

# Richard Haburcak

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## Curriculum Vitae

### Education

- 2018–2023 **Ph.D. in Mathematics**, Dartmouth College, Hanover, New Hampshire  
**Advisor:** Asher Auel  
**Thesis:** Brill–Noether Theory via K3 Surfaces
- 2014–2018 **M.A. in Chemistry**, Brandeis University, Waltham, Massachusetts  
**Advisor:** Bing Xu  
**Thesis:** Ligand-Receptor Interactions Modulate Self-Assembly of Small Molecules
- 2014–2018 **B.A. in Mathematics and Chemistry**, Brandeis University, Waltham, Massachusetts

### Appointments

- 2024-Present **RTG Visiting Assistant Professor**, The Ohio State University, Columbus, Ohio
- Spring 2024 **Postdoctoral Fellow**, Max Planck Institute for Mathematics, Bonn, Germany
- Fall 2023 **Junior Trimester Program**, Hausdorff Research Institute for Mathematics, Bonn, Germany
- 2023-2024 **Visiting Scholar**, Dartmouth College, Hanover, New Hampshire

### Awards and Grants

- 2025-2027 **AMS-Simons Travel Grant, \$6,000**
- 2023 **Outstanding Graduate Teacher**, *Dartmouth College*, student nominated award
- 2018 **Shapiro Prize in Mathematics**, *Brandeis University*
- 2017 **Goldwater Scholarship Honorable Mention**
- 2016 **Science Hall of Fame**, *Brandeis University*

### Publications and Preprints

#### Preprints

- [Link](#) *Brill–Noether loci in genus  $\leq 12$* , Richard Haburcak. 2025. Submitted.
- [Link](#) *Some reducible and irreducible Brill–Noether loci*, Richard Haburcak and Montserrat Teixidor i Bigas. 2025. Submitted.
- [Link](#) *Distinguishing Brill–Noether loci*, Asher Auel, Richard Haburcak, and Andreas Leopold Knutsen. 2024. Submitted.

#### Publications

- [Link](#) *Maximal Brill–Noether loci via K3 surfaces*, Asher Auel and Richard Haburcak. International Mathematics Research Notices (IMRN), **2025**(20), 2025.

- [Link](#) *Maximal Brill–Noether loci via degenerations and double covers*, Andrei Bud and Richard Haburcak. 2024. Accepted to Ann. Sc. Norm. Super. Pisa Cl. Sci. (5).
- [Link](#) *Holomorphic forms and non-tautological cycles on moduli spaces of curves*, Veronica Arena, Samir Canning, Emily Clader, Richard Haburcak, Amy Q. Li, Siao Chi Mok, and Carolina Tamborini. Sel. Math. New Ser. 31, 47 (2025).
- [Link](#) *Maximal Brill–Noether loci via the gonality stratification*, Asher Auel, Richard Haburcak, and Hannah Larson. Accepted to Michigan Math. J.
- [Link](#) *Curves on Brill–Noether special K3 surfaces*, Richard Haburcak. Math. Nachr. 297 (2024), 4479–4509.

## Previous Chemistry Work

- [Link](#) *Ligand–Receptor Interaction Modulates the Energy Landscape of Enzyme-Instructed Self-Assembly of Small Molecules*, Richard Haburcak , Junfeng Shi, Xuewen Du, Dan Yuan, and Bing Xu\*, J. Am. Chem. Soc. 2016, 138, 47, 15397–15404.
- [Link](#) *Nanonets Collect Cancer Secretome from Pericellular Space*, Rong Zhou, Yi Kuang, Jie Zhou, Xuewen Du, Jie Li, Junfeng Shi, Richard Haburcak, Bing Xu\*, PLOS One 2016, 11, e0154126.
- [Link](#) *Enzymatic Dissolution of Biocomposite Solids Consisting of Phosphopeptides to Form Supramolecular Hydrogels*, Junfeng Shi, Dan Yuan, Richard Haburcak, Qiang Zhang, Dr. Chao Zhao, Prof. Dr. Xixiang Zhang, PProf. Dr. Bing Xu\*, Chem. Eur. J. 2015, 21, 18047-18051
- [Link](#) *Supramolecular Detoxification of Neurotoxic Nanofibrils of Small Molecules via Morphological Switch*, Junfeng Shi, Xuewen Du, Dan Yuan, Richard Haburcak, Ning Zhou, and Bing Xu\*, Bioconjugate Chem. 2015, 26, 9, 1879–1883.
- [Link](#) *Enzyme transformation to modulate the ligand–receptor interactions between small molecules*, Junfeng Shi, Xuewen Du, Dan Yuan, Richard Haburcak, Dongdong Wu, Ning Zhou, and Bing Xu\*, Chem. Commun. 2015, 51, 4899-4901
- [Link](#) *Ligand–Receptor Interaction Catalyzes the Aggregation of Small Molecules To Induce Cell Necroptosis*, Junfeng Shi, Xuewen Du, Yibing Huang, Jie Zhou, Dan Yuan, Dongdong Wu, Ye Zhang, Richard Haburcak, Irving R. Epstein\*, and Bing Xu\*, J. Am. Chem. Soc. 2015, 137, 26–29.

## Talks

### Invited Conference Talks

- April 2026 **TBD**, AMS Spring Central Sectional on Classical questions through the lens of birational algebraic geometry, North Dakota State University, Fargo, North Dakota
- Jan 2026 **Refined Brill–Noether theory**, AMS Special Session on Combinatorics and moduli spaces, JMM 2026, Washington, D.C.
- Oct 2025 **Brill–Noether loci**, Boston Algebraic Geometry Day, Tufts University, Medford, Massachusetts

- June 2025 **Limit linear series, theta characteristics, and Brill–Noether loci**, *3rd Workshop of the Kentucky–Ohio ALgebra Alliance (KOALA 2025)*, The Ohio state University, Columbus, Ohio
- Jan 2024 **The Maximum Gonality in a Brill–Noether Locus**, *AMS Special Session on Combinatorial Perspectives on Algebraic Curves and their Moduli*, JMM 2024, San Francisco, California
- April 2023 **Brill–Noether special cubic fourfolds of discriminant 26**, *AMS Spring Central Sectional on Brauer Groups in Algebraic Geometry and Arithmetic*, University of Cincinnati, Cincinnati, Ohio
- Oct 2022 **Brill–Noether Special K3 Surfaces**, *AMS Fall Southeastern Sectional on Geometry and Arithmetic of Hyperkähler Manifolds*, University of Tennessee, Chattanooga, Tennessee

### **Invited Seminar Talks**

- Oct 2025 **Brill–Noether loci in low genus**, *Algebra Seminar*, University of Kentucky, Lexington, Kentucky
- Sept 2025 **Special Algebraic Curves**, *Ohio State University Math Welcome Seminar*, The Ohio State University, Columbus, Ohio
- March 2025 **Brill–Noether loci in low genus**, *Algebra, Geometry, and Number Theory Seminar*, Tufts University, Medford, Massachusetts
- March 2025 **Brill–Noether loci in low genus**, *Dartmouth Algebra and Number Theory Seminar*, Dartmouth College, Hanover, New Hampshire
- Jan 2025 **Non-tautological Cycles on Moduli Spaces of Smooth Curves**, *Arithmetic Geometry Seminar*, The Ohio State University, Columbus, Ohio
- Aug 2024 **Distinguishing Brill–Noether loci**, *Algebraic Geometry Seminar*, The Ohio State University, Columbus, Ohio
- June 2024 **Distinguishing Brill–Noether loci**, *Seminar Algebraic Geometry*, MPIM Bonn, Bonn, Germany
- May 2024 **Maximal Brill–Noether loci**, *Oberseminar*, MPIM Bonn, Bonn, Germany
- April 2024 **(Algebraic) Surfaces, lattice polarized K3 surfaces, and Brill–Noether special K3s**, *Geometry and Topology Seminar*, University of Iowa, Iowa City, Iowa
- Dec 2023 **Maximal Brill–Noether loci**, *Geometry Seminar*, Università Roma Tre, Rome, Italy
- Nov 2023 **Maximal Brill–Noether loci**, *Research Seminar Algebraic Geometry*, Leibniz Universität Hannover, Hannover, Germany
- Oct 2022 **Maximal Brill–Noether loci via K3 Surfaces**, *Algebra Seminar*, University of Kentucky, Lexington, Kentucky
- Sept 2022 **Maximal Brill–Noether loci via K3 Surfaces**, *Algebra Seminar*, Brown University, Providence, Rhode Island
- April 2022 **Maximal Brill–Noether Loci via Lifting Line Bundles**, *Dartmouth Algebra and Number Theory Seminar*, Dartmouth College, Hanover, New Hampshire

- March 2021 **Brill-Noether Special K3 Surfaces**, *Dartmouth Algebra and Number Theory Seminar*, Dartmouth College, Hanover, New Hampshire
- Expository and Reading Seminar Talks**
- Oct 2025 **Degeneracy Loci**, *RTG learning seminar on Affine Grassmannian*, The Ohio State University, Columbus, Ohio
- Nov 2023 **Torelli theorems for cubic threefolds**, *STReTCH seminar*, Hausdorff Institute for Mathematics, Bonn, Germany
- April 2023 **Why are word problems hard? (Introduction to the word problem for groups)**, *Graduate Student Seminar*, Dartmouth College, Hanover, New Hampshire
- Oct 2022 **Galois Cohomology and Local Class Field Theory**, *Reading Seminar in Number Theory*, Dartmouth College, Hanover, New Hampshire
- Oct 2022 **All Triangles Form a Triangle**, *Undergraduate Math Club*, University of Kentucky, Lexington, Kentucky
- Sept 2022 **Triangles. Boundaries. And...? (Introduction to moduli spaces of triangles)**, *Graduate Student Seminar*, Dartmouth College, Hanover, New Hampshire
- July 2022 **Étale Cohomology**, *Brauer Group Reading Seminar*, Dartmouth College, Hanover, New Hampshire
- July 2022 **Group and Galois Cohomology**, *Brauer Group Reading Seminar*, Dartmouth College, Hanover, New Hampshire
- April 2022 **Sheaves on Graphs**, *Graduate Student Seminar*, Dartmouth College, Hanover, New Hampshire
- Jan 2022 **Introduction to Algebraic Surfaces I**, *Reading Seminar in Number Theory*, Dartmouth College, Hanover, New Hampshire
- Oct 2021 **Categories, Particle Physics, and Yoneda**, *Graduate Student Seminar*, Dartmouth College, Hanover, New Hampshire
- May 2021 **Finite groups, étale groups, Cartier duality**, *Reading Seminar in Number Theory*, Dartmouth College, Hanover, New Hampshire
- April 2021 **Projective Space and Lines**, *Graduate Student Seminar*, Dartmouth College, Hanover, New Hampshire
- March 2021 **Nekovář's  $p$ -adic Heights**, *Reading Seminar in Number Theory*, Dartmouth College, Hanover, New Hampshire
- Jan 2021 **Sheafy Vector Bundles and Chern Classes**, *Graduate Student Seminar*, Dartmouth College, Hanover, New Hampshire
- Nov 2020 **Multiplying Divisors**, *Graduate Student Seminar*, Dartmouth College, Hanover, New Hampshire
- Jan 2020 **Maximal Spectra and Why Continuous Functions are Important**, *Graduate Student Seminar*, Dartmouth College, Hanover, New Hampshire

- Sept 2019 **Semisimplicity of Finite Group Rings**, *Graduate Student Seminar*, Dartmouth College, Hanover, New Hampshire
- April 2019 **Adding and Putting Rings on It (Abelian Categories)**, *Graduate Student Seminar*, Dartmouth College, Hanover, New Hampshire

## Service and Outreach

- Fall 2025-26 **Mentor**, *OSU Cycle (undergraduate reading and research)*, The Ohio State University, Columbus, Ohio
- Spring 2023 **Mentor**, *Directed Reading Program*, Dartmouth College, Hanover, New Hampshire
- Winter 2023 **Co-organizer and Mentor**, *Directed Reading Program*, Dartmouth College, Hanover, New Hampshire
- Spring 2022 **Organizer and Mentor**, *Directed Reading Program*, Dartmouth College, Hanover, New Hampshire
- Winter 2022 **Organizer**, *Directed Reading Program*, Dartmouth College, Hanover, New Hampshire
- Winter 2021 **Organizer and Mentor**, *Directed Reading Program*, Dartmouth College, Hanover, New Hampshire
- Spring 2019 **Co-organizer**, *Math table at Dartmouth Science Day*, Dartmouth College, Hanover, New Hampshire

## Conference Organizing

- Spring 2026 **Co-organizer**, *AMS Special Session on Moduli and Syzygies of Algebraic Curves, as part of AMS Spring Eastern Sectional*, Boston College, Boston, Massachusetts
- Fall 2023 **Co-organizer**, *School on K3 surfaces, hyperkähler manifolds, and cubic fourfolds, as part of a Junior Trimester Program*, Hausdorff Research Institute for Mathematics, Bonn, Germany

## Seminar Organizing

- 2025-Present **Co-organizer**, *Ohio State University Algebraic Geometry Seminar*, The Ohio State University, Columbus, Ohio
- Summer 2022 **Co-organizer**, *Brauer Group Reading Seminar*, Dartmouth College, Hanover, New Hampshire
- 2021-2022 **Co-organizer**, *Dartmouth Algebra and Number Theory Seminar*, Dartmouth College, Hanover, New Hampshire

## Teaching experience

*The Ohio State University, Instructor of record*

- Spring 2026 **Abstract Algebra 1, Math 4580**
- Fall 2025 **Abstract Algebra 2, Math 4581**
- Spring 2025 **Introduction to ODEs, Math 2255**

- Fall 2024 **Introduction to ODEs**, *Math 2255*  
[Dartmouth College, Instructor of Record](#)
- Winter 2023 **Multivariable Calculus**, *Math 13*
- Winter 2022 **Calculus**, *Math 3*
- Fall 2020 **Introduction to Calculus**, *Math 1*  
[Teaching Assistant](#)
- Winter 2020 **Graduate Algebra**, *Math 101*, Dartmouth College
- Fall 2019 **Calculus of Functions of one and Several Variables**, *Math 8*, Dartmouth College
- Spring 2019 **Differential Equations**, *Math 23*, Dartmouth College
- Fall 2018 **Advanced Multivariable Calculus**, *Math 13*, Dartmouth College
- 2015–2017 **Quantum Chemistry**, *Chem 142*, Brandeis University, 3 times
- 2017–2018 **Thermodynamics**, *Chem 141*, Brandeis University, 2 times

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### [Conferences and Workshops Attended](#)

- April 2026 **AMS Spring Central Sectional**, North Dakota State University, Fargo, North Dakota
- Mar 2026 **AMS Spring Eastern Sectional**, Boston College, Boston, Massachusetts
- Jan 2026 **VBAC 2026**, Universidad Autónoma de Yucatán (UADY), Mérida, Yucatán, Mexico
- Jan 2026 **JMM 2026**, Washington, D.C.
- Nov 2025 **Algebra, Geometry and Combinatorics Day (AlGeCom) XXVI**, The Ohio State University, Columbus, Ohio
- Oct 2025 **Boston Algebraic Geometry Day**, Tufts University, Medford, Massachusetts
- Sept 2025 **Workshop on Combinatorics and Geometry of Moduli of Curves**, University of Illinois Urbana-Champaign, Champaign, Illinois
- July 2025 **Summer Research Institute in Algebraic Geometry**, Colorado State, Fort Collins, Colorado
- July 2025 **Bootcamp preceding Summer Research Institute in Algebraic Geometry**, Colorado State, Fort Collins, Colorado
- June 2025 **3rd Workshop of the Kentucky-Ohio ALgebra Alliance (KOALA 2025)**, The Ohio State University, Columbus, Ohio
- May 2025 **Arithmetic, K-theory, and Algebraic Cycles**, The Ohio State University, Columbus, Ohio
- March 2025 **MAGNTS 2025**, The Ohio State University, Columbus, Ohio
- March 2025 **Georgia Algebraic Geometry Symposium 2025**, Universyt of Georgia, Athena, Georgia
- Nov 2024 **AGNES 2024**, Dartmouth College, Hanover, New Hampshire
- Feb 2024 **A panorama of moduli spaces**, Goethe University Frankfurt am Main, Frankfurt, Germany

- Jan 2024 **JMM 2024**, San Francisco, California
- Oct 2023 **Vector bundles and combinatorial algebraic geometry**, Goethe University Frankfurt am Main, Frankfurt, Germany
- Sept 2023 **School on K3 surfaces, hyperkähler manifolds, and cubic fourfolds**, Hausdorff Research Institute for Mathematics, Bonn, Germany
- Aug 2023 **VBAC 2023**, Universität Duisburg-Essen, Essen, Germany
- July 2023 **AGNES Summer School on Intersection Theory on Moduli Spaces**, Brown University, Providence, Rhode Island
- July 2023 **GAeL XXX**, University of Warwick, UK
- April 2023 **AGNES 2023**, Stony Brook University, Stony Brook, New York
- April 2023 **AMS Spring Central Sectional**, University of Cincinnati, Cincinnati, Ohio
- Jan 2023 **JMM 2023**, Boston, Massachusetts
- Dec 2022 **Birational Complexity of Algebraic Varieties 2022**, Simons Center, Stony Brook, New York
- Dec 2022 **RTG/SCGP Workshop on Birational Complexity of Algebraic Varieties 2022**, Simons Center, Stony Brook, New York
- Nov 2022 **AGNES 2022**, UMass Amherst, Amherst, Massachusetts
- Oct 2022 **AMS Fall Southeastern Sectional**, University of Tennessee, Chattanooga, Tennessee
- Oct 2022 **AMS Fall Eastern Sectional**, UMass Amherst, Amherst, Massachusetts
- Sept 2022 **BATMOBILE 2022**, Amherst College, Amherst, Massachusetts
- Aug 2022 **AGNES Summer School on Higher Dimensional Moduli**, Brown University, Providence, Rhode Island
- July 2022 **VBAC 2022**, University of Warwick, UK
- May 2022 **AGNES 2022**, Rutgers University, New Brunswick, New Jersey
- May 2022 **BATMOBILE 2022**, Brown University, Providence, Rhode Island
- Oct 2021 **AGNES 2021**, Boston College, virtual
- Jan 2021 **JMM 2021**, virtual
- Oct 2020 **AGNES 2020**, Stony Brook, virtual

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## Referee

Semigroup Forum  
Abhandlungen aus dem Mathematischen Seminar der Universität Hamburg  
Algebraic Geometry

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## Press

[Math Directed Reading Program Fosters Mentorship and Inclusion](#)

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## Memberships

American Mathematical Society (AMS).

## Languages

**English:** native speaker. **Slovak:** fluent. **Spanish:** intermediate.