

# Thomas Yahl

University of Wisconsin – Madison

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## Profile

I am a Van Vleck Visiting Assistant Professor at University of Wisconsin – Madison working in applied and computational algebraic geometry. My mathematical interests include Galois theory in enumerative geometry, numerical homotopy methods, algebraic optimization, algebraic statistics, real algebraic geometry, and their applications to understanding algebraic systems that arise in applications.

## Employment

(2023-Present) University of Wisconsin – Madison  
Van Vleck Visiting Assistant Professor  
Postdoctoral Advisor: Jose Israel Rodriguez

## Education

(2017-2023) Texas A&M University  
Ph.D. Mathematical Sciences  
Advisor: Frank Sottile  
Thesis: “Computational Aspects of Galois Groups in Enumerative Geometry”  
(2013-2017) Indiana University-Purdue University of Indianapolis  
B.A. Mathematical Sciences (Honors)  
Minor Computer Science

## Publications & Research

- “*Galois groups of purely lacunary polynomial systems*”, Yahl, Thomas, in preparation.
- “*Activation thresholds and expressiveness of polynomial neural networks*”, Finkel, Bella; Rodriguez, Jose Israel; Yahl, Thomas; Wu, Chenxi, [arXiv:2408.04569](https://arxiv.org/abs/2408.04569). Submitted for publication.
- “*Completions to Discrete Probability Distributions in Log-linear Models*”, Cai, May; Olesen Recke, Cecilie; Yahl, Thomas, [Algebraic Statistics 15 \(2024\), no. 2, 225-247](#).

- “*Computing Galois Groups of Finite Fano Problems*”, Yahl, Thomas, [Journal of Symbolic Computation](#) 119 (2023), 81-89.
- “*Real Solutions to Systems of Polynomial Equations in Macaulay2*”, Lopez Garcia, Jordy; Maluccio, Kelly; Sottile, Frank; Yahl, Thomas, [Journal of Software for Algebra and Geometry](#) Vol. 14 (2024), 87-95.
- “*Galois Groups in Enumerative Geometry and Applications*”, Sottile, Frank; Yahl, Thomas, [arxiv:2108.07905](#). Submitted for publication.
- “*Polyhedral Homotopies in Cox Coordinates*”, Duff, Tim; Telen, Simon; Walker, Elise; Yahl, Thomas, [Journal of Algebra and its Applications](#).
- “*Decomposable Sparse Polynomial Systems*”, Brysiewicz, Taylor; Rodriguez, Jose Israel; Sottile, Frank; Yahl, Thomas, [Journal of Software for Algebra and Geometry](#) Vol. 11 (2021), 53-59.
- “*Solving Decomposable Sparse Systems*”, Brysiewicz, Taylor; Rodriguez, Jose Israel; Sottile, Frank; Yahl, Thomas, [Numerical Algorithms](#) 88 (2021), 453-474.
- “*Eigenfunctions to Composition Operators of Generalized Linear Fractional Maps*”, 2015. Work presented at Indiana Undergraduate Math Research Conference.

## Service & Organization

- (Ongoing) Organizing [Macaulay2 Workshop: Madison 2025](#).
- Organized the session “[Symbolic-Numeric Methods in Algebraic Geometry](#)” at International Congress on Mathematical Software 2024.
  - Reviewed extended abstracts for conference proceedings for International Congress on Mathematical Software 2024.
- Organized the special session “[Applications of Algebra and Geometry](#)” at AMS Spring Central Sectional 2024.
- Organized the mini-symposium “[Applications and Computation in Algebraic Geometry](#)” at SIAM TX-LA Sectional 2022.
- Supervised undergraduate students in Mathematics REU programs at Texas A&M University
- Mentored graduate students in the Peer Mentoring Program at Texas A&M University

## Talks & Presentations

- JMM 2025, “Activation Thresholds and Expressiveness of Polynomial Neural Networks”.
- AMS Fall Central Sectional Meeting 2024, “Galois groups of purely lacunary polynomial systems”.
- Banff International Research Station Workshop: Computational Geometry, “Galois groups of purely lacunary polynomial systems”.
- Workshop on Computational and Applied Enumerative Geometry, “Galois groups of purely lacunary polynomial systems”.
- UW-Madison Applied Algebra Seminar, “The Unbalanced Procrustes Problem and Algebraic Optimization”.
- Joint Mathematics Meetings 2024, “The Unbalanced Procrustes Problem and Algebraic Optimization”.
- Joint Mathematics Meetings 2023, “Computing Galois groups of Fano problems”.
- University of Wisconsin Algebra and Algebraic Geometry Seminar, “Computing Galois groups of finite Fano problems”.
- Georgia Tech Algebra Seminar, “Solving decomposable sparse polynomial systems”.
- Ohio State University Algebraic Geometry Seminar, “Computing Galois groups of finite Fano problems”.
- Texas A&M University Geometry Seminar, “Computing Galois groups of finite Fano problems”.
- Effective Methods in Algebraic Geometry 2022, “Computing Galois groups of finite Fano problems”.
- Texas A&M University Geometry Seminar, “Solving decomposable sparse polynomial systems”.
- Joint Mathematics Meetings 2022, “Parameter Homotopies in Cox Coordinates”.
- SIAM TX-LA Section Fourth Annual Meeting, “Parameter Homotopies in Cox Coordinates”.
- SIAM Conference on Applied Algebraic Geometry, “Cox Homotopies”.
- Freie Universität, Discrete Geometry Seminar, “Solving Decomposable Sparse Polynomial Systems”.

- Max-Planck-Institut für Mathematik, Seminar on Nonlinear Algebra, “Solving Decomposable Sparse Polynomial Systems”.
- Technische Universität Braunschweig, Oberseminar Applied Algebra and Analysis, “Solving Decomposable Sparse Polynomial Systems”.
- Technische Universität Berlin, Kolloquium on algorithmic mathematics and complexity theory, “Solving Decomposable Sparse Polynomial Systems”.
- SIAM TX-LA Section Second Annual Meeting, “Galois Groups and Decomposable Branched Covers”.

### **Teaching & Duties (Evaluations available upon request)**

University of Wisconsin - Madison:

- Instructor for Math 863:001: Special Topics: Toric Varieties. Spring 2025.
- Instructor for Math 551:002: Elementary Topology. Fall 2024.
- Instructor for Math 213:001: Calculus and Introduction to Differential Equations. Fall 2024.
- Instructor for Math 213:001: Calculus and Introduction to Differential Equations. Spring 2024.
- Instructor for Math 320:002-003: Linear Algebra and Differential Equations. Fall 2023.

Texas A&M University:

- Instructor for Algebra Qualifying Exam Prep Course. Summer 2022.
- Instructor for Math 168: Finite Mathematics. Fall 2021.
- Instructor for Algebra Qualifying Exam Prep Course. Summer 2021.
- TA for Math 152: Calculus II for Engineering. Spring 2021.
- TA for Math 151: Calculus I for Engineering. Fall 2020.
- Instructor for Math 142: Business Calculus. Summer 2020.
- TA for Math 148: Calculus II for Chemistry and Biological Sciences. Fall 2019.
- Graduate Assistant for Texas A&M University REU. Summer 2019.
- TA for Math 152: Calculus II for Engineering. Spring 2019.
- TA for Math 148: Calculus II for Chemistry and Biological Sciences. Fall 2018.

## Honors & Awards

- Recipient of UW-Madison Postdoctoral Excellence in Teaching Award
- Recipient of TAMU AFS Merit Fellowship in Mathematics
- Recipient of Outstanding TA Award at Texas A&M University
- Fourth prize & Best use of additional data prize, Texas A&M University Institute of Data Science 2022 Data Science Competition