

CURRICULUM VITAE

GAVRIL FARKAS

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Personal Information

Date of birth: March 19, 1973 Place of birth: Oradea/Nagyvárad, Romania

Area of specialization

Algebraic geometry with connection to other fields especially topology and physics.

Positions

2007-: Humboldt Universität zu Berlin, Full Professor (W3)
2006-2007: University of Texas at Austin, Associate Professor
2004-2006: University of Texas at Austin, Assistant Professor
(tenure-track position, tenured 2006)
2003- 2004: Princeton University, Assistant Professor
2000- 2003: University of Michigan, Ann Arbor, Assistant Professor
(postdoctoral position)

Education

- 1996-2000: Universiteit van Amsterdam
Ph.D., June 2000. Research supported by N.W.O. (The Dutch Organization for Scientific Research)
Thesis: *The birational geometry of the moduli space of curves*
Adviser: Gerard van der Geer
- 1995-1996: Mathematical Research Institute in the Netherlands (Utrecht-Nijmegen-Groningen-Twente)
Master of Science, specialization: algebraic K-theory, topology and algebraic number theory.
- 1991-1995: "Babes-Bolyai" University, Cluj/Kolozsvár, Romania
Bachelor of Science in Mathematics, specialization: geometry and topology; graduated with average grade 10 out of 10, over the 4 years of study.

Other professional experience

- Harvard University: invited visitor, September-December 1998, October-December 1999.
- Isaac Newton Institute, Cambridge UK: invited visitor, June-July 2002.
- Korean Institute for Advanced Studies, Seoul: invited visitor, March 2005, September 2009.
- Mittag-Leffler Institute Stockholm: Visiting Professor, April-June 2007.
- Instituto Nacional de Matematica Pura e Aplicada, Rio de Janeiro: Visiting Professor, January-February 2007.
- MSRI Berkeley: Research Member, February-April 2009.
- University of Georgia, Athens: Visiting Professor, March-April 2010.
- Institut Henri Poincare, Paris: Visiting Professor, April-May 2010.
- Newton Institute, Cambridge UK: Visiting Professor, February-April 2011.
- Universita Roma Tre: Visiting Professor, October-December 2011.

Awards and grants

- Project leader in the Sonderforschungsbereich 647 "Raum-Zeit-Materie" (2008-2012) of the DFG, Project A9: *Enumerative geometry of moduli spaces*.
- Principal investigator in the DFG Schwerpunkt 1489 "Algorithmische und Experimentelle Methoden in Algebra, Geometrie und Zahlentheorie" (2010-2013).
- *Alfred P. Sloan* Research Fellowship (2005-2008).
- National Science Foundation, research grant DMS-0500747, (2005-2008).
- National Science Foundation, research grant DMS-0140520, (2002-2005).
- CoPI on five year NSF RTG grant at the University of Texas at Austin (with D. Ben-Zvi, D. Freed, S. Keel, L. Sadun and K. Uhlenbeck).
- Texas Summer Research Assignment 2006, Project: *Geometry of moduli spaces*.
- *Rackham* Faculty Fellowship, University of Michigan, June-August 2001.
- Special prize of the *Romanian Mathematical Society* at the Romanian Mathematics Olympiad, 1991.
- Winner of the "*Traian Lalescu*" Mathematics Contest for Romanian undergraduate students in 1992 and 1993.

Editorial work

Editor of *Documenta Mathematica* - the Journal of the German Mathematical Society, as well as of *Mathematica (Cluj)* -a publication of the Romanian Academy.

Publications

- (1) *The geometry of the moduli space of curves of genus 23*, *Mathematische Annalen* 318 (2000), no.1, 43-65.

- (2) *Brill-Noether loci and the gonality stratification of \mathcal{M}_g* , J. reine angewandte Mathematik 539 (2001), 185-200.
- (3) *Divisors on $\mathcal{M}_{g,g+1}$ and the minimal resolution conjecture for points on canonical curves*, (with M. Mustața and M. Popa), Annales Scientifique École Normale Supérieure 17 (2003), 553-581.
- (4) *The Mori cones of moduli spaces of pointed curves of small genus*, (with A. Gibney), Transactions American Mathematical Society 355 (2003), 1183-1199.
- (5) *Regular components of moduli spaces of stable maps*, Proceedings American Mathematical Society 131 (2003), 2027-2036.
- (6) *Effective divisors on $\overline{\mathcal{M}}_g$, curves on K3 surfaces and the Slope Conjecture*, (with M. Popa), Journal of Algebraic Geometry 14 (2005), 241-267.
- (7) *Gaussian maps, Gieseker-Petri loci and large theta-characteristics*, J. reine angewandte Mathematik 581 (2005), 151-174.
- (8) *Syzygies of curves and the effective cone of $\overline{\mathcal{M}}_g$* , Duke Mathematical Journal 135 (2006), 53-98.
- (9) *Higher ramification and varieties of secant divisors on the generic curve*, Journal of the London Mathematical Society 78 (2008), 418-440.
- (10) *Koszul divisors on moduli spaces of curves*, American Journal of Mathematics 131 (2009), 819-868.
- (11) *The global geometry of the moduli space of curves*, Summer Research Institute on Algebraic Geometry, Seattle (2005), Proceedings of Symposia in Pure Mathematics 80 (2009), 125-147.
- (12) *Rational maps between moduli spaces of curves and Gieseker-Petri divisors*, Journal of Algebraic Geometry 19 (2010), 243-284.
- (13) *The Kodaira dimension of the moduli space of Prym varieties*, (with K. Ludwig) Journal of the European Mathematical Society 12 (2010), 755-795.
- (14) *The Fermat cubic and special Hurwitz cycles on $\overline{\mathcal{M}}_g$* , Bulletin of Belgian Mathematical Society "Simon Stevin" 5 (2009), 831-851.
- (15) *The birational type of the moduli space of spin curves*, Advances in Mathematics 223 (2010), 433-443.
- (16) *Aspects of the birational geometry of $\overline{\mathcal{M}}_g$* , in: "Geometry of Riemann surfaces and their moduli spaces", Surveys of Differential Geometry vol 14 (2010), 57-110.
- (17) *Brill-Noether geometry on the moduli space of spin curves*, in: "Classification of algebraic varieties-Schiermonnikoog 2009" 259-276 (C. Faber, G. van der Geer, E. Looijenga-eds), European Mathematical Society Congress Reports.
- (18) *Koszul cohomology with applications to moduli*, (with Marian Aprodu) in: "Grassmannians, vector bundles and moduli", Clay Mathematical Society Proceedings, Volume 14 (2011), 25-50.
- (19) *The classification of the universal Jacobian over the moduli space of curves*, (with A. Verra), to appear in Commentarii Mathematici Helvetici (2012).

- (20) *Moduli of theta-characteristics via Nikulin surfaces*, (with A. Verra), to appear in *Mathematische Annalen* (2012).
- (21) *The Green Conjecture for smooth curves lying on arbitrary $K3$ surfaces* (with M. Aprodu), *Compositio Mathematica* 147 (2011), 839-851.
- (22) *The maximal rank conjecture and rank two Brill-Noether theory* (with A. Ortega), *Pure and Applied Mathematics Quarterly* 7 (2011), 1265-1296, special volume dedicated to the memory of E. Viehweg.
- (23) *The universal theta divisor over the moduli space of curves* (with A. Verra), arXiv:1009.0184, submitted preprint.
- (24) *The geometry of the moduli space of odd spin curves* (with A. Verra), arXiv:1004.0278, submitted preprint.
- (25) *Green's Conjecture for general covers* (with M. Aprodu), to appear in "Vector Bundles and Compact Moduli-Georgia 2010", *Contemporary Mathematics*.
- (26) *Prym varieties and their moduli*, to appear in "Contributions to algebraic geometry" (P. Pragacz editor), *European Mathematical Society Congress Reports*.
- (27) *Higher rank Brill-Noether on sections of $K3$ surfaces* (with Angela Ortega), arXiv:1102.0276, to appear in the *International Journal of mathematics* (2012).
- (28) *Theta characteristics and their moduli*, arXiv:1201.2557, to appear in the *Milan Journal of mathematics* (2012).
- (29) *Singularities of theta divisors and the geometry of A_5* (with S. Grushevsky, R. Salvati-Manni and A. Verra), arxiv:1112.6285, submitted preprint.
- (30) *The intermediate type of certain moduli spaces of curves* (with A. Verra), arXiv:0910.3905.
- (31) *Lectures on moduli of curves*, *Proceedings of the Korean National Institute for Mathematical Sciences*, 2 (2007), 1-20.
- (32) *A multiplicity theorem in equivariant setting*, *Mathematica* 38 (1996), 221-226.
- (33) *On the completeness of Riemannian manifolds*, *Studia Univ. Babeş-Bolyai Math.*, 37 (1992), no.4, 95-101.
- (34) *Lusternik-Schnirelmann theory on closed subsets of C^1 -manifolds*, *Studia Univ. Babeş-Bolyai Math.*, 38 (1993), no.2, 75-89.
- (35) *The birational geometry of the moduli space of curves*, Ph.D. Thesis (book, 85 pages), *Universiteit van Amsterdam* (2000).
- (36) *Effective divisors on $\overline{\mathcal{M}}_g$ and a counterexample to the Slope Conjecture*, (with M. Popa), math.AG/0209171 preprint.
- (37) *$\overline{\mathcal{M}}_{22}$ is of general type*, preprint (2008).
- (38) *Notes on limit linear series for vector bundles*, (with M. Popa), unpublished preprint (2002).
- (39) *The effective cone of the moduli spaces of curves and the Slope Conjecture* *Max Planck Institute for Mathematics preprint based on talk at the Mathematische Arbeitstagung Bonn, June 2003.*

Professional activities

- Former PhD students: Paul Larsen-graduated November 2010, Nicola Tarasca-graduates 2011.
- Current PhD students: Margherita Lelli-Chiesa (BMS), Fabian Müller (DFG Schwerpunkt), Péter Tóth (BMS).
- Senior Faculty Member of the Berlin Mathematical School (BMS).
- Group leader in the Sonderforschungsbereich 647 "Raum-Zeit-Materie. Analytische und Geometrische Strukturen"
Project: "*Enumerative geometry of moduli spaces*".
- Editor (with I. Morrison) of the "*Handbook of moduli*" (3 volumes), dedicated to D. Mumford, International Press, to appear in 2012.
- Co-organizer (with D. Abramovich, L. caporaso and S. Kebekus) of the Oberwolfach Workshop "Moduli spaces in algebraic geometry" (February 2013).
- Co-organizer (with D. Abramovich and S. Kebekus) of the Oberwolfach Workshop "Moduli spaces in algebraic geometry" (January 2010).
- Co-organizer (with L. Ein, D. Eisenbud and I. Peeva) of the Banff Workshop "Syzygies in algebraic geometry with the exploration of a connection to string theory" (August 2012).
- Co-organizer (with C. Faber and R. de Jong) of the conference "Geometry and Arithmetic" (Schiermonnikoog 2010), on the occasion of G. van der Geer's 60th birthday.
- Co-organizer (with K. Altmann), of the workshop "Complex Algebraic Geometry" (Berlin, Humboldt University, October 2009), on the occasion of H. Kurke's 70th birthday.
- Co-organizer (with J. Kramer), of the conference "Moduli" (Berlin, Humboldt University, August 2009).
- Co-organizer (with M. Aprodu), of the "Romanian-German Conference in Algebraic Geometry" (Sibiu, May 2009).
- Co-organizer (with M. Reid and A. Corti), of the "Warwick Algebraic Geometry Symposium" (2007-2008).
- Co-organizer of the Northern German Algebraic Geometry Seminar (No-GAGS), as of 2007.
- Senior speaker at GAEL 2009 (*Géométrie Algébrique en Liberté*), Leiden, June 2009.
- *Speaker and mentor* "Moduli spaces and arcs in algebraic geometry", Cologne, August 2006.
- *Mentor* "Warm-Up Workshop for AMS Summer Institute in Algebraic Geometry", Seattle, July 2005.
- *Mentor* "Algebraic Geometry: Presentations by Young Researchers" Snowbird, Utah, July 2004.
- Organizer of the Princeton Algebraic Geometry Seminar (2003-2004).

- Co-organizer of the Texas Algebraic Geometry Seminar (2005-2007).
- Co-organizer (with A. Gibney and T. Nevins), of the conference on “Curves and their moduli” at the University of Michigan, Ann Arbor, March 2002.
- On behalf of the AMS I have reviewed proposals submitted to the National Security Agency Mathematical Sciences Program.
- I have reviewed proposals submitted to the National Science Foundation. I have refereed proposals submitted to the national funding agencies in Germany (DFG), Chile, Russia, Sweden and The Netherlands (NWO).
- I am a reviewer for *Mathematical Reviews* and *Zentralblatt*.

Selected talks

- “Modular forms and moduli spaces”, CIRM Luminy, October 2011.
- “Periods and moduli spaces”, Korean Institute of Advanced Studies, Seoul, September 2011.
- “Topics in moduli theory” (4 lectures), Instituto Superior Tecnico, Lisbon, September 2011.
- “A celebration of algebraic geometry” Cambridge Massachusetts August 2011, a conference in honor of J. Harris’ 60th birthday.
- “Moduli of Riemann surfaces”, Park City, Utah, July 2011.
- The Seventh Congress of Romanian Mathematicians, Brasov, July 2011.
- “Vector bundles on algebraic curves” Isaac Newton Institute Cambridge, June 2011.
- “Moduli of curves and Gromov-Witten theory”, Grenoble June-July 2011.
- “Moduli spaces and moduli stacks”, New York, Columbia University, May 2011.
- “Groups and Algebraic Geometry”, Erlangen, May 2011-a conference on the occasion of the retirement of W. Barth.
- Cambridge-Oxford-Warwick Seminar, Cambridge March 2011.
- “Geometrie algebrique complexe”, Luminy, January 2011.
- “Classical Algebraic geometry”, Instituto Nazionale di Alta Matematica, Rome, February 2011.
- Kinosaki Algebraic Geometry Symposium, Kinosaki (Japan), October 2010.
- V Iberoamerican Congress on Geometry, Pucon (Chile), December 2010.
- “Perspectives on algebraic varieties”, Levico Terme -a conference on the occasion of the 60th birthday of F. Catanese, C. Ciliberto and A. Verra, September 2010.
- “Moduli and birational geometry”, Pohang (Korea), August 2010.
- IMPANGA Summer School on Algebraic Geometry, Bedlewo (Poland), July 2010.
- Harvard-MIT Algebraic Geometry Seminar, March 2010.
- “After Carnival: An Algebraic Geometry Party”, Turin, February 2010.
- “Complex Algebraic geometry”, Seoul, September 2009.

- “Complex Algebraic geometry” Meeting, Mathematisches Forschungsinstitut Oberwolfach, August 2009.
- “Classification of algebraic varieties” Schiermonnikoog, The Netherlands, May 2009.
- MSRI Main Seminar, Berkeley March 2009.
- Invited plenary speaker at the annual meeting of the German Mathematical Society, Erlangen, September 2008.
- “Algebraic stacks” Trento, Italy, September 2008.
- “Komplexe Analysis” Meeting, Mathematisches Forschungsinstitut Oberwolfach, August 2008.
- “Algebraic geometry”- Institutul de Matematica al Academiei Romane, Bucharest, July 2008.
- “Algebraic Geometry”- a satellite conference of the European Congress of Mathematicians, Leiden, July 2008.
- “Aspects of moduli” Pisa, Italy, June 2008.
- “Classical Algebraic Geometry” Meeting, Mathematisches Forschungsinstitut Oberwolfach, June 2008.
- Princeton Algebraic Geometry Seminar, March 2008.
- “Recent progress on moduli of curves”, Banff, Canada, March 2008.
- “Moduli spaces of geometric and algebraic structures”, Bonn, January 2008.
- “Algebraic geometry and commutative algebra”, Tokyo, December 2007.
- “Complex Algebraic Geometry” Meeting, Mathematisches Forschungsinstitut Oberwolfach, October 2007.
- “Modular forms and moduli spaces” St. Petersburg, Russia, July 2007.
- “Linear series and subschemes” Ghent, Belgium, April 2007.
- “Moduli spaces” Mittag-Leffler Institute Djursholm, May 2007.
- Summer course on “Moduli of curves” (7 lectures), IMPA Rio de Janeiro, February 2007.
- Winterschool on Algebraic Curves, National Institute for Mathematical Sciences, Daejeon (Korea)-series of lectures, January 2007.
- Workshop on Algebraic Geometry and its Applications, Sogang University, Seoul, January 2007.
- Workshop on Vector Bundles, Clay Mathematics Institute, Cambridge, Massachusetts, October 2006.
- “Meetkunde in de Herfsttij” (Geometry in autumn) Workshop, Leiden, The Netherlands, September 2006.
- “Moduli spaces and combinatorics” Banff, Canada, July 2006.
- Cambridge-Oxford-Warwick Seminar, Oxford, June 2006.
- Invited Speaker, “Topicos de geometria algebraica y temas afines” Zacatecas, Mexico, June 2006.
- “Classical Algebraic Geometry” Meeting, Mathematisches Forschungsinstitut Oberwolfach, June 2006.

- Algebraic Geometry Seminar, University of Chicago, January 2006.
- Michigan-Ohio State Algebraic Geometry Meeting, Columbus, April 2006.
- “Recent Trends in Higher Dimensional Algebraic Geometry”, Banff, Canada, April 2006.
- Invited Speaker at the AMS Summer Institute in Algebraic Geometry, Seattle, July 2005.
- Invited Speaker at the AMS/Taiwan Joint International Meeting, Taichung, Taiwan, December 2005.
- Berkeley Algebraic Geometry Seminar, December 2005.
- “Higher Dimensional Algebraic Varieties”, KIAS Workshop, Seoul, March 2005.
- “Western Algebraic Geometry Seminar”, Seattle, March 2005.
- “Texas Algebraic Geometry” Conference, Houston, May 2005.
- “Cohomology of the Moduli Space of Curves” Conference, American Institute of Mathematics, March 2005.
- “Compact Moduli Spaces” Conference, American Institute of Mathematics, December 2004.
- “Classical Algebraic Geometry” Meeting, Mathematisches Forschungsinstitut Oberwolfach, July 2004.
- European Conference on Gromov-Witten invariants, Trieste, June 2004.
- Third Ibero-American Congress of Geometry, Salamanca, June 2004.
- Harvard-MIT Algebraic Geometry Seminar, March 2004.
- “Higher Dimensional Algebraic Geometry” Conference, Taipei, March 2004.
- Western Algebraic Seminar, Vancouver, September 2003.
- Mathematische Arbeitstagung, Bonn 2003.
- Conference “Geometry of Moduli Spaces”, Lille, June 2003.
- Euroconference “Vector Bundles on Algebraic Curves”, Porto, July 2003.
- Princeton Algebraic Geometry Seminar, April 2003.
- Conference on K-theory and Algebraic Cycles, Miami University, Ohio, April 2003.
- Euroconference “Vector Bundles on Algebraic Curves”, Luminy, Marseille, July 2002.
- Euroconference “Higher Dimensional Complex Geometry”, Newton Institute, Cambridge, June 2002.
- “Classical Algebraic Geometry” Meeting, Mathematisches Forschungsinstitut Oberwolfach, May 2002.
- Newton Institute, Cambridge, Program on Higher Dimensional Complex Geometry, June 2002.
- Harvard-MIT Algebraic Geometry Seminar, February 2002.
- Invited Special Session Talk at the AMS Sectional Meeting Ohio State University, Columbus, September 2001.

- European Algebraic Geometry Conference 2001, Norfjordeid, Norway, June 2001.
- Europroj Annual Conference 1999, Kibutz Ma'agan, Israel, September 1999.
- Bayreuth Conference "Free Resolutions and Linear Systems", July 1999.
- Harvard-MIT Algebraic Geometry Seminar, November 1998.
- European Summer School "Spaces with Singularities and Monopoles", Cluj-Napoca, Romania, July 1998.
- Colloquium talks:
 - 2000: Universiteit van Amsterdam
 - 2002: University of Texas at Austin
 - 2003: University of British Columbia, Indiana University at Bloomington, University of California at Irvine, Penn State University, University of Illinois at Urbana-Champaign
 - 2004: Yale University, Rice University
 - 2005: University of Zürich, New Mexico State University, University of San Antonio
 - 2006: University of Georgia, Humboldt Universität zu Berlin, University of Warwick
 - 2007: University of Linnköping (Sweden)
 - 2008: Berlin Mathematical School, Universität Bonn
 - 2009: Universität Heidelberg, Universität Hamburg, Université "Joseph Fourier"-Grenoble
 - 2010: Stony Brook, University of Georgia, Universität Freiburg, Seminario Matematico e Fisico di Milano, Johannes Gutenberg Universität Mainz
 - 2012: Leibniz Universität Hannover
- Seminar talks:
 - USA: University of Chicago (2004, 2006), Harvard University (1999, 2002, 2004, 2010), University of Pennsylvania (2005), University of California-Berkeley (2005, 2009), Columbia University (2003), Johns Hopkins University (2003), Texas A&M University (2005, 2007), Stanford University (2004), University of Georgia (2006, 2010), University of Texas at Austin (2002), University of Illinois Urbana-Champaign (2004), Rice University (2004), Yale University (2004), Ohio State University (2006), University of Massachusetts at Amherst (2007), SUNY Stony Brook (2010)
 - Canada: University of British Columbia (2003, 2004)
 - Germany: Friedrich-Alexander Universität Erlangen-Nürnberg (2008), Universität Duisburg-Essen (2008), Universität Göttingen (2009), Universität des Saarlandes (2009), Johannes Guttenberg Universitat Mainz (2010), Max Planck Institute Bonn (2003, 2006, 2008).
 - Spain: University of Barcelona (2008)

Italy: Universita Roma 3 (2008, 2011), Universita Genoa (2010), Universita Roma 1 Sapienza (2011), Universita Roma 2 Tor Vergata (2011), Istituto Nazionale di Alta Matematica (2011).

England: Cambridge University (2011), Warwick University (2006).

France: Universite Pierre et Marie Curie Paris 6 (2010).

The Netherlands: Universiteit Utrecht (1999), Universiteit van Amsterdam (1999, 2000), Leiden (2006).

Switzerland: ETH Zürich (2011)

Korea: Sogang University (2009)