



Thomas Polstra — Curriculum Vitae

University of Alabama

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Employment

- **University of Alabama** 2022–
○ *Assistant Professor*
- Postdoctoral Experience.....
- **Mathematical Sciences Research Institute** 2021–2022
○ *Offsite postdoctoral fellow*
Host Institution: University of Virginia
- **University of Virginia** 2020–2021
○ *Research associate and lecturer*
- **University of Utah** 2017–2020
○ *NSF postdoctoral fellow*

Research Interests

Commutative Algebra and Algebraic Geometry.

Education

- PhD, Mathematics.....
- **University of Missouri-Columbia** 2012–2017
○ *Advisor: Ian Aberbach*
- Bachelors, Mathematics.....
- **Georgia State University** 2008–2012
○ *Advisor: Florian Enescu*

Awards

- University of Alabama Department of Mathematics Focused Research Group, 2024.
- National Science Foundation standard grant DMS #2101890.
- National Science Foundation conference grants
 - Morgantown Algebra Days 2019, Morgantown, WV.
 - Commutative Algebra in the South 2023, Tuscaloosa, AL.
- Simons postdoctoral fellowship, 2021-2022.

- Outstanding postdoc award, University of Utah, Spring 2019.
- National Science Foundation postdoctoral fellowship, 2017-2020.

Publications and preprints

1. Zariski-Nagata Theorems for Singularities and the Uniform Izumi-Rees Property, submitted.
2. On F -pure Inversion of Adjunction, with Austyn Simpson and Kevin Tucker, to appear in Higher Dimensional Algebraic Geometry, a volume in honor of V.V. Shokurov.
3. On the Equality of Test Ideals, with Ian Aberbach and Craig Huneke, *Adv. Math.* 441, (2024).
4. Primary Decompositions of Regular Sequences, submitted.
5. On the Applications of Big Cohen-Macaulay Modules and Algebras, accepted for publication.
6. F -singularities: a commutative algebra approach, with Linquan Ma, submitted.
7. Compatible ideals in \mathbb{Q} -Gorenstein rings, with Karl Schwede, *Proc. Amer. Math. Soc.* 151 (2023), 4099-4112.
8. Local Cohomology Bounds and the Weak Implies Strong Conjecture in Dimension 4, with Ian Aberbach, *Journal of Algebra* Volume 605, (2022), 37–57.
9. F -purity deforms in \mathbb{Q} -Gorenstein rings, with Austyn Simpson, to appear in *International Mathematics Research Notices*.
10. Global F -splitting ratio of modules, with De Stefani, Alessandro De Stefani and Yongwei Yao, *Journal of Algebra* Volume 610, (2022), 773–792.
11. A theorem about maximal Cohen-Macaulay modules, *International Mathematics Research Notices*, Volume 2022, Issue 3, February 2022, Pages 2086–2094
12. Global Frobenius Betti numbers and Frobenius Euler characteristic, with Alessandro De Stefani and Yongwei Yao, *Michigan Math. J. Advance Publication* 1 - 20, 2021.
13. F -nilpotent rings and permanence properties, with Jenny Kenkel, Kyle Maddox, and Austyn Simpson, to appear in *J. Commut. Algebra*.
14. Equimultiplicity theory of strongly F -regular rings, with Ilya Smirnov, *Michigan Math. J.* 70(4): 837-856 (October 2021).
15. Coverings of rational double points in mixed characteristic, with Javier Carvajal-Rojas, Linquan Ma, Karl Schwede, and Kevin Tucker, *Journal of Singularities*, 23 (2021), 127-150.
16. Globalizing F -invariants, with Alessandro De Stefani and Yongwei Yao, *Adv. Math.* 350 (2019), 359–395.
17. F -signature under birational morphisms, with Linquan Ma, Karl Schwede, and Kevin Tucker, *Forum Math. Sigma* 7 (2019), e11, 20 pp.
18. Nilpotence of Frobenius actions on local cohomology modules and Frobenius closure of ideals, with Pham Hung Quy, *J. Algebra* 529 (2019), 196–225.
19. Continuity of Hilbert-Kunz multiplicity and F -signature, with Ilya Smirnov, *Nagoya Mathematical Journal*, 1-24. doi:10.1017/nmj.2018.43.
20. F -signature and Hilbert-Kunz multiplicity: A combined approach and comparison, with Kevin Tucker, *Algebra Number Theory* 12 (2018), no. 1, 61–97.

21. 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.
22. Uniform bounds in F-finite rings and lower semi-continuity of the F-signature, Trans. Amer. Math. Soc. 370 (2018), no. 5, 3147–3169.
23. 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.
24. 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.
25. Local cohomology bounds and test ideals, with Ian Aberbach, permanent preprint due to delays in publication.

Service

- Tuscaloosa Magnet School Partnership Program, Fall 2023, Spring 2024.
- Algebra and Topology Seminar Organizer, University of Alabama, Fall 2023-present.
- Organizer of the NSF funded conference Commutative Algebra in the South (C.A.T.S.), April 15-16, 2023.
- 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.

Invited Talks

1. SLMath, Recent Developments in Commutative Algebra, April 2024.
2. SLMath, Colloquium, date to be determined.
3. Georgia Tech Algebra Seminar, March 27, 2023.
4. Oberwolfach program on Resolutions and Singularities, February 9, 2023.
5. ICTP Summer school on tight closure, Summer 2022.
6. KUMUNU 2021, May 7-8, 2022.
7. CA+, April 30-May 1, 2022
8. AMS Spring Sectional Meeting, March 2022.
9. Auburn University Algebra seminar, March 2022.
10. Joint Mathematics Meeting, April 2022.
11. University of Alabama Colloquium, November 16, 2021.
12. Purdue Commutative Algebra seminar, November 10, 2021.
13. Syracuse Commutative Algebra seminar, October 29, 2021.
14. University of Virginia Colloquium, October 14, 2022.
15. UIC Commutative Algebra seminar, September 15, 2021.

16. IIT Bombay virtual commutative algebra seminar, March 19, 2021.
17. IIT Bombay virtual commutative algebra seminar, March 12, 2021.
18. University of Virginia Algebra seminar, February 10, 2021.
19. Joint mathematics meeting, AMS special session on commutative algebra in positive characteristic January 7, 2021.
20. Commutative and homological algebra market presentations, December 2, 2020.
21. Fellowship of the ring, July 24, 2020.
22. Early commutative algebra researchers, June 27, 2020.
23. University of Utah, Commutative Algebra Seminar 'February 21, 2020.
24. University of Vermont, Colloquium February 5, 2019.
25. University of Nebraska-Lincoln, Colloquium, November 20, 2019.
26. FACARD 2019, IMUB Barcelona, January 18, 2019.
27. AMS Fall Sectional Meeting, University of Michigan, October 21, 2018.
28. University of Utah RTG minicourse in commutative algebra, Lectures on prime characteristic commutative algebra, joint talks with Linquan Ma, May 7-11, 2018.
29. AMS Spring Southeastern Sectional Meeting, Nashville, Tennessee, April 2018.
30. West Virginia University, Colloquium, November 7, 2017.
31. University of Nebraska-Lincoln, Commutative Algebra Seminar, October 18 and 19, 2017.
32. University of Illinois at Chicago, Commutative Algebra Seminar, October 28, 2016.
33. University of Arkansas, Algebra Seminar, October 14, 2016.
34. University of Kansas, Algebra Seminar, September 29, 2016.
35. University of Michigan, Commutative Algebra Seminar, September 8, 2016.
36. KUMUNU jr. University of Nebraska-Lincoln, April 23, 2016.
37. AMS Spring Central Sectional Meeting, Fargo, North Dakota, Special Session on Commutative Ring Theory, April 16, 2016.
38. University of Utah, Commutative Algebra Seminar, April 8, 2016.
39. University of Virginia, Commutative Algebra Seminar, February 24, 2016.
40. Joint Mathematics Meeting, Seattle, WA, Special Session on Commutative Algebra and Its Interactions with Algebraic Geometry, January 8, 2016.
41. Georgia State University Mathematics Colloquium, Georgia State University, a series of three invited talks given September 14, 16, 18, 2015.
42. KUMUNU jr, University of Nebraska-Lincoln, April 27, 2015.
43. KUMUNU, University of Missouri-Columbia, September 27, 2014.

Teaching Experience at the University of Alabama

- MATH 677 (Introduction to Algebraic Geometry), Fall 2024.
- MATH 677 (Introduction to Commutative Algebra), Spring 2023.
- MATH 674 (Abstract Algebra II), Fall 2024.
- MATH 420 (Linear optimization), Fall 2022, Fall 2023.
- MATH 301 (Discrete math), Spring 2023.
- MATH 237 (Linear Algebra), Fall 2023.

Teaching Experience at the University of Virginia

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

Teaching Experience at the University of Utah

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

Teaching Experience at the University of Missouri-Columbia

- 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.

Student Advisement

Graduate.....

- Maria Akter, current PhD student.
- Sean Hayes, current PhD student.

Undergraduate.....

- Jacob Glidewell (University of Alabama)
- Isaac Martin (University of Utah)
- Taylor Murray (University of Utah)