

# 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

- 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

### Academic Honors

- 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](#) *Maximal Brill–Noether loci via degenerations and double covers*, Andrei Bud and Richard Haburcak. 2024.
- [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, Carolina Tamborini. 2024. Submitted
- [Link](#) *Maximal Brill–Noether loci via the gonality stratification*, Asher Auel, Richard Haburcak, and Hannah Larson. 2023. Submitted.
- [Link](#) *Curves on Brill–Noether special K3 surfaces*, Richard Haburcak. 2023. Submitted

[Link](#) *Maximal Brill–Noether loci via K3 surfaces*, Asher Auel and Richard Haburcak. 2022. Submitted

[Publications](#)

[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.

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## 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, CA

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](#)

Apr 2024 **(Algebraic) Surfaces, lattice polarized K3 surfaces, and Brill–Noether special K3s**, *Geometry and Topology Seminar*, University of Iowa, Iowa City, Iowa

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- 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 **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
- 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

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## 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

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## Conference Organizing

- 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

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## Seminar Organizing

- 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

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## Teaching experience

### Instructor of Record

- Winter 2023 **Multivariable Calculus**, *Math 13*, Dartmouth College
- Winter 2022 **Calculus**, *Math 3*, Dartmouth College
- Fall 2020 **Introduction to Calculus**, *Math 1*, Dartmouth College

## 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

- 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  
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 **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

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## Press

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

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## Memberships

American Mathematical Society (AMS).

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## Languages

**English:** native speaker.

**Slovak:** fluent.

**Spanish:** intermediate.