

# Brian T. Lehmann

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## EMPLOYMENT

Associate Professor, Boston College, 2019 - present  
Assistant Professor, Boston College, 2014 - 2019  
NSF Postdoctoral Fellow/Evans Instructor, Rice University, 2011 - 2014  
NSF Postdoctoral Fellow, University of Michigan, 2010 - 2011

## EDUCATION

Ph.D., Mathematics, Massachusetts Institute of Technology, May 2010  
Advisor: James M<sup>c</sup>Kernan  
Certificate of Advanced Study, Cambridge University, U.K., June 2005  
*Graduated with Distinction*  
B.S., Mathematics, Yale University, May 2004  
*Summa Cum Laude*

## AWARDS AND GRANTS

Simons Foundation Collaboration Grant, 2021  
PI, AGNES NSF grant, 2019  
Co-PI, AGNES NSF grant, 2016  
National Science Foundation Grant, 2016  
NSA Young Investigators Grant, 2015  
National Science Foundation Postdoctoral Research Fellowship, 2010  
National Science Foundation Graduate Fellowship, 2004  
Barry Goldwater Scholarship, 2003  
Phi Beta Kappa Junior Year, Yale University, 2003  
Yale Undergraduate Math Prizes: Deforest, Stanley, and Barge, 2001–2004

## PUBLICATIONS

1. On the asymptotic enumerativity property for Fano manifolds (w/ R. Beheshti, C. Lian, E. Riedl, J. Starr, S. Tanimoto)  
submitted
2. Non-free curves on Fano varieties (w/ E. Riedl, S. Tanimoto)  
to appear in Osaka J. Math.
3. Non-free sections of Fano fibrations (w/ E. Riedl, S. Tanimoto)  
submitted
4. Rational curves on del Pezzo surfaces in positive characteristic (w/ R. Beheshti, E. Riedl, S. Tanimoto)  
Trans. Amer. Math. Soc. Ser. B 10 (2023), 407–451
5. Classifying sections of del Pezzo fibrations, II (w/ S. Tanimoto)  
Geom. and Top. 26 (2022), no. 6, 2565–2647
6. Restricted tangent bundles for general free rational curves (w/ E. Riedl)  
Int. Math. Res. Not. (2023), no. 12, 9901–9949

7. Moduli spaces of rational curves on Fano threefolds (w/ R. Beheshti, E. Riedl, S. Tanimoto)  
Adv. Math. 408 (2022), part A, article 108557, 60 pp.
8. Classifying sections of del Pezzo fibrations, I (w/ S. Tanimoto)  
J. Eur. Math. Soc. 26 (2024), no. 1, 289-354
9. Rational curves on prime Fano threefolds of index 1 (w/ S. Tanimoto)  
J. Alg. Geom. 30 (2021), no. 1, 151–188
10. On exceptional sets in Manin’s Conjecture (w/ S. Tanimoto)  
Res. Math. Sci. 6 (2019), Paper no. 12., 41 pp.
11. Geometric Consistency of Manin’s Conjecture (w/ A.K. Sengupta, S. Tanimoto)  
Compos. Math. 158 (2022), no. 6, 1375-1427
12. Iitaka dimension for cycles  
Trans. of the A.M.S. 371 (2019), no. 7, 4815–4835
13. Positivity of the diagonal (w/ J.C. Ottem)  
Adv. Math. 335 (2018), 664-695
14. Geometric Manin’s Conjecture and rational curves (w/ S. Tanimoto)  
Compos. Math. 155 (2019), no. 5, 833-862
15. A snapshot of the Minimal Model Program  
Proc. of Symp. in Pure Math. 95 (2017), AMS, 1-32
16. Correspondences between convex geometry and complex geometry (w/ J. Xiao)  
EpiGA 1 (2017), Art. 6
17. On the geometry of thin exceptional sets in Manin’s Conjecture (w/ S. Tanimoto)  
Duke Math. J. 166 (2017), no. 15, 2815-2869
18. Positivity functions for curves on algebraic varieties (w/ J. Xiao)  
Algebra Number Theory 13 (2019), no. 6, 1243-1279
19. Convexity and Zariski decomposition structure (w/ J. Xiao)  
Geom. Funct. Anal. 26 (2016), no. 4, 1135-1189
20. Volume and Hilbert function of R-divisors (w/ A.M. Fulger, J. Kollár)  
Mich. Math. J. 65 (2016), no. 2, 371-387
21. Balanced line bundles on Fano varieties (w/ S. Tanimoto, Y. Tschinkel)  
J. Reine Angew. Math. 743 (2018), 91-131
22. Morphisms and faces of pseudo-effective cones (w/ A.M. Fulger)  
Proc. London Math. Soc. 112 (2016), no. 4, 651-676
23. Kernels of numerical pushforwards (w/ A.M. Fulger)  
Adv. Geom. 17 (2017), no. 3, 373-378
24. Positive cones of dual cycle classes (w/ A.M. Fulger)  
Algebraic Geometry 4 (2017), no. 1, 1-28
25. Asymptotic behavior of the dimension of the Chow variety  
Adv. Math. 308 (2017), 815-835
26. Volume-type functions for numerical cycle classes  
Duke Math. J. 165 (2016), no. 16, 3147-3187
27. The movable cone via intersections  
arXiv:1111.3928
28. Zariski decompositions of numerical cycle classes (w/ A.M. Fulger)  
J. Alg. Geom. 26 (2017), no. 1, 43-106

29. Numerical triviality and pullbacks  
J. Pure Appl. Algebra 219 (2015), no. 12, 5637-5649
30. Algebraic bounds on analytic multiplier ideals  
Ann. Inst. Fourier 64 (2014), no. 3, 1077-1108
31. On Eckl's pseudo-effective reduction map  
Trans. of the A.M.S. 366 (2014), no. 3, 1525-1549
32. Comparing numerical dimensions  
Algebra Number Theory 7 (2013), no. 5, 1065-1100
33. Reduction maps and the minimal model program (w/ Y. Gongyo)  
Compos. Math. 149 (2013), no. 2, 295-308
34. A cone theorem for nef curves  
J. Algebraic Geom. 21 (2012), no. 3, 473-493

## INVITED TALKS

- MPS Conference on Higher Dimensional Geometry, "Restriction theorems for curves", May 2024
- UIC Algebraic Geometry Seminar, "Restriction theorems for curves", March 2024
- Brown Algebraic Geometry Seminar, "Restriction theorems for curves on Fano varieties", October 2023
- Boston Algebraic Geometry Day, "Restriction theorems for curves on Fano varieties", September 2023
- Undergraduate Workshop Series Lecturer, CMND Thematic Program on Rationality and Hyperbolicity, June 2023
- Nagoya University Conference, "Non-free sections of Fano fibrations", November 2022
- Columbia Algebraic Geometry Seminar, "Non-free curves on Fano varieties", April 2022
- Zoom Algebraic Geometry Seminar, "Rational curves on del Pezzo surfaces in characteristic p", December 2021
- Princeton Algebraic Geometry Seminar, "Non-free curves on Fano varieties", November 2021
- Online Algebraic Geometry Seminar, Washington University of St. Louis, "Asymptotic geometry and convexity", September 2021
- PRIMA 2021 Summer School, Lecture series on rational curves, August 2021
- Online Algebraic Geometry Seminar, University of Wisconsin, "Sections of del Pezzo fibrations", April 2020
- University of Connecticut Algebraic Geometry Seminar, "On exceptional sets in Manin's Conjecture", January 2020
- Higher Dimensional Arithmetic Geometry conference, Kumamoto University, "Sections of del Pezzo fibrations over  $\mathbb{P}^1$ ", February 2019
- Kumamoto Algebraic Geometry Seminar, "Positivity of the diagonal", November 2018
- Rice University Colloquium, "Counting rational points and rational curves", October 2018
- Northeastern Geometry, Physics, and Representation Theory seminar, "Rational curves on prime Fano threefolds", September 2018
- BICMR workshop on Modern Algebraic Geometry, "Rational curves on prime Fano threefolds", July 2018
- ICERM workshop on Birational geometry and arithmetic, "The exceptional set in Manin's Conjecture", April 2018
- Northwestern Algebraic Geometry Seminar, "The exceptional set in Manin's Conjecture", April 2018

- Spring Central AMS Sectional, “Convexity and Zariski decompositions”, March 2018
- Oberwolfach workshop on Algebraic geometry, “Geometric Manin’s Conjecture”, September 2017
- Boston University Geometry and Physics seminar, “Geometric Manin’s Conjecture and rational curves”, April 2017
- ICMS program on Positivity in algebraic and complex geometry, “Geometric Manin’s Conjecture”, April 2017
- BIRS program on Newton-Okounkov Bodies, Test Configurations, and Diophantine Geometry, “Geometric invariants in Manin’s Conjecture”, March 2017
- University of Copenhagen Number Theory Seminar, “Positivity for curves”, October 2016
- Princeton Algebraic Geometry Seminar, “Convexity in divisor theory”, October 2016
- Positivity of cycles workshop at AIM, “Numerical groups”, August 2016
- Higher dimensional algebraic geometry conference (University of Utah), “Exceptional sets and Manin’s Conjecture”, July 2016
- Tokyo-Princeton algebraic geometry conference, “Positivity for curves”, May 2016
- BIRS program on Free Resolutions, Representations, and Asymptotic Algebra, “Positivity for curves”, April 2016
- RTG Workshop on Higher Codimension Cycles on Algebraic Varieties (UIC), Speaker, March 2016
- Stony Brook Algebraic Geometry Seminar, “Positivity for curves”, November 2015
- Georgia Algebraic Geometry Symposium, “The geometric constants in Manin’s Conjecture,” October 2015
- Princeton Algebraic Geometry Seminar, “The geometric constants in Manin’s Conjecture,” October 2015
- Algebraic Geometry Northeastern Series, “Positivity for curves”, October 2015
- Bootcamp for the Algebraic Geometry Summer Research Institute, “An introduction to the Minimal Model Program,” July 2015
- UW Madison Algebraic Geometry Seminar, “Zariski decompositions of curve classes”, May 2015
- Boston College-Northeastern Algebraic Geometry Conference, “Zariski decompositions of curve classes”, April 2015
- UCSD Algebraic Geometry Seminar, “The geometric constants in Manin’s Conjecture”, April 2015
- Tufts University Algebraic Geometry Seminar, “Positivity of cycles and asymptotic invariants”, February 2015
- Yale University Algebraic Geometry Seminar, “Positivity of cycles and asymptotic invariants”, January 2015
- University of Utah Algebraic Geometry Seminar, “Positivity of cycles and asymptotic invariants,” November 2014
- Boston College Number Theory and Algebraic Geometry Seminar, “The geometric constants in Manin’s Conjecture,” September 2014
- Hausdorff Institute in Bonn, Workshop on Birational Geometry and Foliations, “Positivity of cycles and asymptotic invariants,” February 2014
- Boulder AMS Sectional Meeting, Special Session on Algebraic Geometry, “Big cycles and volume functions,” April 2013
- Harvard-MIT Algebraic Geometry Seminar, “Big cycles and volume functions,” March 2013
- Princeton Algebraic Geometry Seminar, “Big cycles and volume functions,” February 2013

- University of Michigan Algebraic Geometry Seminar, “Big cycles and volume functions,” January 2013
- Rice University Colloquium, “The minimal model program and curves,” September 2012
- Texas Algebraic Geometry Symposium, “An introduction to the minimal model program,” April 2012
- University of Houston Algebraic Geometry Seminar, “Duality for the movable cone,” April 2012
- Texas Christian University Colloquium, “An introduction to the minimal model program,” March 2012
- University of Illinois at Chicago Algebraic Geometry Seminar, “Numerical reduction maps,” February 2012
- Johns Hopkins University Algebraic Geometry Seminar, “Numerical reduction maps,” February 2012
- University of Utah Algebraic Geometry Seminar, “Algebraic bounds on analytic multiplier ideals,” November 2011
- Texas A&M University Algebraic Geometry Seminar, “Numerical reduction maps,” September 2011
- Rice University Colloquium, “Algebraic bounds on analytic multiplier ideals,” September 2011
- University of Washington Algebraic Geometry Seminar, “Algebraic bounds on analytic multiplier ideals,” April 2011
- Stanford University Algebraic Geometry Seminar, “Algebraic bounds on analytic multiplier ideals,” April 2011
- Ohio State University Algebraic Geometry Seminar, “Algebraic bounds on analytic multiplier ideals,” April 2011
- University of Michigan Algebraic Geometry Seminar, “Analytic multiplier ideals,” October 2010
- Rice University Algebraic Geometry Seminar, “Pseudo-effective reduction maps,” January 2010
- University of Michigan Algebraic Geometry Seminar, “Pseudo-effective reduction maps,” January 2010
- Harvard-MIT Algebraic Geometry Seminar, “Pseudo-effective reduction maps,” October 2009

## EDITORIAL ACTIVITIES

Editor, European Journal of Mathematics, August 2023-present

## PROFESSIONAL ACTIVITIES

Co-organizer, Algebraic Geometry Northeastern Series Conference, Boston College, March 2024  
 Co-Organizer, Higher Dimensional Algebraic Geometry Conference, UCSD, January 2024  
 Co-organizer, CMND Thematic Program on Rationality and Hyperbolicity, June 2023  
 Co-organizer, Algebraic Geometry Northeastern Series Conference, Online, October 2021  
 Co-organizer, BIRS conference on Geometry via Arithmetic, Online, July 2021  
 Co-organizer, Algebraic Geometry Northeastern Series Conference, Boston College, September 2019  
 Co-organizer, AIM SQuaREs workshop on “Geometric Manin’s Conjecture in characteristic  $p$ ”, June 2019  
 Organizer, Undergraduate summer research program, Boston College, Summer 2018  
 – Guided two undergraduate students in research projects concerning toric varieties  
 Co-organizer, BC-NEU Algebraic Geometry Conference, Boston College, November 2017  
 Co-organizer, Mini-workshop on Positivity in higher-dimensional geometry, Oberwolfach, September 2017  
 Co-organizer, BC-NEU Algebraic Geometry Conference, Boston College, October 2016  
 Co-organizer, AIM workshop on “Positivity of cycles”, American Institute of Mathematics, August 2016  
 Co-organizer, BC-NEU Algebraic Geometry Conference, Boston College, April 2016  
 Co-organizer, BC-NEU Algebraic Geometry Conference, Northeastern, September 2015  
 Session leader, Bootcamp for Algebraic Geometry Summer Research Institute, University of Utah, July 2015  
 Co-organizer, BC-NEU Algebraic Geometry Conference, Northeastern, April 2015  
 Co-organizer, Algebraic Geometry Northeastern Series Conference, Boston College, March 2015

Co-organizer, Special Session on the Geometry of Algebraic Varieties, Michigan State AMS Sectional, March 2015  
 Co-organizer, Rice Colloquium, Fall 2013-Spring 2014  
 Co-organizer, Rice Algebraic Geometry Seminar, Fall 2012-Spring 2014  
 Co-organizer, Rice Teaching Seminar, Fall 2012-Spring 2013  
 Guest speaker, Rice University Math Tournament, Spring 2012  
 Graduate Assistant, MRC Snowbird Conference, Summer 2010  
 Webpage Administrator, Harvard-MIT Algebraic Geometry Seminar, Fall 2008 - Spring 2010  
 Co-organizer, Harvard-MIT Baby Algebraic Geometry Seminar, Fall 2008  
 MIT Math Department Teacher Training Program, Fall 2008  
 Mentor, Research Science Institute (MIT), Summer 2007  
 – Guided two high school students in math research projects  
 Intern, Force and Motion Inc., Summer 1997 - Summer 1999  
 – Wrote and edited computer-based physics textbook for high school students

### **DEPARTMENT SERVICE**

Graduate admissions committee, Boston College, Fall 2018-Spring 2019  
 Postdoc search committee, Boston College, Fall 2018-Spring 2019, Fall 2021-Spring 2022  
 Distinguished Lecture Series committee, Boston College, Fall 2016-Spring 2018, Fall 2019-Spring 2020  
 Graduate admissions committee, Boston College, Fall 2016-Spring 2017  
 Analysis Qual Author, Spring 2016  
 Postdoc search committee, Boston College, Fall 2015-Spring 2016  
 Undergraduate committee, Boston College, Fall 2014-Spring 2023  
 Website committee, Boston College, Fall 2014-Spring 2020

### **ADVISING**

Thesis work, Gomathy Ganapathy, Fall 2023-present  
 Thesis work, Enhao Feng, Fall 2022-present  
 Graduate reading course, Enhao Feng, Fall 2021  
 Graduate reading course, Siddharth Mahendrakar, Fall 2020-Spring 2021  
 Graduate reading course, Jeeuhn Kim, Fall 2019  
 Senior Thesis, Ning Duan, Fall 2018  
 Summer Research, Ning Duan, Summer 2018  
 Summer Research, Wantong Wei, Summer 2018  
 Graduate reading course, Maria Fox, Spring 2017  
 Senior Thesis, Nicholas Denari, Fall 2015-Spring 2016

### **TEACHING EXPERIENCE**

Boston College  
 Math 4455: Mathematical Problem Solving, Fall 2023  
 Math 8865: Rational points on varieties, Spring 2023  
 Math 3322: Analysis II, Spring 2023  
 Math 3321: Analysis I, Fall 2022  
 Math 8865: Positivity in Algebraic Geometry, Fall 2021  
 Math 3310: Introduction to Abstract Algebra, Fall 2021  
 Math 8865: Algebraic Geometry II, Spring 2021  
 Math 3310: Introduction to Abstract Algebra, Fall 2020  
 Math 8865: Algebraic Geometry I, Fall 2020  
 Math 4455: Mathematical Problem Solving, Spring 2020  
 Math 1190: Fundamentals of Mathematics I, Fall 2019 (2 sections)  
 Math 4455: Mathematical Problem Solving, Spring 2019

Math 4961: Senior Thesis, Fall 2018  
Math 8845: Introduction to the minimal model program, Fall 2018  
Math 1190: Fundamentals of Mathematics I, Fall 2018  
Math 3322: Analysis II, Spring 2018  
Math 2216: Introduction to Abstract Mathematics, Spring 2017  
Math 8845: Introduction to Algebraic Geometry, Fall 2016  
Math 3310: Introduction to Abstract Algebra, Fall 2016  
Math 8811: Complex Analysis, Spring 2016  
Math 4961: Senior Thesis, Fall 2015 - Spring 2016  
Math 2210: Linear Algebra, Fall 2015 (2 sections)  
Math 4430: Introduction to Number Theory, Spring 2015  
Math 3310: Introduction to Abstract Algebra, Fall 2014

Rice University

Math 464: Abstract Algebra III, Spring 2014  
Math 365: Introduction to Number Theory, Fall 2013  
Math 212: Multivariable Calculus, Spring and Fall 2013  
Math 465/565: Introduction to Algebraic Geometry, Fall 2012

University of Michigan

Math 412: Introduction to Modern Algebra, Spring 2011  
Math 115: Calculus I, Fall 2010

Massachusetts Institute of Technology

Head Teaching Assistant, 18.06: Introduction to Linear Algebra, Spring 2008  
Teaching Assistant, 18.06: Introduction to Linear Algebra, Fall 2007