

# CURRICULUM VITAE

Benjamin Bakker

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## Contact Information

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## Personal Information

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Born March 5, 1985 in Massachusetts, USA  
U.S. Citizen

## Education

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**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

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2020–present 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

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

## Awards and Honors

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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)  
2004–2005 John Harvard Scholarship (Harvard University)  
2003 Derek Bok Certificate for Distinction in Teaching (Harvard University)  
2002 Detur Book Prize (Harvard University)  
2000 Massachusetts AP State Scholar

## Papers

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- Definable structures on flat bundles,  
with S. Mullane, 7 pages, submitted.
- Finiteness for self-dual classes in integral variations of Hodge structure,  
with T. W. Grimm, C. Schnell, and J. Tsimerman, 27 pages, submitted.
- Quasiprojectivity of images of mixed period maps,  
with Y. Bruneparbe and J. Tsimerman, 20 pages, submitted.
- The global moduli theory of symplectic varieties,  
with C. Lehn, 47 pages, submitted.
- o-minimal GAGA and a conjecture of Griffiths,  
with Y. Bruneparbe and J. Tsimerman, 31 pages, submitted.
- On the Frey–Mazur conjecture over low genus curves,  
with J. Tsimerman, 17 pages, arXiv preprint, 2013.
- Algebraic approximation and the decomposition theorem for Kähler Calabi-Yau varieties,  
with H. Guenancia and C. Lehn, 44 pages, *Invent. Math.* to appear.
- Definability of mixed period maps,  
with Y. Bruneparbe, B. Klingler, and J. Tsimerman, 15 pages, *J. Eur. Math. Soc.* to appear.
- 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

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- 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 Conference Talks and Lecture Series

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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 Seminar Talks

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November 2021	Colloquium, Northeastern University, Boston
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

## Invited Seminar Talks (continued)

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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  
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

## Invited Seminar Talks (continued)

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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

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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

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2020–present	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) (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 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)

## Teaching Experience (continued)

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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

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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  
2009–present NSF panelist  
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

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

## Languages

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Fluent: English  
Reading: French, German, Classical Greek

## References

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- **Rahul Pandharipande** (doctoral advisor)  
ETH Zürich  
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- **Daniel Huybrechts**  
Bonn Universität  
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- **Paul Pollack** (teaching reference)  
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- **Burt Totaro**  
UCLA  
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- **Peter Sarnak**  
Princeton University, IAS  
sarnak@math.princeton.edu