Karl Schwede

Contact Information	Department of Mathematics The University of Utah 155 S 1400 E Room 233, Call Labor Circo MTD 04110 0000	office: JWB 315 email: schwede@math.utah.edu ww.math.utah.edu/~schwede/
Research Interests	Salt Lake City, UT 84112-0090 I do basic research in mathematics, studying algebra, g larities. Much of my work is in the setting of modular arithmetic), the same setting as much of our modern c mathematics, I work on the boundary of the fields algeb algebra. I am also interested in number theory and con	eometry and particularly singu- arithmetic (also known as clock communication systems. Within oraic geometry and commutative mputational algebra.
Education	 University of Washington, Seattle, WA Ph.D., Mathematics Advisor: Sándor Kovács Dissertation: On F-injective and Du Bois singulari 	August 2006
	 Whitman College, Walla Walla, WA B.A., Mathematics (Honors) Minor: Computer Science Magna Cum Laude 	June 1999
	Bellevue Community College , Bellevue, WA Associate in Arts and Sciences	June 1997
Professional Experience	The University of Utah , Salt Lake City, UT Professor Associate Professor	Jul. 2018–present Jul. 2014–Jun. 2018
	The Pennsylvania State University, State College Assistant Professor MSRI, Berkeley CA Research Member Research Member Research Member Research Member	Jan. 2011–Jun. 2014 Jan.–Mar. 2009 Apr.–May 2013 Apr.–May 2019 Apr.–May 2024
	University of Utah , Salt Lake City, UT Visiting Assistant Professor	Fall 2010
	Johannes Gutenberg University Mainz , Mainz G Honorary Visiting Assistant Professor	ermany Jun. 2010
	University of Michigan, Ann Arbor, MI NSF Postdoc / Postdoctoral Assistant Professor	Sep. 2006–Jul. 2010
	University of Washington, Seattle WA Teaching Assistant and Instructor	Sep. 2000–Aug. 2006
	Havas Interactive (division of Vivendi), Walla W Computer Programmer developing educational softwar	May 1999–Aug. 2000

Awards & Funding	PI – NSF, A Unified Perspective on Singularities in Commutative Algebra and Algebraic Geometry. DMS-2101800	Sept 2021– Aug 2025
	American Mathematical Society, Fellow of the AMS.	Nov. 2020– present
	Simons Foundation, Simons Fellow in Mathematics.	Sep. 2020– May 2021
	co-PI – NSF, FRG: Collaborative Research: Algebraic Geometry and Singularities in Positive and Mixed Characteristic, DMS-1952522.	Jun. 2020– May 2023
	PI – NSF, <i>RTG: Algebra, Geometry, and Topology at the University of Utah</i> , DMS-1840190.	June 2019– May 2024
	PI – NSF, Commutative Algebra: Singularities in All Characteristics with Geometric Applications, DMS-1801849.	Sep. 2018– Aug. 2021
	University of Utah, Presidential Scholar.	Sep. 2017– Aug. 2020
	PI – NSF, CAREER: Test Ideals and the Geometry of Projective Varieties in Positive Characteristic, DMS-1252860/1501102.	Sep. 2013– Aug. 2019
	PI – NSF, FRG: Collaborative Research: Birational Geome- try and Singularities in Zero and Positive Characteristic, DMS- 1265261/1501115.	July 2013– June 2017
	co-PI – NSF, for conference <i>Macaulay2 Development workshop</i> , DMS- 1601205.	May 2016– April 2017
	Alfred P. Sloan Foundation, Alfred P. Sloan Research Fellowship.	Sept. 2012– Sept. 2016
	co-PI – NSF, for conference Computational Workshop on Singulari- ties and Invariants Defined by Frobenius, DMS-1160927.	May 2012
	PI – NSF, Singularities in Characteristic Zero and Singularities in Positive Characteristic, DMS-0969145/1064485.	Sept. 2010– Aug. 2013
	PI then co-PI – NSF, for conference Frobenius splitting in algebraic geometry, commutative algebra, and representation theory, DMS-0968646.	May 2010
	PI – NSF, Postdoctoral Fellowship, DMS-0703505.	Sept. 2007– Aug. 2010
Publications	1. Gluing Schemes and a Scheme Without Closed Points. Recent pro-	gress in arith-

- All have been refereed
- metic and algebraic geometry, 157–172, Contemp. Math. 386. 20052. A simple characterization of Du Bois singularities. Compos. Math. 143, no. 4,
- **3.** Rational singularities associated to pairs, with S. Takagi. Michigan Math. J. 57, 625–658. 2008
- **4.** Generalized test ideals, sharp F-purity, and sharp test elements. Math. Res. Lett. 15, no. 6, 1251–1261. 2008
- 5. F-injective singularities are Du Bois. Amer. J. Math. 131, no 2, 445-473. 2009

- 6. F-adjunction. Algebra & Number Theory. 3, no. 8, 907–950. 2009
- The canonical sheaf of Du Bois singularities, with S. Kovács and K. Smith. Adv. Math. 224, no. 4, 1618–1640. 2010
- Globally F-regular and log Fano varieties, with K. Smith. Adv. Math. 224, no. 3, 863–894. 2010
- **9.** A refinement of sharply F-pure and strongly F-regular pairs. Journal of Commutative Algebra, 2, no. 1, 91–110, 2010
- 10. Centers of F-purity. Math. Z. 265, no. 3, 687-714. 2010
- Discreteness and rationality of F-jumping numbers on rings with singularities, with M. Blickle, S. Takagi and W. Zhang. Math. Ann., 347, no. 4, 917-949. 2010.
- 12. On the number of compatibly Frobenius split subvarieties, prime F-ideals, and log canonical centers, with K. Tucker. Ann. Inst. Fourier (Grenoble) 60 (2010), no. 5, 1515–1531.
- 13. Hodge theory meets the minimal model program: a survey of log canonical and Du Bois singularities, with S. Kovács. Topology of Stratified Spaces (G. Friedman, E. Hunsicker, A. Libgober, and L. Maxim, eds.), Math. Sci. Res. Inst. Publ., vol. 58, Cambridge Univ. Press, Cambridge, 2011, pp. 51–94.
- Test ideals in non-Q-Gorenstein rings, Trans. Amer. Math. Soc. 363 (2011), no. 11, 5925–5941
- A note on discreteness of F-jumping numbers. Proc. Amer. Math. Soc. 139 (2011), no. 11, 3895–3901
- 16. Supplements to non-LC ideal sheaves, with O. Fujino and S. Takagi. Higher Dimensional Algebraic Geometry, RIMS Kôkyûroku Bessatsu, B24, Res. Inst. Math. Sci. (RIMS), Kyoto, 2011, pp. 1–47.
- Semi-log canonical vs F-pure singularities, with L. E. Miller. J. Alg. 349, (2012), no. 1, 150–164.
- On the behavior of test ideals under finite morphisms, with K. Tucker. J. Algebraic Geom. 23 (2014), no. 3, 399–443.
- 19. Test ideals via a single alteration and discreteness and rationality of F-jumping numbers, with K. Tucker and W. Zhang. Math. Res. Lett. 19, (2012), no. 01, 191–197.
- 20. A survey of test ideals, with K. Tucker. Progress in Commutative Algebra 2, Closures, Finiteness and Factorization, Walter de Gruyter GmbH & Co. KG, Berlin, (2012), 39–99.
- An algorithm for computing compatibly Frobenius split subvarieties, with M. Katzman. J. Symbolic Comput., 47, (2012), no. 8, 996-1008.
- 22. Cartier modules on toric varieties, with J.-C. Hsiao, and W. Zhang. Trans. Amer. Math. Soc. 366 (2014), no. 4, 1773-1795.
- Du Bois singularities deform, with S. Kovács. in Minimal Models and Extremal Rays (Kyoto, 2011), Adv. Stud. Pure Math. (2016), 70, 49–66.
- **24.** A canonical linear system associated to adjoint divisors in characteristic p > 0. J. Reine Angew. Math. 696 (2014), 69-87.

- **25.** p^{-1} -linear maps in algebra and geometry, with M. Blickle. Commutative Algebra, Expository Papers Dedicated to David Eisenbud on the Occasion of His 65th Birthday (I. Peeva ed.), Springer New York Heidelberg Dordrecht London, 2013, pp. 123–205.
- 26. F-signature of pairs and the asymptotic behavior of Frobenius splittings, with M. Blickle and K. Tucker. Adv. Math. 231, (2012) no. 6, 3232-3258.
- F-signature of pairs: Continuity, p-fractals and minimal log discrepancies, with M. Blickle and K. Tucker. J. London Math. Soc. 87 (2013), no. 3, 802–818.
- **28.** Richardson varieties have Kawamata log terminal singularities, with S. Kumar. Int. Math. Res. Not. IMRN 2014, no. 3, 842-864.
- Bertini theorems for F-singularities, with W. Zhang. Proc. Lond. Math. Soc. (3) 107 (2013), no. 4, 851-874.
- **30.** A dual to tight closure theory, with N. Epstein. Nagoya Math. J. 213 (2014), 41-75.
- Depth of F-singularities and base change of relative canonical sheaves, with Z. Patakfalvi. Journal of the Institute of Mathematics of Jussieu. 13, no. 1, (2014) 43–63.
- 32. On the numerical dimension of pseudo-effective divisors in positive characteristic, with P. Cascini, C. Hacon and M. Mustaţă. Amer. J. Math. 136 (2014), no. 6, 1609-1628.
- **33.** Appendix: *F*-injectivity and depth, with A. K. Singh. Appendix to Deformations of *F*-injectivity and local cohomology by J. Horiuchi, L. E. Miller and K. Shimomoto. Indiana Univ. Math. J. 63 (2014), no. 4, 1139-1157.
- 34. A Frobenius variant of Seshadri constants, with M. Mustață. Math. Ann. 358 (2014), no. 3-4, 861-878.
- **35.** Explicitly extending Frobenius splittings over finite maps, with K. Tucker. Comm. Algebra 43 (2015), no. 10, 4070-4079.
- 36. Rings of Frobenius operators, with M. Katzman, A. K. Singh and W. Zhang. Math. Proc. Cambridge Philos. Soc. 157 (2014), no. 1, 151-167.
- **37.** Test ideals of non-principal ideals: Computations, Jumping Numbers, Alterations and Division Theorems, with K. Tucker. J. Math. Pures Appl. (9) 102 (2014), no. 5, 891-929.
- **38.** *F*-singularities via alterations, with M. Blickle and K. Tucker. Amer. J. Math. 137 (2015), no. 1, 61–109.
- **39.** The weak ordinarity conjecture and *F*-singularities, with B. Bhatt and S. Takagi. Adv. Stud. Pure Math., 74, Math. Soc. Japan, Tokyo, 2017.
- 40. Uniform bounds for strongly F-regular surfaces, with Paolo Cascini and Yoshinori Gongyo. Trans. Amer. Math. Soc. 368 (2016), no. 8, 5547-5563.
- On rational connectedness of globally F-regular threefolds, with Y. Gongyo, Z. Li, Z. Patakfalvi, H. Tanaka, and R. Zong. Adv. Math. 280 (2015), 47–78.
- Inversion of adjunction for rational and Du Bois pairs, with S. Kovács. Algebra & Number Theory. 10 (2016), no. 5, 969–1000.

- **43.** Test ideals in rings with finitely generated anti-canonical algebras, with A. Chiecchio, F. Enescu and L. E. Miller. J. Inst. Math. Jussieu 17 (2018), no. 1, 171–206.
- **44.** The *F*-different and a canonical bundle formula, with O. Das. Ann. Sc. Norm. Super. Pisa Cl. Sci. 17 (2017), no 3, 1173–1205
- **45.** *F*-singularities in families, with Z. Patakfalvi and W. Zhang. Algebr. Geom. 5 (2018), no. 3, 264–327.
- **46.** Positive characteristic algebraic geometry, with Z. Patakfalvi and K. Tucker. Surveys on recent developments in algebraic geometry, 33–80, Proc. Sympos. Pure Math., 95, Amer. Math. Soc., Providence, RI, 2017.
- 47. On the behavior of singularities at the F-pure threshold, with E. Canton, D. Hernández and E. Witt. Appendix by Alessandro De Stefani, Jack Jeffries, Zhibek Kadyrsizova, Robert Walker, George Whelan. Illinois J. Math. 60 (2016), no. 3–4, 669–685
- **48.** The dualizing complex of *F*-injective and Du Bois singularities, with B. Bhatt and L. Ma. Math. Z. 288 (2018), no. 3–4, 1143–1155.
- **49.** Discreteness of F-jumping numbers at isolated non-Q-Gorenstein points, with P. Graf. Proc. Amer. Math. Soc. 146 (2018), no. 2, 473–487.
- 50. Local cohomology of Du Bois singularities and applications to families., with L. Ma and K. Shimomoto. Compos. Math. 153 (2017), no. 10, 2147–2170.
- 51. Fundamental groups of F-regular singularities via F-signature, with J. Carvajal-Rojas and K. Tucker. Ann. Sci. Éc. Norm. Supér. (4) 51 (2018), no. 4, 993–1016.
- 52. Étale fundamental groups of strongly F-regular schemes, with B. Bhatt, J. Carvajal-Rojas, P. Graf and K. Tucker. Int. Math. Res. Not. IMRN 2019, no. 14, 4325–4339.
- Divisor package for Macaulay2, with Z. Yang. J. Softw. Algebra Geom. 8 (2018), 87–94.
- 54. Perfectoid multiplier/test ideals in regular rings and bounds on symbolic powers, with L. Ma. Invent. Math. 214 (2018), no. 2, 913–955.
- **55.** *F-signature under birational morphisms*, with L. Ma., T. Polstra, K. Tucker. Forum Math. Sigma 7 (2019), e11.
- 56. The TestIdeals package for Macaulay2, with A. F. Boix, D. J. Hernández, Z Kadyrsizova, M. Katzman, S. Malec, M. Robinson, D. Smolkin, P. Teixeira, E. E. Witt. J. Softw. Algebra Geom. 9 (2019), no. 2, 89–110.
- 57. Recent applications of p-adic methods to commutative algebra, with L. Ma. Notices Amer. Math. Soc. 66 (2019), no. 6, 820-831.
- Seminormalization package for Macaulay2, with B. Serbinowski. J. Softw. Algebra Geom. 10 (2020), no. 1, 1–7.
- **59.** A Kunz-type characterization of regular rings via alterations, with L. Ma J. Pure Appl. Algebra 224 (2020), no. 3, 1124–1131.

- 60. Singularities in mixed characteristic via Perfectoid big Cohen-Macaulay algebras, with L. Ma. Duke Math. J. 170 (2021), no. 13, 2815–2890.
- The Frobenius Thresholds package for Macaulay2, with D. J. Hernández, P. Teixeira, E. E. Witt. J. Softw. Algebra Geom. 11 (2021), no. 1, 25–39.
- Bertini Theorems for F-signature, with J. Carvajal-Rojas and K. Tucker. Math. Z. 299 (2021), no. 1-2, 1131–1153.
- Covers of rational double points in mixed characteristic, with J. Carvajal-Rojas, L. Ma, T. Polstra, K. Tucker. Covers of rational double points in mixed characteristic. J. Singul. 23 (2021), 127–150.
- 64. Maximal Cohen-Macaulay complexes and their uses: A partial survey, with S. Iyengar, L. Ma, M. Walker. arXiv:2106.08173. Commutative algebra, 475-500, Springer, Cham, (2021).
- 65. An analog of adjoint ideals and PLT singularities in mixed characteristic, with L. Ma, K. Tucker, J. Waldron, J. Witaszek. J. Algebraic Geom. 31 (2022), no. 3, 399–443.
- 66. RationalMaps, a package for Macaulay2, with C.J. Bott, S. H. Hassanzadeh, D. Smolkin. J. Softw. Algebra Geom. 12 (2022), no. 1, 17-26.
- 67. Symbolic power containments in singular rings in positive characteristic, with E. Grifo and L. Ma. Manuscripta Math. 170 (2023), no. 3-4, 471-496.
- **68.** Compatible ideals in Gorenstein rings, with T. Polstra. Proc. Amer. Math. Soc. 151 (2023), no. 10, 4099-4112.
- 69. Finding points on varieties with Macaulay2, with S. Bisui, S. Maitra, T. T. Nguyên. J. Softw. Algebra Geom. 13 (2023), no. 1, 33-43.
- 70. FastMinors package for Macaulay2, with B. Martinova, M. Robinson, Y. Yao. arXiv:2002.05758. J. Softw. Algebra Geom. 13 (2023), no. 1, 13-31.
- Globally +-regular varieties and the minimal model program for threefolds in mixed characteristic, with B. Bhatt, L. Ma, Z. Patakfalvi, K. Tucker, J. Waldron, J. Witaszek. Publ. Math. Inst. Hautes Études Sci.138(2023), 69-227.
- ACCEPTED 72. Global generation of test ideals in mixed characteristic and applications, with PAPERS C. Hacon, A. Lamarche. To appear in Algebr. Geom., arXiv:2106.14329.
- SUBMITTED**73.** Perfectoid signature, perfectoid Hilbert-Kunz multiplicity, and an applica-
tion to local fundamental groups, with H. Cai, S. Lee, L. Ma, K. Tucker.
arXiv:2209.04046.
 - 74. Test ideals in mixed characteristic: a unified theory up to perturbation, with B. Bhatt, L. Ma, Z. Patakfalvi, K. Tucker, J. Waldron, J. Witaszek. arXiv:2401.00615.
- BOOK DRAFT **75.** Singularities defined by Frobenius and applications, with K. E. Smith. Book draft. The latest version is available here: https://github.com/kschwede/FrobeniusSingularitiesBook.

- RationalMaps package for Macaulay2, a package for check- 2016-present ing whether a rational map is birational/regular/an embedding. With C.J. Bott, H. Hassanzadeh, and D. Smolkin. The current version is in the Macaulay2 build tree: https://github.com/Macaulay2/M2/tree/master/M2/Macaulay2/packages
 - Seminormalization package for Macaulay2, a package for **2018-present** computing seminormalizations. With B. Serbinowski. The current version is in the Macaulay2 build tree: https://github.com/Macaulay2/M2/tree/master/M2/Macaulay2/packages
 - Pullback package for Macaulay2, a package for computing pull- **2015**-present backs in the category of rings. With D. Ellingson. It is part of the current Macaulay2 build tree: https://github.com/Macaulay2/M2/tree/master/M2/Macaulay2/packages
 - Divisor package for Macaulay2, a package for computa- **2014-present** tions with Weil divisors on normal varieties. With Z. Yang. It is part of the current Macaulay2 build tree: https://github.com/Macaulay2/M2/tree/master/M2/Macaulay2/packages
 - Macaulay2 function for computing compatibly split subvari- 2012-present eties, With Mordechai Katzman. Download the current version: http://www.math.utah.edu/~schwede/M2/FSplitting.m2
 - TestIdeals package for Macaulay2, a package for computing *F* **2012**-**present** singularities (test ideals, *F*-rationality, etc.). With E. Bela, A. F. Boix, J. Bruce, D. Hernandez, Z. Kadyrsizova, M. Katzman, S. Malec, M. Robinson, D. Smolkin, P. Teixeira and E. Witt. The latest stable version of TestIdeals is in the Macaulay2 build tree: https://github.com/Macaulay2/M2
 - FrobeniusThresholds package for Macaulay2, a package for computing *F*-thresholds and related invariants. With J. Bruce, D. Hernandez, D. Smolkin, P. Teixeira and E. Witt. The latest stable version of FrobeniusThresholds is in the Macaulay2 build tree: https://github.com/Macaulay2/M2
 - FastMinors package for Macaulay2, faster function field linear al- **2019-present** gebra (with applications to singularities). With B. Martinova, M. Robinson, Y. Yao. The stable version is in the Macaulay2 build tree: https://github.com/Macaulay2/M2
 - RandomPoints package for Macaulay2, a package for finding ratio- 2020-present nal points on varieties over finite fields. With Sankhaneel Bisui, Sarasij Maitra, Thai Nguyen, Zhan Jiang. The latest stable version of RandomPoints is in the Macaulay2 build tree: https://github.com/Macaulay2/M2

Organizational Activities	• Organzier for the conference Notions of Singularity in Different Characteristics, Banff Canada (BIRS)	Oct. 2025
	• Organizer for the conference Epiga 2024, Sorbonne Université,	Jun. 2024
	 Paris Organizer for the conference and summer school Macaulay2, Computational Algebraic Geometry and String Theory, to be held at the University of Utah Lead organizer for the workshop Recent Developments in Com 	May-Jun. 2024 Apr. 2024
	• Lead organizer for the workshop <i>Recent Developments in Com-</i> <i>mutative Algebra</i> , to be held in MSRI During the special Com- mutative Algebra Semester	Apr. 2024
	• On the organizing committee of <i>The Fellowship of the</i> <i>Ring</i> , national commutative algebra online seminar. https://sites.google.com/view/fellowship-of-the-ring	Apr. 2020 – present
	• Co-organizer of an AMS Special Session, held at the University of Utab	Oct. 2022
	• Co-organizer of the conference: Advances in Mixed Characteristic Commutative Algebra and Geo- metric Connections, at Oaxaca (BIRS)	May 2022
	• Co-organizer of the virtual special month on Singu- larities and K-stability at the University of Utah, https://sites.google.com/view/special-month-on-singularit	May-Jun. 2021
	 Co-organizer of an AMS Special Session, held at the University of Michigan 	Oct. 2018
	• Co-organizer of an AMS Special Session, held at Portland State University	Apr. 2018
	• Co-organizer of an AMS Special Session, held that the Joint Math- ematics Meetings in San Diego	Jan. 2018
	• Co-organizer of the conference: Higher dimensional algebraic geometry and characteristic $p > 0$, held at CIRM / Luminy	Sept. 2016
	• Co-organizer of the summer school and conference: Higher Dimensional Algebraic Geometry held at the University of Utab	Jul. 2016
	 Co-organizer of the workshop: Intensive Workshop for Macaulay2 Development, held at the University of Utah 	May 2016
	 Co-organizer of the AMS special session: Algebraic Geometry, held at the University of Utah 	Apr. 2016
	• Co-organizer of the AMS-AWM special session: Commutative Algebra and Its Interactions with Algebraic Geome- try, held at the Joint Mathematical Meetings	Jan. 2016
	• Co-organizer of the Mathematical Research Communities Work- shop on Commutative Algebra held at Snowbird Utah	Jun. 2015
	• Co-organizer of the <i>Positive Characteristic Algebraic Geometry</i> <i>Workshop</i> held at the University of Illinois at Chicago	Mar. 2014

Organizational activities are continued on the next page.

Organizational activities	• Co-organizer of the AMS special session: Homological and characteristic p methods in commutative algebra,	Jan.	2014
CONTINUED	 held at the Joint Mathematical Meetings, Baltimore Co-organizer of the AMS special session: Special Session on The Geometry of Algebraic Varieties, held at Tomple University 	Oct.	2013
	 Organizer/co-organizer of the Penn State algebra and number the- ory seminar 	2013-	2014
	 Co-organizer of a mini-symposium at: SIAM conference on Applied Algebraic Geometry, held at Colorado 	Aug.	2013
	 Co-organizer of the conference: Computational workshop on Frobenius singularities and invari- ants, held at the University of Michigan, see 	May	2012
	 http://sites.google.com/site/computingfinvariantsworkshop/ Co-organizer of the AMS Special Session: Singularities in Commutative Algebra and Algebraic Geometry, held at the University of Kansas 	Mar.	2012
	 Co-organizer of the conference: <i>Relating test ideals and multiplier ideals</i>, held at the American 	Aug.	2011
	 Co-organizer of the conference: Frobenius splitting in algebraic geometry, commutative algebra, and representation theory, see 	May	2010
	 http://sites.google.com/site/frobeniussplitting/ Assistant to the organizers of <i>Commutative algebra</i> AMS MRC summer conference/school in Snowbird Utah 	Jun.	2010
	• Organizer/co-organizer of the University of Michigan commutative algebra seminar.	2008-	2010
	 Local organizer for Mel Hochster's 65th birthday conference. Organizer/co-organizer of the University of Michigan topics in algebraic geometry seminar. 	Aug. 2007–	2008 2008
	 Organizer of the University of Washington algebraic geometry sem- inar. 	2004-	2005
	• Co-organizer of the University of Washington undergraduate math- ematical sciences seminar	2004–	2005
Other professional	• Editor for the journal Épijournal de Géométrie Algébrique. 20 https://epiga.episciences.org/)21–pre	esent
ACTIVITIES	• Series Editor for the RSME Springer Series. 20 http://www.springer.com/series/13759)15-pre	esent
	• Special Assistant to the Dean of the College of Science, University of Utah.	2020-	2022
	• Director of Graduate Studies, University of Utah.	2015–	2017

Professional activities are continued on the next page.

OTHER PROFESSIONAL	• Member of the following committees at the University of Utah: Mathematics Department BPT Chair	2023_prosont
ACTIVITIES	Postdoc hiring committee	2020 present 2023-2024
CONTINUED	Faculty Review Committee Mathematics Department	2023 2024
	Executive Committee Mathematics Department	2022 2025 2022–present
	Senate IT Committee (SACIT)	2021 present
	Hiring committee	2021 process
	Mathematics EDI committee.	2021-2022
	College of Science EDI committee.	2021 - 2022
	Graduate Recruitment Committee.	2014-2017, 2019
	Graduate Committee.	2014 - 2017
	Outstanding Graduate Student & Instructor Award Committee	e. 2015–2017
	Outstanding dissertation award committee (Graduate School)	Summer 2016
	Ad hoc committee on thesis formatting (Graduate School)	2016 - 2019
	University TAship award committee (Graduate School)	Spring 2017
	Executive Committee, Mathematics Department	2017 – 2019
	Bachelor of Undergraduate Studies (BUS) Committee	2018 - 2020
	Departmental Thesis Standards Committee	2018 - 2020
	• Member of the following committees at Penn State: Qualify- ing Exam Committee, Graduate Student Teaching Committee, Library Committee, Eberly College Outreach Council.	2011–2014
	 Ran a 3-week long math camp for high school students, <i>Explorations in Number Theory and Cryptography</i>, University of Utah 	June 2016
	• Ran a week-long math camp for high school students, Spy	June 2013
	Games: the math of secret messages, within Penn State's	and July 2014
	 Helped build and maintain Situs Geometriae Algebraicae, a website designed to help students in algebraic geometry find refer- 	2004–2008
	 Active participant on http://www.mathoverflow.net. 	2010–present
	• Reviewed papers for AMS Math Reviews and Zentralblatt Math.	2006-present
	• Helped develop the University of Washington VIGRE website.	2002 - 2003
	• Panelist for NSF grant applications (Standard Grants, CAREER Grants, GRF grants, Postdoctoral Fellowships)	Various years
	• Referee for NSA grant applications.	Various years
	• Referee for Simons Foundation grant applications.	Various years
	• Referee for grant/fellowship applications from other institu- tions/foundations (ERC/DFG/etc.).	Various years

Journal of the American Mathematical Society, Forum of Math: Pi, Annales **Refereed** & REVIEWED Scientifiques de l'École Normale Supérieure, American Journal of Mathematics, 2007 -Inventiones Mathematica, Duke Mathematical Journal, Journal of the European $\frac{1}{present}$ PAPERS FOR THE JOURNALS: Mathematical Society, Advances in Mathematics, Journal of Algebraic Geometry, Compositio Mathematica, Mathematische Annalen, Journal für die reine und angewandte Mathematik, Algebraic Geometry, Transactions of the American Mathematical Society, Mathematical Research Letters, International Mathematics Research Notices, Proceedings of the American Mathematical Society, Mathematische Zeitschrift, Discrete Math, Israel Journal of Mathematics, Journal of Symbolic Computation, Scuola Normale Superiore (Annali di Scienze), the Illinois Journal of Mathematics, Algebra and Number Theory, the Journal of Algebra, Journal of Pure and Applied Algebra, Annales de l'institut Fourier, Communications in Algebra, Journal of Commutative Algebra, the Michigan Mathematical Journal, AMS Contemporary Mathematics, Pure and Applied Mathematics Quarterly, Manuscripta Mathematica, Central European Mathematics Journal, Canadian Journal of Mathematics, Nagoya Mathematical Journal, Journal of the London Mathematical Society, the Kyoto Journal of Mathematics, American Mathematical Monthly, Periodica Mathematica Hungarica, Mathematical Proceedings of the Cambridge Philosophical Society, miscellaneous proceedings volumes.

TEACHING **Instructor:** I have been an instructor for:

- high school level algebra, University of Washington.
- precalculus, University of Washington.
- calculus, University of Washington, University of Michigan, University of Utah.
- multivariable calculus (Stokes theorem etc.), University of Washington.
- topology, University of Washington.
- linear algebra, University of Michigan.
- honors calculus (essentially introduction to real analysis), University of Michigan.
- introduction to topology, University of Washington.
- introduction to schemes and cohomology, University of Michigan..
- topics course on algebraic geometry and commutative algebra, University of Utah.
- undergraduate abstract algebra, Penn State University & University of Utah.
- graduate-level commutative algebra, Penn State University & University of Utah.
- discrete mathematics (intro. proofs), Penn State University & University of Utah.
- honors multivariable calculus, University of Utah.
- graduate abstract algebra I & II, University of Utah & Penn State University.
- cryptography, University of Utah.
- topics in commutative algebra, University of Utah.
- introductory algebraic geometry, University of Utah.
- introduction to real analysis, University of Utah.
- undergraduate abstract algebra I & II, University of Utah.

Students & Mentoring

Ph.D. students.

- Andrew Bydlon (Summer 2017, University of Utah, transferred from PSU)
- Javier Carvajal-Rojas (Summer 2018, University of Utah)
- Daniel Smolkin (Summer 2019, University of Utah)
- Marcus Robinson (Summer 2020, University of Utah)
- Seungsu Lee (Summer 2023, University of Utah)
- Peter McDonald, joint with Srikanth Iyengar (Summer 2024, University of Utah, expected)
- Hanlin Cai, joint with Sean Howe (Summer 2025, University of Utah, expected)
- Sandra Rodrguez-Villalobos (Summer 2025, University of Utah, expected)
- Rahul Ajit, joint with Christohper Hacon (Summer 2026, University of Utah, expected)
- Anne Fayolle (Summer 2027, University of Utah, expected)
- Yotam Svoray (Summer 2027, University of Utah, expected)

Masters students.

- Faith Pearson (Spring 2021, University of Utah)
- Ruyi Ma (Fall 2022, University of Utah)

Postdocs.

- Linquan Ma (2015-2018)
- Thomas Polstra (2017-2020)
- Alicia Lamarche, co-mentored with Aaron Bertram, (2020-2024 expected)
- Eamon Quinlan, co-mentored with Anurag Singh, (2021-2025 expected)
- Quentin Posva, co-mentored with Christopher Hacon, (2022-2023)
- Swaraj Pande, (2024-2027 expected)

Selected Talks	• University of Washington algebra seminar	Febrary 2004
	• University of Michigan algebraic geometry seminar	November 2005
	• University of Washington algebra seminar	January 2006
	• Bellingham algebraic geometry seminar (BAGS)	February 2006
	• Recent Trends in Higher Dimensional Geometry, conference in	April 2006
	Banff Canada (BIRS)	
	• Rice algebraic geometry seminar	March 2006
	• University of Michigan algebraic geometry seminar	November 2006
	• Davidson College AMS meeting, special session in commuta-	March 2007
	tive algebra	
	• F -singularities and D -modules conference in Ann Arbor	August 2007
	• University of Illinois at Chicago algebraic geometry seminar	February 2008
	• Purdue University working algebraic geometry seminar	February 2008
	• University of Georgia algebraic geometry seminar	April 2008
	• Conference in honor of Mel Hochster's 65th birthday	August 2008
	• University of Washington algebra seminar	September 2008
	• Vancouver British Columbia AMS Meeting, special session in	October 2008
	algebraic geometry	
	• University of Illinois at Urbana-Champaign algebraic geometry	October 2008
	seminar	N
	• University of Utan commutative algebra seminar	November 2008
	Western algebraic geometry seminar (wAGS conference) Surgeuse University, collectium	Topuery 2000
	Syracuse University, conoquium University of North Carolina, colloquium	Fobruary 2009
	University of Illinois at Urbana Champaign AMS meeting spectrum	March 2009
	cial session in commutative algebra	
	• University of Illinois at Urbana-Champaign, colloquium	April 2009
	Dundua University algebraic geometry seminar	Apr:1 2000
	 Fundue University algebraic geometry seminar Commutative Algebra and its Connections to Coomstry (hon 	April 2009
	• Commutative Algebra and its Connections to Geometry (non-	August 2009
	Institute Olinda Brazil	
	 University of Kansas algebra seminar 	September 2009
	Higher Dimensional Algebraic Geometry conference Research	December 2009
	Institute for Mathematical Sciences, Kyoto University, Japan	December 2005
	 Joint mathematical meetings in San Francisco, special session 	January 2010
	on commutative algebra	
	Corcordia University, colloquium	January 2010
	Washington University, colloquium	January 2010
	• Indiana University Bloomington, algebra seminar	January 2010
	• Indiana University Bloomington, colloquium	January 2010
	• University of Missouri, colloquium	January 2010
	• Louisiana State University, colloquium	February 2010
	• Wayne State University, colloquium	February 2010
	• Penn State University, colloquium	February 2010
	• Rice University, colloquium	February 2010
	• Sheffield University, lecture series	March 2010

Selected Talks Continued	• Lexington Kentucky AMS Meeting, special session in commu- tative algebra	March 2010
	• Harvard-MIT algebraic geometry seminar	April 2010
	Frobenius splitting conference	May 2010
	• Algebra seminar, Johannes Gutenberg-Universität Mainz	June 2010
	• Commutative Algebra in the Southeast, Conference, Atlanta Georgia	September 2010
	• University of Utah. Colloquium	September 2010
	• Purdue University working algebraic geometry seminar	October 2010
	• Purdue University commutative algebra seminar	October 2010
	• CIRM, Luminy, Commutative algebra and its interactions with algebraic geometry	November 2010
	• Western algebraic geometry seminar (WAGS conference)	November 2010
	• Joint mathematical meetings in New Orleans, special session on commutative algebra	January 2011
	• Penn State University, algebra and number theory seminar	February 2011
	Berkeley-Davis-Stanford Algebraic Geometry Colloquium	March 2011
	• University of Michigan commutative algebra seminar	March 2011
	• Midwest Commutative Algebra and Geometry Conference	May 2011
	• University of Washington, algebra and algebraic geometry sominar	May 2011
	• Workshop on Almost Purity, University of Michigan	May 2011
	• University of Osnabrück, college seminar - combinatorial struc- tures in algebra and topology	June 2011
	 Johannes Gutenberg-Universität Mainz - algebra seminar 	July 2011
	 University of Nebraska - algebraic geometry seminar 	August 2011
	Denite S1 Conference on Commutative Algebra and Algebraic	Soptember 2011
	• Route 81 Conference on Commutative Algebra and Algebraic Geometry - Cornell University	September 2011
	• Stony Brook University, algebra, geometry and physics semi- nar	September 2011
	\bullet University of Michigan commutative algebra seminar	October 2011
	• University of Utah AMS meeting, special session in commuta- tive algebra	October 2011
	• Sheffield University, lecture series	January 2012
	• Universitat de Barcelona / Universitat Politécnica de Catalunya (joint seminar), Seminari de Geometria Algebraica	January 2012
	• Penn State University, GAP Seminar	February 2012
	• University of Illinois at Chicago, algebraic geometry seminar	March 2012
	• Penn State University, algebra and number theory seminar	March 2012
	• Princeton University, algebraic geometry seminar	March 2012
	• Johns Hopkins University, algebraic geometry/number theory	March 2012
	 seminar ACC for minimal log discrepancies and termination of flips 	May 2012
	conference, American Institute of Mathematics	-
	• char-p & p-adic geometry conference, Mainz Germany	June 2012

Selected Talks	• University of Utah, algebraic geometry seminar	September 2012
Continued	• Ohio State University, algebraic geometry seminar	September 2012
	• Georgia State University, colloquium	October 2012
	• Georgia State University, commutative algebra seminar	October 2012
	• Johns Hopkins University, algebraic geometry/number theory seminar	November 2012
	• Princeton University, algebraic geometry seminar	November 2012
	• Trends in Arithmetic Geometry, Lorentz Center, Leiden, the Netherlands	January 2013
	• Penn State, algebra and number theory seminar	February 2013
	• University of Washington, algebra and algebraic geometry seminar	March 2013
	• Columbia University, algebraic geometry seminar	March 2013
	• Imperial College of London, 6 lectures, Workshop: Character- istic p methods in algebraic geometry	April 2013
	• Southern California Algebraic Geometry Seminar, a joint meeting of Caltech, UC Los Angeles, UC San Diego, and the University of Southern California	April 2013
	• American Institute of Mathematics, conference on The mini- mal model program in characteristic p.	May 2013
	• Math Science Research Institute, Conference: The Commu- tative Algebra of Singularities in Birational Geometry: Mul- tiplier Ideals, Jets, Valuations, and Positive Characteristic	May 2013
	 CIRM Luminy, Commutative algebra and its interactions with algebraic geometry 	July 2013
	• Penn State University, algebra and number theory seminar	August 2013
	• University of Georgia, algebraic geometry seminar	September 2013
	• Georgia State University, commutative algebra seminar	September 2013
	• Johns Hopkins University, algebraic geometry/number theory seminar	October 2013
	• Birational Geometry and Singularities in Positive Character- istic, a conference at the University of Tokyo	November 2013
	• Mini-workshop on Cremona groups – University of Utah	November 2013
	• University of Illinois at Chicago algebraic geometry seminar	November 2013
	• Joint mathematical meetings in Baltimore, special session on algebraic geometry	January 2014
	• University of California at Irvine, colloquium	January 2014
	• University of California at Davis, colloquium	January 2014
	• University of Utan, colloquium	February 2014
	• University of California at Utah, algebraic geometry seminar	February 2014
	 Birational Geometry and Foliations workshop – Hausdorff Research Institute for Mathematics Queens University, algebraic geometry seminar 	March 2014

Selected Talks	• University of South Carolina, colloquium	March 2014
Continued	• Texas Algebraic Geometry Symposium (TAGS)	March 2014
	• George Mason University, colloquium	April 2014
	• George Mason University, combinatorics and algebra seminar	April 2014
	• Penn State University, algebra and number theory seminar	April 2014
	 Introduction to Cartier modules (3 lectures), Special Month on "Birational Geometry and Singularities in Zero and Positive Characteristic" held at the University of Michigan. Research presentation, Special Month on "Birational Geome- try and Singularities in Zero and Positive Characteristic" held 	June 2014 June 2014
	at the University of Michigan.	
	• University of Utah, algebraic geometry seminar	September 2014
	• Route 81 conference – Cornell University	September 2014
	• Western algebraic geometry seminar (WAGS conference) – University of Idaho	October 2014
	• Georgia algebraic geometry symposium (GAGS conference) – University of Georgia	October 2014
	• Georgia Tech, algebra seminar	October 2014
	• University of Michigan, algebraic geometry seminar	January 2015
	• Georgetown University AMS Meeting, Special Session on Clo- sure Operations in Commutative Algebra	March 2015
	• Conference on Frobenius Operators and Cartier Algebras – Georgia State University	March 2015
	• AMS summer institute in Algebraic Geometry – University of Utah	July 2015
	• Mini-course at the Multiplier ideals, Test ideals and Bernstein- Sato polynomials, conference – Universitat Politécnica de Catalunya, Barcelona	September 2015
	 Joint mathematical meetings in Seattle, special session on commutative algebra, 	January 2016
	• University of Illinois at Chicago, algebraic geometry seminar	April 2016
	• Differential forms in algebraic geometry (conference) – University of Freiburg, Germany	September 2016
	• KUMUNU – regional commutative algebra conference	October 2016
	• Nihon University Singularities Seminar	November 2016
	• University of Tokyo Algebraic Geometry Seminar	November 2016
	• SLAM (Southwest Local Algebra Meeting) – University of New Mexico	March 2017
	• AGNES (Algebraic Geometry Northeastern Series) – Stony Brook University	April 2017
	• London Geometry and Topology Seminar	May 2017
	• Higher Dimensional Algebraic Geometry 2017, Taipei, Taiwan	June 2017
	\bullet The Prospects for Commutative Algebra, Osaka, Japan	July 2017

Selected Talks Continued	• University of North Texas AMS Meeting, Special Session on Commutative Algebra Denton Texas	September 2017
	• EPFL Lausanne, Algebraic Geometry Seminar	September 2017
	• Algebraic Geometry: Birational Classification, Derived Cate-	September 2017
	gories, and Moduli Spaces, Oberwolfach, Germany	
	• University of Arizona, Algebraic Geometry Seminar	November 2017
	• Mexican National Congress of Algebraic Geometry, Plenary	February 2018
	• Math Science Research Institute, Hot Topics Workshop: The	March 2018
	Homological Conjectures, MSRI, Berkeley	
	• Lecture Series, Tianyuan Advanced Seminar on Moduli Spaces	April 2018
	In Algebraic Geometry • University of Washington Algebraic Geometry Seminar	M_{237} 2018
	University of Illinois at Chicago, Commutative Algebra Semi-	October 2018
	nar	October 2018
	• Purdue University, Commutative Algebra Seminar	October 2018
	• University of Arkansas AMS Meeting, Special Session on Advances in Birational Geometry, Fayetteville Arkansas	November 2018
	• University of Michigan, Commutative Algebra Seminar	November 2018
	• University of Michigan, Algebraic Geometry Seminar	November 2018
	• Lecture Series, Introductory Workshop: Derived Algebraic Ge- ometry and Birational Geometry and Moduli Spaces, Math Science Research Institute (MSRI), Berkeley	January 2019
	• University of Hawaii AMS Meeting, Special Session on Com- mutative Algebra and its Environs, Honolulu Hawaii	March 2019
	 Workshop on Algebraic Geometry, Fudan University, Shang- hai China 	July 2019
	• University of Michigan, Algebraic Geometry Seminar	October 2019
	• Johns Hopkins University, Algebraic Geometry Seminar	October 2019
	• Joint mathematical meetings in Denver, special session on commutative algebra	January 2020
	• Virtual joint mathematical meetings, special session on com- mutative algebra in positive characteristic	January 2021
	• Geometry Seminar, Roma Tres (Virtual)	April 2021
	• ZAG (Zoom Algebraic Geometry) Seminar (Virtual)	April 2021
	• Tata Institute for Fundamental Research, Colloquium (Vir- tual)	August 2021
	• University of Washington, Algebra and Algebraic Geometry Seminar	October 2021
	• University of Illinois at Chicago, Algebraic Geometry Seminar	October 2021
	• Michigan State University, Algebraic Geometry Seminar	November 2021
	• Georgia Algebraic Geometry Symposium, Emory University	April 2022

Selected Talks Continued	• Algebraic geometry and singularities workshop and conference, University of Washington	June	2022
	• CIMAT, Guanajuato Mexico, colloquium and two seminars	August	2022
	• MMP and Moduli Conference, Simons Center	October	2022
	• Algebra Seminar, George Mason University	May	2023
	• Algebraic geometry and cohomology in mixed characteristic Conference, Northwestern University	May	2023
	• Lecture series, Special Month on Singularities, University of Michigan	May	2023
	• Joint mathematical meetings in San Fransisco, special session on Recent Developments in Commutative Algebra	January	2024
	• Taters (Topics in Algebra, Topology etc) Seminar at Boise State (Virtual)	January	2024
	• Workshop on p-adic Arithmetic Geometry (Spring), IAS School of Mathematics, Princeton	March	2024
	• Algebra and Number Theory Day, University of Maryland	April	2024