

Ilya Smirnov — Curriculum Vitae

BCAM – Basque Center for Applied Mathematics
Bilbao, Basque Country - Spain
Ikerbasque, Basque Foundation for Science
Bilbao, Basque Country - Spain

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Education

University of Virginia , PhD in Mathematics Advisor: Craig Huneke	2013–2015
University of Kansas , PhD Candidate Moved to continue working with Craig Huneke.	2011–2012
Lomonosov Moscow State University , Diploma in Mathematics	2006–2011

Employment

Basque Center for Applied Mathematics , Tenure-track <i>Ramón y Cajal and Ikerbasque Research fellow.</i>	11. 2021–
KTH Royal Institute of Technology , Research fellow <i>Funded by the Swedish Research Council.</i>	03–11. 2021
Charles University in Prague , Researcher	10.2020–03.2021
Stockholm University , Postdoktor	2018–2020
University of Michigan , Visiting Assistant Professor	2015–2018

Research interests

Commutative algebra at the intersection with algebraic geometry and singularity theory:
positive characteristic methods, multiplicity theory, numerical invariants of singularities.

Funding and awards

Ministry of Science and Innovation , PID2021-125052NA-I00: 36800 €	2022–2025
Ministry of Science and Innovation , Ramón y Cajal fellowship: tenure-track	2022–2027
Ikerbasque Foundation , Ikerbasque Research Fellowship: tenure-track	2021–2026
La Caixa Foundation , Junior Leader Postdoctoral Fellowship: 292500 € <i>Resigned on 09.2022 due to Ramón y Cajal</i>	2021–2024
Swedish Research Council , Starting grant: 3,600,000 SEK <i>Resigned in 2021 due to the move to Spain</i>	2021–2025
Stockholm University , Travel grant: 50,000 SEK <i>For a month-long stay at the University of Tokyo, currently postponed</i>	2020

Stockholm Mathematics Center , Master class grant: 140,000 SEK <i>A week-long summer school, August 2022</i>	2019
European Mathematics Society , EMS Summer School grant: 4000 € <i>A week-long summer school, August 2022</i>	2020
Marie Skłodowska-Curie Seal of Excellence	2019
Royal Swedish Academy of Science, Magnusons fond , Travel grant: 11,200 SEK	2019
AMS–Simons Travel Grant : \$4000	2016–2018
Mathematics Research Community , Participant and collaboration grant: \$700	2015

Publications

Published & accepted

- [1] Ilya Smirnov. Differential Krull dimension in differential polynomial extensions. *J. Algebra*, 344:354–372, 2011.
- [2] Craig Huneke and Ilya Smirnov. Prime filtrations of the powers of an ideal. *Bull. Lond. Math. Soc.*, 47(4):585–592, 2015.
- [3] Ilya Smirnov. Upper semi-continuity of the Hilbert-Kunz multiplicity. *Compos. Math.*, 152(3):477–488, 2016.
- [4] Mordechai Katzman, Linqun Ma, Ilya Smirnov, and Wenliang Zhang. D -module and F -module length of local cohomology modules. *Trans. Amer. Math. Soc.*, 370(12):8551–8580, 2018.
- [5] Craig Huneke, Ilya Smirnov, and Javid Validashti. A generalization of an inequality of Lech relating multiplicity and colength. *Comm. Algebra*, 47:2436–2449, 2019.
- [6] Ilya Smirnov. Equimultiplicity in Hilbert-Kunz theory. *Math. Z*, 291(1-2):245–278, 2019.
- [7] Patricia Klein, Linqun Ma, Pham Hung Quy, Ilya Smirnov, and Yongwei Yao. Lech’s inequality, the Stückrad–Vogel conjecture, and uniform behavior of Koszul homology. *Adv. Math.*, 347:442–472, 2019.
- [8] Hailong Dao and Ilya Smirnov. The multiplicity and the number of generators of an integrally closed ideal. *J. Singularities*, 19:61–75, 2019.
- [9] Ilya Smirnov. Hilbert-Kunz multiplicity of the powers of an ideal. *Proc. Amer. Math. Soc.*, 147(8):3331–3338, 2019.
- [10] Hailong Dao and Ilya Smirnov. On the generalized Hilbert-Kunz function and multiplicity. *Israel J. Math.*, 237(1):155–184, 2020.
- [11] Luis Núñez-Betancourt and Ilya Smirnov. Hilbert–Kunz multiplicities and F -thresholds. *Bol. Soc. Mat. Mex.*, 26(1):15–25, 2020.
- [12] Linqun Ma, Pham Hung Quy, and Ilya Smirnov. Colength, multiplicity, and ideal closure operations. *Comm. Algebra*, 48(4):1601–1607, 2020.
- [13] Ilya Smirnov. On semicontinuity of multiplicities in families. *Doc. Math.*, 25:381–399, 2020.

- [14] Thomas Polstra and Ilya Smirnov. Continuity of Hilbert–Kunz multiplicity and F-signature. *Nagoya Math. J.*, 239:322–345, 2020.
- [15] Linquan Ma, Pham Hung Quy, and Ilya Smirnov. Filter regular sequence under small perturbations. *Math. Ann.*, 378(1-2):243–254, 2020.
- [16] Alessandro De Stefani and Ilya Smirnov. Decomposition of graded local cohomology tables. *Math. Z.*, 297(1):1–24, 2021.
- [17] Thomas Polstra and Ilya Smirnov. Equimultiplicity theory of strongly F -regular rings. *Michigan Math. J.*, 70(4):837–856, 2021.
- [18] Craig Huneke, Linquan Ma, Pham Hung Quy, and Ilya Smirnov. Asymptotic Lech’s inequality. *Adv. Math.*, 372:107296, 33, 2020.
- [19] Jack Jeffries and Ilya Smirnov. A transformation rule for natural multiplicities. *Int. Math. Res. Not. IMRN*, 2022(2):999–1015, 2022.
- [20] Jack Jeffries, Yusuke Nakajima, Ilya Smirnov, Kei-ichi Watanabe, and Ken-Ichi Yoshida. Lower bounds on Hilbert-Kunz multiplicities and maximal F -signatures. *Math. Proc. Cambridge Philos. Soc.*, 174(2):247–271, 2023.
- [21] Alessandro De Stefani and Ilya Smirnov. Stability and deformation of F-singularities. *Israel J. Math.* Accepted.
- [22] Linquan Ma and Ilya Smirnov. Uniform Lech’s inequality. *Proc. Amer. Math. Soc.*, 151(6):2387–2397, 2023.

Preprints

- [23] Ilya Smirnov and Kevin Tucker. The theory of F-rational signature. Available at <https://arxiv.org/abs/1911.02642>.
- [24] Boris Shapiro, Ilya Smirnov, and Arkady Vaintrob. Around generalized zonotopal algebras of graphs. Available at <https://arxiv.org/abs/2204.11331>.
- [25] Yairon Cid-Ruiz and Ilya Smirnov. Effective generic freeness and applications to local cohomology. Available at <https://arxiv.org/abs/2302.08196>.
- [26] Linquan Ma, Pham Hung Quy, and Ilya Smirnov. Colength, multiplicity, and ideal closure operations II. Available at <https://arxiv.org/abs/2305.12469>.

Teaching experience

Summer schools:

ICTP School on Commutative Algebra and Algebraic Geometry in Prime Characteristics **May 2-5, 2023**

“Singularity invariants in positive characteristic”, 4 lectures of 50 min.

MSRI Graduate School attached to the Thematic program in Commutative Algebra and its interactions, University of Notre Dame **June 3-7, 2019**

TA for Linquan Ma’s course, running exercise sessions in the afternoon.

BCAM - Basque Center for Applied Mathematics:

Introduction to Multiplicity theory

Spring 2023

Severo Ochoa course, graduate level, 20 hours, hybrid format.

Charles University in Prague:

NMAI062: Algebra I for computer science

Fall 2020

Tutorials on Zoom, 15 classes of 90 minutes in a semester for 8 students.

Stockholm University:

Math 3001: Mathematical Methods in Economics

Spring 2019, Fall 2019

15 classes of 90 minutes in a semester for 30 – 40 students.

University of Michigan:

Math 425: Introduction to Probability

Spring 2017, Spring 2018

Fully in charge, 3 classes of 50 minutes per week, 35 (2017) and 70 (2018) students.

Math 116: Calculus II

Fall 2017

Work in small groups, flipped classroom elements, 2 sections of 18 students meeting 3 times for 75 minutes per week.

Math 214: Applied Linear Algebra

Spring 2016, Fall 2017

Lectures, 2 sections of 60 students meeting 4 times for 50 minutes per week.

Math 115: Calculus I

Fall 2015

Work in small groups, flipped classroom elements, 2 sections of 18 students meeting 3 times for 75 minutes per week.

University of Virginia:

Applied Calculus I, II

Spring 2013, Fall 2013, Fall 2014

Lectures with coordinated exams, 3 classes of 50 minutes per week.

University of Kansas:

Business calculus I

Spring 2012, Fall 2012

Lectures with coordinated exams, 3 classes of 50 minutes per week.

Invited Talks

- The annual meeting of the Algebraic Geometry and Singularities Network in Spain, Bilbao, January 10-13, 2023.
- CMO Workshop: Mixed characteristic commutative algebra, <https://www.birs.ca/events/2022/5-day-workshops/22w5174/videos>, May 13, 2022.
- Stockholm University, April 11, 2022.
- VCAS, IIT Bombay, <https://sites.google.com/view/virtual-comm-algebra-seminar/home>, March 18, 2022
- Fellowship of the ring: Zoom seminar in Commutative Algebra hosted by MSRI, <https://sites.google.com/view/fellowship-of-the-ring/home>, January 28, 2021.
- Koç University, February 11, 2020
- Tulane University, December 3, 2019
- Freie Universität Berlin, November 22, 2019

- **University of Osnabrück**, November 5, 2019
- **Workshop on singularities: semigroups, topology and valuations**, Universidad Complutense de Madrid, October 27-31, 2019
- **University of Genoa**, May 22, 2019
- **Johannes Gutenberg-Universität Mainz**, January 24, 2019
- **FACARD 2019**, University of Barcelona, January 16-18, 2019
- **Meiji University**, July 2, 2018
- **Kyoto University**, June 29, 2018
- **University of Nebraska-Lincoln**, May 2, 2018
- **AMS Sectional Meeting**, Nashville TN, April 14-15, 2018
- **Mini Workshop**, University of Virginia, March 26-29, 2018
- **JMM 2018**, San Diego, January 10-13, 2018
- **University of Utah**, November 10, 2017
- **KUMUNU 2017**, University of Kansas, October 21-22, 2017
- **Tulane University**, October 19, 2017
- **Georgia State University**, March 20, 2017
- **University of Kansas**, March 2, 2017
- **AMS Sectional Meeting**, Athens GA, March 5-6, 2016
- **University of Utah**, September 19, 2014
- **University of Michigan**, March 13, 2014
- **Algebra Day 2014**, University of Kansas, February 10, 2014
- **University of Illinois, Chicago**, January 29, 2014
- **JMM 2014**, Baltimore, January 15-18, 2014

Professional activities

- Referee for La Caixa Foundation and multiple journals: *Compositio*, *Crelle's*, *London Mathematical Society*, *American Mathematical Society*, *Math. Z.*, *Nagoya Math. J.*, *J. Algebra.*, etc.
- Co-organizer of the annual meeting of the Spanish Algebraic Geometry and Singularities Network. Bilbao, January 10–13, 2023.
- Co-organizer, Stockholm Master Class “Local cohomology and related topics”. Stockholm, August 1–5, 2022.
- Participant of the teaching conference of the the Stockholm University Mathematics Department. Gotland, September 25-26, 2019.
- Co-organizer of the problem solving seminar at the Stockholm University, including Zoom talks in Spring 2020.
- Co-organizer of the commutative algebra seminar at the University of Michigan.