids Seminar, University of Waterloo.*

May 2026 **A graph energy conjecture through the lenses of semidefinite programming**, *27th Conference of the International Linear Algebra Society (ILAS 2026).*

Apr 2026 **Computing fixed point free automorphisms of graphs**, *LATIN 2026.*

Nov 2025 **A graph energy conjecture through the lenses of semidefinite programming**, *Dutch Day on Optimization 2025.*

Nov 2025 **A graph energy conjecture through the lenses of semidefinite programming**, *DM Seminar, Umeå University.*

Nov 2025 **A graph energy conjecture through the lenses of semidefinite programming**, *TCS&DM Seminar, Heidelberg University.*

Oct 2025 **Graph energy of highly regular graphs**, *BIRS Workshop - Algebraic Graph Theory and Applications (25w5432).*

Sep 2025 **A graph energy conjecture through the lenses of semidefinite programming**, *LIMDA Seminar, UPC.*

Sep 2025 **A graph energy conjecture through the lenses of semidefinite programming**, *12th PhD Summer School in Discrete Mathematics.*

Jun 2025 **Spectral upper bounds for the Grundy number of a graph**, *The 26th Conference of the International Linear Algebra Society.*

Jun 2025 **Computing Fixed Point Free Automorphisms of Graph Classes**, *5th Pythagorean Conference.*

May 2025 **Computing Fixed Point Free Automorphisms of Graph Classes**, *CO Seminar, Eindhoven University of Technology.*

Apr 2025 **Grundy number and the matching polynomial**, *DMQI Seminar, University of Amsterdam.*

Mar 2025 **Matching (Multi)Cut**, *Dutch Days of Combinatorics*, Lightning talk.

Jun 2024 **Rainbow Stacking of Random Edge-Colorings**, *1st Brazilian Workshop of Combinatorics*, Open problem session.

Oct 2023 **Forbidden structures in integral trees**, *Workshop on Spectral Graph Theory.*

Sep 2023 **Spectral bounds for the Grundy number**, *1st Brazilian School of Combinatorics*, Poster.

Jan 2022 **Quantum walks do not like bridges**, *Algebraic Graph Theory Seminar*, University of Waterloo.

Oct 2021 **Strongly Cospectral Vertices in Trees**, *Algebraic Graph Theory Seminar*, University of Waterloo.

Aug 2021 **Strongly Cospectral Vertices in Trees**, *Workshop on Algebraic Graph Theory and Quantum Information*, The Fields Institute, Poster.

Teaching

2024, sem. 2 **Teaching Assistant**, *Discrete Mathematics*, UFMG.

2024, sem. 1 **Teaching Assistant**, *Operational Research*, UFMG.

2021–2023 **Instructor / Problem Setter**, *International Olympiad in Informatics - Brazilian Qualifiers.*

2022, sem. 2 **Teaching Assistant**, *Graph Theory*, UFMG.

2022, sem. 1 **Teaching Assistant**, *Samsung Software Development Training*, UFMG.

2020–2021 **Course in Algorithms**, *Competitive Programming YouTube Channel*, UFMG.

Experience

2023 **Intern - Computer and Information Research Scientist**, *Most*, Belo Horizonte
Applied analytical research to information extraction from documents in MostQI.

2020–2022 **Undergraduate Researcher**, *Federal University of Minas Gerais*, Belo Horizonte
Supervised by Professor Gabriel Coutinho. Subjects: Spectral Graph Theory and Quantum State Transfer.

2019 **Undergraduate Researcher**, *Federal University of Minas Gerais*, Belo Horizonte
Supervised by Professor Wagner Meira Junior. Subjects: Data Analysis and Natural Language Processing.