# Richard Haburcak

# 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
0014 0010	Thesis: Ligand-Receptor Interactions Modulate Self-Assembly of Small Molecules
2014–2018	<b>B.A. in Mathematics and Chemistry</b> , Brandeis University, Waltham, Massachusetts
	Appointments
2021-Present	RTG Visiting Assistant Professor, The Ohio State University, Columbus, Ohio
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	Postdoctoral Fellow, Max Planck Institute for Mathematics, Bonn, Germany
Fall 2023	<b>Junior Trimester Program</b> , Hausdorff Research Institute for Mathematics, Bonn, Germany
2023-2024	Visiting Scholar, Dartmouth College, Hanover, New Hampshire
	Academic Honors
2023	Outstanding Graduate Teacher, Dartmouth College, student nominated award
2018	Shapiro Prize in Mathematics, Brandeis University
2017	Goldwater Scholarship Honorable Mention
	Science Hall of Fame, Brandeis University
2010	Colonice Train of Fame, Branaels Offiversity
	Publications and Preprints
	Preprints
Link	Distinguishing Brill-Noether loci, Asher Auel, Richard Haburcak, and Andreas Leopold Knutsen. 2024. Submitted.

# ☑ haburcak.1@osu.edu

Haburcak. 2024. Submitted.

Submitted.

Link Maximal Brill-Noether loci via degenerations and double covers, Andrei Bud and Richard

Link Maximal Brill-Noether loci via K3 surfaces, Asher Auel and Richard Haburcak. 2022.

#### **Publications**

- 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. 2024. Accepted to Selecta Mathematica.
- 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, PRof. 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**

- 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
- Apr 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**

- 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
- Apr 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 University 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
- Apr 2022 Maximal Brill-Noether Loci via Lifting Line Bundles, Dartmouth Algebra and Number Theory Seminar, Dartmouth College, Hanover, New Hampshire
- Mar 2021 Brill-Noether Special K3 Surfaces, Dartmouth Algebra and Number Theory Seminar, Dartmouth College, Hanover, New Hampshire

### **Expository and Reading Seminar Talks**

- Nov 2023 **Torelli theorems for cubic threefolds**, *STReTCH seminar*, Hausdorff Institute for Mathematics, Bonn, Germany
- Apr 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 **Ètale 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
- Apr 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
- Apr 2021 **Projective Space and Lines**, *Graduate Student Seminar*, Dartmouth College, Hanover, New Hampshire
- Mar 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
- Apr 2019 Adding and Putting Rings on It (Abelian Categories), Graduate Student Seminar, Dartmouth College, Hanover, New Hampshire

### Service and Outreach

- 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

Fall 2023	<b>Co-organizer</b> , 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
Summer 2022	Co-organizer, Brauer Group Reading Seminar, Dartmouth College, Hanover, New Hampshire
2021-2022	<b>Co-organizer</b> , <i>Dartmouth Algebra and Number Theory Seminar</i> , Dartmouth College, Hanover, New Hampshire
	Teaching experience
	The Ohio State University, Instructor of record
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
	Introduction to Calculus, Math 1
	Teaching Assistant
Winter 2020	Graduate Algebra, Math 101, Dartmouth College
	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	<b>Thermodynamics</b> , <i>Chem 141</i> , Brandeis University 2 times
	Conferences and Workshops Attended
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	<b>Vector bundles and combinatorial algebraic geometry</b> , 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	GAeL XXX, University of Warwick, UK
Apr 2023	AGNES 2023, Stony Brook University, Stony Brook, New York
Apr 2023	AMS Spring Central Sectional, University of Cincinnati, Cincinnati, Ohio
Jan 2023	JMM 2023, Boston, Massachusetts
Dec 2022	<b>Birational Complexity of Algebraic Varieties 2022</b> , 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	<b>AGNES Summer School on Higher Dimensional Moduli</b> , 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
	Referee
	Semigroup Forum
	Abhandlungen aus dem Mathematischen Seminar der Universität Hamburg
	Press
	Math Directed Reading Program Fosters Mentorship and Inclusion
	Memberships
	American Mathematical Society (AMS).
	Languages English: native speaker. Slovak: fluent. Spanish: intermediate.

July 2023 AGNES Summer School on Intersection Theory on Moduli Spaces, Brown

University, Providence, Rhode Island