

# Josué Tonelli-Cueto

## Curriculum Vitae

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### Areas of mathematical interest

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

### Positions

- Sep/2022 **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*  
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] 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.
- [4] J. Tonelli-Cueto. (2022, March). A  $p$ -adic Descartes solver: the Strassman solver. arXiv:2203.07016.
- [5] Kh. Kozhasov & J. Tonelli-Cueto. (2022, January). Probabilistic bounds on best rank-one approximation ratio. arXiv:2201.02191.

#### Journal papers

- [6] 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 [17]. arXiv:2006.04423.
- [7] 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.

- [8] 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.
- [9] 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 [18]. arXiv:2004.06879.
- [10] 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.
- [11] 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.
- [12] 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

- [13] 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..
- [14] 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..
- [15] 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
- [16] J. G. Suchen & J. Tonelli-Cueto. (2022, June). Ultrametric Smale's  $\alpha$ -theory. *ACM Commun. Comput. Algebra*, 56(2), 56–59. doi:10.1145/3572867.3572875. arXiv:2206.08392.
- [17] 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.
- [18] 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

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

#### Organized activities

- 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 together with A. Hinojosa-Calleja (Coordinator), M. de León-Contreras, C. Parreño-Torres, T. Sanz-Perela, A.V. Ponce-Bobadilla, E. Sarrión-Pedralva and J.C. Cortés López  
Member of the Poster Committee together with C. Burgos Simón, A. Capel, D. Martínez, J. Muñoz-Matute, E. Primo Tárraga and E. 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.**  
Co-organizer with Héctor Andrade Loarca, Qiao Luo, Brent Moran and Yuya Tokuta

## Talks and other presentations

### Conference presentations

- 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

- 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

- 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  $\alpha$ -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 Biental 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 2414)**, *The University of Texas at San Antonio*, San Antonio, USA.
- May/2023 Approx. 57 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

- 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  $\pi$ kasle Aldizkaria**, *Mathematics Students' Magazine* [Basque & Spanish].
- Jul/2014 ISSN: 2174-9027 (digital, at [pikastle.com](http://pikastle.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 ***πkasle's Mathematics, Magic and Mystery Workshop*** [Spanish], *U. of the Basque Country*, Leioa, Spain.  
Co-organizer, together with Ricardo Grande
- 23/Oct/2013 ***πkasle'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

- [20] 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
- [21] 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

- 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

- 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

- 16-21/Apr/2023 **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/Jun/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
- 17-21/Jun/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 (1<sup>a</sup> 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/Jun/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 Biental 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**, *Georg-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 Teoria 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.

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## Languages

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

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## 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.