

Hang (Amy) Huang

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Education

- 2013-2019 PhD in Mathematics, University of Wisconsin Madison.
Advisor: Steven Sam.
2009-2013 B.S. in Mathematics and Information Engineering, The Chinese University of Hong Kong.

Employment

- 2025-present Assistant Professor in Mathematics, Texas A & M University
2022-2024 Assistant Research Professor in Mathematics, Auburn University.
2019-2022 Visiting Assistant Professor in Mathematics, Texas A&M University.

Grants, honors & awards

- 2024 Viterbi Endowed Postdoctoral Fellowship, MSRI.
2023-2026 PI on NSF Award DMS - 2302375.
2018-2019 Elizabeth Hirschfelder Prize.
2012 HKSAR Government Scholarship.
2012 Undergraduate Mathematics Scholarship.

Publications

- *On Linear spaces of matrices bounded rank*, with J.M. Landsberg, preprint at [arXiv:2306.14428](https://arxiv.org/abs/2306.14428). To appear in *Selecta Mathematica*, New Series.
- *Bernstein-Gelfand-Gelfand meets geometric complexity theory: resolving the 2×2 permanents of a $2 \times n$ matrix*, with Fulvio Gesmundo, Hal Schenck, Jerzy Weyman, preprint at [arXiv:2312.12247](https://arxiv.org/abs/2312.12247). To appear in *Transactions of the AMS*.
- *Geometry of backflow transformation ansatz for quantum many-body fermionic wavefunctions*, with J.M. Landsberg and Jianfeng Lu, preprint at [arxiv:2111.10314](https://arxiv.org/abs/2111.10314). *Comm Math Sci* 21(2023), no.5, 1447–1453.
- *The InvariantRing package for Macaulay2*, with Luigi Ferraro, Federico Galetto, Francesca Gandini, Matthew Mastroeni, Xianglong Ni, preprint at [arXiv:2010.15331](https://arxiv.org/abs/2010.15331).

- *Bad and good news for Strassen's laser method: Border rank of the 3×3 permanent and strict submultiplicativity*, with Austin Conner, J. M. Landsberg, preprint at [arXiv:2009.11391](https://arxiv.org/abs/2009.11391). Found. Comput. Math. 23 (2023), no. 6, 2049–2087.
- *Vanishing Hessian, wild forms and their border VSP*, with Mateusz Michałek, Emanuele Ventura, preprint at [arXiv:1912.13174](https://arxiv.org/abs/1912.13174). Math. Ann. 378 (2020), no. 3-4, 1505–1532.
- *Relations between the 2×2 minors of a generic matrix*, with Michael Perlman, Claudia Polini, Claudiu Raicu, Alessio Sammartano, preprint at [arXiv:1909.11705](https://arxiv.org/abs/1909.11705). Adv. Math. 386 (2021), Paper No. 107807, 29 pp.
- *Minimal Set of Generators of Ideals Defining Nilpotent Orbit Closures*, preprint at [arXiv: 2008.03166](https://arxiv.org/abs/2008.03166). To appear in Proceedings of the AMS.
- *Computing Schur complexes.*, with Michael K. Brown, Robert P. Laudone, Michael Perlman, Claudiu Raicu, Steven V Sam, João Pedro Santo, preprint at [arXiv: 1812.00790](https://arxiv.org/abs/1812.00790). J. Softw. Algebra Geom. 9 (2019), no. 2, 111–119.
- *Equations of Kalman Varieties*, preprint at [arXiv:1707.08699](https://arxiv.org/abs/1707.08699). To appear in Proceedings of the AMS.

Preprints

- *Smooth Herzog Projective Curves*, with Matteo Varbaro, Yevgeniya Tarasova and Emily Witt, preprint at [arXiv:2512.00584](https://arxiv.org/abs/2512.00584). Submitted.
- *F-signature of Determinantal Rings*, in preparation. Preprint available by request.
- *Syzygies of Determinantal Thickenings*, preprint at [arXiv:2008.02690](https://arxiv.org/abs/2008.02690). Submitted.

Book Chapter

K. Timchenko and H. Huang, *Lightning Introduction to Perverse Sheaves*, In Ben Elias, Shotaro Makisumi, Ulrich Thiel, Geordie Williamson, *Introduction to Soergel bimodules*, (p315–331), RSME Springer Series, vol. 5, (2020).

Conference Presentations & Seminar Talks

Dec 2025	"Why should I learn about commutative algebra", talk in the Why should I learn about X Seminar at Simons Institute.
Nov 2025	"Border Ranks of Tensors related to Laser Method", talk in the Algebraic Geometry Seminar at Simons Institute.
Oct 2025	"Space of Matrices of Bounded Rank", talk in the Algebra, Geometry and Combinatorics Seminar at San Francisco State University.
Oct 2025	"Matrix Multiplication Lower Bound Methods: Border Apolarity", 3 talks in the Matrix Multiplication Workshop at Simons Institute.
July 2025	"F-signature of determinantal rings", talk in the Commutative Algebra seminar at University of Genova.
May 2025	"Singulairties of Squarefree Initial Ideals", talk in Commutative Algebra seminar at Purdue University.
Mar 2025	"Linear Spaces of Matrices of Bounded Rank", talk in Texas Algebraic Geometry Symposium (TAGS) 2025.
Feb 2025	"Application of Commutative Algebra in Old and New Problems in Linear Algebra", talk in "Singularities and Symmetries at Texas".

July 2024	"Syzygies of Determinantal Thickenings and $\mathfrak{gl}(m n)$ representations", talk at HKUST.
May 2024	"Resolving the 2×2 permanents of a $2 \times n$ matrix", talk in 2024 AMS Sectional Meeting in San Francisco.
May 2024	"Linear Spaces of Matrices of Bounded Rank", talk in JM Invariant at 60.
Feb 2024	"Resolving the 2×2 permanents of a $2 \times n$ matrix", talk in SLMath.
Feb 2024	"Free Resolutions: Algebraic Geometry, Representation Theory, and Complexity Theory", talk in the colloquium at Texas A & M University.
Jan 2024	"Free Resolutions: Algebraic Geometry, Representation Theory, and Complexity Theory", talk in the colloquium at California Polytechnic State University.
Jan 2024	"Computational Complexity: Tensor Geometry and Commutative Algebra", talk in the colloquium at the University of Waterloo.
Jan 2024	"Computational Complexity: Tensor Geometry and Commutative Algebra", talk in the colloquium at Auburn University.
Jan 2024	"Resolving the 2×2 permanents of a $2 \times n$ matrix", talk in 2024 Joint Mathematics Meetings in San Francisco.
Dec 2023	"Linear Spaces of Matrices of Bounded Rank", talk in Tensor Methods Reunion Conference 2 (TMRC2), Lake Arrowhead.
Oct 2023	"Resolving the 2×2 permanents of a $2 \times n$ matrix", talk in 2023 Fall Southeastern AMS Sectional Meeting.
Oct 2023	"Computational Complexity: Tensor Geometry and Commutative Algebra", talk in the virtual seminar at the University of Hawaii.
June 2023	"Linear Spaces of Matrices of Bounded Rank", talk in algebraic geometry seminar at Mathematical Institute of the Polish Academy of Sciences.
Apr 2023	"An old problem in linear algebra relevant to quantum information theory and complexity theory, and what modern algebraic geometry can tell us about it", talk in Meeting on Applied Algebraic Geometry (MAAG 23) at Georgia Tech University.
Apr 2023	"New Questions for Commutative Algebraic Stemming from Theoretical Computer Science", talk in CA+ at the University of Minnesota.
Apr 2023	"Difference between Tensor Ranks and Border Rank of 3×3 Permanent", talk at Chinese Academy of Sciences.
Mar 2023	"A new Basic Example of Vector Space of Matrices of Low Rank", talk in Texas A & M University Geometry Seminar.
Dec 2022	"Limitation of Backflow Transformation Ansatz via Tensor Geometry", talk in IPAM tensor reunion workshop.
Nov 2022	"Vanishing Hessian and Wild Polynomials", talk in Texas A&M Geometry Seminar.
Oct 2022	"Difference between Tensor Ranks and Border Rank of 3×3 Permanent", talk in TATERS at Boise State University.
Oct 2022	"Border Apolarity and 3×3 Permanent", talk in AMS western sectional meeting, the University of Utah.
Apr 2022	"Difference between Tensor Ranks and Border Rank of 3×3 Permanent", talk in a workshop on Geometry and Complexity Theory.
Mar 2022	"Tensor Ranks and Matrix Multiplication Complexity", talk in the Fellowship of the Ring.
Mar 2022	"Tensor Ranks and Matrix Multiplication Complexity", talk in the UIC Algebraic Geometry seminar.
Feb 2022	"Syzygies of Determinantal Thickenings and $\mathfrak{gl}(m n)$ representations", talk at the Southwest Local Algebra Meeting (SLAM 2022).
Feb 2022	"Tensor Ranks and Matrix Multiplication Complexity", talk in the colloquia of Notre Dame University.
Dec 2021	"Tensor Ranks and Matrix Multiplication Complexity", talk in the Texas Tech University Algebra and Number Theory seminar.
Nov 2021	"Tensor Ranks and Matrix Multiplication Complexity", talk in the Commutative and Homological

	Algebra Market Presentations (CHAMP).
Nov 2021	"Tensor Ranks and Matrix Multiplication Complexity", talk in the University of North Carolina at Chapel Hill Geometric Methods in Representation Theory seminar.
Nov 2021	"Syzygies of Determinantal Thickenings and Tensor Ranks", talk in Stony Brook University Algebraic Geometry seminar.
Nov 2021	"Tensor Ranks and Matrix Multiplication Complexity", talk in Duke University virtual Algebraic Geometry seminar.
Nov 2021	"Border Apolarity and Border Rank of the 3×3 Permanent", talk at SIAM TX-LA meeting.
Nov 2021	"Tensor Ranks and Matrix Multiplication Complexity", talk in the University of Notre Dame Algebraic Geometry/Commutative Algebra seminar.
Aug 2021	"Border Apolarity and Border Rank of the 3×3 Permanent", talk in SIAM Conference on Applied Algebraic Geometry.
May 2021	"Border Apolarity and Border Rank of the 3×3 Permanent", talk in the spring 2021 virtual meeting of the AMS western section.
Apr 2021	"Vanishing Hessian and Wild Polynomials", talk in AMS spring central sectional meeting.
Mar 2021	"Syzygies of Determinantal Thickenings and $\mathfrak{gl}(m n)$ representations", talk in spring Southeastern AMS sectional meeting.
Aug 2020	"Syzygies of Determinantal Thickenings and $\mathfrak{gl}(m n)$ representations", talk in ICERM Free Resolutions and Representation Theory Workshop.
Jun 2020	"Vanishing Hessian and Wild Polynomials", talk in Nonlinear Algebra Seminar Online (NASO) at MIP MiS.
May 2020	"Vanishing Hessian and Wild Polynomials", talk in Webinar. Recent advances in border rank and secant varieties of homogeneous varieties.
Oct 2019	"Syzygies of Determinantal Thickenings and $\mathfrak{gl}(m n)$ representations", talk in Texas A&M University Algebra and Combinatorics seminar.
Apr 2019	"Syzygies of Determinantal Thickenings", talk in the University of Notre Dame Algebraic Geometry/Commutative Algebra seminar.
Feb 2019	"Syzygies of Determinantal Thickenings", talk in the University of San Diego Combinatorics seminar.
Jan 2019	"Equations of Kalman Varieties", talk in Texas A&M Geometry seminar.
Oct 2018	"Equations of Kalman Varieties", talk in AMS fall central sectional meeting, University of Michigan.
Dec 2017	"Equations of Kalman Varieties", talk in the UIUC algebra, geometry, and combinatorics seminar.
Oct 2017	"Equations of Kalman Varieties", talk in DePaul University algebra and combinatorics seminar.
Oct 2017	"Equations of Kalman Varieties", poster at KUMUNU 2017 in University of Kansas.
Oct 2017	"Equations of Kalman Varieties", talk in University of Connecticut algebra seminar.
Mar 2017	"Equations of Kalman Varieties", talk in UW-Madison algebraic geometry seminar.

Teaching

Spring 2026, Topics in Algebra, Instructor, Texas A & M University
 Spring 2025, Applied Algebra, Instructor, Texas A & M University
 Spring 2025, Abstract Algebra, Instructor, Texas A & M University
 Fall 2023, Linear Algebra (200+ students), Instructor, Auburn University
 Spring 2023, Linear Algebra (100+ students), Instructor, Auburn University
 Spring 2022, Linear Algebra (50+ students), Instructor, Texas A&M University
 Spring 2021, Linear Algebra (30+ students), Instructor, Texas A&M University
 Fall 2020, Engineering Math III (100+ students), Instructor, Texas A&M University
 Spring 2020, Linear Algebra (30+ students), Instructor, Texas A&M University
 Spring 2018, Elementary Matrix and Linear Algebra, Teaching Assistant, UW-Madison

Spring 2017, Discrete Math, Teaching Assistant, UW-Madison
Fall 2016, Calculus, Teaching Assistant, UW-Madison
Summer 2016, Analysis I, Grader, UW-Madison
Spring 2016, Elementary Martrix and Linear Algebra, Teaching Assistant, UW-Madison
Fall 2015, Calculus and Introduction to Differential Equations, Teaching Assistant, UW-Madison
Spring 2015, Calculus II, Teaching Assistant, UW-Madison
Fall 2014, Algebra, Teaching Assistant, UW-Madison
Spring 2014, Calculus I, Teaching Assistant, UW-Madison
Fall 2013, Calculus II, Teaching Assistant, UW-Madison