



# Josué Tonelli-Cueto

Mathematician  
BMS PhD Student



0000-0002-2904-1215



Technische Universität Berlin



+49 (0)30 314 - 29385



ton-cue@math.tu-berlin.de



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 3rd of December of 2019.

## education

2017-19 Doctorate in Mathematics

Under the supervision of Prof. P. Bürgisser and Prof. F. Cucker.  
In the framework of the Berlin mathematical School

TU Berlin

2014-17 M.Sc. Mathematics

M.'s t. "On the complexity of some Null-Cone Membership Problems" with Prof. P. Bürgisser.  
In the framework of the Berlin mathematical School

TU Berlin

2009-14 Licenciatura en Matemáticas con Premio Nacional Fin de Carrera UPV/EHU  
*B. Mathematics* in the University of the Basque Country.

## grants & awards

2017-19 BMS Doctoral Fellowship

Within Prof. F. Cucker's Einstein Visiting 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.

2013-14 Beca de Colaboración, para el curso 2013-2014

Basque Government

On "Pro- $p$  and  $p$ -adic analytic groups" with Prof. G.A. Fernández-Alcober in UPV/EHU.

2013 Beca de Introducción a la Investigación del Programa JAE

CSIC

On "Class Field Theory" with Prof. A. Jaikin-Zapirain in ICMAT during the summer.

## papers and preprints

2019 Computing the Homology of Semialgebraic Sets.

II: General Formulas

Together with Peter Bürgisser and Felipe Cucker

arXiv:1903.10710

2019 Plantinga-Vegter algorithm takes average polynomial time

ISSAC 2019

Together with Felipe Cucker and Alperen A. Ergür.

2018 On the Number of Real Zeros of Random Fewnomials

arXiv:1811.09425

Together with Peter Bürgisser and Alperen A. Ergür

To appear at SIAM Journal on Applied Algebra and Geometry (SIAGA)

2018 Computing the Homology of Semialgebraic Sets. I: Lax Formulas

J.FoCM

Together with Peter Bürgisser and Felipe Cucker. arXiv:1807.06435

## selected talks

2019 Complexity of Numerical Computation: A conference in honor of Felipe Cucker  
"Average minus Weak Complexity equals Adaptive algorithms"

BBWA

2019 ISSAC 2019

"Plantinga-Vegter takes average polynomial time"

Beihang University

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"

2019 Random Real Algebraic Geometry Workshop

Nesin Matematik Köyü

"On Zeros of Random Fewnomials" (5 talks series)

2018 "What is...?" Seminar (with recorded contributed talk)

BMS

"What is the best voting system?"

2018 1st BYMAT Conference: Bringing Young Mathematicians Together

ICMAT

"Computing the homology of closed semialgebraic sets"

2018 Oberseminar of the Institut für Algebra und Geometrie

OvGU Magdeburg

"Computing the homology of semialgebraic sets"

2017 Reading Group on Real Algebraic Geometry

MPI MIS Leipzig

"Random real Schubert calculus and lines on surfaces"

## 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 Biental 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

- 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
- 2014 Course "Group of units in complete discrete valuation rings" [4 hours] UPV/EHU  
Organized by the GRECA research group
- 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 in [www.pikastle.com](http://www.pikastle.com) (with ISSN 2174-9027), but with some issues also on paper (with ISSN 2255-5714 and Legal Deposit BI 305-2013).  
Founder (together with Ricardo Grande), editor, desktop publisher, cover designer (except in issue number 10), interviewer and sporadic author.  
2013 Mención de honor en Ciencia en Acción XIV  
Honor mention in the category "Works of popularization of science. Media"  
2012 Premio al alumnado de difusión de la imagen de la UPV/EHU.  
1st prize in the science category
- 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

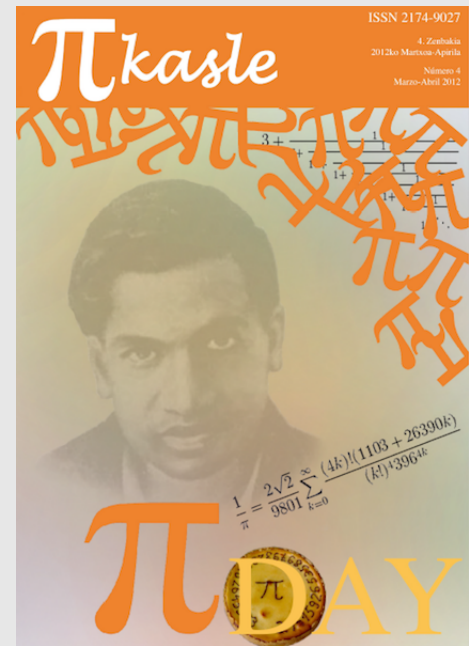
- 2015-18 Vocal del Comité de Evaluación de Titulaciones de Ciencias de UNIBASQ  
Student evaluator of science degrees  
at Agency for Quality of the Basque University System (UNIBASQ)
- 2017 Student Representative of the BMS Berlin Mathematical School  
Representation of students at BMS Executive Board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

## references

Peter Bürgisser  
Felipe Cucker  
Alperen Ali Ergür  
Marta Macho-Stadler

Technische Universität Berlin  
CityU Hong Kong  
Carnegie Mellon University  
University of the Basque Country

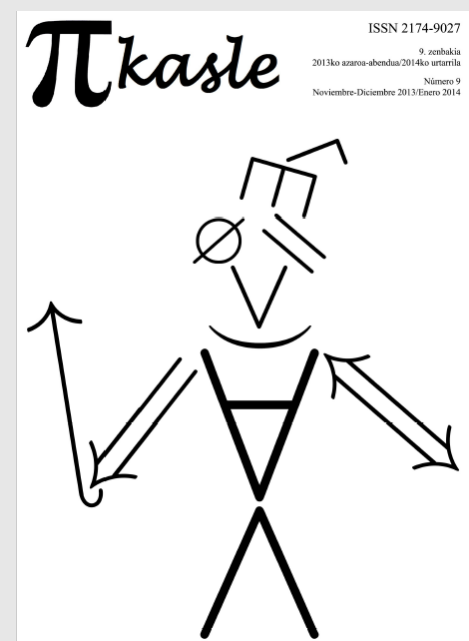
## Some designs



$\pi$ kasle No. 4



$\pi$ kasle No. 7



$\pi$ kasle No. 9