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POSITIONS

University of Washington, Seattle, Washington.

- Professor, 2021–current.
- Associate Professor, 2017–2021.

Australian National University, Canberra, Australia.

- Senior Lecturer, 2015–2016.
- Lecturer, 2012–2014.

Universidad de Los Andes, Bogotá, Colombia.

- Tenure-track assistant professor, 2011–2012.

Columbia University, New York, New York.

- NSF Postdoctoral Fellow, 2008–2011.

EDUCATION

Stanford University, Stanford, California.

- Ph.D. in Mathematics, June 2008.
- Thesis advisor: Ravi Vakil.
- Thesis title: *Good moduli spaces for Artin stacks*.

Brown University, Providence, RI.

- Sc.B. with honors in Mathematics, Sc.B. in Computer Science, Magna Cum Laude, May 2002.

GRANTS AND AWARDS

- NSF standard grant DMS-210088, funding \$296,000 (USD), 2021–2024.
- NSF standard grant DMS-1801976, funding \$150,000 (USD), 2018–2021.
- Australian Research Council Discovery Early Career Researcher Award (DE 140101519), funding amount of \$393,979 (AUD), 2014–2016.
- Alexander von Humboldt Fellowship, 2013–2014.
- National Science Foundations Postdoctoral Fellowship, 2008–2011.
- Fulbright Fellowship, Ruprecht-Karls-Universität Heidelberg, 2002–2003.

VISITING POSITIONS

- *Mercatur Fellow at Universität Duisburg-Essen*, Essen (Germany), June 2022 – July 2022.
- *Institut Mittag-Leffler*, Stockholm (Sweden), September 2021.
- *Mathematical Sciences Research Institute (MSRI)*, Berkeley, California (USA), January 2019 – February 2019.

- *Instituto Nacional de Matemática Pura e Aplicada* (IMPA), Rio de Janeiro (Brazil), April 2015.
- *Humboldt Universität*, Berlin (Germany), July 2013 – December 2013 and July 1 2014 – December 2014.
- Vietnam Institute for Advanced Study in Mathematics (VIASM), Hanoi (Vietnam), January 2014 – February 2014.
- *Centro de Investigación en Matemáticas* (CIMAT), Guanajuato (Mexico), January 2013 – February 2013.
- *Institut des Hautes Études Scientifiques* (IHES), Bures-sur-Yvette (France), June 2012 – July 2012.
- *Harvard University*, Cambridge (USA), April 2010.
- *Mathematical Sciences Research Institute* (MSRI), Berkeley, California (USA), January 2009 – June 2009.

PREPRINTS

- (1) *Artin algebraization for pairs with applications to the local structure of stacks and Ferrand pushouts* (with D. Halpern-Leistner, J. Hall and D. Rydh)
<https://arxiv.org/abs/2205.08623>, 26 pages.
- (2) *The étale local structure of algebraic stacks* (with J. Hall and D. Rydh)
<https://arxiv.org/abs/1912.06162>, 54 pages.
- (3) *Existence of moduli spaces for algebraic stacks* (with D. Halpern-Leistner and J. Heinloth)
<https://arxiv.org/abs/1812.01128>, 68 pages.

PUBLICATIONS

- (3) Projectivity of the moduli space of vector bundles on a curve (with P. Belmans, D. Bragg, J. Liang, T. Tajakka), to appear in *STACKS PROJECT EXPOSITORY COLLECTION* published by Cambridge University Press, 2022.
- (4) Reductivity of the automorphism group of K -polystable Fano varieties (with H. Blum, D. Halpern-Leistner and C. Xu)
INVENTIONES MATHEMATICAE, **222** (2020), no. 3, 995-1032.
- (5) *A Luna étale slice theorem for algebraic stacks* (with J. Hall and D. Rydh)
ANNALS OF MATHEMATICS, (2) **191** (2020), no. 3, 675–738.
- (6) *Cartan–Iwahori–Matsumoto decompositions for reductive groups* (with D. Halpern-Leistner and J. Heinloth)
PURE AND APPLIED MATHEMATICS QUARTERLY, special issue in dedication to David Mumford’s 80th birthday, **17** (2021), no. 2, 593-604.
- (7) *Szygies of the apolar ideals of the determinant and permanent* (with R. Rowlands)
JOURNAL OF ALGEBRAIC COMBINATORICS, **51** (2020), no. 3, 419–454.
- (8) *Associated forms and hypersurface singularities: The binary case* (with A. Isaev)
JOURNAL FÜR DIE REINE UND ANGEWANDTE MATHEMATIK, **745** (2018), 83–104.

- (9) *Second flip in the Hassett–Keel program: Projectivity* (with M. Fedorchuk and D. Smyth)
INTERNATIONAL MATHEMATICS RESEARCH NOTICES, (2017), no. 24, 7375–7419.
- (10) *Second flip in the Hassett–Keel program: A local description* (with M. Fedorchuk, D. Smyth, and F. van der Wyck)
COMPOSITIO MATHEMATICA, **153** (2017), no. 8, 1547–1583.
- (11) *Second flip in the Hassett–Keel program: Existence of good moduli spaces* (with M. Fedorchuk and D. Smyth)
COMPOSITIO MATHEMATICA, **153** (2017), no. 8, 1584–1609.
- (12) *A lower bound for the determinantal complexity of a hypersurface* (with T. Bogart and M. Velasco)
FOUNDATIONS OF COMPUTATIONAL MATHEMATICS, **17** (2017), no. 3, 829–836..
- (13) *Associated forms of binary quartics and ternary cubics* (with A. Isaev and N.G. Kruzhilin)
TRANSFORMATION GROUPS, **21** (2016), no. 2, 593–618.
- (14) *Equivariant versal deformations of semistable curves* (with A. Kresch)
MICHIGAN MATHEMATICAL JOURNAL, **65** (2016), no. 2, 227–250.
- (15) *Singularities with \mathbb{G}_m -action and the log minimal model program for \overline{M}_g* (with M. Fedorchuk and D. Smyth)
JOURNAL FÜR DIE REINE UND ANGEWANDTE MATHEMATIK, **721** (2016), 1–41.
- (16) *Adequate moduli spaces and geometrically reductive group schemes*
ALGEBRAIC GEOMETRY, **1** (2014), no. 4, 489–531.
- (17) *Associated forms in classical invariant theory and their applications to hypersurface singularities* (with A. Isaev)
MATHEMATISCHE ANNALEN, **360** (2014), no. 3-4, 799–823.
- (18) *Good moduli spaces for Artin stacks*
ANNALES DE L’INSTITUT FOURIER, **63** (2013), no. 6, 2349–2402.
- (19) *Finite Hilbert stability of (bi)canonical curves* (with M. Fedorchuk and D. Smyth)
INVENTIONES MATHEMATICAE, **191** (2013), no. 3, 671–718.
- (20) *Invariant rings through categories* (with J. de Jong)
JOURNAL OF ALGEBRA, **375** (2013), 235–257.
- (21) *Common left- and right-hand divisors of a quaternion integer* (with M. Abouzaid, S. DiMauro, J. Grosslight, and D. Smith)
JOURNAL OF PURE AND APPLIED ALGEBRA, **217** (2013), no. 5, 779–785.
- (22) *Recasting results in equivariant geometry: affine cosets, observable subgroups and existence of good quotients* (with R. Easton)
TRANSFORMATION GROUPS, **17** (2012), no. 1, 1–20.
- (23) *Local properties of Artin stacks*
TOHOKU MATHEMATICAL JOURNAL, **64** (2012), 105–123.

- (24) *Computing invariants via slicing groupoids: Gel'fand MacPherson, Gale and positive characteristic stable maps*
 MATHEMATISCHE NACHRICHTEN, **285** (2012), no. 5–6, 562–579.
- (25) *On the local quotient structure of Artin stacks*
 JOURNAL OF PURE AND APPLIED ALGEBRA, **214** (2010), no. 9, 1576–1591.
- (26) *On cosets of the unit loop of octonion integers* (with M. Abouzaid, S. DiMauro, J. Grosslight, and D. Smith)
 COMMUNICATIONS IN ALGEBRA, **35** (2007), no. 1, 207–214.
- (27) J. Alper, *On the choice of random directions for stochastic approximation algorithms* (with J. Theiler)
 IEEE TRANSACTIONS ON AUTOMATED CONTROL, **51** (2006), no. 3, 476–481.

CONFERENCE PROCEEDINGS

- (27) *The moduli stack of semistable curves*
 OBERWOLFACH REPORTS, Report No. **6** (2013), 373–376.
- (28) *Birational models of \overline{M}_g*
 OBERWOLFACH REPORTS, Report No. **30** (2012), 22–25.
- (29) *GIT Constructions of Log Canonical Models of \overline{M}_g* (with D. Hyeon)
 COMPACT MODULI AND VECTOR BUNDLES, 87–106, CONTEMPORARY MATHEMATICS, **564**, American Math Society, Providence, RI, 2012 (Proceedings of the 2010 conference at the University of Georgia, Athens).
- (30) *Good moduli spaces for Artin stacks*
 OBERWOLFACH REPORTS, Report No. **26** (2008), 14–16.

EXPOSITORY

- (31) *Introduction to Stacks and Moduli*, in progress, working draft available at <https://math.washington.edu/~jarod/moduli.pdf>
- (32) *A Guide to Organizing a Virtual Conference* (with D. Litt, I. Vogt), NOTICES OF THE AMERICAN MATHEMATICAL SOCIETY, September 2020, 1135–1138.
- (33) *Artin algebraization and a Luna étale slice theorem for algebraic stacks*
 Notes for *Summer School: Algebraic Stacks and Related Topics* at Universität Mainz in September 2015.
- (34) *A guide to the literature on algebraic stacks*
 Notes for the graduate student seminar on algebraic stacks at Columbia University in Fall 2010—they have been incorporated into *The Stacks Project*.

INVITED LECTURE SERIES AND WORKSHOPS

- *Geometry and arithmetics of moduli spaces* (4 hrs), Scuola Normale Superiore di Pisa, Pisa (Italy), July 18–22, 2022.
- *Mercatur Lecture Series* (6 hrs), Universität Duisburg-Essen, Essen (Germany), June 2022–July 2022.
- *Invariants in Algebraic Geometry* (4 hrs), Institut de Mathématiques de Bourgogne, Dijon (France), May 2022

- Mentor for the *Stacks Project Workshop 2020*, virtual, August 2020.
- *FRG Workshop on Moduli Spaces of sheaves and Bridgeland Stability* (2.5 hrs), UIC, Chicago (USA), December 2018.
- *International summer school on arithmetic geometry* (4 hrs), Salerno (Italy), September 2018.
- *Summer School: Algebraic Stacks and Related Topics* (4 hrs), Universität Mainz, Mainz (Germany), September 2015.
- Lecture series on *Algebraic Complexity Theory* (4 hrs), Universidad de Los Andes, Bogota (Colombia), January 2015.
- *GAIA Seminar: Special Lecture Series on Algebraic Stacks* (6 hours), Pohang University of Science and Technology (POSTECH), Pohang (South Korea), March 2012.

INVITED CONFERENCE TALKS AND COLLOQUIA

- *Basel-Dijon-EPFL Meeting*, École polytechnique fédérale de Lausanne, Lausanne (Switzerland), May 2022.
- *Moduli and Algebraic Cycles*, Institut Mittag-Leffler, Stockholm (Sweden), September 2021.
- *JHU-UMD Algebra and Number Theory Day*, virtual, April 2021.
- *Simons conferences: K-stability*, virtual, September 2020.
- *Zoom Algebraic Geometry Seminar*, virtual, September 2020.
- *Colloquium*, Department of Mathematics, Universidad de Los Andes, Bogota (Colombia), February 2020.
- *Algebraic transformation groups: the mathematical legacy of Domingo Luna*, University of La Sapienza, Rome (Italy), October 2019.
- *Algebraic Geometry Northeastern Series (AGNES)*, Boston College, Boston (USA), September 2019.
- *MSRI Joint Colloquium*, Berkeley (USA), February 2019.
- *Moduli Spaces: Birational Geometry and Wall Crossings*, Banff International Research Station (Canada), October 2018.
- *Joint International Meeting of CMS and AMS—Special Session on Algebraic Geometry*, Fudan University, Shanghai (China), July 2018.
- *AMS Section meeting—Special Session on Moduli Spaces*, Portland State University, Portland (USA), April 2018.
- *XXII Coloquio Latinoamericano de Algebra—Special Session on Representation Theory*, Quito (Ecuador), August 2017.
- *Western Algebraic Geometry Symposium (WAGS)*, University of British Columbia, Vancouver (Canada), April 2017.
- *Georgia Algebraic Geometry Symposium (GAGS)*, University of Georgia, Athens (USA), March 2017.
- *Cycles on Moduli Spaces, Geometric Invariant Theory, and Dynamics*, The Institute for Computational and Experimental Research in Mathematics (ICERM), Providence (USA), August 2016.
- Special session on *Homological Methods*, XXI Coloquio Latinoamericano de Algebra, Buenos Aires (Argentina), August, 2016.

- Special session on *Representation Theory and Algebraic Geometry*, 59th Annual Meeting of the Australian Mathematical Society, Adelaide (Australia), September, 2015.
- *Moduli Spaces and Enumerative Geometry*, Instituto Nacional de Matemática Pura e Aplicada (IMPA), Rio de Janeiro (Brazil), April 2015.
- *Workshop on birational geometry and stability of moduli stacks and spaces of curves*, Vietnam Institute for Advanced Study in Mathematics (VIASM), Hanoi (Vietnam), January 2014
- Northern Germany Algebraic Geometry Seminar (NoGAGS), Humboldt Universität zu Berlin, Berlin (Germany), November 2013.
- *Algebraic geometry and related fields*, Australian National University, Canberra (Australia), May 2013.
- *Moduli Spaces in Algebraic Geometry*, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach (Germany), February 2013.
- *AIM Workshop: Log minimal model program for moduli spaces*, The American Institute of Mathematics (AIM), Palo Alto (USA), December 2012.
- *IV Congreso Latinoamericano de Matemáticos*, Universidad Nacional de Córdoba, Córdoba (Argentina), August 2012.
- *Classical Algebraic Geometry*, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach (Germany), June 2012.
- *Algebraic Stacks: Progress and Prospects*, Banff International Research Station, Banff (Canada), March 2012.
- *Conference on Vector Bundles and Real Algebraic Curves*, Universidad de Los Andes, Bogotá (Colombia), September 2011.
- *Workshop on Moduli and Birational Geometry*, Pohang University of Science and Technology (POSTECH), Pohang (South Korea), August 2010.
- *Representation Theory, Geometry and Combinatorics: Equivariant algebraic geometry and related topics*, Berkeley (USA), May 2009.
- *A.M.S. Sectional Meeting*, Vancouver (Canada), October 2008.
- *Classical Algebraic Geometry*, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach (Germany), June 2008.
- *Conference on Geometric Invariant Theory*, Göttingen (Germany), June 2008.
- *Géométrie Algébrique en Liberté*, Madrid (Spain), April 2008.
- *Winter School and Conference on Moduli Spaces*, University and Max Planck Institute for Mathematics, Bonn (Germany), January 2008.
- *C.M.S. Winter Meeting*, London (Canada), December 2007.
- *American Institute of Mathematics*, Palo Alto (USA), May 2007.
- *A.M.S. Sectional Meeting*, Tucson (USA), April 2007.

TEACHING

- *Math 300—Introduction to Mathematical Reasoning* (2 sections), University of Washington, Spring 2022.
- *Math 567A—Algebraic Geometry*, University of Washington, Fall 2021.
- *Math 581J—Topics in Scheme Theory*, University of Washington, Fall 2021.
- *Math 404—Introduction to Modern Algebra*, University of Washington, Spring 2021.

- *Math 583C—Introduction to Stacks and Moduli*, University of Washington, Winter 2021.
 - Class was made public by allowing informal Zoom participation with lectures posted on youtube. There were 240 registered participants and real-time Zoom attendance varied between 60 and 130 students.
- *Math 583D—Recent Hits in Algebraic Geometry*, University of Washington, Winter 2021.
- *Algebraic groups I* (Math 581B), University of Washington, Fall 2019.
- *Calculus I* (Math 124A—2 sections), University of Washington, Fall 2019.
- *Algebraic Complexity Theory* (Math 480A), University of Washington, Spring 2019.
- *Calculus I* (Math 124A), University of Washington, Spring 2019.
- *Complex Analysis* (Math 427), University of Washington, Fall 2018.
- *Calculus I* (Math 124B), University of Washington, Fall 2019.
- *Bridgeland stability* (Math 583D), University of Washington, Spring 2018.
- *Moduli of Vector Bundles* (Math 582D), University of Washington, Winter 2018.
- *Introduction to Modern Algebra* (Math 403B), University of Washington, Winter 2018.
- *Modern Algebra* (Math 504), University of Washington, Fall 2017.
- *Abstract Linear Algebra* (Math 340), University of Washington, Spring 2017.
- *Advanced Commutative Algebra* (Math 508), University of Washington, Winter 2017.
- *Honours Algebra 2: Galois Theory*, Australian National University, Semester 1 2015.
- *Differential Calculus*, Australian National University, Semester 1 2013.
- *Honours Algebra 3: Lie groups and algebras*, Australian National University, Semester 2 2012.
- *Algebraic curves*, Universidad de los Andes, Spring 2012.
- *Cálculo diferencial*, Universidad de los Andes, Spring 2012.
- *Cálculo diferencial*, Universidad de los Andes, Fall 2011.
- *Calculus III* (Section 2), Columbia University, Fall 2010.
- *Algebraic Number Theory*, Columbia University, Fall 2010.
- *Calculus III* (Sections 3 and 4), Columbia University, Fall 2008.

SUPERVISION OF GRADUATE STUDENTS

- Jonathan Andres Nino Cortes (PhD), current.
- Martin Bishop (PhD UW), current.
- Varodom Theplertboon (PhD UW), current.
- Tejas Devanur (PhD UW), current.
- Tuomas Tajakka (PhD UW), 2021.
- David Benjamin Lim (PhD Stanford), 2020.
- Chi-Yu Cheng (PhD UW), 2020.

SUPERVISION OF UNDERGRADUATE RESEARCH

- Supervised the Spring 2022 WXML projects on Formalizing Mathematics in Lean
 - Supervised 4 undergraduates on formulazing commutative algebra results in Lean.

- Supervised the Spring 2020 WXML projects on COVID-19 mathematical models (with Jake Levinson)
 - Supervised 10 undergraduate students split into two groups of five.
 - One group focused on learning and implementing stochastic compartmentalized age-structured SIR-based models while the other focused on agent-based models following the March 16 Report by Imperial College London.
- Supervised the 2019 UW honors thesis “Sampling from conditional distributions using Groöbner basis theory” by Katrina Warner
 - Katrina is currently a PhD student in Biology at Harvard University.
- Supervised the 2016 ANU honors thesis “Syzygies of the perpendicular ideals of the determinant and permanent” of Rowan Rowlands.
 - Rowan’s thesis was later expanded to a joint paper published in the *Journal of Algebraic Combinatorics* in 2020.
 - Rowan is currently a PhD student in Mathematics at UW.
- Supervised the 2015 ANU honors thesis “Moduli Functors, GIT and Semistability of the Gradient Morphism for Ternary Forms” of David Benjamin Lim
 - Ben established new results on the semistability of the gradient of smooth homogeneous forms of degree $d \leq 9$ in $n \leq 3$ variables. Ben’s result was later shown to hold for all d and n in the main result of a *Mathematische Annalen* paper by Maksym Fedorchuk.
 - Ben received a PhD in Mathematics at Stanford University in 2020.

CONFERENCE ORGANIZATION

- Co-organizer of “Moduli problems beyond geometric invariant theory II” at the American Institute of Mathematics (AIM), Feb 27 - Mar 3, 2023 (with Daniel Halpern-Leistner, Yuchen Liu, and Filippo Viviani).
- Co-organizer of “Trends in the Classification of Algebraic Varieties and their Sheaves” in Casa Matemática Oaxaca (CMO) affiliated with the Banff International Research Station (BIRS), virtual, August 8–13, 2021 (with Anand Deopurkar and César Lozano Huerta) (CANCELLED).
- Co-organizer of “Moduli problems beyond geometric invariant theory” at the American Institute of Mathematics (AIM), virtual, Jan 25–29, 2021 (with Daniel Halpern-Leistner, Yuchen Liu, and Filippo Viviani).
- Co-organizer of the Fall 2020 Western Algebraic Geometry Symposium (WAGS), virtual, Nov 13–14, 2020 (with Edray Herber Goins and Dagan Karp).
- Co-organizer of Western Algebraic Geometry ONline (WAGON), a virtual edition of the biannual Western Algebraic Geometry Symposium (WAGS), April 18-19, 2020 (with Daniel Litt and Isabel Vogt).
- Co-organizer of the graduate student workshop and conference “Geometry at the ANU” in Canberra, Australia during August 15–26, 2016 (with Amnon Neeman, James Borger and David Smyth).
- Co-organizer of “Equivariant geometry and algebraic stacks” at the ANU Kioloa Campus in Kioloa, Australia during March 14–18, 2016 (with Jack Hall and Amnon Neeman).
- Member of the scientific committee for “Workshop on birational geometry and GIT of moduli stacks and spaces of curves” at the Vietnam Institute for Advanced

Study in Mathematics (VIASM) in Hanoi, Vietnam during January–February, 2014.

- Co-organizer of “Algebraic geometry and related fields” at the Australian National University in Canberra, Australia (with James Borger, Amnon Neeman and David Smyth) during May 29–31, 2013.
- Co-organizer of “Log minimal model program for moduli spaces” at the American Institute of Mathematics (AIM) in Palo Alto, California during December 10–14, 2012 (with Maksym Fedorchuk, Brendan Hassett, and David Smyth).
- Co-organizer of “Moduli spaces and stacks” at Columbia University in New York City during May 23–27, 2011 (with Johan de Jong, Brendan Hassett, Jason Starr, and Michael Thaddeus).