

CURRICULUM VITAE FOR HENRY K. SCHENCK

Department of Mathematics
Auburn University
Auburn, Alabama 36849

EDUCATION

Ph.D., Mathematics, Cornell University, 1997
M.S., Mathematics, Cornell University, 1994
B.S., Applied Mathematics and Computer Science, Carnegie Mellon University, 1986

MILITARY SERVICE

1986-1990 Officer, United States Army. Left service as a Captain

PROFESSIONAL EXPERIENCE

2019- Auburn University, Rosemary Kopel Brown Eminent Scholars Chair in Mathematics
2024 University of Cambridge, Isaac Newton Institute (Lent and Easter terms)
2023 University of Oxford, Leverhulme Professor (Hilary and Trinity terms)
2017-2019 Iowa State University, Professor and Chair of Mathematics
2012-2017 University of Illinois, Professor of Mathematics
2012-2015 University of Illinois, Associate Chair of Mathematics
2007-2012 University of Illinois, Associate Professor of Mathematics
2008 Texas A&M University, Professor of Mathematics
2005-2008 Texas A&M University, Associate Professor of Mathematics
2001-2005 Texas A&M University, Assistant Professor of Mathematics
2000-2001 Harvard University, N.S.F. Postdoctoral Research Fellow
1998-2000 Northeastern University, N.S.F. Postdoctoral Research Fellow
1997-1998 Cornell University, Visiting Assistant Professor of Mathematics

AWARDS, HONORS, FELLOWSHIPS

- Visiting Fellow, Clare Hall
University of Cambridge, 2024.
- Leverhulme Trust Visiting Professorship
University of Oxford, 2023.
- Auburn University, Veterans Resource Center
Special Recognition Award, 2022.
- American Mathematical Society
Fellow of the A.M.S., 2020.
- Iowa State University, Office of the Provost
Early Achievement in Departmental Leadership, 2019.
- Iowa State University, Veterans Center
Outstanding Partner Award for development of mathematics support for student veterans, 2019.
- Iowa State University, Division of Student Affairs
Wilbur L. Layton Faculty Recognition Award, 2019.
- Fulbright Visiting Professorship
Universidad de Buenos Aires, 2014.
- American Mathematical Society
Invited Hour Address, Southeast Sectional Meeting, New Orleans, 2012.

TEACHING RECOGNITION

- University of Illinois, College of Arts and Sciences
Dean's Award for Excellence in Undergraduate Teaching, 2015.
- Cornell University, College of Arts and Sciences
Clark Distinguished Teaching Award, 1997.

GRANTS AND EXTERNAL FUNDING

1. PI-NSF grant (Computational Algebra and Applications), \$200,000, 2021-2024.
2. co-PI-NSF grant (RTG: Combinatorics, Computation and Applications), \$1,500,000, 2019-2024.
3. PI-NSF grant (Symbolic computation meets computational geometry), \$150,000, 2018-2021.
4. PI-MFO conference grant (Toric geometry), 2019.
5. PI-Simons grant (Applied algebraic geometry), \$42,000, 2017-2022.
6. PI-MFO conference grant (Toric geometry), 2016.
7. PI-NSF grant (Systemic risk and topology), \$135,000, 2013-2016 (R. Sowers co-PI).
8. PI-Fulbright grant (Multigraded algebra and surface modeling), 2014.
9. PI-BIRS conference grant (Symbolic computation and geometric modeling), 2014.
10. PI-MFO conference grant (Splines and algebraic geometry), 2014.
11. PI-NSF grant (Combinatorial commutative algebra), \$159,999, 2011-2014.
12. PI-NSA grant (Toric varieties, hyperplane arrangements, splines), \$56,150, 2011-2013.
13. PI-NSF conference grant (Syzygies in Berlin), \$20,000, 2013.
14. PI-NSF grant (Surface modeling, approximation theory, and coding theory), \$65,799, 2007-2010.
15. PI-AIM conference grant (SQUARE: Arrangements, log vector fields, D-modules), 2009-2011.
16. PI-BIRS conference grant (RIP: Cohomology Jump Loci), 2008.
17. PI-MFO conference grant (Miniworkshop: Surface Modelling), 2007.
18. PI-NSA grant (Applied Commutative Algebra), \$30,000, 2007-2009.
19. PI-NSA grant (Texas Algebraic Geometry Conference and Workshop), \$15,000, 2007.
20. PI-BIRS conference grant (FRG: Complex Arrangements). 2006.
21. PI-NSF grant (Symbolic Computations in Algebra and Topology), \$85,427, 2003-2006.
22. co-PI-ATP grant (Splines for Geometric Modeling), \$149,898, 2004-2006, (PI P. Stiller).
23. PI-NSA grant (Algebra and Combinatorics of arrangements in \mathbb{P}^2), \$25,662, 2003-2005.
24. co-PI-NSF grant (CBMS conference), 2002, \$27,500, (PI P. Lima-Filho).
25. PI-NSF grant (Postdoctoral Research Fellowship), \$90,000, 1998-2001.
26. MSRI Postdoctoral Research Fellowship, 1998 (declined).

INTERNAL GRANTS

1. PI-UIUC Research Board (Applied algebraic geometry), \$22,000 for a GRA, 2016-2017.
2. PI-UIUC Research Board (Geometric surface modeling), \$30,000 for 2 GRA's, 2014-2015.
3. PI-UIUC Research Board (Approximation theory and geometry), \$13,000 for a GRA 2012-2013.
4. PI-UIUC Research Board (Chow cohomology of toric varieties), \$18,500 for a GRA 2010-2011.

BOOKS

1. Schenck, H. "Algebraic foundations for applied topology and data analysis," 232 p., Springer (2022).
2. Cox, D., Little, J., Schenck, H. "Toric varieties," 858 p., AMS Graduate Studies in Mathematics (2011).
3. Schenck, H., "Computational algebraic geometry," 193 p., Cambridge University Press (2003).

RESEARCH PUBLICATIONS

1. Lanini, M., Schenck, H., Tymoczko, J., "The algebra of splines: duality, group actions and homology", *Springer INdAM series: Numerical Analysis meets Algebraic Geometry*, to appear.
2. Di Gennaro, R., Illardi, G., Miro-Roig, R.M., Schenck, H., Valles, J., "Free curves, eigenschemes, and pencils of curves", *Bulletin of the London Mathematical Society*, to appear.
3. Abdallah, N., Schenck, H., "Free resolutions and Lefschetz properties of some Artin Gorenstein rings of codimension four", *Journal of Symbolic Computation*, **121**, 13 pp, (2024).
4. Grate, S., Schenck, H., "Betti tables forcing failure of the weak Lefschetz property", *Springer INdAM series: The strong and weak Lefschetz properties*, to appear.
5. Abdallah, N., Schenck, H., "Nets in \mathbb{P}^2 and Alexander Duality", *Discrete and Computational Geometry*, **70**, 1840-1861 (2023).
6. Mastroeni, M., Schenck, H., Stillman, M., "Quadratic Gorenstein rings and the Koszul property, II", *International Mathematics Research Notices*, **2**, 1461-1482 (2023).
7. Schenck, H., Stillman, M., Yuan, B., "Calabi-Yau threefolds in \mathbb{P}^n and Gorenstein rings", *Advances in Theoretical and Mathematical Physics*, **26**, 764-792, (2022).
8. Brooks, J., Grundmeier, D., Schenck, H., "Algebraic properties of Hermitian sums of squares", *Proceedings of the A.M.S.*, **150**, 3471-3476, (2022).
9. Migliore, J., Nagel, U., Schenck, H., "Schemes supported on the singular locus of a hyperplane arrangement in \mathbb{P}^n ", *International Mathematics Research Notices*, **1**, 140-170, (2022).
10. Botbol, N., Dickenstein, A., Schenck, H., "The simplest minimal free resolutions in $\mathbb{P}^1 \times \mathbb{P}^1$ ", *Commutative Algebra*, Springer Verlag, 113-145, (2021).
11. Buse, L., Dimca, A., Schenck, H., Sticlaru, G., "The Hessian polynomial and the Jacobian ideal of a reduced hypersurface in \mathbb{P}^n ", *Advances in Mathematics*, **392**, 22pp, (2021).
12. Mastroeni, M., Schenck, H., Stillman, M., "Quadratic Gorenstein rings and the Koszul property, I", *Transactions of the A.M.S.*, **374**, 1077-1093 (2021).
13. Schenck, H., Sowers, R., Song, R., "Trading networks and Hodge theory", *Journal of Physics Communications*, **4**, (2020).
14. Schenck, H., "Rees algebras, syzygies, and computational geometry", in *Applications of Polynomial Systems*, by D. Cox, *CBMS Lecture Notes in Mathematics*, **134**, 121-135 (2020).
15. Migliore, J., Nagel, U., Schenck, H., "The Weak Lefschetz property for quotients by Quadratic Monomials", *Mathematica Scandinavica*, **126**, 41-61 (2020).
16. Schenck, H., Stillman, M., Yuan, B., "A new bound for smooth spline spaces", *Journal of Combinatorial Algebra*, **4**, 359-367 (2020).
17. Harrington, H., Otter, N., Schenck, H., Tillmann, U., "Stratifying Multiparameter Persistent Homology", *SIAM Journal on Applied Algebra and Geometry*, **3**, 439-471, (2019).
18. Schenck, H., Terao, H., Yoshinaga, M., "Logarithmic vector fields for curve configurations in \mathbb{P}^2 with quasihomogeneous singularities", *Math Research Letters*, **25**, 1977-1992, (2018).
19. Efremenko, K., Landsberg, J.M., Schenck, H., Weyman, J., "Shifted partial derivatives cannot separate the permanent from the determinant" *Mathematics of Computation*, **87**, 2037-2045, (2018).
20. Schenck, H., Sorokina, T., "Subdivision and spline spaces", *Constructive Approximation*, **47**, 237-247, (2018).

21. Efremenko, K., Landsberg, J.M., Schenck, H., Weyman, J., “On minimal free resolutions of subpermanents and other ideals arising in complexity theory” *Journal of Algebra*, **503**, 8-20, (2018).
22. Little, J., Schenck, H., “Codes from surfaces with small Picard number”, *SIAM Journal on Applied Algebra and Geometry*, **2**, 242-258, (2018).
23. Fieldsteel, N., Schenck, H., “Polynomial interpolation in higher dimension: from simplicial complexes to geometrically characterized sets”, *SIAM Journal on Numerical Analysis*, **55**, 131-143, (2017).
24. Schenck, H., “Algebraic methods in approximation theory”, *Computer Aided Geometric Design*, **45**, 14-31, (2016).
25. Duarte, E., Schenck, H., “Tensor product surfaces and syzygies”, *Proceedings of the A.M.S.*, **144**, 65-72, (2016).
26. Cohen, D. Schenck, H., “Chen ranks and resonance”, *Advances in Mathematics*, **285**, 1-27, (2015).
27. Bogart, T., Haase, C., Hering, M., Lorenz, B., Nill, B., Paffenholz, A., Rote, G., Santos, F., Schenck, H., “Finitely many smooth d-polytopes with n lattice points”, *Israel Jour. Math.*, **207**, 301-330, (2015).
28. Schenck, H. “Splines on the Alfeld split of a simplex and type A root systems”, *Journal of Approximation Theory*, **182**, 1-6 (2014).
29. Irving, C., Schenck, H. “Geometry of Wachspress surfaces”, *Algebra Number Theory*, **8**, 369-396 (2014).
30. Schenck, H., Seceleanu, A., Validashti, J. “Syzygies and singularities of tensor product surfaces of bidegree (2,1)”, *Mathematics of Computation*, **83**, 1337-1372 (2014).
31. Denham, G., Schenck, H., Schulze, M., Wakefield, M., Walther, U., “Local cohomology of logarithmic forms,” *Annales de l’Institut Fourier*, **63**, 1177-1203 (2013).
32. Schenck, H., “Toric Hirzebruch-Riemann-Roch via Ishida’s theorem on the Todd genus”, *Proceedings of the A.M.S.*, **141**, 1215-1217 (2013).
33. Schenck, H., Sidman, J. “Commutative algebra of subspace and hyperplane arrangements”, *Commutative Algebra*, Springer Verlag, 639-665 (2013).
34. Schenck, H., Stillman, M. “High rank linear syzygies on low rank quadrics”, *American Journal of Mathematics*, **134**, 561-579 (2012).
35. Schenck, H., “Equivariant Chow cohomology of nonsimplicial toric varieties”, *Transactions of the A.M.S.*, **364** 4041-4051 (2012).
36. Schenck, H., “Hyperplane arrangements: computations and conjectures”, *Advanced Studies in Pure Mathematics*, **62**, 323-358 (2012).
37. Schenck, H. “Resonance varieties via blowups of \mathbb{P}^2 and scrolls,” *International Mathematics Research Notices*, **20**, 4756-4778 (2011).
38. Harbourne, B., Schenck, H., Seceleanu, A., “Inverse systems, Gelfand-Tsetlin patterns and the weak Lefschetz property,” *Journal of the L.M.S.*, **84**, 712-730 (2011).
39. Schenck, H. “Euler characteristic of coherent sheaves on simplicial torics via the Stanley-Reisner ring,” *J. Mathematical Physics*, **51**, 8 pp. (2010).
40. Schenck, H., Seceleanu, A., “The weak Lefschetz property and powers of linear forms in $K[x, y, z]$,” *Proceedings of the A.M.S.*, **138**, 2335-2339 (2010).
41. Schenck, H., Tohaneanu, S., “Freeness of conic-line arrangements in \mathbb{P}^2 ,” *Commentarii Mathematici Helvetici*, **84**, 235-258 (2009).
42. McDonald, T., Schenck, H., “Piecewise polynomials on polyhedral complexes,” *Advances in Applied Mathematics*, **42**, 82-93 (2009).
43. Schenck, H., Tohaneanu, S., “Orlik-Terao algebra and formality,” *Math Res.Lett.*, **16**, 171-182 (2009).
44. Lima-Filho, P., Schenck, H. “Holonomy Lie algebras and the LCS formula for subarrangements of A_n ,” *International Mathematics Research Notices*, **8**, 1421-1432 (2009).
45. Lima-Filho, P., Schenck, H., “Efficient computation of resonance varieties using Grassmannians,” *J. Pure and Applied Algebra*, **213** 1606-1611 (2009).
46. Cox, D., Dickenstein, A., Schenck, H., “A case study in bigraded commutative algebra,” Lecture notes in Pure and Applied Mathematics **254** (Syzygies and Hilbert Functions; I. Peeva, ed.), 67–112 (2007).
47. Gold, L., Schenck, H., Srinivasan, H., “Betti numbers and degree bounds for some linked zero-schemes,” *J. Pure and Applied Algebra*, **210**, 481-491 (2007).
48. Hering, M., Schenck, H., Smith G. “Syzygies, multigraded regularity, and toric varieties”, *Compositio Mathematica*, **142**, 1499-1506 (2006).
49. Schenck, H., Suci, A., “Linear syzygies, Chen ranks, and the Bernstein-Gelfand-Gelfand correspondence,” *Transactions of the A.M.S.*, **358**, 2269-2289 (2006).

50. Kung, J.P.S., Schenck, H., “Derivation modules of orthogonal duals of hyperplane arrangements”, *J. Algebraic Combinatorics*, **24**, 253-262 (2006).
51. Little, J., Schenck, H., “Toric surface codes and Minkowski sums”, *SIAM Journal on Discrete Mathematics*, **20**, 999-1014 (2006).
52. Gold, L., Little, J., Schenck, H. “The Cayley-Bacharach theorem and evaluation codes on complete intersections,” *J. Pure and Applied Algebra*, **196**, 91-99 (2005).
53. Schenck, H., “Linear systems on a special rational surface,” *Math Research Letters*, **11**, 697-713 (2004).
54. Schenck, H., “Lattice polygons and Green’s theorem,” *Proc. of the A.M.S.*, **132**, 3509-3512 (2004).
55. Schenck, H., “Elementary modifications and line configurations in \mathbb{P}^2 ,” *Commentarii Mathematici Helvetici*, **78**, 447-462 (2003).
56. Cox, D., Schenck, H., “Local complete intersections in \mathbb{P}^2 and Koszul syzygies,” *Proceedings of the A.M.S.*, **131**, 2007-2014 (2003).
57. Schenck, H., Suciuc, A., “Lower central series and free resolutions of hyperplane arrangements,” *Transactions of the A.M.S.*, **354**, 3409-3433 (2002).
58. Schenck, H., Stiller, P., “Cohomology vanishing and a problem in approximation theory,” *manuscripta mathematica*, **107**, 43-58 (2002).
59. Mustața, M., Schenck, H., “The module of logarithmic p-forms of a locally free arrangement,” *J. Algebra*, **241**, 699-719 (2001).
60. Dalbec, J., Schenck, H., “On a conjecture of Rose,” *J. Pure and Applied Algebra*, **165**, 151-154 (2001).
61. Schenck, H., “A rank two vector bundle associated to a three arrangement, and its Chern polynomial,” *Advances in Mathematics*, **149**, 214-229 (2000).
62. Schenck, H., “Subalgebras of the Stanley-Reisner ring,” *Dis. and Comp. Geom.*, **21**, 551-556 (1999).
63. Geramita, A., Schenck, H., “Fat points, inverse systems, and piecewise polynomial functions,” *J. Algebra*, **204**, 116-128 (1998).
64. Schenck, H., “A spectral sequence for splines,” *Advances in Applied Mathematics*, **19**, 183-199 (1997).
65. Schenck, H., Stillman, M., “Local cohomology of bivariate splines,” *J. Pure and Applied Algebra*, **117-118**, 535-548 (1997).
66. Schenck, H., Stillman, M., “A family of ideals of minimal regularity and the Hilbert series of $C^r(\hat{\Delta})$,” *Advances in Applied Mathematics*, **19**, 169-182 (1997).

TALKS (CONFERENCE, SEMINAR, COLLOQUIA) AND SHORT COURSES

- Conference talks
 - “Combina-Torics”, CIMPA research school on bridges between algebra and combinatorics, Popayan, Columbia, July 2024. (4 hours of lectures, 6 hours of small group problem solving sessions).
 - “Kuramoto Oscillators: dynamical systems meet computational algebraic geometry”, Newton Institute workshop on applied algebraic geometry, Cambridge, January 2024 (invited hour talk).
 - “Algebra and topology of Kuramoto oscillators”, SIAM minisymposium on combinatorial and computational algebraic geometry, Lafayette LA, November 2023 (invited 30 minute talk).
 - “Bounds on smooth spline spaces”, ICIAM minisymposium on finite element complexes and multivariate splines, Tokyo, August 2023 (invited 30 minute talk).
 - “MSSM: symbolic computation meets particle physics”, ISSAC conference on symbolic and algebraic computation, Norway, July 2023 (winner, best software prize)
 - “Kuramoto Oscillators: algebraic and topological aspects”, Cambridge-Oxford-Warwick (COW) Algebraic Geometry conference, London, May 2023 (invited hour talk).
 - “Gorenstein rings of codimension four and low regularity”, Banach Center conference on explicit algebraic geometry, Bedlewo Poland, April 2023 (invited hour talk).
 - “Density of states for discrete Schrodinger operators: homological methods”, ICERM workshop on algebraic geometry and spectral theory, Brown, February 2023 (invited 45 minute talk).
 - “Gorenstein rings in codimension four”, CIRM conference on commutative algebra, Marseille, France, January 2023 (invited 50 minute talk).
 - “Quarternary quartics and Gorenstein rings”, INdAM conference on the strong and weak Lefschetz properties, Cortona, Italy, September 2022 (invited 40 minute talk).

- “The algebra of splines”, INdAM conference on Approximation Theory and Numerical Analysis meet Algebra, Geometry, Topology, Cortona, Italy, September 2022 (90 minute survey talk).
- “Data meets Topology: an invitation to persistent homology”, Arrangements in Ticino: Geometry, topology, algebra and their applications, Ticino, Switzerland, July 2022 (invited hour talk).
- “Calabi-Yau threefolds in \mathbb{P}^n and Gorenstein rings”, Applied Algebra and Geometry, Swansea, December 2021 (virtual).
- “From approximation theory to Castelnuovo-Mumford regularity of vector bundles”, Algebraic Geometry in Ischia, Italy, October 2021.
- “Symmetry: from physics of Calabi-Yau threefolds to algebra of Gorenstein rings”, Chern Institute, Symposium on Physics and Geometry, Nankai, August 2021 (virtual).
- “New bounds for smooth planar splines”, Universita Roma (Tor Vergata) workshop on algebraic approaches to multivariate splines, Rome, May 2021 (virtual).
- “Castelnuovo-Mumford regularity of the Jacobian of a hypersurface”, MFO Workshop on Logarithmic vector fields and freeness of divisors, Oberwolfach, January 2021 (virtual).
- “Castelnuovo-Mumford regularity of the Jacobian of a hypersurface”, IPM Workshop on Commutative Algebra, Tehran, January 2021 (virtual).
- “Calabi-Yau threefolds in \mathbb{P}^n and Gorenstein rings”, MSRI National Commutative Algebra/Algebra Geometry Seminar, November 2020 (virtual).
- “Castelnuovo-Mumford regularity of the Jacobian of a hypersurface”, Arrangements Online Conference, online, August 2020 (virtual).
- “Algebraic tools in Topological Data Analysis”, CIMAT graduate-postdoc workshop, Guanajuato, Mexico, January 2020. (4.5 hours of lectures).
- “Syzygies: from theory to applications”, CIMPA graduate-postdoc workshop, Joao Pessoa, Brazil, November 2019. (8 hours of lectures and computer labs).
- “Lefschetz, Linkage, and Quadratic Gorenstein non-Koszul algebras”, CIRM workshop on Lefschetz properties, Marseille, France, October 2019. (invited 45 minute talk).
- “Toric Varieties”, MSRI-NCTS summer graduate workshop, Taipei, Taiwan, August 2019. (10 hours of lectures).
- “Stratifying Multiparameter Persistent Homology”, ICERM workshop “Nonlinear algebra and applications”, Brown University, November 2018. (invited 45 minute talk).
- “Geometric Modeling and Syzygies”, ARCADES doctoral school “Algebraic representations in Computer-Aided Design”, Barcelona, September 2018. (two 90-minute talks).
- “Stratifying Multiparameter Persistent Homology”, BIRS-CMO workshop “Multiparameter Persistent Homology”, Oaxaca, Mexico, August 2018. (invited hour talk).
- “Quadratic Gorenstein non-Koszul algebras via idealization”, BIRS workshop “Progress on Syzygies”, Banff, Canada, June 2018. (invited hour talk).
- “Rees algebras, syzygies, and computational geometry”, CBMS conference “Applications of polynomial systems”, TCU, Dallas, Texas, June 2018. (invited hour talk).
- “The Lefschetz property for quadratic monomial ideals”, Lefschetz properties in algebra, geometry, combinatorics, Mittag-Leffler Institute, Stockholm Sweden, July 2017. (invited 45 min talk)
- “Multiparameter Persistent Homology”, Combinatorics, Geometry, Topology and Applications, Centro de Giorgi, Pisa Italy, June 2017. (invited 40 min talk).
- “Syzygies, Exterior Algebra, and Hyperplane Arrangements”, KIAS Conference on “Syzygies, Exterior algebras, and cohomology”, Jeju, Korea, August 2016 (two invited hour talks).
- “From Geometrically Characterized sets to simplicial complexes”, Conference on “Mathematical Methods for curves and surfaces”, Tonsberg, Norway, June 2016 (invited hour talk).
- “The Lefschetz property for quadratic monomial ideals”, INdAM conference “Computational and Homological methods in Commutative Algebra”, Cortona, June 2016 (invited 45-minute talk).

- “The Weak Lefschetz Property and Bernstein-Gelfand-Gelfand”, BIRS workshop on Lefschetz Properties and Artinian Algebras, Banff, Canada, March 2016. (invited hour talk).
- “Logarithmic vector fields and curve arrangements”, MFO workshop on Arrangements of Subvarieties and Applications, Oberwolfach, Germany, March 2016 (invited half hour talk).
- “Approximation theory and root systems of type A arrangements”, ICERM conference on Computational topology of arrangements, Brown University, July 2015 (invited half-hour talk).
- “Trading networks and Hodge theory”, Conference on Geometry and Data Analysis, Stevanovich center for financial mathematics, University of Chicago, June 2015 (invited hour talk).
- “Geometry of generalized barycentric coordinates”, ICMS conference on free resolutions, Betti numbers, and combinatorics, Edinburgh, Scotland, June 2015 (invited hour talk).
- “Algebraic methods in approximation theory”, MFO workshop on multivariate splines, Oberwolfach, Germany, April 2015 (invited hour talk).
- “Wachspress varieties and geometric modeling”, Foundations of Computational Mathematics conference, Montevideo, December 2014 (invited 30-min talk).
- “Chen ranks and resonance varieties”, INdAM conference “Configuration spaces: geometry, topology and representation theory”, Cortona, September 2014 (invited hour talk).
- “Geometry of generalized barycentric coordinates”, SLAM conference “Southwest local algebra conference”, Texas A&M, February 2014 (invited hour talk).
- “Logarithmic vector fields for curve configurations in \mathbb{P}^2 ”, RIMS conference “Hyperplane arrangements and characteristic classes”, Kyoto, November 2013 (invited hour talk).
- “Geometry of Wachspress surfaces”, KUMUNU conference on Commutative algebra, Univ. Missouri, September 2013 (invited hour talk).
- “Syzygies and singularities of tensor product surfaces”, SIAM minisymposium “Toric geometry, lattice points, and applications”, Colorado State, August 2013 (invited 25-min talk).
- “Geometry of Wachspress surfaces”, SIAM minisymposium “Computations and bounds in commutative algebra”, Colorado State, August 2013 (invited 25-min talk).
- “Toric Varieties and applications”, SIAM minicourse, Colorado State, July 2013 (2 hour long talks, problem sessions).
- “Syzygies and Combinatorics”, NSF-DFG sponsored workshop “Syzygies in Berlin”, Berlin, Germany, May 2013. (4 hour long talks)
- “Geometry of Wachspress surfaces”, BIRS workshop on Algebraic geometry and geometric modelling, Banff, Canada, January 2013. (invited 40-min talk)
- “Logarithmic vector fields for curve configurations in \mathbb{P}^2 ”, MSRI seminar (commutative algebra program), Berkeley, December 2012. (invited hour talk)
- “Equivariant Chow cohomology of nonsimplicial toric varieties”, MFO workshop on cohomology rings and fundamental groups of arrangements, Oberwolfach, Germany, October 2012. (invited hour talk)
- “From approximation theory to algebraic geometry: the ubiquity of splines”, AMS Invited hour address, New Orleans, October 2012.
- “Logarithmic vector fields and quasihomogeneous curve arrangements”, AMS Special Session on Combinatorial Commutative Algebra, New Orleans, October 2012 (invited 20-min talk)
- “Syzygies and singularities of tensor product surfaces”, Bluegrass Algebra Conference, University of Kentucky, June 2012. (invited hour talk)
- “Syzygies of toric varieties”, MFO workshop on toric geometry, Oberwolfach, Germany, April 2012. (invited 40-min talk)
- “Approximation theory, spectral sequences, and splines”, SIAM workshop on algebraic geometry and approximation theory, Raleigh, October 2011. (invited 25-min talk)

- “Resonance varieties via blowups of \mathbb{P}^2 and scrolls”, AMS Special Session on Arrangements, Boston, April 2011. (invited 20-min talk)
- “The weak Lefschetz property and powers of linear forms”, KUMUNU conference on commutative algebra, University of Nebraska, April 2011. (invited hour talk)
- “Cohomology and Chow rings of toric varieties”, BIRS workshop on Topological methods in toric and symplectic geometry and combinatorics, Banff, Canada, Nov 2010. (invited hour talk)
- “Linear series and linear syzygies”, MFO miniworkshop on Linear series on algebraic varieties, Oberwolfach, Germany, October 2010. (invited hour talk)
- “Equivariant Chow cohomology of nonsimplicial toric varieties”, Configuration Spaces: Geometry, Combinatorics and Topology, Centro de Giorgi, Pisa Italy, June 2010. (invited hour talk)
- “Blowups of \mathbb{P}^2 at singular points of line configurations: resonance, syzygies, scrolls”, AMS Special Session on Combinatorial algebra, Lexington, KY, March 2010. (invited 20-min talk)
- “Equivariant Chow cohomology of nonsimplicial toric varieties”, AMS Special Session on Zonotopal Algebra, San Francisco, January 2010. (invited 40-min talk)
- “Arrangements and Computations”, Math Society of Japan summer school, Hokkaido, Japan, August 2009. (3 hour long invited talks)
- “Logarithmic forms for quasihomogeneous curve arrangements in \mathbb{P}^2 ”, AIM squares workshop on Logarithmic forms, arrangements and D-modules, Stanford, CA, May 2009.
- “Toric specializations of the Rees algebra of Koszul cycles”, AMS special session on algebra and number theory with polyhedra, San Francisco, CA, April 2009. (invited 20-min talk)
- “Piecewise polynomials on polyhedral complexes”, Conference on algebraic geometry and approximation theory, Towson, Maryland, April 2009. (invited hour talk)
- “Geometry and Syzygies of surfaces associated to line configurations in \mathbb{P}^2 ”, Bluegrass Algebra Conference, University of Kentucky, March 2009. (invited hour talk)
- “The Orlik-Terao algebra and 2-formality.” Conference in honor of Peter Orlik, Fields Institute, Toronto, Canada, August 2008. (invited hour talk)
- “Open problems in syzygies and Hilbert functions”, AMS workshop on Computational Algebra and Convexity, Snowbird, UT, June 2008. (invited hour talk)
- “Computations in topology and applied mathematics”, Conference on applications of Macaulay2, Cornell University, March 2008. (invited hour talk)
- “Algebra and Geometry of four sections of $\mathcal{O}(2, 1)$ ”, MFO miniworkshop on syzygies and surface modeling, Oberwolfach, Germany, November 2007. (invited hour talk)
- “A syzygy approach to projective normality”, MFO miniworkshop on projective normality of smooth toric varieties, Oberwolfach, Germany, August 2007. (invited hour talk)
- “Computational algebraic geometry and approximation theory”, IMA PI graduate workshop on Applicable Algebraic geometry, Texas A&M, July 2007. (invited 75-min talk)
- “Splines on polyhedral complexes”, BIRS workshop on Commutative algebra, Banff, Canada, June 2007. (invited 30-min talk)
- “Syzygies of plane curve singularities”, MSRI workshop on commutative algebra and algebraic geometry, Berkeley, CA, May 2007. (informal 30-min talk, invited by organizers)
- “Toric surface codes and Minkowski sums”, AMS Special Session on Computational methods for low dimensional varieties, New Orleans, LA, January 2007.(invited 20-min talk)
- “A spectral sequence stratification of cohomology jump loci”, AMS Special Session on Arrangements and related topics, New Orleans, LA, January 2007.(invited 20-min talk)
- “Configurations of smooth rational curves in \mathbb{P}^2 ”, BIRS workshop on Hilbert functions and Syzygies, Banff, Canada, October 2006. (invited 30-min talk)
- “Fitting ideals and cohomology jump loci”, MSRI workshop on Configuration Spaces and Arrangements, Berkeley, August 2006. (invited hour talk)

- “ R^k for a k -generic arrangement is $V(\text{ann}(\text{Ext}^{k+1}(F(A), S)))$ ”, BIRS Focussed research group on complex arrangements, Banff, Canada, June 2006. (invited hour talk)
- “Holonomy Lie algebras, Graphic Arrangements, and $\text{Tor}_i^A(k, k)_i$ ”, AMS Special Session on Syzygies, San Antonio, TX, January 2006.(invited 20-min talk)
- “Bigraded algebra and incomplete linear systems on $\mathbb{P}^1 \times \mathbb{P}^1$.” AMS Special Session on Resolutions, Eugene, OR, November 2005.(invited 20-min talk)
- “Projective dimension and derivations.” PIMS workshop on Hyperplane Arrangements, Vancouver, Canada August 2005. (invited 40-min talk)
- “Syzygies and Toric Varieties.” BASCOLA: Coloquio de Algebra en Buenos Aires, Argentina, August 2005. (invited 40-min talk)
- “Holonomy Lie algebras and the LCS formula for graphic arrangements.” XVI Coloquio Latinoamericano de Algebra, Uruguay, August 2005. (invited 40-minute talk)
- “A spectral sequence stratification of cohomology jump loci.” BIRS Focussed research group on cohomology and rational homotopy, Banff, Canada, June 2005. (invited hour talk)
- “Commutative and Homological methods for arrangements.” MSRI Workshop on Hyperplane Arrangements, Berkeley, August 2004. (invited hour talk)
- “Free resolutions of a family of monomial ideals and a family of ideals generated by powers of linear forms.” MFO workshop on Combinatorial Commutative Algebra, Oberwolfach, Germany, July 2004. (invited 45-min talk)
- “Chen ranks and the Bernstein-Gelfand-Gelfand correspondance.” Geometry and Combinatorics, Flagstaff, January 2004. (invited hour talk)
- “Linear systems on a special rational surface.” AMS Special Session on Algebraic Geometry, Boulder, October 2003. (invited 20-min talk)
- “Castelnuovo-Mumford regularity and line configurations in the projective plane.” AMS Special Session on Combinatorial Commutative Algebra and Algebraic Geometry, San Francisco, May 2003. (invited 20-min talk)
- “Resonance, Syzygies, and the Bernstein-Gelfand-Gelfand correspondence.” MSRI Workshop on Computational Commutative Algebra, Berkeley, March 2003. (invited hour talk)
- “Hyperplane arrangements and free resolutions.” Contemporary Algebra and Algebraic Geometry conference, Texas Tech University, November 2002. (invited 30-min talk)
- “Hyperplane arrangement cohomology and free resolutions.” Fields Institute meeting on Symbolic Computational Algebra, Ontario, Canada, July 2002. (invited 30-min talk)
- “Resonance varieties and free resolutions.” MFO miniworkshop on Cohomology jumping loci, Oberwolfach, Germany, March 2002. (invited hour talk) Diego, January 2002. (invited 20-min talk)
- “Local complete intersections in \mathbb{P}^2 and Koszul syzygies.” Annapolis Algebraic Geometry conference, USNA, October 2001. (invited 40-min talk)
- “Stability and jump loci for a family of bundles on \mathbb{P}^2 .” AMS Special Session on Commutative Algebra, Lowell, April 2000. (invited 20-min talk)
- “Logarithmic p-forms on a locally free arrangement.” Arrangements in Boston, Boston, June 1999. (invited 30-min talk)
- “The Chern polynomial of a three arrangement.” MSRI workshop on Symbolic Computation, Berkeley, October 1998. (invited 30-min talk)
- “A spectral sequence for splines.” Conference on Commutative Algebra and Combinatorics, Essen, Germany, June 1997. (invited hour talk)
- “A spectral sequence for splines.” MSRI workshop on Geometric Combinatorics, Berkeley, February 1997. (invited hour talk)
- “Local cohomology of bivariate splines.” Fourth International Symposium on Effective Methods in Algebraic Geometry, Eindhoven, Netherlands, June 1996. (invited 30-min talk)

- Colloquium talks

- Amherst
- Auburn
- Georgia
- Howard
- Navy
- Louisiana State
- Nebraska
- Notre Dame
- Univ. of California - Riverside
- Univ. of Illinois
- Univ. of New Hampshire
- Univ. of North Carolina - Charlotte
- Univ. of North Texas
- Univ. of Tennessee
- Univ. of Western Ontario
- Univ. of Wisconsin
- Rice
- Texas A&M
- T.C.U.
- U.T. Arlington
- Virginia Tech

- Seminar talks

- Bath (UK)
- Berkeley
- Beirut (Lebanon)
- Berlin (Germany)
- Brown
- Buenos Aires (Argentina)
- Cambridge (UK)
- Chicago
- Colorado State
- Cornell
- Edinburgh (UK)
- Georgia
- Louisiana State
- Harvard
- Minnesota
- MIT
- Nebraska
- Northeastern

- Notre Dame
- Oxford (UK)
- Purdue
- Queens (Canada)
- Texas A&M
- T.C.U.
- Univ. of California - Riverside
- Univ. of California - San Deigo
- Univ. of Illinois, Chicago
- Univ. of Illinois
- Univ. of Massachusetts - Amherst
- Univ. of New Hampshire
- Univ. of Texas
- Warwick (UK)
- Western Ontario (Canada)
- Univ. of Wisconsin

SELECTED CONFERENCE AND WORKSHOP ORGANIZATION

- Organizer, Fields Institute semester “Commutative Algebra and Applications”, Toronto, Spring 2025 (w/ Eisenbud, Gorla, Harada, Rajchgot, Van Tuyl).
- Organizer, SIAM minisymposium “Applied and Computational Algebraic Geometry”, Texas-Louisiana SIAM meeting, 11/2023.
- Organizer, AMS special session on Commutative Algebra, Georgia Tech, 3/2023 (w/ Brown).
- Organizer, INdAM conference “Approximation Theory and Numerical Analysis meet Algebra, Geometry, Topology”, Cortona, Italy, 9/2022 (w/ Lanini, Manni).
- Organizer, MFO miniworkshop “Interpolation, Approximation, Algebra”, Oberwolfach, Germany, 2/2022 (w/ de Boor, Sauer, Sorokina).
- Organizer, SIAM workshop “Applied Algebraic Geometry 2021”, Texas A&M, 8/2021 (w/ Yu).
- Organizer, MFO workshop “Toric geometry”, Oberwolfach, Germany, 9/2019 (w/ Hausen, Maclagan).
- Organizer, MSRI-NCTS graduate summer school: “Toric varieties”, Taipei, Taiwan, 8/2019 (w/ Cox).
- Organizer, “Ideals-Varieties-Applications, Amherst, 6/2019 (w/ Buse, D’Andrea, Dickenstein, Goldman, Little, Pflueger, Sidman, Sturmfels).
- Organizer, NSF-Berkeley workshop “Free Resolutions and Computational Algebra”, Berkeley, 7/2017 (w/ Eisenbud, Mapes, Stone, Swinarski, Taylor).
- Organizer, BIRS-CMO workshop “Computational Algebra and Geometric Modeling”, Oaxaca, Mexico, 8/2016 (w/ Buse, Goldman).
- Organizer, MFO workshop “Toric geometry”, Oberwolfach, Germany, 3/2016 (w/ Hausen, Maclagan).
- Organizer, ICERM workshop “Computational geometric topology in arrangement theory”, Brown University, 7/2015 (w/ Budur, Denham, Macinic, Matei, Maxim, Wakefield).
- Organizer, MFO workshop “Splines and algebraic geometry”, Oberwolfach, Germany, 4/2015 (w/ Schumaker, Sorokina).

- Organizer, AMS special session on Toric geometry, Eau Claire, 9/2014 (w/ Berkesch, Erman).
- Organizer, NSF sponsored Macaulay2 workshop, University of Illinois, 6/2014.
- Organizer, Institute for Mathematical Sciences and Engineering workshop “Applied topology and geometry”, University of Illinois, 2/2014 (w/ Hirani).
- Main speaker, SIAM summer school “Toric Geometry”. Several lectures on toric geometry, coding theory, and approximation theory, Ft. Collins, 8/2013.
- Main speaker, NSF-DFG grad/postdoc workshop “Syzygies in Berlin”. Gave four lectures on syzygies and combinatorics, Berlin, 5/2013.
- Organizer, AMS special session on approximation theory and algebraic geometry, New Orleans, 10/2012.
- Scientific Committee, PIMS conference: “Arrangements and applications”, Vancouver, Canada, 8/2011.
- Scientific Committee, MSRI-INdAM workshop: “Toric varieties”, Cortona, Italy, 7/2011.
- Organizer, MSRI graduate student workshop: “Toric varieties”, Berkeley, CA, 6/2009.
- Organizer, AMS-NSF Math Research Community grad/postdoc workshop: “Computational Algebra and Convexity”, Snowbird, UT, 6/2008.
- Organizer, MFO Miniworkshop “Surface modeling”, Oberwolfach, Germany, 11/2007.
- Organizer, BIRS Focussed Research Group “Complex arrangements”, Banff, Canada, 6/2006.

GRADUATE AND POSTDOC ADVISING AND OUTCOMES

- Nicholas Gaubatz, current Ph.D. student.
- Sean Grate, current Ph.D. student.
- Joanie Morris, Ph.D. 2023, Auburn. Lecturer, Auburn University.
- Beihui Yuan, Ph.D. 2021, Cornell. (joint with M. Stillman). Postdoc, Swansea University (UK).
- Matt Mastroeni, Ph.D. 2018, UIUC. Postdoc, Iowa State University.
- Eliana Duarte, Ph.D. 2017, UIUC. Tenure track at Universidade do Porto (Portugal).
- Nathan Fieldsteel, Ph.D. 2017, UIUC. Postdoc, University of Kentucky.
- Michael DiPasquale, Ph.D. 2015, UIUC. Tenure track at New Mexico State University.
- Jimmy Shan, Ph.D. 2014, UIUC. Senior analyst, Ernst and Young Financial Services.
- Alexandra Seceleanu, Ph.D. 2011, UIUC. Tenured at University of Nebraska-Lincoln.
- Jimmy Kimball, Ph.D. 2008, Texas A&M. Instructor at Louisiana-Lafayette.
- Stefan Tohaneanu, Ph.D. 2007, Texas A&M. Tenured at University of Idaho.
- Terry McDonald, Ph.D. 2006, Texas A&M. Tenured at Midwestern State University.
- Amy Huang, postdoc, 2022-current.
- Mucyo Karemera, postdoc, 2021-2022 (joint with R. Molinari). Research Scientist, U. Geneva.
- Jayan Mukherjee, ICERM bridge postdoc, 2021-2022. Postdoc, UC-Riverside.
- Javid Validashti, postdoc, 2011-2014. Tenure track at Cleveland State University.
- Leah Gold, NSF-VIGRE postdoc, 2002-2005. Tenured at Cleveland State University.

EDITORIAL BOARD AND NATIONAL COMMITTEE SERVICE

- Chair, Committee of Academic Sponsors, MSRI, 2020-2023.
- Member (ex-officio), Board of Trustees, MSRI, 2020-2023.
- Advances in Applied Mathematics, Managing Editor, 2018-present, Editorial Board, 2014-2017.
- Journal of Combinatorial Algebra, Editorial Board, 2016-present.
- Data Science in the Mathematical Sciences, Editorial Board, 2021-present.
- Computer Aided Geometric Design, Guest Managing Editor, 2016.
- International Journal of Algebra and Computation, Editorial Board, 2011-2017.
- Journal of Commutative Algebra, Managing Editor, 2008-2016, Editorial Board 2017-present.
- Member, AMS-SIAM Employment Committee, 2016-2019.
- Member, AMS Math Research Community Advisory Board, 2008-2014.
- Member, AMS Data Committee, 2006-2008.

EXTERNAL DEPARTMENTAL REVIEWS

- University of Oregon Mathematics, 2023.
- Ohio State University Mathematics, 2022.

COLLEGE AND UNIVERSITY SERVICE

- Faculty Representative, Auburn Board of Trustees Development Committee, 2021-
- Member, Auburn Faculty Senate Committee on Faculty Rank, 2022.
- Member, Auburn Veteran's Resource Center Hiring Committee, 2022.
- Chair, Committee on closing the achievement gap for Veterans, Iowa State, 2018-20.
- Chair, Statistics department chair search, Iowa State 2018-19.
- Member, Committee on teaching effectiveness, Iowa State, 2018-19.
- Member, Veterans and Military Affiliated Advisory Committee, Iowa State, 2019-20.
- Member, Campus Research Board, UIUC, 2016-2017.
- Member, Campus General Education Board, UIUC, 2015-2016.
- Member, Graduate College, Doctoral Program Assessment Committee, UIUC, 2015-2016.
- Member, Graduate College, Postdoctoral Advisory Committee, UIUC, 2013-2015.
- Member, College of Arts & Sciences Awards Committee, UIUC, 2012-2014.

DEPARTMENTAL SERVICE

- Chair, Auburn Mathematics faculty search committees, 2020, 2021, 2022, 2023.
- Chair, ISU Mathematics, 2017-19.
- Elected Member, Executive Committee, UIUC Mathematics, 2016-2017.
- Associate Chair, UIUC Mathematics, 2012-2015.
- Chair, Teaching Awards Committee, UIUC Mathematics 2015-2016.

- Chair, Math Prizes Committee, UIUC Mathematics 2013-2015.
- Member, Promotion & Tenure Committee, UIUC Mathematics, 2012-2014.
- Chair, Postdoctoral Committee, UIUC Mathematics 2011-2012.
- Elected Member, Executive Committee, UIUC Mathematics, 2009-2011.
- Chair, Graduate Affairs Committee, UIUC Mathematics spring 2009.
- Member, Grants Committee, UIUC Mathematics 2009.
- Member, Graduate Affairs Committee, UIUC Mathematics fall 2008.
- Member, Graduate Fellowship Committee, UIUC Mathematics 2007-2008.
- Elected Member, Executive Committee, Texas A&M Mathematics, 2005-2007.
- Member, Committee to redesign graduate algebra curriculum (Texas A&M), 2005-2007
- Chair, Committee to redesign engineering linear algebra (Texas A&M), fall 2006.

REFEREEING AND REVIEWING

- NSF Panels: 2003, 2004, 2018, 2021; also individual grants: NSF, NSA, NSERC, BNF.
- Journals: Advances in Mathematics, Advances in Applied Mathematics, Algebraic & Geometric Topology, Algebra Number Theory, Canadian Journal of Mathematics, Commentarii Mathematici Helvetici, Compositio Mathematica, Discrete and Computational Geometry, Duke Mathematical Journal, European J. of Combinatorics, Experimental Mathematics, Foundations of Computational Mathematics, IEEE Transactions on Information Theory, IMRN, Inventiones, Israel Journal of Mathematics, Journal of Algebra, Journal of Algebraic Combinatorics, Journal of Algebraic Geometry, Journal of the A.M.S., Journal of the L.M.S., Journal of Pure and Applied Algebra, Journal of Symbolic Computation, Mathematische Zeitschrift, Mathematics of Computation, Math Research Letters, Proceedings of the A.M.S., Proceedings of the L.M.S., SIAM J. Applied Algebra and Geometry, SIAM J. Discrete Math, Transactions of the A.M.S.
- Books: Cambridge University Press (LMS Student Texts), Springer Verlag (LNM Series)

CLASSES TAUGHT

- Cornell: Calculus I, II, III.
- Northeastern: Calculus I, II.
- Harvard: Computational Algebraic Geometry.
- Texas A&M: Calculus I, II, III, Linear Algebra, Commutative Algebra, Algebraic Geometry I, II, Reflection Groups, Computational Algebra.
- Illinois: Calculus I, II, III, Linear Algebra, Commutative Algebra, Algebraic Geometry I, II, Homological Algebra, Riemann Surfaces, Toric Varieties I, II.
- Universidad de Buenos Aires: Geometric Surface Modeling.
- Iowa State: Calculus III.
- Auburn: Abstract Algebra II, Calculus III, Topological Data Analysis, Linear Algebra, Computational Algebra.
- Oxford: Toric Varieties.
- Cambridge: Geometry 1B (supervision)