

CURRICULUM VITAE

MATTHEW D. KERR

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Born August 5th, 1975 in Washington, D.C.

Citizenship: U.S.

Education:

Ph.D. Princeton University, January 2003
Advisor: Phillip A. Griffiths

B.A. University of Virginia, May 1997, *summa cum laude* in mathematics and physics
Undergraduate Advisor: David Brydges

Employment:

Assistant Professor, Washington University in St. Louis, Aug. 2010 - present
Lecturer, Durham University, Fall 2007 - July 2010
L.E. Dickson Instructor, University of Chicago, Fall 2004 - Summer 2007
Postdoctoral Fellow, Max-Planck-Institute for Mathematics, Bonn, Germany, Jan.-Aug. 2005
Adjunct Assistant Professor, UCLA Math Department, Fall 2002 - Summer 2004

Grants and Academic Honors:

NSF Standard Grant DMS-1068974 (PI), July 2011 - June 2014, \$127,412
EPSRC First Grant EP/H021159/1 (PI), Jan. 2010 - July 2010, 102K GBP, terminated by move
National Science Foundation Graduate Fellowship, 1997-2000
E.J. McShane Prize, University of Virginia Mathematics Department, 1997
James W. Elkins Award, University of Virginia Physics Department, 1997
Barry M. Goldwater Scholarship, 1996-7

Research Interests:

Algebraic Geometry
Hodge Theory
Mathematical Physics

Memberships:

Member, American Mathematical Society, Aug. 2009 - present
Fellow, Higher Education Academy (UK), Nov. 2008 - present

Research Publications:

- Indecomposable K_1 of elliptically fibered $K3$ surfaces: a tale of two cycles*, to appear in *Fields. Inst. Commun.*
- “Mumford-Tate groups and domains: their geometry and arithmetic” (book), joint with M. Green and P. Griffiths, *Annals of Math. Studies*, no. **183**, Princeton University Press, 2012, 289 pp.
- Algebraic K -theory of toric hypersurfaces*, joint with C. Doran, *CNTP* **5** (2011), no.2, 397-600.
- Normal functions and the GHC*, joint with G. Pearlstein, *RIMS Kokyuroku* **1745** (2011), 71-75.
- Mumford-Tate domains*, joint with M. Green and P. Griffiths, *Bollettino dell’Unione Math. Ital.* **3** (2010), no. 2, 281-308.
- An exponential history of functions with logarithmic growth*, joint with G. Pearlstein, in “Topology of Stratified Spaces”, *MSRI Pub.* **58**, Cambridge Univ. Press, 2011, 281-374.
- The sheaf of nonvanishing meromorphic functions in the projective algebraic case is not acyclic*, joint with X. Chen and J. Lewis, *C. R. Acad. Sci. Paris, Ser. I* **348** (2010), 291-293.
- Néron models and limits of Abel-Jacobi mappings*, joint with M. Green and P. Griffiths, *Compositio Math.* **146** (2010), 288-366.
- Some enumerative global properties of variations of Hodge structure*, joint with M. Green and P. Griffiths, *Moscow Math J.* **9** (2009), 469-530.
- Higher Abel-Jacobi Maps for 0-cycles*, *J. of K -theory* **1** (2008), 1-55.
- Neron models and boundary components for degenerations of Hodge structures of mirror quintic type*, joint with M. Green and P. Griffiths, in “Curves and Abelian Varieties (V. Alexeev, Ed.)”, *Contemp. Math* **465** (2007), AMS, 71-145.
- The Abel-Jacobi Map for Higher Chow Groups, II*, joint with J. Lewis, 67 pp., *Invent. Math.* **170** (2007), 355-420.
- A survey of transcendental methods in the study of Chow groups of 0-cycles*, in “Mirror Symmetry V (Banff, 2003)”, *AMS/IP Stud. Adv. Math.* **38** (2006), 295-349.
- Exterior products of 0-cycles*, *J. reine angew. Math* **600** (2006), 1-23.
- The Abel-Jacobi Map for Higher Chow Groups*, joint with J. Lewis and Stefan Muller-Stach, *Compositio Math.* **142** (2006), no. 2, 374-396.
- An Elementary Proof of Suslin Reciprocity*, *Canad. Math. Bull.* **48** v.2 (2005), pp. 221-236.
- A Regulator Formula for Milnor K -groups*, *K -Theory* **29** (2003) pp. 175-210.

Research Preprints:

- Boundary components of Mumford-Tate domains*, joint with G. Pearlstein, preprint, 58 pp., submitted.
- Special values of automorphic cohomology classes*, joint with M. Green and P. Griffiths, preprint, 192 pp., submitted.
- Normal functions, Picard-Fuchs equations, and elliptic fibrations on $K3$ surfaces*, joint with X. Chen, C. Doran, and J. Lewis, 32 pp., submitted.
- Shimura Varieties: a Hodge-theoretic perspective*, 45 pp., submitted.
- Iterative Formula for AJ on $CH^p(X, n)$* , preprint, 9 pp.
- Higher Abel-Jacobi Maps and Differential equations*, preprint, 15 pp.
- “Geometric Construction of Regulator Currents with Applications to Algebraic Cycles”, Princeton Ph.D. Thesis, 355 pp.

Invited Talks:

Southern Illinois Univ. Carbondale Math Department Seminar, Nov. 13, 2012
AMS meeting, session on “Motives, Algebraic Cycles and K-Theory”, University of Arizona, October 27-28, 2012 (planned)
Canadian Number Theory Association XII Meeting, Special Session on Number Theory and Physics, University of Lethbridge, June 17-22, 2012
NSF/CBMS Conference on “Hodge Theory, Complex Geometry, and Representation Theory” (2 talks), Texas Christian University, June 18-22, 2012
Texas A&M Working Seminar in Geometry (5 talks), May 14-18, 2012
Special Number Theory Seminar, Institute for Advanced Study, Princeton, March 30, 2012
Algebra, Geometry, and Physics Seminar, Stony Brook University, March 14, 2012
Workshop on the Arithmetic and Geometry of Algebraic Varieties, Fields Institute, Nov. 19-20, 2011
Conference on the Arithmetic and Geometry of K3 Surfaces and CY Threefolds, Fields Institute, Aug 16-25, 2011
“Number Theory and Physics at the Crossroads”, BIRS (Banff), May 8-13
Show-me Algebraic Geometry Conf., Columbia, MO, May 7-8, 2011
Texas A&M Geometry Seminar, Feb. 7, 2011
Purdue Algebraic Geometry Seminar, Jan. 19, 2011
AMS meeting, session on “Number Theory and Physics”, Notre Dame, Nov. 6, 2010
“Regulators III” Conference, Barcelona, July 12 - July 22, 2010
ICTP Summer School on Hodge Theory (7 talks), ICTP (Trieste), June 14 - July 3, 2010
University of Cambridge Geometry Seminar, May 19, 2010
Washington University Colloquium and Algebraic Geometry seminar, Jan. 25-26, 2010
University of Alberta Colloquium and Algebra Seminar, Jan. 18-19, 2010
University of Alberta Algebra Seminar, Nov. 30, 2009
Oxford University Algebraic Geometry Seminar, Oct. 13, 2009
Workshop on Homological Mirror Symmetry and Hodge Theory, Universität Wien (3 talks), Aug. 8-12, 2009
Hodge Theory and Algebraic Geometry, A Symposium in Honor of S. Usui, RIMS (Kyoto, Japan), June 23-July 3, 2009
Michigan State University Colloquium and Algebra Seminar, April 23-24, 2009
Durham Arithmetic Study Group (3 talks), Feb.-March 2009
MPIM-Bonn Number Theory Seminar, Jan. 12, 2009
Universität Wien, Jan. 7, 2009
University of Exeter Colloquium, Nov. 27, 2008
University of Bristol Colloquium, Nov. 26, 2008
Cambridge Geometry Seminar, Nov. 12, 2008
COW/Geometry-Topology Seminar, Imperial College London, Nov. 6, 2008
Algebraic and Differential Geometry, A Conference in Celebration of the 70th Birthday of Phillip Griffiths, IAS, Oct. 16-17, 2008
BIRS Workshop (Banff, AB, Canada), Number Theory and Physics at the Crossroads, Sept. 21-26, 2008
MSRI Workshop (Berkeley, CA), Topology of Stratified Spaces, Sept. 8-12, 2008
University of Washington (US), Superseminar, April 17, 2008
University of Alberta (Canada), Conference on Regulators and heights in Algebraic Geometry, April 11-16, 2008

BIRS Workshop on Hodge Theory, April 6-11, 2008
University of Chicago Algebra Seminar, April 2, 2008
University of Durham Colloquium, Jan. 2008
University of Washington conference on $K3$ surfaces and string dualities (4 talks), July 2007
University of Durham, May 18, 2007
University of Georgia conference on Moduli of Curves and Abelian Varieties,
Athens, GA, April 2007
University of Wisconsin Geometry Seminar, March 2, 2007
Georgia Tech Algebra Seminar, February 5, 2007
Johns Hopkins University Colloquium, January 25, 2007
Purdue University Algebraic Geometry Seminar, January 10, 2007
CMS Conference, workshop on C-Y Varieties and Mirror Symmetry, Toronto, Dec. 7, 2006
Texas A&M University, October 13, 2006
Universität Mainz (2 talks), June-July 2006
Motives and Periods Conference, PIMS/UBC, June 7, 2006
Ohio State University Algebraic Geometry Seminar, May 18, 2006
University of Chicago Algebraic Geometry Seminar, April 26, 2006
UIC Algebraic Geometry Seminar, April 17, 2006
Fields Institute Weekend Seminar, March 5, 2006
University of Washington Special Seminar, February 23, 2006
MPIM-Bonn Number Theory Seminar, August 17, 2005
University of Durham, August 9, 2005
MPIM-Bonn IMPRS Seminar, July 22, 2005
Insitut de Jussieu, July 4, 2005
Universita di Roma ("La Sapienza"), June 21, 2005
Variations on Mahler Measure, CIRM-Luminy, May 31-June 4, 2005
Antalya Algebra Days, May 17-23, 2005
Bilkent University (3 talks), May 2005
Purdue University Algebraic Geometry Seminar, November 17th, 2004
University of Chicago Algebraic Geometry Seminar, November 10th, 2004
University of Washington Algebra Seminar, November 2nd, 2004
UCLA Perspectives in Mathematics Seminar, April 12th, 2004
Fields Institute Weekend Seminar, March 27-28, 2004
Lehigh University Math Department, February 12-13, 2004
Ohio State University Math Department, February 4, 2004
BIRS Workshop, Calabi-Yau Varieties and Mirror Symmetry, December 6-11, 2003
Summer School on the Arithmetic, Geometry, and Topology of Algebraic Cycles,
UNAM-Morelia (3 hour talks), June 15-July 4, 2003
Conference on Web Theory and Differential Equations, CIRM-Luminy, March 31 -
April 4, 2003
University of Alberta Math Department, April 5, 2002
Brown University Math Department, January 25, 2002
Johns Hopkins Algebraic Geometry Seminar, January 24, 2002
Summer School on Transcendental Aspects of Algebraic Cycles, Université de Grenoble,
June 18-July 6, 2001

Teaching Experience:

Courses taught at WUSTL: Matrix Algebra, Hodge theory, Graduate Complex Analysis;
Current (Fall 2012-Spring 2013): Graduate Algebra; Planned (Spring 2013): Number Theory and Cryptography

Alberta Science and Math Initiative (2 talks to high school students), Univ. of Alberta, July 2011

Courses taught at Durham: Algebraic Geometry, Number Theory III/IV, Algebra and Number Theory II; ANT II and SMA (Calculus) tutorials

Undergraduate Algebraic Geometry book (331 pp., on webpage) written for Fall 2009 - Spring 2010 class

Supervised five Masters' theses (Project IV) at Durham (one co-supervised with H. Gangl); two were selected as best project in maths department (2008, 2009)

Courses taught at Chicago: Basic Algebra I, Complex Analysis, Honors Calculus III, Summer REU class on Algebraic Curves, Calculus II, Algebraic Curves.

Courses taught at UCLA (5/yr.): Finite Math, Calculus for Life Science, Multivariable Calculus, Honors Linear Algebra, Analysis, Differential Geometry, Game Theory; 10 lectures in graduate Hodge-theory seminar.

Advanced Linear Algebra book (192 pp., on webpage) written for Fall 2002 Honors class
Teaching Assistant, Princeton University Mathematics Department, 2000-2002

Advising:

Postdoctoral mentor for Ivan Horozov, Fall 2011-present

Current Ph.D. Students: Ryan Keast (3rd year), Genival Francisco Fernandes da Silva Jr. (1st year)

Current undergraduate research students: Thomas Morrell (senior thesis); Patrick Lopatto (research project)

2011-12: directed several reading courses with both graduate and undergraduate students

Masters' students at Durham: Stephanie Belcher, Andrew Strangeway, Thomas Oliver, Adam Watts, Jason de Carvalho

Service:

Co-Organizer (with J. Lewis and G. Pearlstein): "Recent Advances in Hodge Theory: Period Domains, Algebraic Cycles, and Arithmetic" (Vancouver, June 10-20, 2013)

Co-Organizer (with A. Clinger, C. Doran, and J. Walcher): "Hodge Theory and String Duality" (Banff, Dec. 4-9, 2011)

Co-Organizer of WUSTL Algebraic Geometry Seminar; organized Kirk Lecture (2011);
Math Club supervisor, 2012-13 academic year

Chair, Postdoctoral Hiring Committee, 2010-11 academic year

Washington University Math Circle, Nov. 14, 2010, Oct. 2, 2011, and Oct. 7, 2012

Co-Organizer (with V. Kurlin): Durham Univ. Pure Maths Colloquium, Fall 2008-Spring 2010
MAGIC Coordinator, Durham University, Fall 2009 - Spring 2010

Principal Organizer: University of Chicago Algebraic Geometry Seminar, Winter-Spring 2007

Referee for papers submitted to American Journal of Mathematics, Journal of Number Theory, Mathematical Research Letters, Journal of Algebraic Geometry, Advances in Theoretical and Mathematical Physics, Nagoya Mathematical Journal, Journal of the London Math. Society,

Mathematische Annalen, Mathematische Zeitschrift, Manuscripta Math., Canadian Math. Bulletin, Proceedings of the AMS, Communications in Number Theory and Physics, Duke Mathematical Journal, Journal of K-theory, and proceedings volumes
NSF panelist and referee for three other funding bodies
Reviewer for AMS Mathscinet, including book review (“Mixed Hodge Theory” by C. Peters and J. Steenbrink)
Member of three Ph.D. Committees (2 at WUSTL, 1 at Durham)