

Aaron Bertram/CV

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Education:

PhD Mathematics June, 1989 UCLA (Robert Lazarsfeld, Advisor)
MA Mathematics December, 1985 UCLA
BA Mathematics June, 1984 Harvard University

Recognition:

Fellow of the American Mathematical Society (Awarded 2016)
Distinguished Mentor, University of Utah (Awarded 2016)

Positions Held:

7/00- present	Professor	University of Utah
7/20-6/22	Associate Chair/Mathematics	University of Utah
7/12-6/13	Director	Math for America-Utah
7/05-6/11	Chair/Mathematics	University of Utah
8/00-11/00	Visiting Professor	University of Nice
7/95-6/00	Associate Professor	University of Utah
7/92-6/95	Assistant Professor	University of Utah
7/89-6/93	Benjamin Peirce Asst Professor	Harvard University

Grants:

7/17-6/20 NSF FRG Grant (with four Co PIs, extended to 6/21)
7/16-6/21 Simons Foundation Travel Grant (extended to 6/22)
7/18-7/19 Simons Foundation Sabbatical Fellowship
7/13-6/18 NSF RTG Grant (Co PI with Bromberg and deFernex)
7/09-6/16 NSF Noyce Grant (with Hugo Rossi)
7/09-6/14 NSF Research Grant
7/06-6/12 NSF VIGRE Grant (Co PI with David Dobson)
7/05-6/08 NSF Research Grant
7/02-6/05 NSF Research Grant (Co PI with Herb Clemens)
7/99-6/02 NSF Research Grant (Co PI with Herb Clemens)
7/95-6/98 NSF Research Grant
9/94-6/96 Sloan Research Fellowship
7/92-6/95 NSF Research Grant
9/89-6/92 NSF Postdoctoral Research Fellowship
9/88-6/89 Sloan Doctoral Dissertation Research Fellowship

Selected Publications

- *Change of Polarization for Moduli of Sheaves on Surfaces a Bridgeland Wall-Crossings*, with C. Martinez, IMRN (2020), no. 7, 20072033.
- *The tropical Nullstellensatz for conguences*, with R. Easton, Advances in Mathematics 308, (2017), 36-82.
- *Some remarks on surface moduli and determinants*, Recent Advances in Algebraic Geometry 417, (2015), 13-28.
- *The stability manifolds of \mathbf{P}^1 and local \mathbf{P}^1* , with S. Marcus and J. Wang, Hodge Theory and Classical Algebraic Geometry 647, (2015),
- *Bridgeland stability conditions on threefolds II*, with A. Bayer, E. Macri and Y. Toda, Journal of Alg Geometry 23 (2014), 693-710.
- *The birational geometry of moduli spaces of sheaves on the projective plane*, with C. Martinez and J. Wang, Geometriae Dedicata 173 (1), (2014), 37-64.
- *The birational geometry of the Hilbert scheme of points on surfaces*, with I. Coskun, Birational Geometry, Rational curves, and Arithmetic, (2013), 15-55
- *Polynomiality, wall crossings and Hurwitz cycles*, with R. Cavalieri and H. Markwig, Journal of Combinatorial Theory, Series A 120 (7), (2013), 1604-1631.
- *The minimal model program for the Hilbert scheme of points on \mathbf{P}^2* with D. Arcara, I. Coskun, J. Huizenga, Advances in Math 235 (2013), 580-626.
- *Bridgeland-stable moduli spaces for K -trivial surfaces*, with D. Arcara, J. of the Eur Math. Soc., Volume 15, Issue 1, (2013), 1-38
- *Reider's theorem and Thaddeus pairs revisited*, with D. Arcara, Grassmannians, Moduli spaces and Vector Bundles 14, (2011), 51-68.
- *Evaluating tautological classes using only Hurwitz numbers*, with R. Cavalieri and G. Todorov, Transactions of the AMS 360 (11), (2008), 6103-6111.
- *Gromov Witten invariants for abelian and non-abelian quotients*, with I. Ciocan-Fontanine and B. Kim, Journal of Alg Geometry **17** (2008), 275-294.
- *Computing Gromov-Witten invariants with algebraic geometry*, IAS/Park City Mathematics Series, Volume 11 (2006), 31-60.
- *Two proofs of a conjecture of Hori and Vafa*, with I. Ciocan-Fontanine and B. Kim, Duke Math Journal, **126** 1 (2005), 101-136.
- *New recursions for genus-zero Gromov-Witten invariants*, with H.Kley, Topology **44** 1 (2005).
- *Stable maps and Gromov-Witten invariants*, Proceedings of the Workshop on Stacks and Moduli Spaces, ICTP Lecture Notes XIX (2004), 1-42.
- *Using symmetry to count rational curves*, Symposium in Honor of C.H. Clemens, Contemporary Mathematics, 312 (2002), 87-99.
- *On the quantum cohomology of a symmetric product of an algebraic curve*, with M. Thaddeus, Duke Mathematical Journal 108 (2), (2001), 329-362.

- *The formula $12 = 10 + 2 \times 1$: Counting rational curves on \mathbf{F}^2* , with D. Abramovich, Contemporary Mathematics 276, (2001) 83-88.
- *Another way to enumerate rational curves with torus actions*, Inventiones Mathematicae, **142** (2000) 487-512.
- *Some applications of localization to enumerative problems*, Michigan Math J, special edition for Bill Fulton, 48 (2000) 65-75.
- *Quantum multiplication of Schur polynomials*, with I. Ciocan-Fontanine and W. Fulton, Journal of Algebra **219** (1999) 727-746.
- *On stable rank two vector bundles with canonical determinant and many sections*, with B. Feinberg, Marcel-Dekker Lecture Notes **200** (1998), 259-270.
- *Quantum Schubert Calculus*, Advances in Math, **128** 2 (1997), 289-305.
- *Stable Pairs and Log Flips*, in AMS Proceedings of Symposium in Pure Math, 62, 1 (1997), 185-201.
- *Gromov invariants for Grassmannians*, with G. Daskalopoulos and R. Wentworth, Journal of the American Mathematical Society, **9** 2 (1996), 529-571.
- *Towards a Schubert calculus for maps from a Riemann surface to a Grassmannian*, International Journal of Math., **5** 6 (1994), 811-825.
- *Stable pairs and stable parabolic pairs*, Journal of Algebraic Geometry **3** (1994), 703-724.
- *Generalized $SU(2)$ theta functions*, Inventiones Math 113 (1), (1993) 351-372.
- *Hilbert polynomials of moduli spaces of rank 2 vector bundles*, with A. Szenes, Topology **32** 3 (1993), 599-609.
- *Moduli of rank-2 vector bundles, theta divisors, and the geometry of curves in projective space*, Journal of Differential Geometry **35** (1992), 429-469.
- *Vanishing theorems, a theorem of Severi, and equations*, with L. Ein and R. Lazarsfeld, Journal of the American Mathematical Society **4** 3 (1991), 587-602.
- *Surjectivity of Gaussian maps*, with L. Ein and R. Lazarsfeld, Lecture Notes in Math **1479** (1991), 15-25..
- *An existence theorem for Prym special divisors*, Inventiones Math, 90 (3), (1987) 669-671.

Volumes Edited.

- *Algebraic Geometry Summer Institute*, with D. Abramovich, L. Katzarkov, R. Pandharipande, M. Thaddeus, Proceedings of Symposia in Pure Mathematics 80 (2009), 1004 pages in two volumes.
- *Snowbird Lectures on String Geometry*, with K. Becker, M. Becker, P. Green, B. McKay, AMS Contemporary Mathematics 401 (2006).
- *Spring 2000 Symposium in Honor of C.H. Clemens*, with J. Carlson and H. Kley, AMS Contemporary Mathematics 312 (2002).

Conferences Organized

The WAGS (Western Algebraic Geometry) Symposia.

- WAGS Symoisum (with A. Bayer and M. Hering), SLC, (2008)
- WAGS Symoisum (with de Fernex, Hacon and Lee), SLC, (2006)
- WAGS Symoisum (with C. Hacon and Y.P. Lee), SLC, (2005)
- WAGS Symoisum (with J. Fernandez), Salt Lake City, (2004)
- WAGS Symoisum/AMS Sectional, Salt Lake City, (2002)
- WAGS Symposium, Salt Lake City, (1999)
- UCLA-Utah-Chicago Conference, Salt Lake City, (1995).

AMS Summer Research Conferences

- **Derived Categories** (with Lee and Sharpe), Snowbird, Utah, (2007)
- **String Geometry** (Becker(s), P. Green, B. McKay) Snowbird, Utah, (2004).
- **Quantum Cohomology** (with Y. Ruan), Mt. Holyoke College, MA (1998).

Graduate Mini-Courses at the University of Utah

- **Derived Categories**, with YP Lee and E Sharpe (2007).
- **Motivic Integration**, with Chris Hacon (2005).

Other Conferences

- **AMS Summer Institute in Algebraic Geometry**, (with D. Abramovich, L. Katzarkov, R. Pandharipande, M. Thaddeus) Seattle, WA, July-August 2005.
- **Clemens Algebraic Geometry Weekend**, with J. Carlson and H. Kley, Salt Lake City, (2000).

Teaching at the University of Utah

High School Students

High School Summer Program in Mathematics
High School Math Circles

Undergraduate Teaching

Math 1030 Introduction to Quantitative Reasoning
Math 1040 Introduction to Statistics and Probability
Math 1210 Calculus I
Math 1220 Calculus II
Math 1250 AP Calculus I
Math 1260 AP Calculus II
Math 1310 Engineering Calculus I
Math 2200 Discrete Mathematics
Math 2210 Calculus III
Math 2270 Linear Algebra
Math 3210 Foundations of Analysis I
Math 4200 Introduction to Complex Variables
Math 4400 Number Theory
Math 4800 Undergraduate Research Topics
Math 5310 Introduction to Modern Algebra I
Math 5320 Introduction to Modern Algebra II
Math 5405 Cryptography and Codes

Teaching of Secondary School Teachers

Math 3100 Foundations of Geometry
Math 4030 Foundations of Algebra
Math 5270 Transformational Geometry
Math 5900 Topics in Algebra
Math 6080 Topics in Contemporary Math
Teachers Math Circles and Masters Projects for Teachers
Reading Courses and Project Work

Graduate Teaching

Survival Skills for Graduate Students
Math 6130 Introduction to Algebraic Geometry I
Math 6140 Introduction to Algebraic Geometry II
Math 6150 Complex Manifolds (Hodge Theory)
Math 6180 Complex Manifolds (Riemann Surfaces)
Math 6520 Introduction to Algebraic Topology
Math 7800 Topics in Algebraic Geometry
Reading Courses and Thesis Research in Algebraic Geometry

Mentoring

Henri Shahrouz. Harvard PhD 1995 (while I was a postdoc).

Thesis: *The Grothendieck Quot Scheme and Composition Laws*

Current Employment: Software Architect. NFL Enterprises.

Ionut Ciocan-Fontanine. Utah PhD 1996

Thesis: *The Quantum Cohomology Ring of Flag Varieties*

Current Employment: Professor. University of Minnesota.

Jian Kong. Utah PhD 2001

Thesis: Schubert Calculus on Flag Manifolds and Flag Bundles

Current Employment: Research Associate Scientist. Johns Hopkins.

Dragos Mustata. Utah PhD 2003

Thesis: Intermediate Moduli Spaces of Stable Maps

Current Employment: Lecturer. University College Cork, Ireland.

Renzo Cavalieri. Utah PhD 2005

Thesis: A Topological Quantum Field Theory for Admissible Covers

Current Employment: Associate Professor. Colorado State University.

Fumitoshi Sato. Utah PhD 2005

Thesis: Relations in the Tautological Ring Via Localization

Current Employment: Lecturer. Kagawa National College of Technology.

Gueorgui (Joro) Todorov. Utah PhD 2008

Thesis: Pluricanonical Maps for Threefolds

Current Employment: Quantitative Analyst. BlueCrest Capital.

Dylan Zwick. Utah PhD 2014

Thesis: Variations on a Theme of Symmetric Tropical Matrices

Current Employment: Director of Data Science, Overstock.com

Christian Martinez. Utah PhD 2015

Thesis: Stability Conditions and Birational Geometry

Current Employment: Postdoc, Unicamp, Brazil

Drew Johnson. Utah PhD 2016

Thesis: Strange Duality and Tropical Geometry

Current Employment: Visiting Professor, BYU

Thomas Goller. Utah PhD 2017

Thesis: Enumerative Geometry of Curves and Surfaces

Current Employment: Instructor, The New Jersey

Franco Rota. Utah PhD 2019

Thesis: Bridgeland Stability Conditions on Orbifolds

Current Employment: Postdoc, University of Glasgow

Huachen Chen. Utah PhD 2019
Thesis: Wall-Crossing and Stability Conditions
Current Employment: Postdoc, UCSB

Dapeng Mu. Utah PhD 2020
Thesis: Bridgeland Stability for Sheaves on Curves in Projective Three Space
Current Employment: Postdoc, Unicamp, Brazil

Matteo Altavilla. Utah PhD 2020
Current Employment: Unknown

Marin Petkovic. Utah PhD expected, 2022

Postdocs Mentored

Holger Kley (1997-2000) Assistant Professor/Lecturer
Current Employment: Manager. Spirae.

Prakash Belkale (1999-2002) Wylie Assistant Professor/Lecturer
Current Employment: Professor. University of North Carolina.

Daniele Arcara (2003-2006) Assistant Professor/Lecturer
Current Employment: Chair and Associate Professor. Saint Vincent College.

Arend Bayer (2006-2008) Wylie Assistant Professor/Lecturer
Current Employment: Lecturer. University of Edinburgh.

Emanuele Macri (2008-2011) Wylie Assistant Professor/Lecturer
Current Employment: Associate Professor. Northeastern University.

Steffen Marcus (2011-2014) Burgess Assistant Professor/Lecturer
Current Employment: Assistant Professor. The College of New Jersey.

Nicola Tarasca (2013-2016) Assistant Professor/Lecturer
Current Employment: Assistant Professor, Virginia Commonwealth

Brooke Ullery (2015-16) NSF Postdoctoral Scholar
Current Employment: Assistant Professor, Emory University

Katrina Honigs (2015-18) NSF Postdoctoral Scholar and Wylie Instructor
Current Employment: Assistant Professor, Simon Fraser University

Bronson Lim (2017-20) RTG Postdoc
Current Employment: Assistant Professor, Cal State San Bernardino

Alicia Lamarche (2020-2024) RTG/NSF Postdoctoral Scholar

Undergraduates Mentored (Research Projects)

Drew Ellingson (2014-2015) (COS Undergraduate Research Award)

Project: Tropical Theta Characteristics

Hunter Simper (2015-2016)

Project: Tropical Plane Curves with Many Singularities

Dietrich Geisler (2015-2017)

Project: Lie Algebras

Oliver Richardson (2016-17)

Project: Tropical Trigonal Curves

Masters Projects (Secondary School Teachers).

Nate Nelson (2016-17). *Quaternions and Octonions.*

Kiersten Thorsen and Angela Price (2016-17). *Generalized Spirographs.*

Camilla Strong (2015-16). *Elliptic Curves.*

Vivian Shell (2014-15). *The Real Projective Plane.*

Nordin and Okamura (2014-15). *Ciphers and Cryptography.*

Lissett Sierra (2014-15). *The Rubik's Cube.*

Shinil Kang (2014-15). *The Euclidean Solids.*

Eric Schober (2013-14). *The Complex Circle.*

Chris Sheffield (2013-14). *Quadratic Reciprocity.*

Jessica Millar (2012-13). *Quadratic Functions in Math and Physics.*

Recent Service

Mathematics Department Committees

2020-2022 Associate Chair for Scheduling and Student Services

2015-2016 Hiring Committee

2013-2015 Executive Committee

2012-2013 Chair of the Tenure-Track/Tenured Hiring Committee

2005-2011 Chair of the Mathematics Department.

2004-2005 Tenure-Track/Tenured Hiring Committee
Vision and Strategic Planning Committee
Outstanding Student and Instructor Awards
Mathematics Education Committee

2003-2004 Executive Committee
Graduate Admissions Committee
Mathematics Education Committee

2002-2003 Executive Committee
Graduate Recruitment and Admissions Committee
Mathematics Education Committee

College of Science Committees

2014-2018 College RPT Committee

2012-2013 Director, Math for America Utah

2011-2013 Center for Science and Math Education Steering Committee

2011-2012 George Thomas Building Educational Planning Committee

2003-2005 College of Science Council

University of Utah Committees

- College of Education Dean Search Committee 2019-20.
- College of Education Math/Science Ed Hiring Committee(s) 2015-17.
- University of Utah Teaching Committees
- University of Utah Research Committees
- Internal Reviewer for Graduate Programs

External Service

2009-2011 Member-at-Large, Council of the American Mathematical Society

2006-2012 Steering Committee for the Park City Mathematics Institute

2005-2007 Governor Huntsman's Math advisory board.