



# Josué Tonelli-Cueto

Mathematician  
Postdoc at Inria Paris



0000-0002-2904-1215



Inria Paris & IMJ-PRG



josue.tonelli.cueto@bizaia.eu



tonellicueto.xyz

## Interests

- \* Numerical algorithms and condition-based complexity
- \* Computational algebraic geometry
- \* Random geometry

## Languages

Castellano (Spanish) — [Native]

English

Euskera (Basque)

Deutsch (German)

(\*)[The scale follows the Common European Framework of Reference for Languages: Learning, Teaching, Assessment with the black lines indicating levels A2, B2 and C2 and the gray lines the levels A1, B1 and C1.]

## Programming

C

FORTRAN

GAP

MatLab

julia

R

(\*)[The skill scale for each program or programming language is from 0 (Fundamental Awareness) to 6 (Expert).]

Last update on the 24th of February of 2021.

## employment & education

- 2020-22 FSMP Postdoctoral Fellow Inria Paris & IMJ-PRG  
In the OURAGAN team with F. Roullier and E. Tsigaridas
- 2020 Postdoctoral researcher Inria Paris & IMJ-PRG  
In the OURAGAN team with F. Roullier and E. Tsigaridas
- 2017-19 Dr. rer. nat. Mathematik (PhD in Mathematics) BMS & TU Berlin  
Under the supervision of Prof. P. Bürgisser and Prof. F. Cucker.
- 2014-17 M.Sc. Mathematics BMS & TU Berlin  
M.'s t. "On the complexity of some Null-Cone Membership Problems" with Prof. P. Bürgisser.
- 2009-14 Licenciatura en Matemáticas con Premio Nacional Fin de Carrera UPV/EHU  
B. Mathematics in the University of the Basque Country.

## grants & awards

- 2020 3rd Prize in the Tiburtius Prizes 2020 of the Berlin Universities LKRP Berlin  
For the PhD thesis
- 2020-22 FSMP Postdoctoral Fellowship Foundation Sciences Mathématiques de Paris  
Call of 2020 in the "interactions" program
- 2017-19 BMS Doctoral Fellowship BMS and Einstein Foundation
- 2019 SIAM Student Travel Award SIAM Conference AAG 2019
- 2019 Special Award to Young Researchers presenting Posters MEGA 2019  
One out of three given awards
- 2018 First Prize in the End of Studies Spanish National Award Spanish Government  
In recognition of academic achievements during B. Mathematics
- 2014-16 Beca de "la Caixa" para estudios de posgrado en universidades europeas  
Jointly awarded by Obra Social "la Caixa" and DAAD in 2014 for BMS Phase I.

## papers and preprints

- 2021 Functional norms, condition numbers and numerical algorithms in algebraic geometry arXiv:2102.11727  
With Felipe Cucker and Alperen A. Ergür.
- 2020 Condition Numbers for the Cube. I: Univariate Polynomials and Hypersurfaces arXiv:2006.04423  
With Elias Tsigaridas. Conference version at ISSAC'20.
- 2020 On the Complexity of the Plantinga-Vegter Algorithm arXiv:2004.06879  
With Felipe Cucker and Alperen A. Ergür. Journal version of ISSAC'19 paper.
- 2019 Computing the Homology of Semialgebraic Sets. II: General Formulas J.FoCM  
With Peter Bürgisser and Felipe Cucker. arXiv:1903.10710
- 2019 Plantinga-Vegter algorithm takes average polynomial time ISSAC 2019  
With Felipe Cucker and Alperen A. Ergür. arXiv:1901.09234
- 2019 On the Number of Real Zeros of Random Fewnomials SIAGA  
With Peter Bürgisser and Alperen A. Ergür. arXiv:1811.09425
- 2018 Computing the Homology of Semialgebraic Sets. I: Lax Formulas J.FoCM  
With Peter Bürgisser and Felipe Cucker. arXiv:1807.06435

## selected talks

- 2020 ISSAC 2020 On-line  
"Condition Numbers for the Cube. I: Univariate Polynomials and Hypersurfaces"
- 2019 Complexity of Numerical Computation: A conference in honor of Felipe Cucker BBWA  
"Average minus Weak Complexity equals Adaptive algorithms"
- 2019 ISSAC 2019 Beihang University  
"Plantinga-Vegter takes average polynomial time"
- 2019 SIAM Conference AAG 2019 Uni Bern  
Farewell to Weyl: Condition-based analysis with a Banach norm in numerical algebraic geometry
- 2019 Workshop MEGAR 2019: Effective Methods in Real Algebraic Geometry UCM  
"Numerical Computation of Homology Groups of Closed Semialgebraic Sets"
- 2019 2nd BYMAT Conference: Bringing Young Mathematicians Together ICMAT  
"How many zeros does a random fewnomial system have?"
- 2019 Algebra Seminar of the Department of Mathematics UPV/EHU  
"Computing the Homology of Semialgebraic Sets in Weak Exponential Time"

## selected posters

- 2019 Computing the Homology Groups  
of Closed Semialgebraic Sets in Weak Exponential Time UCM  
Presented at *MEGA 2019: Effective Methods in Algebraic Geometry*  
Won one out of three Special Awards to Young Researchers presenting Posters
- 2019 Computing the Homology of Semialgebraic Sets in Weak Exponential Time UC  
Presented at *Congreso Bienal de la Real Sociedad Matemática Española*
- 2018 Computing the Homology of Semialgebraic Sets MPI MIS Leipzig  
Presented at *Summer School on Numerical Computation in Algebraic Geometry*
- 2018 Computing the "Shape" of Semialgebraic Sets Embassy of Spain in Berlin  
Presented at *Bridging European Science II*

## selected organized activities

- 2021 S. Session *Symbolic and Numerical Computation with Polynomials* MCA2021  
With Diego Armentano, Matías Bender and Alperen A. Ergür
- 2020 3rd BYMAT Conference UV & UPV  
Member of the Scientific Committee and of the Poster Committee
- 2016-19 "What is...?" Seminar BMS  
Member of the Organizing Committee
- 2019 Minisymposium *Numerical methods for structured polynomial system solving* SIAM Conference AAG 2019  
With Alperen A. Ergür, Pierre Lairez and Gregorio Malajovich
- 2018 6th BMS Student Conference (21-23/2) BMS  
With BMS Student Representatives of 2017

## teaching experience

- 2018 *Effective Algebraic Geometry Seminar* TU Berlin  
Organizer together with Peter Bürgisser and Alperen A. Ergür
- 2013-14 Private remedial teacher [ $\sim 156$  hours] Centro de Estudios INTEC  
*Linear algebra* lessons to one 1st and one 2nd year mathematics students group  
*General mathematics* lessons to one 1st year chemical engineering students group
- 2012-13 "P vs. NP and related topics" Seminar (Organizer) [30 hours] UPV/EHU  
Student seminar covering the Cook-Levin theorem and the AKS primality test.

## popularization of mathematics

- 2015 *Emmy Noether, retrato alfabético* [Spanish] Poem  
Published in the blog "mujeres con ciencia" on the 5th of October.
- 2011-14  $\pi$ kasle [PIkasle] UPV/EHU Math Students' Magazine  
Mainly online (with ISSN 2174-9027), but with some issues also on paper.  
Founder (together with Ricardo Grande), editor, desktop publisher, cover designer  
(except in issue number 10), interviewer and sporadic author.  
2013 Honor mention in *Ciencia en Acción XIV*  
2012 One 1st Prize in the *Image Difussion Student Awards of the UPV/EHU*
- 2014 PIkasle's *Mathematics, Magic and Mystery Workshop* Event  
Two sessions during April in UPV/EHU. Organizer (together with Ricardo Grande).
- 2013 PIkasle's Martin Gardner Celebration of Mind Event  
*Martin Gardner Celebration of Mind* in UPV/EHU. Organizer.

## service

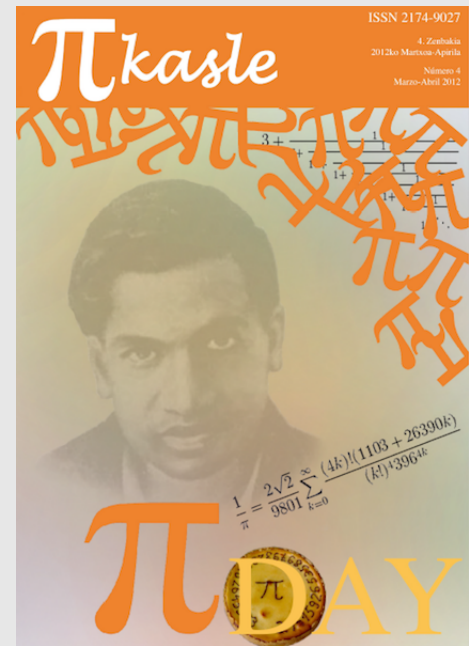
- 2015-18 Vocal del Comité de Evaluación de Titulaciones de Ciencias de UNIBASQ  
Student evaluator of science degrees  
at Agency for Quality of the Basque University System (UNIBASQ)
- 2017 Student Representative of the BMS Berlin Mathematical School  
Representation of students at BMS Executive Board and *Mentoring, Gender and Diversity* Committee and organization of students' social events

## references

Peter Bürgisser  
Felipe Cucker  
Alperen Ali Ergür  
Elias Tsigaridas

Technische Universität Berlin  
CityU Hong Kong  
Carnegie Mellon University  
Inria Paris & IMJ-PRG

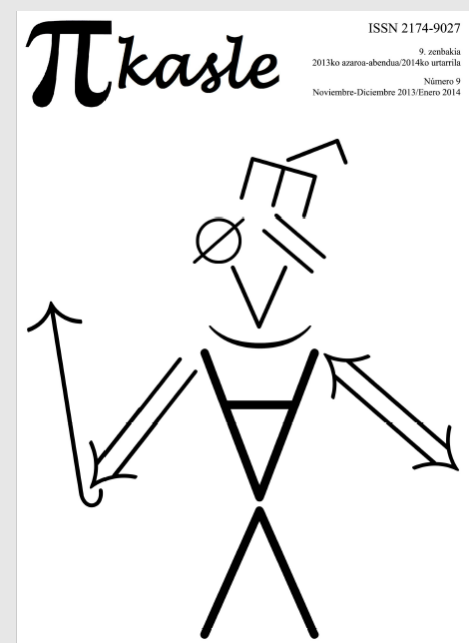
## Some designs



$\pi$ kasle No. 4



$\pi$ kasle No. 7



$\pi$ kasle No. 9