Jack Huizenga

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US Citizen

Employment

- The Pennsylvania State University — Fall 2015-Present
  Assistant Professor
- University of Illinois at Chicago — 2012-2015
  Research Assistant Professor and NSF Postdoctoral Fellow

Education

- Harvard University — 2012
  Ph.D. in Mathematics, supervised by Joe Harris
- Harvard University — 2008
  S.M. in Mathematics
- The University of Chicago — 2007
  B.A. with Honors in Mathematics

Research Interests

I am primarily interested in classical algebraic geometry. My research focuses on the geometry of curves and surfaces, with a particular emphasis on moduli spaces of vector bundles and interpolation-type problems.

Funding, Awards, and Honors

- NSF Focused Research Group Grant — 2017-2021
  Joint with UIC, Northeastern, and the University of Utah
  (DMS #1664303, $181,465 for PSU's portion)
- NSA Young Investigator Grant (#H98230-16-1-0306, $40,000) — 2017-2019
- NSF Mathematical Sciences Postdoctoral Research Fellowship — 2012-2016
  (DMS #1204066, $150,000)
- Derek C. Bok Award for Excellence in Graduate Student Teaching — 2011
- NSF Graduate Research Fellowship — 2007
- Paul R. Cohen memorial prize for mathematics — 2007
- Barry M. Goldwater scholarship for science and mathematics — 2005
- Phi Beta Kappa, Beta of Illinois chapter — 2006

- Student Marshal at the University of Chicago 2006

Professional Memberships

- American Mathematical Society

Submitted Publications

I. Coskun, J. Huizenga, and J. Kopper, The cohomology of general tensor products of vector bundles on $\mathbb{P}^2$, submitted (2020). (33 pages)

I. Coskun and J. Huizenga, Existence of semistable sheaves on Hirzebruch surfaces, submitted (2019). (71 pages)

Accepted Publications

I. Coskun and J. Huizenga, Brill-Noether problems, Ulrich bundles and the cohomology of moduli spaces of sheaves, accepted to the Proceedings of the ICM 2018 Satellite Meeting "Moduli spaces in algebraic geometry and applications" (2020). (25 pages)

Publications

L. Farnik, K. Hanumanthu, J. Huizenga, D. Schmitz, and T. Szemberg, Rationality of Seshadri constants on general blow ups of $\mathbb{P}^2$, J. Pure Appl. Algebra **224** (2020), no. 8, 106345, 13 pp.

I. Coskun and J. Huizenga, The moduli spaces of sheaves on surfaces, pathologies and Brill-Noether problems, in *Geometry of moduli*, 75–105, Abel Symp., 14, Springer, Cham. (2018).

I. Coskun and J. Huizenga, Brill-Noether theorems and globally generated vector bundles on Hirzebruch surfaces, Nagoya Math. J. **238** (2020), 1–36.

I. Coskun and J. Huizenga, Weak Brill-Noether for rational surfaces, in *Local and global methods in algebraic geometry*, 81–104, Contemp. Math., 712, Amer. Math. Soc., Providence, RI, 2018.

Th. Bauer, S. Di Rocco, B. Harbourne, J. Huizenga, A. Seceleanu, and T. Szemberg, Negative curves on symmetric blowups of the projective plane, resurgences, and Waldschmidt constants, Int. Math. Res. Not. IMRN **2019**, no. 24, 7459–7514.

J. Huizenga, Birational geometry of moduli spaces of sheaves and Bridgeland stability, in *Surveys on recent developments in algebraic geometry*, 101–148, Proc. Sympos. Pure Math., 95, Amer. Math. Soc., Providence, RI, 2017.

I. Coskun and J. Huizenga, The nef cone of the moduli space of sheaves and strong Bogomolov inequalities, Israel J. Math. **226** (2018), no. 1, 205–236.

B. Bolognese, J. Huizenga, Y. Lin, E. Riedl, B. Schmidt, M. Woolf and X. Zhao, Nef cones of Hilbert schemes of points on surfaces, Algebra Number Theory **10** (2016), no. 4, 907–930.

I. Coskun, L. Costa, J. Huizenga, R. M. Miró-Roig and M. Woolf, Ulrich Schur bundles on flag varieties, J. Algebra **474** (2017), 49–96.

I. Coskun and J. Huizenga, The ample cone of moduli spaces of sheaves on the plane, Algebr. Geom. **3** (2016), no. 1, 106–136.

I. Coskun, J. Huizenga and M. Woolf, The effective cone of the moduli space of sheaves on the plane, J. Eur. Math. Soc. (JEMS) **19** (2017), no. 5, 1421–1467.

I. Coskun and J. Huizenga, The birational geometry of the moduli spaces of sheaves on $\mathbb{P}^2$, in *Proceedings of the Gökova Geometry-Topology Conference 2014*, 114–155, Gökova Geometry/Topology Conference (GGT), Gökova.

Th. Bauer, S. Di Rocco, B. Harbourne, J. Huizenga, A. Lundman, P. Pokora and T. Szemberg, Bounded Negativity and Arrangements of Lines, Int. Math. Res. Not. **2015**, no. 19, 9456–9471.

I. Coskun and J. Huizenga, Interpolation, Bridgeland stability and monomial schemes in the plane, J. Math. Pures Appl., **102** (2014), 930-971.

J. Huizenga, Effective divisors on the Hilbert scheme of points in the plane and interpolation for stable bundles, J. Algebraic Geom. **25** (2016), no. 1, 19–75.

D. Arcara, A. Bertram, I. Coskun and J. Huizenga, The minimal model program for the Hilbert scheme of points on $\mathbb{P}^2$ and Bridgeland stability, Adv. Math. **235** (2013), 580–626.

J. Huizenga, Restrictions of Steiner bundles and divisors on the Hilbert scheme of points in the plane, Int. Math. Res. Not. **23** (2013), 4829-4873.

J. Huizenga, *Restrictions of Steiner bundles and divisors on the Hilbert scheme of points in the plane,* Ph.D. Thesis, Harvard University. (2012)

J. Huizenga, Interpolation on surfaces in $\mathbb{P}^3$, Trans. Amer. Math. Soc. **365** (2013), no. 2, 623–644.

J. Huizenga and K. Tapp, Invariant metrics with nonnegative curvature on SO(4) and other Lie groups, Michigan Math. J. **55** (2007), no. 3, 609–630.

J. Huizenga, The minimum size of complete caps in $(\mathbb{Z}/n\mathbb{Z})^2$, Electron. J. Combin. **13** (2006) R58. (19 pages)

J. Huizenga, Chromatic capacity and graph operations, Discrete Math. **308** (2008), no. 11, 2134–2148.

Expository Articles and Presentations, available on the web

J. Huizenga, Polynomial interpolation: an introduction to algebraic geometry. Lecture notes for an undergraduate course in algebraic geometry.

J. Huizenga, Steiner bundles and divisors on the Hilbert scheme of points in $\mathbb{P}^2$. Poster presented at Joe Harris' 60th birthday conference.

J. Huizenga, Interpolation on Surfaces in $\mathbb{P}^3$. Slides.

J. Huizenga, Rationally connected varieties. This was my minor thesis at Harvard.

J. Huizenga, The Noether-Lefschetz theorem.

Teaching Experience

- Teaching an original short course (22 hours) on linear algebra and applications for a group of 9 advanced high school students at State College High School — Fall 2020
- Teaching Math 435, Basic Abstract Algebra, at Penn State — Fall 2020
- Taught Math 435, Basic Abstract Algebra, at Penn State — Spring 2020
- Taught Math 436, Linear Algebra, at Penn State — Spring 2020
- Taught Math 535, Linear Algebra and its Applications, at Penn State — Fall 2019
- Taught Math 538, Commutative Algebra, at Penn State — Spring 2019
- Taught Math 465, Number Theory, at Penn State — Spring 2019

- Taught Math 497A, Honors MASS Algebra, at Penn State — Fall 2018
  Designed an original course with publicly available lecture notes
- Taught Math 436, Linear Algebra, at Penn State (2 sections) — Spring 2018
- Taught Math 547, Algebraic Geometry I, at Penn State — Fall 2017
- Taught a 1 week minicourse (7.5 hours) on the birational geometry of moduli spaces of sheaves for ELGA 3 at CIMAT, Guanajuato, México — Aug. 2017
- Taught Math 538, Commutative Algebra, at Penn State — Spring 2017
- Taught Math 437, Algebraic Geometry, at Penn State — Fall 2016
- Taught Math 465, Number Theory, at Penn State — Spring 2016
- Taught Math 436, Linear Algebra, at Penn State — Fall 2015
- Mentor for the Bridgeland stability group at the Algebraic Geometry Bootcamp preceding the AMS Summer Research Institute at the University of Utah — Jul. 2015
- Taught Math 552, Algebraic Geometry I, at UIC — Fall 2014
- Taught a minicourse (22 hours) on Moduli at VIASM, Vietnam — Fall 2013
- Taught a minicourse (12 hours) on Vector Bundles at UIC — Fall 2013
- Taught Math 320, Linear Algebra I, at UIC — Fall 2012
- Taught Math 21a, Multivariable Calculus, at Harvard — Fall 2010
- Taught Math 21a, Multivariable Calculus, at Harvard — Fall 2009
- Recitation leader for Math 232a & 232b, Algebraic Geometry I & II, at Harvard — 2009-2010
  Received a Certificate of Distinction in Teaching for both semesters
- Attended teacher training seminar at Harvard — Fall 2007
- Course assistant for Math 204-5, Analysis II & III, at the University of Chicago — 2007
- Course assistant for Math 161-3, Honors Calculus I, II & III, at U of Chicago — 2004-2005

Advising

- Postdoctoral mentor to John Kopper — 2019-Present
- Advising Ph.D. student Dmitrii Pedchenko in Algebraic Geometry — 2018-Present
- Advised Ph.D. student Daniel Levine (Ph.D. 2020) — 2015-2020
- Advised undergraduate student Jacob Keller — Spring 2018-Spring 2019
  in Algebraic Geometry (Schreyer Honors Thesis Supervisor)
- Supervising a reading course on Algebraic Geometry for Sebastian Calvo — Fall 2020
- Supervising a reading course on Algebraic Geometry for Kedar Karhadkar — Spring 2020

- Serving on Ana Chavez Caliz's Ph.D. thesis committee at Penn State 2019-Present
- Serving on Hao-Wei Chu's Ph.D. thesis committee at Penn State 2018-Present
- Supervised a reading course on Algebraic Geometry for Zheng Zhu and Zhitai Li Fall 2018
- Supervised a reading course on Algebra for Alexa Derago and Alison Harris Summer 2018
- Supervised a reading group of 8 graduate students learning scheme theory Spring 2018
- Supervised a reading course on Hodge Theory for Dmitrii Pedchenko Fall 2017
- Supervised a reading group of 6 graduate students learning scheme theory Spring 2017
- Supervised an independent study in Field Theory and Galois Theory for undergraduate student Cheng Zuo Spring 2017
- Served on Seckin Adali's Ph.D. thesis committee at UIC 2016
- Served on Tim Ryan's Ph.D. thesis committee at UIC 2015-2016
- Served on César Lozano Huerta's Ph.D. thesis committee at UIC 2014

Conferences organized

- Co-organizing the special session Moduli Spaces in Geometry and Applications at the Mathematical Congress of the Americas, Buenos Aires Argentina Jul. 2021
- Co-organizing the special session Geometry and Arithmetic of Algebraic Varieties at the PSU AMS sectional meeting. Oct. 2020
- Co-organized the UIC FRG Workshop on Stability, Moduli spaces and applications. Dec. 2019
- Co-organized the MFO mini-workshop on Seshadri constants in Oberwolfach, Germany. Oct. 2019
- Co-organized the UIC FRG Workshop on Moduli Spaces of Sheaves and Bridgeland Stability. Dec. 2018
- Co-organized the Penn State FRG Workshop on Moduli of Sheaves and Strange Duality. Dec. 2017

Service

- Co-organizer of the PSU Algebra and Number Theory Seminar 2016-Present
- Ph.D. Qualifying Exam Committee for Linear Algebra Spring 2019-Present
- Elected to serve on the Policy Committee of the PSU Math Department 2017-2020
- Elected to serve on the Department Head Search Committee for PSU Math 2018
- Penn State representative on the MSRI Committee of Academic Sponsors 2017-2018

- Member of the Graduate Teaching Assistant Oversight committee at PSU 2016-2018
- Member of the Student Awards committee at PSU 2016-2019
- Gave two introductory lectures for PSU Math Grad Student Prospective Days 2018 & 2020
- Panelist for a discussion on hiring in mathematics for graduate students and postdocs at Penn State Nov. 2018
- Taught a 3 lecture minicourse on the birational geometry of moduli spaces of sheaves at the University of Michigan Apr. 2018
- Taught a 1 week minicourse (7.5 hours) on the birational geometry of moduli spaces of sheaves for ELGA 3 at CIMAT, Guanajuato, México Aug. 2017
- Panelist for a discussion on hiring in mathematics for graduate students and postdocs at Penn State 2016
- Panelist for a discussion on hiring in algebraic geometry at the summer graduate student bootcamp in algebraic geometry at Utah 2015
- Mentored a 1-week bootcamp on Bridgeland stability leading up to the 10-year algebraic geometry conference in Utah 2015
- Co-organizer of the UIC Algebraic Geometry Seminar 2014
- Taught a 4-week minicourse for graduate students at VIASM in Vietnam leading up to the workshop on Birational Geometry and Moduli 2014
- Referee for journals including the Journal of Differential Geometry, Math Research Letters, Algebra & Number Theory, Journal of Algebraic Geometry, International Math Research Notices, Proceedings of the AMS, Geometry & Topology, Michigan Mathematical Journal, Advances in Geometry, Proceedings of the AMS, Communications in Analysis and Geometry, Central European Journal of Math, European Journal of Math, Discrete Math, and Algebraic Geometry,

Talks and Upcoming Talks

- University of Illinois at Chicago Algebraic Geometry Seminar Sep. 2020
- Stanford Algebraic Geometry Seminar Feb. 2020
- Workshop on Seshadri Constants, Oberwolfach Oct. 2019
- Workshop on asymptotic invariants of homogeneous ideals, Oberwolfach Oct. 2018
- Harvard/MIT algebraic geometry seminar Sep. 2018
- Penn State Algebra and Number Theory seminar Sep. 2018
- ICM Satellite conference on Moduli Spaces and Applications, Campinas, Brazil Jul. 2018
- Taught a 3 lecture minicourse on the birational geometry of moduli spaces of sheaves at the University of Michigan Apr. 2018

- Taught a 1 week minicourse (7.5 hours) on the birational geometry of moduli spaces of sheaves for ELGA 3 at CIMAT, Guanajuato, México — Aug. 2017
- Conference on Moduli of Vector Bundles, UC San Diego — May 2017
- Conference on Moduli and Birational Geometry, Jeju Island, South Korea — Dec. 2016
- Conference on Combinatorial Moduli Spaces at the Fields Institute, Toronto — Dec. 2016
- Route 81 Commutative Algebra Conference at Syracuse University — Sep. 2016
- Penn State Algebra and Number Theory seminar — Sep. 2016
- Workshop on Arrangements of Subvarieties, Oberwolfach — Mar. 2016
- Penn State GAP seminar — Oct. 2015
- Penn State Algebra and Number Theory seminar — Oct. 2015
- Algebraic Geometry Bootcamp at the University of Utah — Jul. 2015
- AMS special session on Geometry of Algebraic Varieties at Michigan State — Mar. 2015
- Workshop on Geometry from Stability Conditions, University of Warwick, UK — Feb. 2015
- Colloquium at Colorado State — Jan. 2015
- Colloquium at Michigan State — Jan. 2015
- Colloquium at Penn State — Jan. 2015
- Colloquium at Queen's University — Jan. 2015
- Colloquium at the University of California, Irvine — Jan. 2015
- Colloquium at the University of Toronto — Jan. 2015
- Colloquium at Rice University — Dec. 2014
- Colloquium at Boston College — Nov. 2014
- Colloquium at the University of Waterloo — Nov. 2014
- Workshop on Moduli Spaces, Derived Geometry, and Rep. Theory at UNC — Nov. 2014
- University of Illinois at Urbana-Champaign Algebraic Geometry Seminar — Oct. 2014
- Harvard-MIT Algebraic Geometry Seminar — Oct. 2014
- University of Illinois at Chicago Algebraic Geometry Seminar — Sep. 2014
- RIMS Kyoto conference on Bridgeland Stability and Birational Geometry — Jun. 2014
- UC San Diego Algebraic Geometry Seminar — Apr. 2014
- SUNY Stony Brook Algebraic Geometry Seminar — Mar. 2014
- Workshop on Negative Curves on Surfaces, Oberwolfach — Feb. 2014

- Workshop on Positivity of Linear Series and Vector Bundles, Banff — Feb. 2014
- Colloquium at the University of Georgia — Jan. 2014
- Minicourse on Moduli at VIASM, Vietnam — Dec. 2013
- Workshop on Arith. and Geometry of Rational Curves, Rice University — Sep. 2013
- Conference on Moduli and Birational Geometry, Pohang, South Korea — Aug. 2013
- Géométrie Algébrique en Liberté conference, KTH Stockholm — Jun. 2013
- University of Illinois at Chicago Algebraic Geometry Seminar — May 2013
- University of Wisconsin-Madison Algebraic Geometry Seminar — Apr. 2013
- Purdue University Algebraic Geometry Seminar — Mar. 2013
- Ohio State University Algebraic Geometry Seminar — Feb. 2013
- RIMS Kyoto conference on Stability Conditions and Related Topics (3 hour lecture series) — Dec. 2012
- University of Illinois at Chicago Algebraic Geometry Seminar — Nov. 2012
- Texas A&M Workshop on Applications of Algebraic Geometry to Science — Apr. 2012
- University of Michigan Algebraic Geometry Seminar — Apr. 2012
- Harvard-MIT Algebraic Geometry Seminar — Sep. 2011
- Rice University Algebraic Geometry Seminar — Apr. 2011
- University of Illinois at Chicago Algebraic Geometry Seminar — Mar. 2011
- Harvard-MIT Baby Algebraic Geometry Seminar — Feb. 2011
- Invited special session speaker at the Joint Meetings of the MAA/AMS — Jan. 2011
- Problems in Algebraic Geometry seminar, Harvard — Oct. 2009
- Harvard-MIT Baby Algebraic Geometry Seminar — Sep. 2009
- Harvard Trivial Notions Seminar — Sep. 2009
- Harvard Trivial Notions Seminar — Nov. 2008