



Josué Tonelli-Cueto

Curriculum Vitae

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Areas of mathematical interest

- Numerical algorithms
- Computational algebraic geometry
- Condition-based complexity
- Random geometry

Positions

- Aug/2023 **Rufus Isaacs Postdoctoral Fellow**, *John Hopkins University*, Baltimore, United States.
Aug/2025|26 Mentor: Soledad Villar
- Sep/2022 **Lecturer/Research Fellow**, *The University of Texas at San Antonio*, San Antonio, United States.
Aug/2023 Mentor: Alperen A. Ergür
- Oct/2020 **FSMP Postdoctoral Fellow**, *OURAGAN team, Inria Paris & IMJ-PRG*, Paris, France.
Sep/2022 Mentors: Fabrice Rouillier, Elias Tsigaridas
- Feb/2020 **Postdoctoral researcher**, *OURAGAN team, Inria Paris & IMJ-PRG*, Paris, France.
Sep/2020 Mentors: Fabrice Rouillier, Elias Tsigaridas

Education

- Jan/2017 **Dr. rer. nat. Mathematik**, *Technische Universität Berlin*, Germany, *Summa Cum Laude*.
Nov/2019 Thesis *Condition and Homology in Semialgebraic Sets* defended on November 28, 2019
Supervised by Peter Bürgisser and Felipe Cucker in the framework of the Berlin Mathematical School
With 3rd Prize in the *Tiburtius Prizes 2020 of the Berlin Universities* and *MATH+ Dissertation Award 2020*
- Oct/2014 **M.Sc. Mathematik**, *Technische Universität Berlin*, Germany, *1.0*.
Mar/2017 Thesis *On the Complexity of some Null-Cone Membership Problems* supervised by Peter Bürgisser
In the framework of the Berlin Mathematical School
- Oct/2009 **Licenciatura en matemáticas**, *University of the Basque Country*, Spain, *9.86*.
Jul/2014 With *Best Student Record* and *First Prize in the End of Studies Spanish National Awards*

Publications

In progress

- [1] J. Tonelli-Cueto. (n.d.). A numerical algorithm for zero counting. IV: An adaptive speedup. In progress. Presented at MEGA2020.
- [2] J. Tonelli-Cueto & E. Tsigaridas. (n.d.). Condition-based bounds on the size of a polynomial zero set. In progress.

Preprints

- [3] Alperen A. Ergür, Máté L. Telek, & J. Tonelli-Cueto. (2023, June). On the Number of Real Zeros of Random Sparse Polynomial Systems. arXiv:2306.06784.
- [4] M. Radons & J. Tonelli-Cueto. (2022, June). Generalized Perron Roots and Solvability of the Absolute Value Equation. Journal-submitted version of [16]. arXiv:1912.08157.
- [5] J. Tonelli-Cueto. (2022, March). A p -adic Descartes solver: the Strassman solver. arXiv:2203.07016.
- [6] Kh. Kozhasov & J. Tonelli-Cueto. (2022, January). Probabilistic bounds on best rank-one approximation ratio. arXiv:2201.02191.

Journal papers

- [7] J. Tonelli-Cueto & E. Tsigaridas. (2023, March). Condition Numbers for the Cube. I: Univariate Polynomials and Hypersurfaces. *Journal of Symbolic Computation*, 115, 142–173. doi:10.1016/j.jsc.

2022.08.013. In the Special Issue of ISSAC '20. Journal version of [18]. arXiv:2006.04423.

- [8] F. Cucker, A. A. Ergür, & J. Tonelli-Cueto. (2022, November). Functional norms, condition numbers and numerical algorithms in algebraic geometry. *Forum of Mathematics, Sigma*, 10(e103), 1–41. doi:10.1017/fms.2022.89. arXiv:2102.11727.
- [9] J. Tonelli-Cueto. (2022, October). A Geometric Summation of the Geometric Series. *The American Mathematical Monthly*, 129(10), 974–974. doi:10.1080/00029890.2022.2115825. hal-03779492.
- [10] F. Cucker, A. A. Ergür, & J. Tonelli-Cueto. (2022, August). On the Complexity of the Plantinga-Vegter Algorithm. *Discrete & Computational Geometry*, 68(3), 664–708. doi:10.1007/s00454-022-00403-x. Journal version of [19]. arXiv:2004.06879.
- [11] P. Bürgisser, F. Cucker, & J. Tonelli-Cueto. (2021, October). Computing the Homology of Semialgebraic Sets. II: General formulas. *Foundations of Computational Mathematics*, 21(5), 1279–1316. On-line from January of 2021. doi:10.1007/s10208-020-09483-8. arXiv:1903.10710.
- [12] P. Bürgisser, F. Cucker, & J. Tonelli-Cueto. (2020, February). Computing the Homology of Semialgebraic Sets. I: Lax Formulas. *Foundations of Computational Mathematics*, 20(1), 71–118. On-line from May of 2019. doi:10.1007/s10208-019-09418-y. arXiv:1807.06435.
- [13] P. Bürgisser, A. A. Ergür, & J. Tonelli-Cueto. (2019, December). On the Number of Real Zeros of Random Fewnomials. *SIAM J. Appl. Algebra Geom.* 3(4), 721–732. doi:10.1137/18M1228682. arXiv:1811.09425.

Conference papers

- [14] A. Chalkis, Ch. Katsamaki, & J. Tonelli-Cueto. (2022, July). On the Error of Random Sampling: Uniformly Distributed Random Points on Parametric Curves. In *Proceedings of the 2022 international symposium on symbolic and algebraic computation* (pp. 273–282). ISSAC '22. Villeneuve-d'Ascq, France. ACM. doi:10.1145/3476446.3536190. arXiv:2203.02832..
- [15] A. A. Ergür, J. Tonelli-Cueto, & E. Tsigaridas. (2022, July). Beyond Worst-Case Analysis for Root Isolation Algorithms. In *Proceedings of the 2022 international symposium on symbolic and algebraic computation* (pp. 139–148). ISSAC '22. Villeneuve-d'Ascq, France. ACM. doi:10.1145/3476446.3535475. arXiv:2202.06428..
- [16] M. Radons & J. Tonelli-Cueto. (2022, July). Generalized Perron roots and solvability of the absolute value equation. In L. F. Tabera Alonso (Ed.), *Discrete mathematics days 2022* (pp. 237–242). Santander, Spain. Editorial Universidad de Cantabria. doi:10.22429/Euc2022.016
- [17] J. G. Suchen & J. Tonelli-Cueto. (2022, June). Ultrametric Smale's α -theory. *ACM Commun. Comput. Algebra*, 56(2), 56–59. doi:10.1145/3572867.3572875. arXiv:2206.08392.
- [18] J. Tonelli-Cueto & E. Tsigaridas. (2020, July). Condition Numbers for the Cube. I: Univariate Polynomials and Hypersurfaces. In *Proceedings of the 2020 on International Symposium on Symbolic and Algebraic Computation* (pp. 434–441). ISSAC '20. Kalamata, Greece. ACM. doi:10.1145/3373207.3404054. arXiv:2006.04423v1.
- [19] F. Cucker, A. A. Ergür, & J. Tonelli-Cueto. (2019, July). Plantinga-Vegter Algorithm Takes Average Polynomial Time. In *Proceedings of the 2019 on International Symposium on Symbolic and Algebraic Computation* (pp. 114–121). ISSAC '19. Beijing, China. ACM. doi:10.1145/3326229.3326252. arXiv:1901.09234.

Other

- [20] J. Tonelli-Cueto. (2019, December). *Condition and Homology in Semialgebraic Geometry* (Doctoral thesis, Technische Universität Berlin). doi:10.14279/depositonce-9453

Organized activities

13-17/Jan/2025 **VII Congreso de Jóvenes Investigadores de la RSME**, University of the Basque Country (UPV/EHU) & Basque Center for Applied Mathematics (BCAM), Bilbao, Spain.
Organizing Committee with Julen Alvarez-Aramberri, Jon Asier Bárcena-Petisco, Aingeru Fernández Bertolin, Oihana Garayalde Ocaña, Leticia Hernando, Iker Malaina, Judit Muñoz-Matute, and Jone Uria-Albizuri

- 10-14/Jul/2023 **Minisymposium *Computational Real Algebraic Geometry***, *SIAM Conference on Applied Algebraic Geometry 2023*.
Co-organizer with Beatriz Pascual Escudero, Sebastian Debus, and Cordian Riener
- 6-11/Feb/2023 **Sesión Especial *Geometría Algebraica II: Aplicaciones y Computación***, *VI Congreso de Jóvenes Investigadores de la RSME*.
Co-organizer with Angélica Torres
- 4-7/Jan/2023 **AMS Special Session on *Data Science at the Crossroads of Analysis, Geometry, and Topology (a Mathematics Research Communities session)***, *Joint Mathematics Meetings 2023*.
Co-organizer with Hitesh Gakhar and Harlin Lee
- 12-16/Dec/2022 **Sesión Especial *Computación y Aplicaciones en Geometría Algebraica***, *II Encuentro RSME-UMA*.
Co-organizer with Alicia Dickenstein, Gabriela Jerónimo and Beatriz Pascual Escudero
- 4-6/Nov/2022 **Mini-Symposium *Applications and Computation in Algebraic Geometry***, *5th Annual Meeting of the SIAM Texas-Louisiana Section*.
Co-organizer with Jordy Lopez and Thomas Yahl
- 17-21/Jan/2022 **Sesión Especial *Geometría Algebraica: la Aplicada, la Computacional y la Numérica***, *Congreso Bienal de la Real Sociedad Matemática Española 2022*.
Co-organizer with Laura Brustenga i Moncusí and Roser Homs
- 16-20/Aug/2021 **Minisymposium *Computational Real Algebraic Geometry***, *SIAM Conference on Applied Algebraic Geometry 2021*.
Co-organizer with Cordian Riener
- 19-24/Jul/2021 **Special Session *Symbolic and Numerical Computation with Polynomials***, *Mathematical Congress of the Americas 2021*.
Co-organizer with Diego Armentano, Matías Bender and Alperen A. Ergür
- 1-3/Dec/2020 **3rd BYMAT Conference**, *Universitat de València & Universitat Politècnica de València*, (On-line).
Member of the Scientific Committee with Adrián Hinojosa-Calleja (Coordinator), Marta de León-Contreras, Consuelo Parreño-Torres, Tomás Sanz-Perela, Victoria Ponce-Bobadilla, Erik Sarrión-Pedralva, and Juan Carlos Cortés López
Member of the Poster Committee with Clara Burgos Simón, Ángela Capel, David Martínez, Judit Muñoz-Matute, Eva Primo Tárraga, and Erik Sarrión-Pedralva
- May/2016 **“What is . . . ?” Seminar**, *Berlin Mathematical School*.
- Dec/2019 Student organized seminar where a new concept, idea or object is introduced each week
Co-organizer, web-design and video management
- 21-26/Oct/2019 **Research Workshop on Random Real Algebraic Geometry**, *Güzelyurt*, Northern Cyprus.
Co-organizer with Alp Bassa, Turgay Bayraktar, Özgür Kiisel and Ferit Öztürk
- 9-12/Jul/2019 **Minisymposium *Numerical methods for structured polynomial system solving***, *SIAM Conference on Applied Algebraic Geometry 2019*.
Co-organizer with Alperen A. Ergür, Pierre Lairez and Gregorio Malajovich
- 21-23/Feb/2018 **6th BMS Student Conference**, *Berlin Mathematical School*.
Member of Organizing Committee with Héctor Andrade Loarca, Qiao Luo, Brent Moran and Yuya Tokuta

Talks and other presentations

Conference presentations

- Jul/2023 **Condition-Based Probabilistic Complexity of Symbolic Algorithms: Descartes' Solver and Beyond!**, *SIAM Conference on Applied Algebraic Geometry 2023*, Paris, France.
- Apr/2023 **Robust probabilistic bounds on the number of real zeros**, *BIRS Workshop “Random Algebraic Geometry” (23w5070)*, Banff, Canada.
- Feb/2023 **Condition-based Low-Degree Approximation of Real Polynomial Systems**, *VI Congreso de Jóvenes Investigadores de la RSME*, León, Spain.

- Jan/2023 **Condition-based Low-Degree Approximation of Real Polynomial Systems**, *Joint Mathematics Meetings 2023*, Boston, USA.
- Nov/2022 **Average Almost-Optimality of Descartes Solver**, *4th BYMAT Conference*, On-line.
- Nov/2022 **Generating random points uniformly distributed on a parametric curve**, *5th Annual Meeting of the SIAM Texas-Louisiana Section*, Houston, USA.
- Oct/2022 **Why does Descartes solver work?**, *8th Iberian Mathematical Meeting*, Sevilla, Spain.
- Jul/2022 **The Grid Method in Numerical Real Algebraic Geometry**, *XXI Lluís Santaló School: Random and Deterministic Point Configurations*, Santander, Spain.
- Jul/2022 **Beyond Worst-Case Analysis for Root Isolation Algorithms**, *ISSAC 2022*, Lille, France.
- Jun/2022 **Probabilistic bounds on best rank-one approximation ratio**, *MEGA 2022*, Kraków, Poland.
- Jan/2022 **New bounds for the number of real zeros of a random polynomial system**, *Congreso Bienal de la Real Sociedad Matemática Española 2022*, Ciudad Real, Spain.
- Nov/2021 **Reacciones químicas, polinomios y sus ceros reales**, *Jornada SIEF y Asamblea General 2021*, Colegio de España, Cité internationale universitaire de Paris, France.
- Oct/2021 **Metric restrictions on the number of real zeros**, *Workshop "Real Polynomials: Counting and Stability"*, Casa Matemática Oaxaca, Mexico (On-line poster due to the COVID-19 pandemic).
- Aug/2021 **Breaking the Curse of Infinite Average Run-Time in Numerical Real Algebraic Geometry, can the Adaptive Grid Method do the Job?**, *SIAM Conference on Applied Algebraic Geometry 2021*, College Station, Texas, USA. (On-line poster due to the COVID-19 pandemic).
Contributed talk, submitted as poster
- Aug/2021 **What's new in Computational Real Algebraic Geometry? (Introductory Talk for the Minisymposium *Computational Real Algebraic Geometry*)**, *SIAM Conference on Applied Algebraic Geometry 2021*, College Station, Texas, USA. (On-line talk due to the COVID-19 pandemic).
Together with C. Riener.
- Aug/2021 **Symbolic vs. Numerical: Allies or Enemies? (Introductory Talk for the Special Session *Symbolic and Numerical Computation with Polynomials*)**, *Mathematical Congress of the Americas 2021*, Buenos Aires, Argentina. (On-line talk due to the COVID-19 pandemic).
Together with M. Bender.
- Jun/2021 **A Numerical Algorithm for Zero Counting. IV: An Adaptive Speedup**, *MEGA 2021*, Tromsø, Norway. (On-line talk due to the COVID-19 pandemic).
- Jun/2021 **Functional norms, condition numbers and numerical algorithms in algebraic geometry**, *MEGA 2021*, Tromsø, Norway. (On-line talk due to the COVID-19 pandemic).
Together with F. Cucker and A.A. Ergür
- Jul/2020 **Condition Numbers for the Cube. I: Univariate Polynomials and Hypersurfaces**, *ISSAC 2020*, Kalamata, Greece. (On-line talk due to the COVID-19 pandemic).
- Feb/2020 **Beyond Gaussians in the probabilistic analysis of condition numbers in algebraic geometry**, *Milestones Conference of the Thematic Einstein Semester on Algebraic Geometry*, Berlin, Germany.
- Jan/2020 **Computing the homology of semialgebraic sets in weak single exponential time**, *V Congreso de Jóvenes Investigadores la RSME*, Castelló, Spain.
- Jan/2020 **Real zeros of random fewnomials**, *V Congreso de Jóvenes Investigadores de la RSME*, Castelló, Spain.
- Oct/2019 **On zeros of random fewnomials (2 talks)**, *Research Workshop on Random Real Algebraic Geometry*, Güzelyurt, Northern Cyprus.
- Oct/2019 **What is the probabilistic analysis of a condition number?**, *Opening Conference of the Thematic Einstein Semester on Algebraic Geometry*, Berlin, Germany.
- Aug/2019 **Average minus Weak Complexity equals Adaptive algorithms**, *Complexity of numerical computation: A conference in honor of Felipe Cucker*, Berlin, Germany.
- Jul/2019 **Plantinga-Vegter takes average polynomial time**, *ISSAC 2019*, Beijing, China.

- Jul/2019 **Farewell to Weyl: Condition-based analysis with a Banach norm in numerical algebraic geometry**, *SIAM Conference on Applied Algebraic Geometry 2019*, Bern, Switzerland.
- Jun/2019 **Numerical Computation of Homology Groups of Closed Semialgebraic Sets**, *Workshop MEGAR 2019: Effective Methods in Real Algebraic Geometry*, Madrid, Spain.
- May/2019 **How many zeros does a random fewnomial system have?**, *2nd BYMAT Conference*, Madrid, Spain.
- Feb/2019 **How many zeros does a random fewnomial system have?**, *7th BMS Student Conference*, Berlin, Germany.
- Jan/2019 **On Zeros of Random Fewnomials (5 talks)**, *Random Real Algebraic Geometry Workshop*, Nesin Matematik Köyü, Turkey.
- May/2018 **Computing the Homology of Closed Semialgebraic Sets**, *1st BYMAT Conference*, Madrid, Spain.
- Feb/2018 **The Niyogi-Smale-Weinberger Approximation Theorem**, *6th BMS Student Conference*, Berlin, Germany.
- Nov/2017 **Computing the Homology of General Semialgebraic Sets**, *Workshop "Algebra meets Numerics: Condition and Compleity"*, Berlin, Germany.
- Jul/2017 **Random real Schubert Calculus and lines on surfaces**, *Workshop "Reading Group on Real Algebraic Geometry"*, Leipzig, Germany.
- Feb/2017 **The shadow of the hidden combinatorics of completely positive operators on Polynomial Identity Testing**, *5th BMS Student Conference*, Berlin, Germany.
- [Invited seminar talks](#)
- 30/May/2023 **Condition Numbers and Probability for Explaining Algorithms**, *CodEx Seminar*, On-line.
- 15/Nov/2022 **Computing numerically the homology of semialgebraic sets**, *Symbolic Computation Seminar*, North Carolina State University.
- 6/Sep/2022 **Condition Numbers and Probability for Explaining Algorithms in Computational Geometry**, *MINDS & CIS Seminar Series*, MINDS and CIS at John Hopkins University.
- 16/Jun/2022 **A p -adic Descartes solver: the Strassman solver**, *Séminaire Calcul Formel*, Institut de Recherche XLIM.
- 05/May/2022 **On the complexity of sampling from parametric curves**, *Seminar on Geometry, Probability, and Computing*, UTSA, TAMU & Mizzou. On-line..
- 12/Apr/2022 **A p -adic Descartes solver: the Strassman solver**, *Seminar of the LFANT project-group*, Institut de Mathématiques de Bordeaux.
- 08/Dec/2021 **What does the condition number of a real polynomial system tell us? Unexpected answers in the real world**, *Seminar of the "Algorithmic Algebra" Group*, Technische Universität Berlin.
- 02/Dec/2021 **New condition-based bounds for the number of real zeros**, *Applied Algebra and Analysis Online Seminar*, Technische Universität Braunschweig & Universität Osnabrück. (On-line).
- 28/Oct/2021 **A sequel for a famous trilogy: accelerating the grid method by adaptive grids**, *Algebra Seminar*, UiT The Arctic University of Norway.
- 09/Jul/2021 **Finding real zeros a lot faster through an adaptive grid**, *Coloquio de Matemática Aplicada del Instituto de Matemática*, Universidade Federal do Rio de Janeiro. (On-line).
- 06/May/2021 **A Numerical Algorithm for Zero Counting. IV: An Adaptive Speedup**, *Seminar of the OURAGAN team*, Inria Paris & IMJ-PRG. (On-line).
- 10/Feb/2021 **Towards Finite Expectation in the Numerical Computation of the Homology of Semialgebraic Sets**, *Seminar of the "Algorithmic Algebra" Group*, Technische Universität Berlin. (On-line).
- 30/Jun/2020 **Condition Numbers for the Cube. I: Univariate Polynomials and Hypersurfaces**, *Seminar of the OURAGAN team*, Inria Paris & IMJ-PRG. (On-line).
- 02/May/2019 **Computing the Homology of Semialgebraic Sets in Weak Exponential Time**, *Algebra Seminar of the "Groups, Topology and Applications" Research Group*, U. of the Basque Country.

- 11/Apr/2019 **Condition meets Computational geometry: The Plantinga-Vegter algorithm case**, *Colloquium of the Graduiertekolleg "Facets of Complexity" (GRK 2434)*, Freie Universität Berlin.
- 16/Jan/2018 **Computing the Homology of Semialgebraic Sets**, *Oberseminar des Institut für Algebra und Geometrie*, Otto von Guericke Universität Magdeburg.
- 09/Jan/2017 **Sobre la complejidad de algunos problemas de pertenencia al cono nulo**, *Seminario del Departamento de Matemáticas*, University of the Basque Country. [In Spanish].

Posters

- Jun/2023 **A p -adic Descartes solver: the Strassman solver**, *FoCM 2023 Conference (Workshop I.2: Computational Number Theory)*, Paris, France.
- Jun/2023 **Condition-based Bounds on the Number of Real Zeros**, *FoCM 2023 Conference (Workshop II.3: Real-Number Complexity)*, Paris, France.
- Jun/2023 **Probabilistic bounds on best rank-one approximation ratio**, *FoCM 2023 Conference (Workshop III.1: Numerical Linear Algebra)*, Paris, France.
- Nov/2022 **Probabilistic Bounds on Best Rank-One Approximation Ratio**, *5th Annual Meeting of the SIAM Texas-Louisiana Section*, Houston, USA.
- Oct/2022 **Kushnirenko's Fewnomials, the Number of Real Zeros and Condition Numbers**, *2022 Texas Algebraic Geometry Symposium*, College Station, USA.
- Jul/2022 **Ultrametric Smale's α -theory**, *ISSAC 2022*, Lille, France.
- Apr/2021 **Computing the Homology of Semialgebraic Sets via TDA**, *Topological Data Analysis Workshop*, Chicago, Illinois, USA. (On-line poster due to the COVID-19 pandemic).
- Jun/2019 **Computing the Homology Groups of Closed Semialgebraic Sets in Weak Exponential Time**, *MEGA 2019: Effective Methods in Algebraic Geometry*, Madrid, Spain.
Awarded one of the three Special Awards to Young Researchers presenting Posters
- Feb/2019 **Computing the Homology Groups of Semialgebraic Sets**, *2nd Graduate meeting on Applied Algebra and Combinatorics*, Leipzig, Germany.
- Feb/2019 **Computing the Homology Groups of Semialgebraic Sets in Weak Exponential Time**, *Congreso Bienal de la Real Sociedad Matemática Española 2019*, Santander, Spain.
- Aug/2018 **Computing the Homology Groups of Semialgebraic Sets**, *Summer School on Numerical Computing in Algebraic Geometry*, Leipzig, Germany.
- Jun/2018 **Polynomial Identity Testing and the Combinatorics of Completely Positive Operators**, *Qmath Masterclass on "Tensors: Geometry and Quantum Information"*, Copenhagen, Denmark.
- Jun/2018 **Computing the "Shape" of Semialgebraic Sets**, *Symposium "Bridging European Science II"*, Berlin, Germany.

Others

- Mar/2021 **The Niyogi-Smale-Weinberger Theorem & its relatives**, *tutorial-a-thon*, Applied Algebraic Topology Network.
- 07/Dec/2018 **What is the best voting system?**, *"What is...?" Seminar*, Berlin Mathematical School.
- 29/Jun/2018 **What are semialgebraic sets in context?**, *"What is...?" Seminar*, Berlin Mathematical School.
- 30/Jun/2017 **What are BPP, RP and the other probabilistic complexity classes?**, *"What is...?" Seminar*, Berlin Mathematical School.
- 27/Jan/2017 **What is the length of a potato?**, *"What is...?" Seminar*, Berlin Mathematical School.
- 05/Feb/2016 **What is an Origami Constructible Number?**, *"What is...?" Seminar*, Berlin Mathematical School.

Teaching experience

Official teaching

- Jan/2023 **Calculus II (MATH 1224)**, *The University of Texas at San Antonio*, San Antonio, USA.
May/2023 Approx. 60 hours of lectures
- Oct/2021 **3rd year Bachelor Research Project “Topological Data Analysis in Computational Real Algebraic Geometry”**, *École polytechnique*, Paris, France.
Dec/2021 Supervised the student Aurèle Bohbot together with Elias Tsigaridas
- Apr/2018 **Effective Algebraic Geometry Seminar**, *Technische Universität Berlin*, Berlin, Germany.
Jul/2018 Organized together with Peter Bürgisser and Alperen Ali Ergür

Courses in an academic setting

- Feb/2023 **UTSA Problem-Solving Club**, *The University of Texas at San Antonio*, San Antonio, USA.
May/2023 Approx. 30 hours of teaching. Organized together with Christopher Duffer
- 11-14/Feb/2014 **“Groups of units in complete discrete valuation rings” Course**, *University of the Basque Country*, Leioa, Spain.
4 hours of teaching
- Nov/2012 **“P vs. NP and related topics” Seminar**, *University of the Basque Country*, Leioa, Spain.
May/2013 Organized together with Luis Martínez
30 hours of teaching

Other

- Oct/2013 **Private Remedial Teacher**, *Centro de Estudios INTEC*, Bilbao, Spain.
May/2014 Linear algebra to math undergraduates and mathematics to non-math undergraduates
Approx. 156 hours of teaching

Communication/Popularization of Mathematics and Science

Projects and organized activities

- 2-7/May/2022 **Fête de la Science 2022**, *Colegio de España*, Cité Internationale Universitaire de Paris, France.
Science week, with daily activities in English, French or Spanish for the general public, organized by the Colegio de España, its Comité de Residentes and SIEF. Co-organizer in representation of SIEF.
- Sep/2011 **Revista π kasle Aldizkaria**, *Mathematics Students' Magazine* [Basque & Spanish].
Jul/2014 ISSN: 2174-9027 (digital, at pikasle.com) and 2255-5714 (printed).
Founder, together with Ricardo Grande
Member of the Editorial Committee. Cover designer and desktop publisher. Social media manager.
- 09&30/May/2014 **π kasle's Mathematics, Magic and Mystery Workshop** [Spanish], *U. of the Basque Country*, Leioa, Spain.
Co-organizer, together with Ricardo Grande
- 23/Oct/2013 **π kasle's Martin Gardner Celebration of Mind** [Spanish], *U. of the Basque Country*, Leioa, Spain.
Organizer

Activities

- 08/May/2022 **Radio Interview “Sistemas de ecuaciones, ¿cómo resolverlas?” by Antonio G. Armas** [Spanish], *Program “Investigadores por el Mundo” (number 159)*, Radio Libertad FM.
- 07/May/2022 **Magic & Mathematics Stand** [English & Spanish] at **Fête de la Science 2022**, *Colegio de España*, Cité internationale universitaire de Paris, France.
Stand open to the general public in which I performed and explained magic tricks based on mathematics
- May/2021 **Divulgative video “Semi... ¿qué? Las múltiples formas de lo semialgebraico y cómo determinarlas” about my research** [Spanish], *Congreso Online Divulga NextGen (1ª edición)*, On-line.
Divulgative video about my research
- 06/Oct/2011 **Astronomia Emakunde/Con ‘A’ de Astrónomas Exhibition**, *U. Basque Country*, Bilbao, Spain.
11/Nov/2011 Tour guide in Spanish

05-26/May/2011 **RSME-IMAGINARY BILBAO Exhibition**, *U. of the Basque Country*, Bilbao, Spain.
Tour guide in Spanish

Articles

- [21] J. Tonelli-Cueto. (2021, May). Semi... ¿qué? Las múltiples formas de lo semialgebraico y cómo determinarlas [Spanish] (Semi... what? The multiple shapes of the semialgebraic and how to determine them). In *Libro de Resúmenes de Divulga NextGen I (26, 27 y 28 de mayo de 2021)* (pp. 42–43). Zenodo. doi:10.5281/zenodo.4718329
- [22] J. Tonelli-Cueto. (2015, October). Emmy Noether, un retrato alfabético [Spanish] (Emmy Noether, an alphabetic portrait). *Blog "mujeres con ciencia"*. 2015-10-05.

Taken formative activities and courses

04/May/2022 **IMSI's MathComms Bootcamp 1: Storytelling and Narrative; 2: How to Write for a General Audience & 3: Job Talks & Stage Presence**, *Institute for Mathematical and Statistical Innovation*, On-line.

11/Mar/2022

04/Feb/2022

Service work

Referee/Reviewer (*Current and past reviews in alphabetical order*).

Journal: Annals of Mathematics and Artificial Intelligence; Forum of Mathematics, Sigma; Foundations of Computational Mathematics; Journal of Complexity; Mathematics of Computation; SIAM Journal on Applied Algebra and Geometry (SIAGA)

Conference: ISSAC 2020; MEGA2019

Other: MathSciNet

Jan-Jul/2023 **Member of the Short Communication Committee**, *48th International Symposium on Symbolic and Algebraic Computations (ISSAC'23)*.

Member together with Eunice Y. S. Chan, Beatriz Pascual Escudero, Sebastian Falkensteiner, and Juana Sendra (Chair)

Apr/2015 **Student Vocal at the Committee of Evaluation of Degrees in the Area of Science**, *Agency for Quality of the Basque University System (UNIBASQ)*, Vitoria, Spain.

Mar/2018

Jan-Dec/2017 **BMS Student Representative**, *Berlin Mathematical School*, Berlin, Germany.

Sep/2012 **Secretary**, *Mathematics Students' Association Epsilon-Delta*, Leioa, Spain.

May/2013 Association of mathematics students of the University of the Basque Country

Grants & Awards

Research fellowships and scholarships

Jul/2023 **2023 AMS-Simons Travel Grant**.

Jun/2025 Awarded by the AMS and the Simons Foundation for travelling

Oct/2020 **FSMP Postdoctoral Fellowship**, *2020 Call*, "Interactions" program.

Sep/2022 Awarded by the Fondation Sciences Mathématiques de Paris

Jan/2017 **BMS Doctoral Fellowship**.

Dec/2019 Funded by the Einstein Foundation Berlin withing F. Cucker's Einstein Visiting Fellowship

Oct/2014 **Scholarship of "la Caixa" for graduate studies in Europe**, *2014 Call*.

Jul/2017 Funded also by the German Academic Exchange Service (DAAD)

Nov/2013 **Collaboration Scholarship for the academic year 2013-2014**.

Jun/2014 Funded by the Basque Government

Working with Gustavo Adolfo Fernández Alcober on *pro-p groups and p-adic analytic groups* at University of the Basque Country

Jul/2013 **Research Introduction Scholarship of the JAE Program**.

Sep/2013 Funded by the Consejo Superior de Investigaciones Científicas (CSIC)

Working with Andrei Jaikin-Zapirain on *Class Field Theory* at Instituto de Ciencias Matemáticas (ICMAT)

Awards

- Dec/2021 **MATH+ Dissertation Award 2020**, *Berlin Mathematics Research Center MATH+, Berlin Mathematical School & Einstein Foundation Berlin.*
- Oct/2020 **3rd Prize in the 2020 Tiburtius Prizes of the Berlin Universities**, *State Conference of Rectors and Presidents of Berlin Universities (LKRP).*
- Jul/2019 **SIAM Student Travel Award**, *SIAM Conference on Applied Algebraic Geometry 2019.*
- Jun/2019 **Special Award to Young Researchers presenting Posters**, *MEGA2019.*
One out of three awards
- Jul/2018 **First Prize in the End of Studies Spanish National Awards**, *Spanish Government.*
- Jun/2015 **End of Degree Extraordinary Award of the Licenciatura en matemáticas**, *University of the Basque Country.*
- Oct/2013 **Honor Mention in the modality “Popular science work. Media”**, *14th Ciencia en Acción.*
Together with Ricardo Grande for the Mathematics Students' Magazine *πkasle*
- 29/Nov/2012 **III Awards to students who best spread the image of the University of the Basque Country.**
1st prize in the category of science with Ricardo Grande for the Mathematics Students' Magazine *πkasle*
1st prize in the category of social sciences and legal studies with my fellow teammates for winning the IV University Debate League of the G9 Group
- Feb-Mar/2012 **Winner in the IV University Debate League of the G9 Group**, *Oviedo, Spain.*
As part of the team of the University of the Basque Country
- Jun/2011 **Special Mention in the Contests of Works about Sophia Kovalevskaya**, *University of the Basque Country.*
For doing a calligram about Sophia Kovalevskaya

Activities

Research stays and visits

- Oct-Nov/2021 **Research visit to Cordian Riener**, *Tromsø, Norway.* (25/Oct-2/Nov).
- Jan/2020 **Research visit to Elias Tsigaridas**, *Paris, France.* (19-25/Jan).
- Dec/2019 **Research visit to Elias Tsigaridas**, *Paris, France.* (8-12/Dec).
- May/2019 **Research visit to Elias Tsigaridas**, *Paris, France.* (12-17/May).
- Mar-Apr/2019 **Research stay with Felipe Cucker**, *Hong Kong, China.* (15/Mar-01/Apr).
- Oct-Nov/2018 **Research visit to Nicolai Vorobjov**, *Bath, England.* (27/Oct-03/Nov).
- Oct/2018 **Research stay with Felipe Cucker**, *Tuleries d’Affiac, France.* (01-15/Oct).
- Apr/2018 **Research stay with Felipe Cucker**, *Hong Kong, China.* (10-28/Apr).
- Nov-Dec/2017 **Research stay with Felipe Cucker**, *Hong Kong, China.* (21/Nov-08/Dec).
- Jan/2017 **Research stay with Felipe Cucker**, *Hong Kong, China.* (13-26/Jan).

Attended conferences

- 13-17/Jan/2025 **VII Congreso de Jóvenes Investigadores de la RSME**, *University of the Basque Country (UPV/EHU) & Basque Center for Applied Mathematics (BCAM), Bilbao, Spain.*
- 10-14/Jul/2023 **SIAM Conference on Applied Algebraic Geometry 2023**, *Eindhoven University of Technology, Eindhoven, The Netherlands.*
- 12-21/Jun/2023 **FoCM 2023 Conference**, *Sorbonne Université, Paris, France.*
- 8-9/Jun/2023 **Fifth Bilbao Data Science Workshop (BiDAS 2023)**, *Basque Center for Applied mathematics (BCAM), Bilbao, Spain.*
- 16-21/Apr/2023 **BIRS Workshop “Random Algebraic Geometry” (23w5070)**, *Banff International Research Station for Mathematical Innovation and Discovery, Banff, Canada.*
- 6-11/Jan/2023 **VI Congreso de Jóvenes Investigadores de la RSME**, *Universidad de León, León, Spain.*
- 4-7/Jan/2023 **Joint Mathematics Meetings 2023**, *Boston, USA.*

- 12-16/Dec/2022 **II Encuentro RSME-UMA**, *Universidad de Málaga*, Ronda, Spain.
- 9-11/Nov/2020 **4th BYMAT Conference**, *Universitat de València & Universitat Politècnica de València*, On-line.
- 4-6/Nov/2022 **5th Annual Meeting of the SIAM Texas-Louisiana Section**, *Houston University*, Houston, USA.
- 28-29/Oct/2022 **17th Texas Undergraduate Mathematics Conference**, *UT Austin*, Austin, USA.
- 5-7/Oct/2022 **8th Iberian Mathematical Meeting**, *Universidad de Sevilla*, Sevilla, Spain.
- 30/Sep-2/Oct/2022 **2022 Texas Algebraic Geometry Symposium**, *Texas A&M University*, College Station, USA.
- 11-15/Jul/2022 **XXI Lluís Santaló School: Random and Deterministic Point Configurations**, *Universidad Internacional Menéndez Pelayo*, Santander, Spain.
- 4-7/Jul/2022 **47th International Symposium on Symbolic and Algebraic Computations (ISSAC 2022)**, *Université de Lille*, Lille, France.
- 20-24/Jun/2022 **MEGA 2022: Effective Methods in Algebraic Geometry**, *Pedagogical University of Krakow*, Kraków, Poland.
- 29/May/2022 **2022 Mathematical Research Communities Conference Data Science at the Crossroads of Analysis, Geometry, and Topology**, *Beaver Hollow Conference Center*, Java Center, USA.
- 4/Jun/2022 **2022 Mathematical Research Communities Conference Data Science at the Crossroads of Analysis, Geometry, and Topology**, *Beaver Hollow Conference Center*, Java Center, USA.
- 17-21/Jan/2022 **Congreso Bienal de la Real Sociedad Matemática Española 2022**, *Universidad de Castilla-La Mancha*, Ciudad Real, Spain.
- 18-22/Oct/2021 **Workshop “Real Polynomials: Counting and Stability” (21w5117)**, *Banff International Research Station for Mathematical Innovation and Discovery*, Casa Matemática Oaxaca (On-line).
- 16-20/Aug/2021 **SIAM Conference on Applied Algebraic Geometry 2021**, *Texas A&M University*, College Station, USA (On-line).
- 19-23/Jul/2021 **Mathematical Congress of the Americas 2021**, *Buenos Aires*, Argentina. (On-line).
- 07-11/Jun/2021 **MEGA 2021: Effective Methods in Algebraic Geometry**, *UiT The Arctic University of Norway*, Tromsø, Norway (On-line).
- 26-28/May/2021 **Congreso Online Divulga NextGen (1ª edición)**, *On-line*.
- 26-30/Apr/2021 **Topological Data Analysis Workshop**, *Institute for Mathematical and Statistical Innovation*, On-line.
- 1-3/Dec/2020 **3rd BYMAT Conference**, *Universitat de València & Universitat Politècnica de València*, On-line.
- 14-25/Sep/2020 **CO@Work 2020**, *Technische Universität Berlin & Zuse Institut Berlin*, On-line.
- 20-23/Jul/2020 **45th International Symposium on Symbolic and Algebraic Computations (ISSAC 2020)**, *Kalamata*, Greece. (On-line).
- 27-28/Feb/2020 **Milestones Conference of the Thematic Einstein Semester on Algebraic Geometry**, *Zuse Institut Berlin*, Berlin, Germany.
- 27-31/Jan/2020 **V Congreso de Jóvenes Investigadores de la RSME**, *Universitat Jaume I*, Castelló, Spain.
- 21-26/Oct/2019 **Research Workshop on Random Real Algebraic Geometry**, *Güzelyurt*, Northern Cyprus.
- 07-11/Oct/2019 **Opening Conference of the Thematic Einstein Semester on Algebraic Geometry**, *Freie Universität Berlin*, Berlin, Germany.
- 19-23/Aug/2019 **Complexity of numerical computation: A conference in honor of Felipe Cucker**, *Berlin-Brandenburgische Akademie der Wissenschaften*, Berlin, Germany.
- 15-18/Jul/2019 **44th International Symposium on Symbolic and Algebraic Computations (ISSAC 2019)**, *Beihang University*, Beijing, China.
- 09-13/Jul/2019 **SIAM Conference on Applied Algebraic Geometry 2019**, *Universität Bern*, Bern, Switzerland.
- 21-22/Jun/2019 **Workshop MEGAR 2019: Effective Methods in Real Algebraic Geometry**, *Universidad Complutense de Madrid*, Madrid, Spain.
- 17-21/Jun/2019 **MEGA 2019: Effective Methods in Algebraic Geometry**, *Universidad Complutense de Madrid*, Madrid, Spain.
- 03-05/Jun/2019 **Noether Konferenz 2019: Wie kommt das Neue in die Welt?**, *Berlin Mathematics Research Center MATH+*, Berlin, Germany.

- 20-24/May/2019 **2nd BYMAT Conference**, *Instituto de Ciencias Matemáticas*, Madrid, Spain.
- 20-22/Feb/2019 **7th BMS Student Conference**, *Berlin Mathematical School*, Berlin, Germany.
- 18-20/Feb/2019 **2nd Graduate Meeting on Applied Algebra and Combinatorics**, *Max-Planck-Institut für Mathematik in der Naturwissenschaften*, Leipzig, Germany.
- 04-08/Feb/2019 **Congreso Bienal de la Real Sociedad Matemática Española 2019**, *Universidad de Cantabria*, Santander, Spain.
- 21-27/Jun/2019 **Random Real Algebraic Geometry Workshop**, *Nesin Matematik Köyü*, Turkey.
- 23-28/Sep/2018 **6th Heidelberg Laureate Forum**, *Heidelberg*, Germany.
- 13-17/Aug/2018 **Summer School on Numerical Computing in Algebraic Geometry**, *Max-Planck-Institut für Mathematik in der Naturwissenschaften*, Leipzig, Germany.
- 18-22/Jun/2018 **QMath Masterclass on “Tensors: Geometry and Quantum Information”**, *University of Copenhagen*, Copenhagen, Denmark.
- 04-08/Jun/2018 **Workshop “Optimization, Complexity and Invariant Theory”**, *Institute for Advance Studies*, Princeton, USA.
- 02/Jun/2018 **Symposium “Bridging European Science II”**, *Spanish Embassy*, Berlin, Germany.
- 07-09/May/2018 **1st BYMAT Conference**, *Instituto de Ciencias Matemáticas*, Madrid, Spain.
- 21-23/Feb/2018 **6th BMS Student Conference**, *Berlin Mathematical School*, Berlin, Germany.
Co-organizer with Héctor Andrade Loarca, Qiao Luo, Brent Moran and Yuya Tokuta
- 06-07/Nov/2017 **Workshop “Algebra meets Numerics: Condition and Complexity”**, *Technische Universität Berlin*, Berlin, Germany.
- 13-19/Jul/2017 **FoCM 2017 Conference (Blocks B and C)**, *Universitat de Barcelona*, Barcelona, Spain.
- 03-07/Jul/2017 **Workshop “Reading Group on Real Algebraic Geometry”**, *Max-Planck-Institut für Mathematik in der Naturwissenschaften*, Leipzig, Germany.
- 10/Jun/2017 **Workshop “Polynomial and Polytopes”**, *Technische Universität Berlin*, Berlin, Germany.
- 22-24/May/2017 **Chow Lectures 2017**, *Max-Planck-Institut für Mathematik in der Naturwissenschaften*, Leipzig, Germany.
- 13-17/Mar/2017 **BCAM Course “Quantum Information Theory”**, *Basque Center for Applied Mathematics*, Bilbao, Spain.
- 22-24/Feb/2017 **5th BMS Student Conference**, *Berlin Mathematical School*, Berlin, Germany.
- 12-14/Dec/2016 **Workshop “Tensors: Algebra meets Numerics”**, *Max-Planck-Institut für Mathematik in der Naturwissenschaften*, Leipzig, Germany.
- 18-22/Jul/2016 **7th European Congress of Mathematics**, *Technische Universität Berlin*, Berlin, Germany.
- 17-19/Feb/2016 **4th BMS Student Conference**, *Berlin Mathematical School*, Berlin, Germany.
- 26/Jul/2015 **Hilbert Bernays Summer School on Logic and Computation**, *Geor-August-Universität Göttingen*, Göttingen, Germany.
- 01/Aug/2015
- 13-17/Jul/2015 **2015 Santaló Summer School on “Number theory and arithmetic geometry”**, *Universidad Internacional Menéndez Pelayo*, Santander, Spain.
- 29/Jun/2015 **BMS Summer School 2015 on “Convex Geometry – discrete and computational”**, *Berlin Mathematical School*.
- 10/Jul/2015
- 02-06/Mar/2015 **Homological Algebra Workshop**, *Instituto de Ciencias Matemáticas*, Madrid, Spain.
- 18-20/Feb/2015 **3rd BMS Student Conference**, *Berlin Mathematical School*, Berlin, Germany.
- 07-11/Jul/2014 **10th AIMS Conference on Dynamical Systems, Differential Equations and Applications**, *Universidad Autónoma de Madrid & Instituto de Ciencias Matemáticas*, Madrid, Spain.
Attended as student volunteer
- 30/Jun/2014 **First International Meeting of the Italian and Spanish Mathematical Societies**, *University of the Basque Country*, Leioa, Spain.
- 04/Jul/2014
Attended as student volunteer

- 19-21/Feb/2014 **2nd BMS Student Conference**, *Berlin Mathematical School*, Berlin, Germany.
- 01-26/Jun/2013 **VI Edición de la Escuela JAE de Matemáticas**, *Instituto de Ciencias Matemáticas (ICMAT)*.
- 23-29/Jul/2012 **XIII Encuentro Nacional de Estudiantes de Matemáticas**, *Murcia*, Spain.
- 01-21/Jul/2012 **2012 PCMI Summer Session “Geometric Group Theory”**, *IAS/Park City Mathematic Institute*, Park City, USA.
- 03-23/Jul/2011 **2011 PCMI Summer Session “Moduli Spaces of Riemann Surfaces”**, *IAS/Park City Mathematic Institute*, Park City, USA.
- 24/Jun/2011 **Coloquio RSME 2011: Las dos ideas de Sofía Kovalevskaya**, *University of the Basque Country*, Bilbao, Spain.
- 01-03/Jun/2011 **Jornadas RSME 2011: Los Problemas del Milenio**, *Universitat de Barcelona*, Barcelona, Spain.
- Other**
- 20/Sep/2022 **10th Annual San Antonio Postdoctoral Research Forum**, *UT Health SA*, San Antonio, USA.
- 30/Jun/2022 **dramaTOURgia: un viaje teatral a través de España**, *Comédie Oberkampf*, Paris, France.
End-of-course representation showing scenes worked during the course *Teatro Español à Paris* by Luzía Eviza
- Oct/2020 **Teatro Español à Paris**, Paris, France.
- Jun/2022 Once-a-week theater classes in Spanish by Luzía Eviza
- 8-10/Jun/2022 **Arctic MSCA Symposium**, *UiT The Arctic University of Norway*, Tromsø, Norway.
- 11/May/2022 **Taller “Baterías: Presente y Futuro”**, *EHUalumni*, On-line.
Course by Jon Serrano-Sevillano about the state of the art of batteries
- 27/Nov/2021 **Jornada SIEF y Asamblea General 2021**, *Sociedad de Investigadores Españoles en Francia (SIEF)*, Paris, France.
- 28/Nov/2020 **Jornada y Asamblea Anual 2020 de la Sociedad de Investigadores Españoles en Francia**, France (On-line).
- 18-20/Sep/2017 **Science+ 2017, ERA Career Day Bilbao**, *University of the Basque Country*, Bilbao, Spain.
- 06/Jun/2016 **Slam the library #2 - Poetry Slam**, *University Library of the TU Berlin and UdK*, Berlin, Germany.
Participant under pseudonym *Iasafro Maesman* ending at 2nd place
- 10-04/Nov/2014 **Exhibition Reflejos. Proyecto experimental entre artistas y poetas**, *Biblioteca Central de Cantabria*, Santander, Spain.
Participation with *Reflejo de Palabras* (Reflection of words) together with María Jesús Cueto Puente
- 25-27/Jun/2014 **Curso H.1 ¿Qué hay que enseñar hoy en la escuela?**, *XXXIII Summer Courses of the University of the Basque Country*, Donostia, Spain.
- 23-24/Jun/2014 **Workshop 6.1 “Once upon a time. . .” Techniques for Storytelling in English**, *XXXIII Summer Courses of the University of the Basque Country*, Donostia, Spain.
- 09/May/2014 **Curso “Cognición comprada entre chimpancés y humanos”**, Bilbao, Spain.
Course by Miquel Llorente Espino on compared cognition between primates
- Jan-Jun/2014 **Talentia Programme 2013-2014 of Bizkaia Talent**, Province of Biscay, Spain.
- 16/Oct/2013 **II. Simposio UNIBASQ. La Calidad del Sistema Universitario Vasco: La Perspectiva de los Usuarios**, Bilbao, Spain.
- 31/Aug/2012 **Poetry Recital at the opening of the exhibition Proyecto Trait D’Union**, *Observatorio del Arte*, Arnuero, Spain.
- Sep-Dec/2011 **Curso de Teoría de Grafos aplicando el método de Moore**, *University of the Basque Country*.
Course on graph theory by Luiz Martínez using Moore’s Method
- Scientific Olympiads**
- Oct/2009 **Gold Medal in the XIV Iberoamerican Olympiad of Physics**, *Santiago de Chile*, Chile.
- Apr/2009 **Silver Medal and Special McGraw-Hill Prize to the best resolution of the theoretical part in the XX Spanish Mathematical Olympiad**, *Pamplona*, Spain.

Mar/2009 **Bronze Medal in the XLV Spanish Mathematical Olympiad**, *Sant Feliu de Guíxols*, Spain.

Languages

Spanish **Native**
English **C1**
Basque **A2-B1**
German **A2**
French **A2**

References

- Peter Bürgisser, pbuerg@math.tu-berlin.de, Technische Universität Berlin.
- Felipe Cucker, macucker@cityu.edu.hk, CityU Hong Kong.
- Alperen Ali Ergür, alperen.ergur@utsa.edu, UT San Antonio.
- Marta Macho-Stadler, marta.macho@ehu.eus, University of the Basque Country.
- Elias Tsigaridas, elias.tsigaridas@inria.fr, Inria Paris & IMJ-PRG.