

# Ilya Smirnov — Curriculum Vitae

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

ismirnov@bcamath.org  
<http://www.bcamath.org/en/people/ismirnov>

## Education

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

## Employment

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

## Research interests

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

## Funding and awards

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<b>Ministry of Science and Innovation</b> , PID2024-156181NB-C31: 88000 € Co-PIs: Javier Fernandez de Bobadilla.	<b>2025–2029</b>
<b>Joint AEI-DFG pilot call</b> , PCI2024-155055-2: 205000 € Co-PIs: Javier Fernandez de Bobadilla, Manuel Blickle, and Duco van Straten.	<b>2025–2028</b>
<b>Ministry of Science and Innovation</b> , EUR2023-143443: 100000 €	<b>2023–2026</b>
<b>Ministry of Science and Innovation</b> , PID2021-125052NA-I00: 36800 €	<b>2022–2025</b>
<b>Ministry of Science and Innovation</b> , Ramón y Cajal fellowship: tenure-track	<b>2022–2027</b>
<b>Ikerbasque Foundation</b> , Ikerbasque Research Fellowship: tenure-track	<b>2021–2026</b>

<b>La Caixa Foundation</b> , Junior Leader Postdoctoral Fellowship: 292500 € <i>Resigned on 09.2022 due to Ramón y Cajal</i>	<b>2021–2024</b>
<b>Swedish Research Council</b> , Starting grant: 3,600,000 SEK <i>Resigned in 2021 due to the move to Spain</i>	<b>2021–2025</b>
<b>Oberwolfach Research in Pairs</b>	<b>January 2020</b>
<b>Stockholm Mathematics Center</b> , Master class grant: 140,000 SEK <i>A week-long summer school, August 2022</i>	<b>2019</b>
<b>Marie Skłodowska-Curie Seal of Excellence</b>	<b>2019</b>
<b>Royal Swedish Academy of Science, Magnusons fond</b> , Travel grant: 11,200 SEK	<b>2019</b>
<b>AMS–Simons Travel Grant</b> : \$4000	<b>2016–2018</b>

## Publications

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### 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] Linqun Ma, Pham Hung Quy, and Ilya Smirnov. Filter regular sequence under small perturbations. *Math. Ann.*, 378(1-2):243–254, 2020.
- [16] Craig Huneke, Linqun Ma, Pham Hung Quy, and Ilya Smirnov. Asymptotic Lech’s inequality. *Adv. Math.*, 372:107296, 33, 2020.
- [17] Alessandro De Stefani and Ilya Smirnov. Decomposition of graded local cohomology tables. *Math. Z.*, 297(1):1–24, 2021.
- [18] Thomas Polstra and Ilya Smirnov. Equimultiplicity theory of strongly  $F$ -regular rings. *Michigan Math. J.*, 70(4):837–856, 2021.
- [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.*, 264(1):1–35, 2024.
- [22] Linqun Ma and Ilya Smirnov. Uniform Lech’s inequality. *Proc. Amer. Math. Soc.*, 151(6):2387–2397, 2023.
- [23] Ilya Smirnov and Kevin Tucker. The theory of  $F$ -rational signature. *J. Reine Angew. Math.*, 812:1–58, 2024.
- [24] Linqun Ma, Pham Hung Quy, and Ilya Smirnov. Colength, multiplicity, and ideal closure operations II. *Michigan Math. J.* Accepted, available at <https://arxiv.org/abs/2305.12469>.
- [25] Yairon Cid-Ruiz and Ilya Smirnov. Effective generic freeness and applications to local cohomology. *J. Lond. Math. Soc. (2)*, 110(4):Paper No. e12995, 31, 2024.
- [26] Ilya Smirnov. An invitation to equimultiplicity of F-invariants. To appear in Contemporary Mathematics, a volume in honor of Hochster and Huneke.

## Preprints

- [27] Boris Shapiro, Ilya Smirnov, and Arkady Vaintrob. Around generalized zonotopal algebras of graphs. Available at <https://arxiv.org/abs/2204.11331>.
- [28] Alessandro De Stefani and Ilya Smirnov. Tight closure of products and F-rational singularities. Available at <https://arxiv.org/abs/2411.03167>.
- [29] Alessandro De Stefani, Luis Núñez-Betancourt, and Ilya Smirnov. The defect of the F-pure threshold. Available at <https://arxiv.org/abs/2501.13613>.
- [30] Aldo Conca, Alessandro De Stefani, Luis Núñez-Betancourt, and Ilya Smirnov. F-singularities of polynomials with square-free support. Available at <https://arxiv.org/abs/2501.16198>.
- [31] Igor Pak, Boris Shapiro, Ilya Smirnov, and Ken-ichi Yoshida. Hilbert–Kunz multiplicity of quadrics via Ehrhart theory. Available at <https://arxiv.org/abs/2508.17915>.

[32] Linquan Ma and Ilya Smirnov. Lech–Mumford constant and stability of local rings. Available at <https://arxiv.org/abs/2508.19893>.

## Supervision

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### PhD Students:

<b>Elías Guisado Villalgorido</b>	<b>2024–2028</b>
<b>Joel Castillo Rey</b>	<b>2023–2027</b>

### Postdocs:

<b>Antonino Ficarra</b> Funded by Juan de la Cierva fellowship JDC2023-051705-I	<b>2025–2027</b>
<b>Devlin Mallory</b> Funded by EUR2023-143443 and a Marie Skłodowska–Curie fellowship SIPOCAG	<b>2024–2028</b>
<b>Kriti Goel</b>	<b>2023–2025</b>

## Teaching experience

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### Lecture series:

<b>RGAS School on Singularities in Seville</b> “Hilbert–Kunz multiplicity as a measure of singularities”, 4 lectures of 90 min.	<b>January 8-12, 2024</b>
<b>ICTP School on Commutative Algebra and Algebraic Geometry in Prime Characteristic</b> “Singularity invariants in positive characteristic”, 4 lectures of 50 min.	<b>May 2-5, 2023</b>
<b>MSRI Graduate School attached to the Thematic program in Commutative Algebra and its interactions, University of Notre Dame</b> TA for Linquan Ma’s course, running exercise sessions in the afternoon.	<b>June 3-7, 2019</b>

### BCAM - Basque Center for Applied Mathematics:

<b>Introduction to Multiplicity theory</b> Severo Ochoa course, graduate level, 20 hours, hybrid format.	<b>Spring 2023</b>
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### Charles University in Prague:

<b>NMAI062: Algebra I for computer science</b> Tutorials on Zoom, 15 classes of 90 minutes in a semester for 8 students.	<b>Fall 2020</b>
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### Stockholm University:

<b>Math 3001: Mathematical Methods in Economics</b> 15 classes of 90 minutes in a semester for 30 – 40 students.	<b>Spring 2019, Fall 2019</b>
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### University of Michigan:

<b>Math 425: Introduction to Probability</b> Fully in charge, 3 classes of 50 minutes per week, 35 (2017) and 70 (2018) students.	<b>Spring 2017, Spring 2018</b>
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**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 (last 5 years)

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- **Stockholm University**, October 15, 2025.
- **University of Barcelona**, May 9, 2025.
- **Purdue University**, August 21, 2024.
- **Recent Developments in Commutative Algebra**, Joint AMS-UMI meeting, Palermo, July 25–26, 2024.
- **EPFL**, Lausanne, May 21, 2024.
- **Recent Developments in Commutative Algebra**, SLMATH, April 15–19, 2024.
- **Nihon University**, Tokyo, December 14, 2023.
- **The 44th Japan Symposium on Commutative Algebra**, Tokyo, November 22–26, 2023.
- **Iberosing International Workshop 2023**, Granada, November 6–10, 2023.
- **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 9–13, 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

## Professional activities

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- Co-organizer of the biannual BCAM-UPV colloquium since Spring 2025.

- Scientific committee of the Iberoamerican Congress on Singularities, 09 - 13 december 2025, Valparaíso, Chile.
- Co-organizer of a summer school on “Perfectoid techniques”. La Cristalera, May 19–23, 2025. External funding by the Foundation Nagoya Mathematical Journal (\$5000) and Clay Mathematics Institute (\$2000).
- Co-organizer of a special session “Algebraic Geometry and Singularity theory” in the Biannual Congress of the Royal Spanish Mathematics Society. Pamplona, January 22–26, 2024.
- 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. External funding by the European Mathematical Society (4000 €).
- Refereeing for La Caixa Foundation and multiple journals: Compositio, Crelle’s, London Mathematical Society, American Mathematical Society, Math. Z., Nagoya Math. J., J. Algebra., etc.