

# CURRICULUM VITAE

Benjamin Bakker

November 1, 2023

## Contact Information

---

Address: University of Illinois at Chicago  
Department of Mathematics, Statistics, and Computer Science  
851 S. Morgan St.  
Chicago, IL 60607  
Email: [bakker.uic@gmail.com](mailto:bakker.uic@gmail.com)  
Webpage: <https://bakker.people.uic.edu/>

## Education

---

**Princeton University**, Princeton, New Jersey  
Ph.D. in Mathematics, 2010  
Thesis: *Hodge polynomials of moduli spaces of stable pairs on K3 surfaces*  
Advisor: Rahul Pandharipande

**Harvard University**, Cambridge, Massachusetts  
A.B. in Mathematics and Physics, 2005  
Senior thesis: *Toric varieties and mirror symmetry*  
Senior thesis advisor: Shing-Tung Yau

## Academic Positions

---

2022–present Associate Professor, University of Illinois at Chicago  
2020–2022 Assistant Professor, University of Illinois at Chicago  
2016–2020 Assistant Professor, University of Georgia  
2014–2016 Postdoc (Wissenschaftlicher Mitarbeiter), Humboldt-Universität zu Berlin  
2011–2014 NSF Postdoctoral Fellow  
2010–2013 Courant Instructor, Courant Institute NYU

## Research Interests

---

Algebraic geometry, Hodge theory, moduli of abelian, symplectic, and Calabi-Yau varieties, relations to arithmetic geometry and model theory, derived categories.

## Awards and Honors

---

2019 Felix Klein Lectures, Hausdorff Center of Mathematics  
2019–2024 NSF CAREER Grant  
2017–2020 NSF Individual Research Grant  
2011–2014 NSF Postdoctoral Fellowship  
2006 Clay Mathematics Institute Summer School grant  
2004 Phi Beta Kappa (Harvard University)  
2003 Derek Bok Certificate for Distinction in Teaching (Harvard University)

- A Hodge theoretic proof of Hwang's theorem on base manifolds of Lagrangian fibrations,  
with C. Schnell, 22 pages, preprint.
- A short proof of a conjecture of Matsushita,  
6 pages, submitted.
- Functional transcendence of periods and the geometric André–Grothendieck period conjecture,  
with J. Tsimerman, 21 pages, submitted.
- On the Frey–Mazur conjecture over low genus curves,  
with J. Tsimerman, 17 pages, arXiv preprint, 2013.
- Definability of mixed period maps,  
with Y. Brunebarbe, B. Klingler, and J. Tsimerman, 15 pages, **J. Eur. Math. Soc.** to appear.
- Quasiprojectivity of images of mixed period maps,  
with Y. Brunebarbe and J. Tsimerman, **J. Reine Angew. Math.** 2023(804):197-219 (2023).
- Definable structures on flat bundles,  
with S. Mullane, **Bull. Lond. Math. Soc.** 55(5):2515-2524 (2023).
- Finiteness for self-dual classes in integral variations of Hodge structure,  
with T. W. Grimm, C. Schnell, and J. Tsimerman, **Épijournal Géom. Algébrique**, Special volume  
in honour of Claire Voisin (2023).
- o-minimal GAGA and a conjecture of Griffiths,  
with Y. Brunebarbe and J. Tsimerman, **Invent. Math.** 232(1):163-228 (2023).
- The global moduli theory of symplectic varieties,  
with C. Lehn, **J. Reine Angew. Math.** 2022(790):223-265 (2022).
- Algebraic approximation and the decomposition theorem for Kähler Calabi-Yau varieties,  
with H. Guenancia and C. Lehn, **Invent. Math.** 228(3):1255-1308 (2022).
- A global Torelli theorem for singular symplectic varieties,  
with C. Lehn, **J. Eur. Math. Soc.** 23(3):949-994 (2021).
- Tame topology of arithmetic quotients and algebraicity of Hodge loci,  
with B. Klingler and J. Tsimerman, **J. Amer. Math. Soc.** 33(4):917-939 (2020).
- The Ax–Schanuel conjecture for variations of Hodge structures,  
with J. Tsimerman, **Invent. Math.** 217(1):77-94 (2019).
- The Mercat conjecture for stable rank 2 vector bundles on generic curves,  
with G. Farkas, **Amer. J. Math.** 140(5):1277-1295 (2018).
- The geometric torsion conjecture for abelian varieties with real multiplication,  
with J. Tsimerman, **J. Differential Geom.** 109(3):379-409 (2018).
- The Kodaira dimension of complex hyperbolic manifolds with cusps,  
with J. Tsimerman, **Compos. Math.** 154(3):549-564 (2018).
- A classification of Lagrangian planes in holomorphic symplectic varieties,  
**J. Inst. Math. Jussieu** 16(4):859-877 (2017).
- $p$ -torsion monodromy representations of elliptic curves over geometric function fields,  
with J. Tsimerman, **Ann. of Math.** 184(3):709-744 (2016).
- Lagrangian 4-planes in holomorphic symplectic varieties of  $K3^{[4]}$ -type,  
with A. Jorza, **Cent. Eur. J. Math.** 12(7):952-975 (2014).
- Higher rank stable pairs on  $K3$  surfaces,  
with A. Jorza, **Commun. Number Theory Phys.** 6(4):805-847 (2012).
- Hodge polynomials of moduli spaces of stable pairs on  $K3$  surfaces,  
Ph.D. thesis, Princeton University, 2010.

## Other Publications

---

Hodge theory and o-minimality,  
Felix Klein Lecture notes, 32 pages.

Lectures on the Ax–Schanuel conjecture,  
with J. Tsimerman, *Arithmetic Geometry of Logarithmic Pairs and Hyperbolicity of Moduli Spaces*,  
1-68, CRM Short Courses, Springer, 2020.

## Invited Lecture Series and Conference Talks

---

November 2023	Birational Workshop, Bonn
September 2023	Geometry of Hyperkähler varieties, Hangzhou
June 2023	Recent Trends in Algebraic Geometry, Oberwolfach
June 2023	Alpine meeting on nonpositive curvature in Kähler geometry, Aussois
April 2023	Komplexe Analysis, Oberwolfach
February 2023	Periods, Shafarevich Maps, and Applications, University of Miami
January 2023	Hyperkähler quotients, singularities, and quivers, Simons Center, Stony Brook University
December 2022	Midrasha Mathematicae, Hebrew University
October 2022	Finiteness results for special subvarieties, Lake Como School of Advanced Studies
September 2022	Hyperkähler varieties and related topics, Sapienza Università di Roma
August 2022	Derived Categories, Moduli Spaces, and Hyperkähler Varieties, University of Michigan
July 2022	AMS-SMF-EMS Joint International Meeting, Université de Grenoble-Alpes, Grenoble
June 2022	Nonabelian Hodge theory, Saint-Jacut
June 2022	Geometric Aspects of the Swampland, Madrid
September 2021	Hyperkähler Geometry, Bonn
November 2020	Geometry and TACoS, ETH Zürich
October 2020	AMS Special Session on Geometry and Arithmetic of Hyperkähler Manifolds, Chattanooga
September 2020	Categories, Cycles and Cohomology of Hyperkähler Varieties, Bonn
August 2020	Komplexe Analysis - Algebraicity and Transcendence, Oberwolfach
September 2019	AGNES, Boston College
September 2019	o-Minimal Structures in Algebraic Geometry, Freiburg Universität
June 2019	Symposium on Symplectic Varieties and Moduli Spaces, ETH Zürich
May 2019	Felix Klein Lectures, Bonn Universität, Bonn
April 2019	Moduli in Budapest, Rényi Institute of Mathematics, Budapest
April 2019	o-minimal geometry and Hodge theory, ETH Zürich
March 2019	Midwest Algebraic Geometry Graduate Conference, University of Illinois, Chicago
February 2019	Hodge theory and birational geometry, CIRM, Luminy
September 2018	Workshop on Moduli Spaces and Related Problems, Shanghai
June 2018	AMS-CMS Joint Meetings, Fudan University, Shanghai
May 2018	Shimura varieties and hyperbolicity of moduli spaces, UQAM, Montreal
October 2017	WAGS, UC Los Angeles
May 2017	Geometry and Topology of Ball Quotients and Related Topics, Hunter College
April 2017	Mini-school on abelian and symplectic varieties, UNC Chapel Hill
August 2016	Geometry at the ANU, Australian National University, Canberra
January 2016	German-Israeli Workshop in Algebraic and Tropical Geometry, Bar-Ilan University, Tel-Aviv
December 2015	North German Algebraic Geometry Seminar, Freie Universität, Berlin
October 2015	Symposium on Symplectic Varieties and Moduli Spaces, Kyoto University
February 2015	Geometry and arithmetic of hyperkähler manifolds, Leibniz-Universität
February 2015	Motivic invariants related to K3 and abelian geometries, Humboldt-Universität
October 2014	Current developments in moduli theory, Northeastern University, Boston
August 2014	Recent Developments in Algebraic and Arithmetic Geometry, Rényi Institute, Budapest
November 2013	Holomorphic Symplectic Varieties, BICMR, Peking University
September 2013	Arithmetic and Geometry of Rational Curves, Rice University, Houston
October 2012	Hyperkähler Geometry, Stony Brook University
June 2011	Holomorphic Symplectic Varieties, Courant Institute NYU

## Invited Colloquia and Seminar Talks

---

October 2023	Algebraic geometry seminar, UIUC
January 2023	Algebraic geometry seminar, Stony Brook University
December 2022	Algebraic geometry seminar, University of Poitiers
October 2022	Algebraic geometry seminar, Columbia University
October 2022	Joint Columbia–CUNY–NYU Number theory seminar, NYU
May 2022	Algebraic geometry seminar, ZAG, Zoom
February 2022	Algebraic geometry seminar, Northwestern University
November 2021	Colloquium, Northeastern University
November 2021	Colloquium, University of Chicago
May 2021	Algebraic geometry seminar, ETH Zürich
March 2021	Algebraic geometry seminar, Purdue University
January 2021	Algebraic geometry seminar, UC Davis
November 2020	Algebraic geometry seminar, University of Ohio
November 2020	Algebraic geometry seminar, University of Wisconsin
October 2020	Algebraic geometry seminar, Princeton University
February 2020	Colloquium, Brown University
February 2020	Colloquium, University of Toronto
January 2020	Colloquium, Rice University
January 2020	Colloquium, University of Illinois, Chicago
December 2019	Colloquium, University of Illinois, Urbana-Champaign
December 2019	Algebraic geometry seminar, University of Michigan
November 2019	Colloquium, UC San Diego
October 2019	Colloquium, Washington University
October 2019	Algebraic geometry seminar, Washington University
October 2019	Algebraic geometry seminar, Brown University
May 2019	Algebraic geometry seminar, Max Planck Institut, Bonn
April 2019	Algebraic geometry seminar, Institut de Mathématiques de Jussieu, Paris
March 2019	Algebraic geometry seminar, New York University
February 2019	Colloquium, Stony Brook University
February 2019	Algebraic geometry seminar, Stony Brook University
December 2018	Number theory seminar, University of Wisconsin
November 2018	Algebraic geometry seminar, Duke University
May 2018	Algebraic geometry seminar, Rutgers University
April 2018	Algebraic geometry seminar, Northwestern University
April 2018	Algebraic geometry seminar, University of Illinois, Chicago
February 2018	Algebraic geometry seminar, UC Davis
January 2018	Algebraic geometry seminar, Boston College
December 2017	Geometry seminar, Temple University
December 2017	Algebra seminar, University of Pennsylvania
October 2017	Algebraic geometry seminar, Princeton University
April 2017	Algebra seminar, University of Kentucky
March 2017	Algebraic geometry seminar, Columbia University
February 2017	Algebraic geometry seminar, UC San Diego
January 2017	Algebraic geometry seminar, Stanford University
November 2016	Algebraic geometry seminar, Stony Brook University
October 2016	Colloquium, University of South Carolina
October 2016	Algebra and number theory seminar, Emory University
June 2016	Algebraic geometry seminar, University of Edinburgh
March 2016	Algebraic and Tropical Geometry, Yale University
March 2016	Colloquium, University of Georgia
February 2016	Colloquium, Rice University
February 2016	Algebraic geometry seminar, University of Hong Kong
January 2016	Colloquium, University of Washington
January 2016	Colloquium, University of Notre Dame

## Invited Colloquia and Seminar Talks (continued)

---

January 2016	Colloquium, UC Irvine
December 2015	Colloquium, University of Pennsylvania
November 2015	SFB Kolloquium, Universität Mainz
September 2015	Algebraic geometry seminar, Northeastern University
September 2015	Algebraic geometry seminar, Courant Institute NYU
June 2015	Algebraic geometry seminar, Leibniz-Universität Hannover
January 2015	Number theory seminar, University of Toronto
January 2014	Algebraic geometry seminar, Max Planck Institut, Bonn
November 2014	Algebraic geometry seminar, Humboldt-Universität Berlin
November 2014	Algebraic geometry seminar, ETH Zürich
October 2014	Algebraic geometry seminar, Columbia University
September 2014	Lie groups seminar, Yale University
September 2014	Algebra seminar, University of Pennsylvania
April 2014	Algebraic geometry preprint seminar, Columbia University
January 2014	Algebraic geometry seminar, Leibniz-Universität Hannover
January 2014	Algebraic geometry seminar, Humboldt-Universität Berlin
January 2014	Algebraic geometry seminar, University of Chicago
December 2013	Algebraic geometry seminar, Courant Institute NYU
December 2013	Algebraic geometry seminar, University of Michigan
November 2013	Number theory seminar, University of Illinois, Chicago
November 2013	Algebraic geometry seminar, University of Illinois, Urbana-Champaign
November 2013	Algebraic geometry seminar, University of Notre Dame
October 2013	Algebra seminar, University of Pennsylvania
May 2013	Algebraic geometry seminar, Courant Institute
April 2012	Algebraic geometry seminar, University of Massachusetts, Amherst
January 2012	Algebraic geometry seminar, UC San Diego
January 2012	Algebraic geometry seminar, Caltech
October 2011	Algebraic geometry seminar, Courant Institute NYU
October 2011	Algebraic geometry seminar, Harvard/MIT
November 2010	Algebraic geometry seminar, Courant Institute
October 2010	Graduate student seminar, Princeton University
September 2010	Algebraic geometry seminar, Columbia University
March 2010	Moduli seminar, Princeton University

## Conference Organization

---

August 2022	Midwest Algebraic Geometry Graduate Conference, UIC, Chicago
December 2020	Hodge theory, period mappings, and local systems, CRM, Montreal
February 2018	Joint Athens-Atlanta Number Theory Seminar, Athens, GA
March 2017	Georgia Algebraic Geometry Symposium, Athens, GA
August 2015	IRTG Summer School: Recent advances in algebraic and arithmetic geometry, Siena

## Teaching Experience

---

2022–present	Associate Professor, UIC Calculus III (Math 210)
2020–2022	Assistant Professor, UIC Hyperkähler manifolds (Math 571) Second Course in Abstract Algebra I (Math 516) Definable Complex Analytic Geometry (Math 571) Linear Algebra I (Math 320)
2016–2020	Assistant Professor, UGA Moduli spaces (Math 8330) Calculus II (Math 2260) Differential equations (Math 2700)

## Teaching Experience (continued)

---

- 2016–2020 Assistant Professor, UGA (continued)  
(Counter)examples in char.  $p$  geometry (Math 8330)  
Commutative Algebra (Math 8020)  
Topics in Hodge theory research group (Math 8850)  
Differential equations (Math 2700)  
Abelian Varieties (Math 8330)  
Modern Algebra and Geometry I (Math 4000)  
Graduate Modern Algebra and Geometry I (Math 6000)
- 2014–2016 Organizer of the college seminar at Humboldt-Universität zu Berlin  
Nonarchimedean analytic geometry and rational points  
Literature seminar  
Faltings’ theorem  
Derived equivalence of abelian varieties
- 2010–2014 Instructor at Courant Institute, NYU  
Undergraduate reading course on Elementary Number Theory
- 2010–2014 Instructor at Courant Institute, NYU (continued)  
Graduate Algebraic Number Theory (MATH-GA 2210)  
Elementary Number Theory (MATH-UA 248)  
Graduate Algebra I (MATH-GA 2130)  
Graduate reading course on Complex Algebraic Curves  
Graduate Algebraic Topology II (Math-GA 2320)  
Calculus (V63.0121)
- 2007 Instructor at Princeton University  
Calculus (Math 103)
- 2005–2010 Teaching Assistant at Princeton University  
Numbers, Equations, and Proofs (Math 214)  
Advanced Multivariable Calculus (Math 203)  
Analysis in Several Variables (Math 218)  
Ordinary Differential Equations (Math 303)  
Calculus (Math 104)  
Multivariable Calculus (Math 201)  
Linear Algebra (Math 202)
- 2002–2005 Course Assistant at Harvard University  
Multivariable Calculus (Math 21a/b)  
Multivariable Calculus (Math 21a/b)  
Honors Multivariable Calculus and Linear Algebra (Math 25a)  
Multivariable Calculus (Math 21a/b)

## Academic Services

---

- 2020–present Fellow of UIC Honors Collage
- 2020–present Colloquium Committee, UIC
- 2020–present Co-organizer of Algebraic Geometry seminar, UIC
- 2016–2020 Co-organizer of Algebraic Geometry seminar, UGA
- 2016–2020 Co-organizer of Postdoc seminar, UGA
- 2017–2020 Committee member for Ph.D. general examinations, UGA
- 2014–2016 Organizer of College Seminar for IRTG, Humboldt-Universität
- 2013 Undergraduate reading course on elementary number theory, Courant Institute
- 2012–2013 Committee member for Ph.D. general examinations, Courant Institute  
Committee member for Ph.D. defense, Courant Institute
- 2011–2012 Co-organizer of Joint Columbia-CUNY-NYU Number Theory seminar, Courant Institute
- 2011 Graduate reading course on plane algebraic curves, Courant Institute

## Academic Services (continued)

---

2009–present    NSF panelist (Individual and CAREER)  
Referee for: *Ann. of Math.*—*Algebra Number Theory*—*Algebr. Geom.*  
*Ann. Sci. Éc. Norm. Supér.*—*Geom. Top.*—*IMRN*—*Invent. Math.*—*Amer. J. Math.*  
*J. Differential Geom.*—*J. Éc. Polytech. Math.*—*J. Lond. Math. Soc.*—*J. Reine Angew. Math.*  
*Math. Ann.*—*Res. Math. Sci.*

## PhD students

---

UIC:    Benjamin Tighe (UGA: 2018–2020; UIC: 2020–2023).  
         Zhehao Li (2021–present)  
         Hank Morris (2022–present)

## Languages

---

Fluent:    English  
Reading:   French, German, Classical Greek

## References

---

- |   |   |
|---|---|
| • <b>Rahul Pandharipande</b> (doctoral advisor)<br>ETH Zürich<br>rahul@math.ethz.ch | • <b>Burt Totaro</b><br>UCLA<br>totaro@math.ucla.edu                            |
| • <b>Daniel Huybrechts</b><br>Bonn Universität<br>huybrech@math.uni-bonn.de         | • <b>Peter Sarnak</b><br>Princeton University, IAS<br>sarnak@math.princeton.edu |
| • <b>Paul Pollack</b> (teaching reference)<br>UGA<br>pollack@uga.edu                |   |