

# Thomas Polstra | Curriculum Vitae

University of Virginia Department of mathematics

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## Postdoctoral experience

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- **Mathematical Sciences Research Institute**  
*Offsite postdoctoral fellow* 2021–2022  
Host Institution: University of Virginia
- **University of Virginia**  
*Research associate and lecturer* 2020–2021
- **University of Utah**  
*NSF postdoctoral fellow* 2017–2020

## Education

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### PhD, Mathematics

- **University of Missouri-Columbia**  
*Advisor: Ian Aberbach* 2012–2017

### Bachelors, Mathematics

- **Georgia State University**  
*Advisor: Florian Enescu* 2008–2012

## Publications and preprints

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1. Local Cohomology Bounds and the Weak Implies Strong Conjecture in Dimension 4, with Ian Aberbach, submitted.
2.  $F$ -singularities: a commutative algebra approach, with Linquan Ma, preliminary version.
3.  $F$ -purity deforms in  $\mathbb{Q}$ -Gorenstein rings, with Austyn Simpson, submitted.
4. Compatible ideals in Gorenstein rings, with Karl Schwede, submitted.
5. Local cohomology bounds and test ideals, with Ian Aberbach, submitted.
6. Coverings of rational double points in mixed characteristic, with Javier Carvajal-Rojas, Linquan Ma, Karl Schwede, and Kevin Tucker, submitted.
7. Globalizing Frobenius splitting ratio, with Alessandro De Stefani and Yongwei Yao, submitted.
8. A theorem about maximal Cohen-Macaulay modules, to appear in Int. Math. Res. Not.

9. Global Frobenius Betti numbers and Frobenius Euler characteristic, with Alessandro De Stefani and Yongwei Yao, to appear in Mich. M. Journal.
10.  $F$ -nilpotent rings and permanence properties, with Jenny Kenkel, Kyle Maddox, and Austyn Simpson, to appear in J. Commut. Algebra.
11. Equimultiplicity theory of strongly  $F$ -regular rings, with Ilya Smirnov, to appear in Mich. M. Journal.
12. Globalizing  $F$ -invariants, with Alessandro De Stefani and Yongwei Yao, Adv. Math. 350 (2019), 359–395.
13.  $F$ -signature under birational morphisms, with Linqun Ma, Karl Schwede, and Kevin Tucker, Forum Math. Sigma 7 (2019), e11, 20 pp.
14. Nilpotence of Frobenius actions on local cohomology modules and Frobenius closure of ideals, with Pham Hung Quy, J. Algebra 529 (2019), 196–225.
15. Continuity of Hilbert-Kunz multiplicity and  $F$ -signature, with Ilya Smirnov, Nagoya Mathematical Journal, 1-24. doi:10.1017/nmj.2018.43.
16.  $F$ -signature and Hilbert-Kunz multiplicity: A combined approach and comparison, with Kevin Tucker, Algebra Number Theory 12 (2018), no. 1, 61–97.
17. A generalization of Serre’s Theorem and Bass’s Cancellation Theorem on projective modules, with Alessandro De Stefani and Yongwei Yao, Proc. Amer. Math. Soc. 146 (2018), no. 4, 1417–1430.
18. Uniform bounds in  $F$ -finite rings and lower semi-continuity of the  $F$ -signature, Trans. Amer. Math. Soc. 370 (2018), no. 5, 3147–3169.
19. Depths and Stanley depths of path ideals of spines, with Daniel Campos, Ryan Gunderson, Susan Morey, Chelsey Paulsen, Involve 9 (2016), no. 1, 155–170.
20. Depths and Cohen-Macaulay properties of path ideals with Daniel Campos, Ryan Gunderson, Susan Morey, Chelsey Paulsen, J. Pure Appl. Algebra 218 (2014), no. 8, 1537–1543.

## Service

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- Organizer of the special session on recent developments in commutative algebra at the 2023 Spring Southeastern sectional meeting at Georgia Tech.
- Organizer of the University of Utah high school math circle, 2018-2020.
- Designed an REU undergraduate topics course and guided an REU research project at the University of Utah.
- Co PI of the NSF funded conference Morgantown Algebra Days, April 13-14, 2019.
- Teaching assistant at the graduate school at the Thematic Program in Commutative Algebra and its Interactions with Algebraic geometry, June 3-7, 2019.
- Teaching assistant of the graduate school at the RTG minicourse on commutative algebra at the University of Utah.
- Organizer of the special session on Commutative Algebra at the 2018 AMS Fall Southeastern sectional meeting in Fayetteville, Arkansas.
- Organizer of various seminars as a graduate student at the University of Missouri.

## Awards

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- National Science Foundation standard grant DMS #2101890.
- Simons postdoctoral fellowship, 2021-2022.
- Outstanding postdoc award, University of Utah, Spring 2019.
- National Science Foundation conference grant, Morgantown Algebra Days.
- National Science Foundation postdoctoral fellowship, 2017-2020.

## Invited Talks

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1. IIT Bombay virtual commutative algebra seminar, “Deformation of prime characteristic singularities” March 19, 2021.
2. IIT Bombay virtual commutative algebra seminar, “ $F$ -regularity, Cohen-Macaulay modules, and  $F$ -signature” March 12, 2021.
3. University of Virginia Algebra seminar, “ $F$ -singularities and the deformation problem” February 10, 2021.
4. Joint mathematics meeting, AMS special session on commutative algebra in positive characteristic “Compatible ideals in Gorenstein rings,” January 7, 2021.
5. Commutative and homological algebra market presentations, “ $F$ -purity deforms in  $\mathbb{Q}$ -Gorenstein rings,” December 2, 2020.
6. Fellowship of the ring, “The weak implies strong conjecture and finite generation of symbolic Rees algebras,” July 24, 2020.
7. Early commutative algebra researchers, “Strongly  $F$ -regular rings and their divisor class groups,” June 27, 2020.
8. University of Utah, Commutative Algebra Seminar “A theorem about maximal Cohen-Macaulay modules,” February 21, 2020.
9. University of Vermont, Colloquium “Tight closure and the weak implies strong conjecture,” February 5, 2019.
10. University of Nebraska-Lincoln, Colloquium “Prime characteristic singularities, tight closure, and the weak implies strong conjecture,” November 20, 2019.
11. FACARD 2019, IMUB Barcelona, “Prime characteristic invariants under birational morphisms,” January 18, 2019.
12. AMS Fall Sectional Meeting, University of Michigan, “Prime characteristic invariants under birational morphism,” October 21, 2018.
13. University of Utah RTG minicourse in commutative algebra, Lectures on prime characteristic commutative algebra, joint talks with Linquan Ma, May 7-11, 2018.
14. AMS Spring Southeastern Sectional Meeting, Nashville, Tennessee, “Nilpotence of Frobenius actions on local cohomology and Frobenius closure of ideals” April 2018.
15. West Virginia University, Colloquium, “When are two rings similar?,” November 7, 2017.

16. University of Nebraska-Lincoln, Commutative Algebra Seminar, "When are two rings the same?" and "When are two rings similar?," October 18 and 19, 2017.
17. University of Illinois at Chicago, Commutative Algebra Seminar, "The  $F$ -signature of non-local rings," October 28, 2016.
18. University of Arkansas, Algebra Seminar, "Positivity of limits in characteristic  $p$  commutative algebra," October 14, 2016.
19. University of Kansas, Algebra Seminar, "Frobenius splittings in non-local rings and the  $F$ -signature," September 29, 2016.
20. University of Michigan, Commutative Algebra Seminar, "Frobenius splittings in non-local rings and the  $F$ -signature," September 8, 2016.
21. KUMUNU jr. University of Nebraska-Lincoln, "Global Hilbert-Kunz Multiplicity," April 23, 2016.
22. AMS Spring Central Sectional Meeting, Fargo, North Dakota, Special Session on Commutative Ring Theory, "Uniform Bounds in  $F$ -finite Rings and Their Applications," April 16, 2016.
23. University of Utah, Commutative Algebra Seminar, "Global Hilbert-Kunz Multiplicity," April 8, 2016.
24. University of Virginia, Commutative Algebra Seminar, "Global Hilbert-Kunz Multiplicity," February 24, 2016.
25. Joint Mathematics Meeting, Seattle, WA, Special Session on Commutative Algebra and Its Interactions with Algebraic Geometry, "Lower Semi-Continuity of the  $F$ -signature for Pairs," January 8, 2016.
26. Georgia State University Mathematics Colloquium, Georgia State University, "Uniform Bounds in  $F$ -Finite Rings and Lower Semi-Continuity of the  $F$ -Signature," a series of three invited talks given September 14, 16, 18, 2015.
27. KUMUNU jr, University of Nebraska-Lincoln, "Lower Semi-Continuity of the  $F$ -Signature," April 27, 2015.
28. KUMUNU, University of Missouri-Columbia, "Uniform Convergence of Hilbert-Kunz Functions and Upper Semi-Continuity," September 27, 2014.

## Teaching Experience at the University of Virginia

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- MATH 1320 (Calculus II), Fall 2020.
- MATH 1310 (Calculus I), Spring 2021.

## Teaching Experience at the University of Utah

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- MATH 4800 (Undergraduate Research), Fall 2019.
- MATH 1260 (Honors Multivariable Calculus), Fall 2018.

## Teaching Experience at the University of Missouri-Columbia

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- MATH 8411 (Algebra II) Teaching Assistant, Spring 2016, Spring 2017.

- MATH 8410 (Algebra I) Teaching Assistant, Fall 2016.
- MATH 4720 (Introduction to Abstract Algebra) Recitation Instructor, Spring 2015, Fall 2015, Spring 2017.
- MATH 4140 (Matrix Theory) Instructor, Summer 2015, Summer 2017.
- MATH 3000 (Introduction to Advanced Mathematics) Recitation Instructor, Fall 2016.
- MATH 2320 (Discrete Mathematical Structures) Instructor, Spring 2017.
- MATH 2300 (Calculus III) Instructor, Summer 2014, Summer 2016.
- MATH 1700 (Calculus II) Recitation Instructor, Fall 2015.
- MATH 1100 (College Algebra) Instructor, Fall 2013, Fall 2014.
- MATH 0110 (Intermediate Algebra) Instructor, Spring 2014.