Sebastian Casalaina-Martin

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Appointments

University of Colorado
Associate Professor, 2015–present.
Assistant Professor, 2008–15.

Mathematical Sciences Research Institute (Berkeley)
Postdoctoral Fellow, Spring 2009.

Harvard University
NSF Postdoctoral Research Fellowship, 2005–2008.

Stony Brook University
Simons Instructor, 2004–2007.

Education

Columbia University
Ph.D., Mathematics, 2004. Advisor: Robert Friedman.
M.Phil., Mathematics, 2004.
M.A., Mathematics, 2000.

Brown University
B.Sc., Mathematics, *Honors*, 1998.

Grants and Awards

- PI on **NSA** Standard Grant H98230-16-1-0053, 2016–2018.
- **Simons Foundation** Collaboration Grant for Mathematicians #317572, 2014–2016.
- PI on **NSF** Standard Grant DMS-1101333, 2011–14.
- **NSF** Postdoctoral Research Fellowship DMS-0503228, 2005–2008.
- Co-PI on **NSF** Seminar Grants DMS-1636713 (2016–2019), DMS-15-02166 (2015), DMS-0955038 (2010–15), DMS-0951907, (2009).

Research

I am an algebraic geometer with a broad range of interests. My research focuses on curves, abelian varieties, cubic threefolds, vector bundles and moduli spaces.

PUBLICATIONS All publications are available online at `http://math.colorado.edu/~casa`

1. J. Acther, S. Casalaina-Martin, and C. Vial, *Distinguished models of intermediate Jacobians*, preprint. [arXiv:1611.07471]
2. J. Achter, S. Casalaina-Martin and C. Vial, *Parameter spaces for algebraic equivalence*, preprint. [arXiv:1610.06586]
3. S. Casalaina-Martin, M. Popa and S. Schreieder, *Generic vanishing and minimal cohomology classes on abelian fivefolds*, to appear in J. Algebraic Geom. [arXiv:1602.06231]
4. S. Casalaina-Martin, S. Grushevsky, K. Hulek and R. Laza, *Complete moduli of cubic threefolds and their intermediate Jacobians*, preprint. [arXiv:1510.08891]
5. S. Casalaina-Martin and J. Wise, *An introduction to moduli stacks, with a view towards Higgs bundles on algebraic curves*, preprint.
6. J. Achter, S. Casalaina-Martin and C. Vial, *On descending cohomology geometrically*, to appear in Compositio Math. [arXiv:1410.5376]
7. S. Casalaina-Martin, J. Kass and F. Viviani, *The singularities and birational geometry of the universal compactified Jacobian*, to appear in Algebraic Geom. [arXiv:1408.3494]
8. S. Casalaina-Martin, S. Grushevsky, K. Hulek and R. Laza, *Extending the Prym map to toroidal compactifications of the moduli space of abelian varieties*, to appear in J. Eur. Math. Soc. [arXiv:1403.1938]
9. S. Casalaina-Martin, J. Kass and F. Viviani, *The local structure of compactified Jacobians*, Proc. Lond. Math. Soc. (3) **110** (2015), no. 2, 510–542. [arXiv:1107.4166]
10. S. Casalaina-Martin, D. Jensen and R. Laza, *Log canonical models and variation of GIT for genus four canonical curves*, J. Algebraic Geom. **23** (2014), no. 4, 727–764. [arXiv:1203.5014]
11. S. Casalaina-Martin, *A tour of stable reduction with applications*, A celebration of algebraic geometry, 65–117, Clay Math. Proc., **18**, Amer. Math. Soc., Providence, RI, 2013. [arXiv:1207.1048]
12. S. Casalaina-Martin, J. Kass and F. Viviani, *The geometry and combinatorics of cographic toric face rings*, Algebra and Number Theory **7** (2013), no. 8, 1781–1815. [arXiv:1102.2547]
13. S. Casalaina-Martin and R. Laza, *Simultaneous semi-stable reduction for curves with ADE singularities*, Trans. Amer. Math. Soc. **365** (2013), no. 5, 2271–2295. [arXiv:1007.0265]
14. S. Casalaina-Martin, D. Jensen and R. Laza, *The geometry of the ball quotient model of the moduli space of genus four curves*, Compact Moduli Spaces and Vector Bundles, 107–136, Contemp. Math. **564**, Amer. Math. Soc., Providence, RI, 2012. [arXiv:1109.5669]
15. S. Casalaina-Martin and J. Kass, *A Riemann singularity theorem for integral curves*, Amer. J. Math., **134** (2012), no. 5, 1143–1165. [arXiv: 0907.0212]

16. S. Casalaina-Martin and M. Teixidor i Bigas, *Singularities of Brill-Noether loci for vector bundles on curves*, Math. Nach. **284** (2011), no. 14-15, 1846–1871. [arXiv:0710.2480]
17. S. Casalaina-Martin and R. Laza, *The moduli space of cubic threefolds via degenerations of the intermediate Jacobian*, J. Reine Angew. Math. **633** (2009), 29–65. [arXiv:0710.5329]
18. S. Casalaina-Martin, T. Gwena, and M. Teixidor i Bigas, *Some examples of vector bundles in the base locus of the generalized theta divisor*, C. R. Math. Acad. Sci. Paris **347** (2009), no. 3-4, 173–176. [arXiv:0707.2326]
19. S. Casalaina-Martin, *Singularities of the Prym theta divisor*, Ann. of Math. **170** (2009), no. 1, 163–204. [rXiv:math/0405195]
20. S. Casalaina-Martin, M. Lahoz and F. Viviani, *Cohomological support loci for Abel-Prym curves*, Matematiche (Catania) **63** (2008), no. 1, 205–222. [arXiv:0802.3683]
21. S. Casalaina-Martin, *Singularities of theta divisors in algebraic geometry*, Curves and abelian varieties, 25–43, Contemp. Math. **465**, Amer. Math. Soc., Providence, RI, 2008. [arXiv:1207.1042]
22. S. Casalaina-Martin, *Cubic threefolds and abelian varieties of dimension five. II*, Math. Z. **260** (2008), no. 1, 115–125. [arXiv:math/0605666]
23. S. Casalaina-Martin and R. Friedman, *Cubic threefolds and abelian varieties of dimension five*, J. Algebraic Geom. **14** (2005), no. 2, 295–326. [arXiv:math/0307015]

PRESENTATIONS

- Jeju, Korea, *Conference On Moduli and Birational Geometry V*, December 2016.
- International Centre for Theoretical Physics, Trieste, Italy, *Advanced School and Workshop on Moduli Spaces, Mirror Symmetry and Enumerative Geometry*, August 2016.
- Leibniz Universität Hannover, Germany, *Algebraic Geometry Seminar*, June 2016.
- Cambridge University, *Algebraic Geometry Seminar*, June 2016.
- University of Utah, *AMS Summer Institute in Algebraic Geometry*, July 2015.
- Stony Brook University, *New Techniques in Birational Geometry*, April 2015.
- Institute for Advanced Study (IAS), Princeton, *Topology of Algebraic Varieties*, January 2015.
- University of Utah, *Algebraic Geometry Seminar*, December 2014.
- National University of Singapore, Institute of Mathematical Sciences, *Workshop on the Geometry, Topology and Physics of Moduli Spaces of Higgs Bundles*, July 2014.

- Humboldt Universität zu Berlin, Germany, *Forschungsseminar Algebraische Geometrie*, June 2014.
- Università Roma Tre, Italy, *Seminari di Geometria*, June 2014.
- Univeristy of Northern Texas, *Colloquium*, March 2014.
- Stony Brook University, *Algebraic Geometry Seminar*, October 2013.
- Boston College, *Number Theory and Algebraic Geometry Seminar*, October 2013.
- POSTECH, Korea, *Conference on Moduli and Birational Geometry*, August 2013.
- San Diego, CA, *Singularities in Geometry and Algebra*, Special Session of the AMS joint meeting, January 2013.
- Mathematisches Forschungsinstitut Oberwolfach, Germany, *Komplexe Analysis*, September 2012,
- Busan, Korea, *Workshop on Moduli and Birational Geometry*, July 2012.
- University of Georgia, *Georgia Algebraic Geometry Symposium*, May 2012.
- University of Washington, *Algebraic Geometry Seminar*, March, 2012.
- National University of Singapore, *Topology and Geometry Seminar*, November 2011.
- Salt Lake City, Utah, *Algebraic Geometry*, Special Session of the AMS meeting, October 2011.
- Maresias, Brazil, *11th Meeting on Algebraic Geometry and Commutative Algebra*, October 2011.
- Colorado State University, *Rocky Mountain Algebraic Combinatorics Seminar*, September 2011.
- CUNY Graduate Center, *Commutative Algebra and Algebraic Geometry Seminar*, November 2010.
- University of Washington, *Colloquium*, October 2010.
- University of British Columbia–University of Washington, *Algebraic Geometry Seminar*, October 2010.
- KIAS, Korea, *Algebraic Geometry Seminar*, August 2010.
- POSTECH, Korea, *Workshop on Moduli and Birational Geometry*, August 2010.
- IMPA, Brazil, *10th Meeting on Algebraic Geometry and Commutative Algebra*, July 2010.
- Stony Brook University, *Seminar on Algebra, Geometry, and Physics*, May 2010.
- University of Colorado, *Great Plains Operator Theory Special Year One Day Conference*, November 2009.
- University of California at San Diego, *Algebraic Geometry Seminar*, October 2009.

- Columbia University, *Algebraic Geometry Seminar*, September 2009.
- California Polytechnic State University, *Colloquium*, May 2009.
- University of British Columbia, *Algebgraic Geometry Seminar*, April 2009.
- University of Utah, *Western Algebraic Geometry Seminar*, November 2008.
- Colorado State University, *Algebra Seminar*, October 2008.
- University of Illinois at Chicago, *Algebraic Geometry Seminar*, October 2008.
- University of North Carolina, *Colloquium*, February 2008.
- Texas A&M University, *Colloquium*, February 2008.
- Stanford University, *Algebraic Geometry Seminar*, February 2008.
- University of California at Santa Cruz, *Colloquium*, January 2008.
- Rutgers University, *Colloquium*, January 2008.
- University of Toronto, *Colloquium*, January 2008.
- Harvard University, *Algebraic Geometry Seminar*, December 2007.
- CUNY, Lehman College, *Colloquium*, December 2007.
- University of California at Irvine, *Colloquium*, November 2007.
- University of Georgia, *Curves, abelian varieties, and their interactions; on the occasion of the 65th birthday of Roy Smith*, April 2007.
- University of Michigan, *Algebraic Geometry Seminar*, March 2007.
- Brown University, *Algebraic Geometry Seminar*, March 2007.
- Boston University, *Geometry Seminar*, April 2006.
- University of Chicago, *Algebraic Geometry Seminar*, December 2005.
- Harvard University, *Algebraic Geometry Seminar*, March 2005.
- Stony Brook University, *Algebraic Geometry Seminar*, September 2004.
- Salamanca, Spain, *III Iberoamerican conference on geometry*, June 2004.
- Columbia University, *Algebraic Geometry Seminar*, April 2004.

Teaching

1. *Abstract algebra 1*, Fall 2016 (University of Colorado). An undergraduate course on Groups, Rings and Fields.
2. *Complex analysis*, Spring 2016 (University of Colorado). An undergraduate course on complex analysis.
3. *Introduction to discrete mathematics*, Spring 2016 (University of Colorado). An undergraduate course on the language of mathematics and proofs.
4. *Functions of a complex variable 1*, Fall 2015 (University of Colorado). A graduate course on complex analysis.

5. *Complex analysis*, Spring 2015 (University of Colorado). An undergraduate course on complex analysis.
6. *Euclidean and non-Euclidean geometry*, Spring 2015 (University of Colorado). An undergraduate introduction to Euclidean and non-Euclidean geometry.
7. *Commutative algebra*, Fall 2014 (University of Colorado). A graduate introduction to commutative algebra.
8. *Homological algebra*, Spring 2014 (University of Colorado). Graduate course in homological algebra.
9. *Euclidean and non-Euclidean geometry*, Spring 2014 (University of Colorado). An undergraduate introduction to Euclidean and non-Euclidean geometry.
10. *Analysis 1*, Fall 2013 (University of Colorado). An undergraduate introduction to real analysis.
11. *Introduction to linear algebra*, Spring 2013 (University of Colorado). An undergraduate introduction to linear algebra.
12. *Commutative algebra*, Fall 2012 (University of Colorado). A graduate introduction to commutative algebra.
13. *Analytic geometry and calculus 2*, Spring 2012 (University of Colorado). A second semester undergraduate calculus course. Lectured and served as course coordinator for 8 sections with over 200 students in total, 7 graduate student instructors, 1 instructor, 3 graduate student teaching assistants, and 2 undergraduate learning assistants.
14. *Abstract algebra 2*, Spring 2012 (University of Colorado), A second semester undergraduate course in algebra.
15. *Functions of a complex variable 2*, Spring 2011 (University of Colorado). A second semester graduate course in complex analysis.
16. *Abstract algebra 1*, Spring 2011 (University of Colorado). An undergraduate course on Groups, Rings and Fields.
17. *Algebraic geometry*, Spring 2010 (University of Colorado). A graduate introduction to algebraic geometry.
18. *Abstract algebra 1*, Fall 2009, (University of Colorado). An undergraduate course on Groups, Rings and Fields.
19. *Complex analysis*, Fall 2008 (University of Colorado). An undergraduate course on complex analysis.
20. *Abstract algebra 2*, Spring 2010 (University of Colorado), A second semester undergraduate course in algebra.
21. *Introduction to algebraic geometry II: algebraic surfaces*, Spring 2008 (Harvard). A graduate course focusing on the classification of complex algebraic surfaces.
22. *Theory of schemes II*, Spring 2008 (Harvard). The second semester of a one year graduate course focusing on the theory of schemes, sheaves, and sheaf cohomology.

23. *Introduction to curves and abelian varieties*, Fall 2006 (Harvard). A graduate course on algebraic curves and abelian varieties, focusing on the relation between a curve and its Jacobian.
24. *Calculus 1*, Spring 2005 (Stony Brook University). A first semester course in calculus. Served as course coordinator.
25. *Calculus 1*, Fall 2004 (Stony Brook University). A first semester course in calculus.
26. *Linear algebra*, Summer 2004 (Columbia). An undergraduate course in linear algebra.
27. *Calculus IA*, Spring 2003 (Columbia). First semester courses in calculus.
28. *College algebra and analytic geometry*, Fall 2002 (Columbia). A one-semester course of pre-calculus.
29. *College algebra and analytic geometry*, Summer 2002 (Columbia). A one-semester course of pre-calculus.
30. *Basic mathematics*, Spring 2002 (Columbia). A course in elementary mathematics as a preparation for pre-calculus.
31. *Calculus I*, Summer 2001 (Columbia). First semester courses in calculus.

Advising Graduate students towards Ph.D.

- Matthew Grimes (Ph.D. 2016). *Relative moduli of vector bundles and the log-minimal model program on the moduli space of curves* [arXiv: 1409.5734 [math.AG]]. Currently a Visiting Assistant Professor (postoc) at Boston College.
- Krisztian Havasi (Ph.D. 2016). *Geometric realization of strata in the boundary of the intermediate Jacobian locus.* Currently a 3D Modeling Software Engineer in Colorado.
- Josh Frinak (2014-present).

SERVICE

- Co-organizer of the workshop Perspectives on Complex Algebraic Geometry, in honor of Bob Friedman's 60th birthday, May 2015 at Columbia University.
- Co-organizer of the Spring 2014 Western Algebraic Geometry Symposium (WAGS) at the University of Colorado.
- Co-organizer of the Front Range Algebra, Geometry and Number Theory Seminar (FRAGMENT), joint with CSU, Fall 2009-present.
- Co-organizer of the Western Algebraic Geometry Symposium (WAGS) held at CSU in Fall 2011.
- Long-term organizing for the Western Algebraic Geometry Symposium (WAGS), Fall 2009-present.
- Co-organizer of the special session on Algebraic Geometry at the AMS sectional meeting held at the University of Colorado, Spring 2013.

- Organizer of the University of Colorado Department of Mathematics Kempner Colloquium, Fall 2011–Spring 2015.
- Co-organizer of a working seminar on Stacks, Groupoids, and Deformation Theory at the University of Colorado, 2009-2012.
- Committee work (University of Colorado): executive committee, preliminary and comprehensive exam committees, graduate committee, algebra committee, hiring committees. Thesis reader for students at the University of Colorado, Harvard and Tufts.
- Advising of graduate students (towards Ph.D.): Matthew Grimes (Ph.D. 2016), Krisztian Havasi (Ph.D. 2016). Josh Frinak (2014-present).
- NSF and NSA grant proposal evaluation.
- Refereed articles for journals including Compositio Mathematica, Journal of Algebraic Geometry, Bulletin of the London Mathematics Society, Algebra and Number Theory, Monatshefte fuer Mathematik, IMRN, Contemporary Mathematics, and Communications is Algebra.