Josué Tonelli-Cueto

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EMPLOYMENT

Assistant Professor on Tenure Track,
CUNEF Universidad, Dept. of Quantitative Methods, 2026–present.

Rufus Isaacs Postdoctoral Fellow,
Johns Hopkins University (Maryland, United States of America), 2023-2026.

Lecturer / Postdoctoral Researcher,
The University of Texas at San Antonio (Texas, United States of America), 2022-2023.

FSMP Postdoctoral Fellow,
Inria Paris & IMJ-PRG (France), 2020-2022.

Postdoctoral Researcher,
Inria Paris & IMJ-PRG (France), 2020.

EDUCATION

Dr. rer. nat. Mathematik (Doctorado en Matemáticas),
Berlin Mathematical School & Technische Universität Berlin (Germany), 2019.

M.Sc. Mathematik,
Berlin Mathematical School & Technische Universität Berlin (Germany), 2017.

Licenciatura en Matemáticas,
University of the Basque Country, 2014.

FIELDS OF INTEREST

Computational algebraic geometry; numerical methods; symbolic-numerical methods; random geometry; analysis and design of algorithms; applied algebraic geometry; data science

SELECTED PUBLICATIONS

Khalife, Sammy; Tonelli-Cueto, Josué: "Is uniform expressivity too restrictive? Towards efficient expressivity of GNNs," in *The Thirteenth International Conference on Learning Representations (ICLR'25)*, 2025. https://openreview.net/forum?id=lsvGqR6OTf

La Valle, Chris; Tonelli-Cueto, Josué: "Some lower bounds on the reach of an algebraic variety," in *ISSAC '24: Proceedings of the 2024 International Symposium on Symbolic and Algebraic Computation*, ACM, pp.217-225, 2024. https://doi.org/10.1145/3666000.3669693

Tonelli-Cueto, Josué; Tsigaridas, Elias: *Condition numbers for the cube. I: Univariate polynomials and hypersurfaces*, *Journal of Symbolic Computation*, 115, pp.142-173, 2023. https://doi.org/10.1016/j.jsc.2022.08.013

Radons, Manuel; Tonelli-Cueto, Josué: "Generalized Perron roots and solvability of the absolute value equation," *SIAM Journal on Matrix Analysis and Applications*, 44-4, pp.1645-1666, 2023. https://doi.org/10.1137/22M1517184

Ergür, Alperen; Tonelli-Cueto, Josué; Tsigaridas, Elias: "Beyond worst-case analysis for root isolation algorithms" in *ISSAC '22: Proceedings of the 2022 International Symposium on Symbolic and Algebraic Computation*, ACM, pp.139-148, 2022. https://doi.org/10.1145/3476446.3535475

Cucker, Felipe; Ergür, Alperen A.; Tonelli-Cueto, Josué: "Functional norms, condition numbers and numerical algorithms in algebraic geometry," *Forum of Mathematics, Sigma*, 10-e103 1–49, 2022. https://doi.org/10.1017/fms.2022.89

Cucker, Felipe; Ergür, Alperen A.; Tonelli-Cueto, Josué: "On the complexity of the Plantinga-Vegter algorithm," *Discrete & Computational Geometry*, 68-3, pp.664-708, 2022. https://doi.org/10.1007/s00454-022-00403-x

Bürgisser, Peter; Cucker, Felipe; Tonelli-Cueto, Josué: "Computing the homology of semialgebraic sets. II: General formulas," *Foundations of Computational Mathematics*, 21-5, pp.1279-1316, 2021. https://doi.org/10.1007/s10208-020-09483-8

Bürgisser, Peter; Cucker, Felipe; Tonelli-Cueto, Josué: "Computing the homology of semialgebraic sets. I: Lax formulas," *Foundations of Computational Mathematics*, 20-1, pp.71-118, 2020. https://doi.org/10.1007/s10208-019-09418-y

Bürgisser, Peter; Ergür, Alperen A.; Tonelli-Cueto, Josué: "On the number of real zeros of random fewnomials," *SIAM Journal on Applied Algebra and Geometry*, 3-4, pp.721-732, 2019. https://doi.org/10.1137/18M1228682

WORKING PAPERS

Tonelli-Cueto, Josué: "Condition-based Low-Degree Approximation of Real Polynomial Systems. II.W: The Positive Dimensional Case in the Elliptic Regime". In progress.

Tonelli-Cueto, Josué; Tsigaridas, Elias: "Condition-based Low-Degree Approximation of Real Polynomial Systems. I: The Zero-Dimensional Dimensional Case". In progress.

Ergür, Alperen; Tonelli-Cueto, Josué; Tsigaridas, Elias: "Beyond Worst-Case Analysis for Symbolic Computation: Root Isolation Algorithms". arXiv:2506.04436. https://doi.org/10.48550/arXiv.2506.04436

Gregory, Wilson G.; Tonelli-Cueto, Josué; Marshall, Nicholas F.; Lee, Andrew S.; Villar, Soledad: "Learning equivariant tensor functions with applications to sparse vector recovery," arXiv:2406.01552. https://doi.org/10.48550/arXiv.2406.01552

Ergür, Alperen; Telek, Máté L.; Tonelli-Cueto, Josué: "On the Number of Real Zeros of Random Sparse Polynomial Systems," arXiv:2306.06784. https://doi.org/10.48550/arXiv.2306.06784

SELECTED ACADEMIC HONOURS AND GRANTS

Member of the Program Committee of the **50th International Symposium on Symbolic and Algebraic Computation (ISSAC'25)** (July 28-August 1, 2025, in Guanahuato, Mexico)

Chairperson of the Organizing Committee of **RSME's 7th Congress of Young Researchers** [gazteakRSME2025] (January 13-17, 2025, in Bilbao, Spain). https://jovenes2025.rsme.es/

AMS Travel Grant 2023. 2-year grant (with 6 000 USD funds) awarded by the American Mathematical Society for research activities.

2020 FSMP Postdoctoral Fellowship. Awarded by the Fondation Sciences Mathématiques de Paris (FSMP) to fund a postdoctoral position.

3rd Prize in the Tiburtius Prizes 2020 of the Berlin Universities. Award given by the State Conference of Rectors and Presidents of Berlin Universities to PhD theses defended in Berlin.

SELECTED PRESENTATIONS

Accepted Paper Presentations at Conferences: ISSAC'24, ISSAC'22, ISSAC'21, ISSAC'20, ISSAC'19; MEGA2021, MEGA2022, MEGA2024; ICLR'25 (poster). **Presentations at Special Sessions of Conferences:** JMM 2023; MCA2025, MCA2021; SIAM AG 2025, SIAM AG 2023, SIAM AG 2019; RSME2024, RSME2022; jóvenesRSME2023, jóvenesRSME2020; 2025 Fall Central AMS Sectional Meeting, 2025 Spring Southeastern AMS Sectional Meeting. **Presentations at Research Conferences/Workshops:** MikeFest2025, BIRS-IMAG 2024, BIRS-CMO 2024, CIRM 2023, BIRS 2023, 8th Iberian Mathematical Meeting (2022), BIRS 2021. **Seminar Presentations:** University of Texas at San Antonio 2025, University of Missouri 2024, University of the Basque Country 2024, CodEx Seminar 2023 [online], North Carolina State University 2022, JHU MINDS & CIS Seminar 2022, Institut de Recherche XLIM 2022, Institut de Mathématiques de Bordeaux 2022, UiT The Artic University of Norway 2021, Universidade Federal do Rio de Janeiro 2021 [online].

OTHER ACTIVITIES

Active Member of *Johns Hopkins Postdocs & Researchers Organized-United Auto Workers (Hopkins PRO-UAW)*, 2023-2026.

Co-President of the Homewood Postdoctoral Association (HW-PDA) at Johns Hopkins, 2024-2025.