

# YUCHEN LIU

- CONTACT INFORMATION** Department of Mathematics      yuchenl[at]northwestern.edu  
Northwestern University      faculty.wcas.northwestern.edu/yuchenl/  
2033 Sheridan Rd  
Evanston, IL, USA 60208
- RESEARCH INTERESTS** I am interested in algebraic geometry and its connections to complex geometry and commutative algebra, specifically Fano varieties, K-stability, moduli spaces, and singularities.
- EMPLOYMENT** **Northwestern University**  
Assistant Professor, July 2021 — present  
**Princeton University**  
Visiting Assistant Professor, September 2020 — June 2021  
**Yale University**  
Gibbs Assistant Professor, August 2017 — August 2020  
**Mathematical Sciences Research Institute**  
Della Pietra Endowed Postdoctoral Fellow, January — May 2019
- EDUCATION** **Princeton University**  
Ph.D. in Mathematics, June 2017  
• Thesis advisor: Professor János Kollár  
**Peking University**  
M.A. in Mathematics, July 2013  
• Thesis advisor: Professor Gang Tian  
B.A. in Mathematics, July 2011
- AWARDS** • NSF Grant DMS-2001317, 2020–2023.  
• AMS-Simons Travel Grant, 2019–2020.
- PUBLISHED AND ACCEPTED PAPERS** 1. *On K-stability of some del Pezzo surfaces of Fano index 2* (joint with Andrea Petracci) (2020). To appear in Bull. Lond. Math. Soc.. arXiv:2011.05094.  
2. *K-moduli of curves on a quadric surface and K3 surfaces* (joint with Kenneth Ascher and Kristin DeVleming) (2020). To appear in J. Inst. Math. Jussieu. arXiv:2006.06816.  
3. *Optimal destabilization of K-unstable Fano varieties via stability thresholds* (joint with Harold Blum and Chuyu Zhou) (2019). To appear in Geom. Topol.. arXiv:1907.05399.  
4. *On the sharpness of Tian's criterion for K-stability* (joint with Ziquan Zhuang) (2019). To appear in Nagoya Math. J.. arXiv:1903.04719.  
5. *Openness of uniform K-stability in families of  $\mathbb{Q}$ -Fano varieties* (joint with Harold Blum) (2018). To appear in Ann. Sci. Éc. Norm. Supér.. arXiv:1808.09070.

6. *On properness of  $K$ -moduli spaces and optimal degenerations of Fano varieties* (joint with Harold Blum, Daniel Halpern-Leistner, and Chenyang Xu) (2020). *Selecta Math. (N.S.)* 27 (2021), no. 4, Paper No. 73.
7. *The normalized volume of a singularity is lower semicontinuous* (joint with Harold Blum). *J. Eur. Math. Soc. (JEMS)* 23 (2021), no. 4, 1225-1256.
8. *Birational superrigidity and  $K$ -stability of singular Fano complete intersections* (joint with Ziquan Zhuang) (2018). *Int. Math. Res. Not. IMRN* 2021, no. 1, 382-401.
9. *A guided tour to normalized volume* (joint with Chi Li and Chenyang Xu). *Geometric analysis*, 167-219, *Progr. Math.*, 333, Birkhäuser/Springer, Cham, 2020.
10.  *$K$ -stability of cubic threefolds* (joint with Chenyang Xu). *Duke Math. J.* 168 (2019), no. 11, 2029-2073.
11. *Kähler-Einstein metrics and volume minimization* (joint with Chi Li). *Adv. Math.* 341 (2019), 440-492.
12. *Hyperbolicity of cyclic covers and complements*. *Trans. Amer. Math. Soc.* 370 (2018), no. 8, 5341-5357.
13. *Characterization of projective spaces by Seshadri constants* (joint with Ziquan Zhuang). *Math. Z.* 289 (2018), no. 1-2, 25-38.
14. *Construction of hyperbolic Horikawa surfaces*. *Ann. Inst. Fourier (Grenoble)* 68 (2018), no. 2, 541-561.
15. *The volume of singular Kähler-Einstein Fano varieties*. *Compos. Math.* 154 (2018), no. 6, 1131-1158.

PREPRINTS

1.  *$K$ -stability and birational models of moduli of quartic  $K3$  surfaces* (joint with Kenneth Ascher and Kristin DeVleming) (2021). Preprint. [arXiv:2108.06848](https://arxiv.org/abs/2108.06848).
2. *The existence of the Kähler-Ricci soliton degeneration* (joint with Harold Blum, Chenyang Xu, and Ziquan Zhuang) (2021). Submitted. [arXiv:2103.15278](https://arxiv.org/abs/2103.15278).
3. *Finite generation for valuations computing stability thresholds and applications to  $K$ -stability* (joint with Chenyang Xu and Ziquan Zhuang) (2021). Submitted. [arXiv:2102.09405](https://arxiv.org/abs/2102.09405).
4. *ACC for local volumes and boundedness of singularities* (joint with Jingjun Han and Lu Qi) (2020). Submitted. [arXiv:2011.06509](https://arxiv.org/abs/2011.06509).
5.  *$K$ -stability of cubic fourfolds* (2020). Submitted. [arXiv:2007.14320](https://arxiv.org/abs/2007.14320).
6. *Equivariant  $K$ -stability under finite group action* (joint with Ziwen Zhu) (2020). Submitted. [arXiv:2001.10557](https://arxiv.org/abs/2001.10557).
7. *Wall crossing for  $K$ -moduli spaces of plane curves* (joint with Kenneth Ascher and Kristin DeVleming) (2019). Submitted. [arXiv:1909.04576](https://arxiv.org/abs/1909.04576).
8. *On the Cheltsov-Rubinstein conjecture* (joint with Kento Fujita, Hendrik Süß, Kewei Zhang, and Ziquan Zhuang) (2019). Submitted. [arXiv:1907.02727](https://arxiv.org/abs/1907.02727).
9. *Openness of  $K$ -semistability for Fano varieties* (joint with Harold Blum and Chenyang Xu) (2019). Submitted. [arXiv:1907.02408](https://arxiv.org/abs/1907.02408).

INVITED TALKS

- Kansas Geometry Day, University of Kansas, Online Aug/2021
- Special Month on Singularities & K-Stability, University of Utah, Online May/2021
- Westlake Mathematics Seminar, Westlake University, Online Mar/2021
- Minicourse on K-stability, Zhejiang University, Online Dec/2020
- Columbia University AG Seminar, Online Dec/2020
- Special Session on Algebraic singularities in arbitrary characteristic, AMS Sectional Meeting, Online Oct/2020
- Simons Conferences – K-stability, Online Sep/2020
- Harvard/MIT AG Seminar, Online Sep/2020
- Princeton University AG Seminar, Online Sep/2020
- Zoom Algebraic Geometry Seminar, Online Aug/2020
- BICMR Geometric Analysis Seminar, Online Jul/2020
- SCMS-Fudan AG Seminar, Online Jun/2020
- Summer School on Fano Varieties, Xiamen University, Online Jun/2020
- Stanford University AG Seminar, Online May/2020
- Nanjing University Differential Geometry Seminar, Online May/2020
- University of Connecticut Algebra Seminar, Storrs, CT, USA Mar/2020
- Thematic Seminar, University of California, Berkeley, CA, USA Jan/2020
- Workshop on “K-stability and related topics”, AIM, San Jose, CA, USA Jan/2020
- Joint AG and Max Dehn Seminar, University of Utah, Salt Lake City, UT, USA Jan/2020
- Departmental Colloquium, University of Utah, Salt Lake City, UT, USA Jan/2020
- Northwestern University AG Seminar, Evanston, IL, USA Dec/2019
- Special Colloquium, University of Minnesota, Minneapolis, MN, USA Nov/2019
- University of Utah AG Seminar, Salt Lake City, UT, USA Oct/2019
- Lecture Series in Algebraic Geometry, Morningside Center of Mathematics, Beijing, China Aug/2019
- Workshop on Algebraic Geometry, Fudan University, Shanghai, China Jul/2019
- SCMS AG Seminar, Fudan University, Shanghai, China Jul/2019
- National Algebraic Geometry Conference, East China Normal University, Shanghai, China Jul/2019
- University of Colorado Boulder FRAGMENT Seminar, Boulder, CO, USA Apr/2019
- Birational Geometry, Kähler-Einstein Metrics and Degenerations, Higher School of Economics, Moscow, Russia Apr/2019
- Lectures on Local and Global K-stability Theory, MSRI, Berkeley, CA, USA Apr/2019
- Birational Geometry and Moduli Spaces Seminar, MSRI, Berkeley, CA, USA Feb/2019
- University of Maryland Algebra and Number Theory Seminar, Dec/2018

- College Park, MD, USA
- Workshop on Algebraic Geometry, Princeton, NJ, USA Dec/2018
  - Connection for Algebraic Geometers, Shanghai Center of Mathematical Sciences, Shanghai, China Nov/2018
  - University of Illinois at Chicago AG Seminar, Chicago, IL, USA Oct/2018
  - UMass Amherst Valley Geometry Seminar, Amherst, MA, USA Oct/2018
  - Algebraic Surfaces and Related Topics, Xiamen University, Xiamen, China Sep/2018
  - Yale University Algebraic and Tropical Geometry Seminar, New Haven, CT, USA Sep/2018
  - BICMR AG Seminar, Beijing, China Jul/2018
  - Workshop on Degenerations of Calabi-Yau Manifolds, Paris, France May/2018
  - University of Utah AG Seminar, Salt Lake City, UT, USA Apr/2018
  - Special Session on Algebraic Geometry and its Connections, AMS Sectional Meeting, Portland, OR, USA Apr/2018
  - Northeastern University Geometry, Physics, and Representation Theory Seminar, Boston, MA, USA Mar/2018
  - Northwestern University AG Seminar, Evanston, IL, USA Feb/2018
  - Young Mathematician Forum, Peking University, Beijing, China Dec/2017
  - Johns Hopkins University AG Seminar, Baltimore, MD, USA Dec/2017
  - Princeton University AG Seminar, Princeton, NJ, USA Oct/2017
  - Harvard/MIT AG Seminar, Cambridge, MA, USA Oct/2017
  - Brown University AG Seminar, Providence, RI, USA Sep/2017
  - Colloquium at Rutgers University, Newark, NJ, USA Sep/2017
  - Yale University Algebraic and Tropical Geometry Seminar, New Haven, CT, USA Sep/2017
  - Stanford University AG Seminar, Stanford, CA, USA May/2017
  - Stony Brook University Geometry/Topology Seminar, Stony Brook, NY, USA Mar/2017
  - Yale University Algebraic and Tropical Geometry Seminar, New Haven, CT, USA Feb/2017
  - Geometry & Topology at Princeton, Princeton, NJ, USA Feb/2017
  - Stony Brook University AG Seminar, Stony Brook, NY, USA Jan/2017
  - Purdue University AG Seminar, West Lafayette, IN, USA Nov/2016
  - University of Michigan AG Seminar, Ann Arbor, MI, USA Oct/2016
  - Algebraic Geometry: Old and New, Clay Research Conference and Workshops, Oxford, UK Sep/2016
  - Université d'Aix-Marseille Complex Geometry Seminar, Marseille, France Sep/2016
  - Institut Fourier AG Seminar, Grenoble, France Sep/2016
  - Fudan University AG Seminar, Shanghai, China Jun/2016
  - Beijing Algebraic Geometry Colloquium, Beijing, China Jun/2016
  - Tokyo-Princeton Algebraic Geometry Conference, Princeton University, Princeton, NJ, USA May/2016

CONFERENCES ATTENDED	• AGNES Online, Stony Brook University	Oct/2020
	• WAGON, Online	Apr/2020
	• AGNES, Boston College, Chestnut Hill, MA, USA	Sep/2019
	• Recent Progress in Moduli Theory, MSRI, Berkeley, CA, USA	May/2019
	• Introductory Workshop: Derived Algebraic Geometry and Birational Geometry and Moduli Spaces, MSRI, Berkeley, CA, USA	Jan/2019
	• Workshop on Birational Geometry and Related Topics, Shanghai Center of Mathematical Sciences, Shanghai, China	Nov/2018
	• AGNES, Northeastern University, Boston, MA, USA	Oct/2017
	• Birational Geometry, Simons conference in Mathematics and Physical Sciences, Simons Foundation, New York, NY, USA	Aug/2017
	• Hodge Theory, Moduli and Representation Theory, Stony Brook University, Stony Brook, NY, USA	Aug/2017
	• Mini-workshop in Birational Geometry and Hodge Theory, Northwestern University, Evanston, IL, USA	May/2017
	• AGNES, Stony Brook University, Stony Brook, NY, USA	Apr/2017
	• Workshop on “Stability and Moduli Spaces”, AIM, San Jose, CA, USA	Jan/2017
	• AGNES, UMass Amherst, Amherst, MA, USA	Nov/2016
	• Differential Forms in Algebraic Geometry, Universität Freiburg, Freiburg, Germany	Sep/2016
	• Higher Dimensional Algebraic Geometry and Characteristic $p$ , CIRM, Marseille, France	Sep/2016
	• Stable Rationality and Diagonal Decomposition, BICMR, Beijing, China	Jul/2016
	• Tokyo-Princeton Algebraic Geometry Conference, Princeton University, Princeton, NJ, USA	May/2016
	• AGNES, Yale University, New Haven, CT, USA	Apr/2016
	• AGNES, Brown University, Providence, RI, USA	Oct/2015
	• AMS Algebraic Geometry Summer Institute, University of Utah, Salt Lake City, UT, USA	Jul/2015
	• Workshop on “New Techniques in Birational Geometry”, Stony Brook University, Stony Brook, NY, USA	Apr/2015
	• AGNES, Boston College, Chestnut Hill, MA, USA	Mar/2015
	• Complex Geometry and Algebraic Geometry, BICMR, Beijing, China	Jul/2014
• Workshop on Algebraic Geometry, Sichuan University, Chengdu, China	May/2014	
TEACHING EXPERIENCE	• Introduction to Riemann Surfaces (MAT 531), Princeton University	S/2021
	• Linear Algebra with Applications (MAT 202), Princeton University	F/2020
	• Discrete Mathematics (MATH 244), Yale University	S/2020
	• Linear Algebra with Applications (MATH 222), Yale University	F/2019
	• Foundations of Algebraic Geometry (MATH 619), Yale University	F/2019
	• Reading Course on Algebraic Surfaces, Yale University	F/2018

- Reflection Groups (MATH 235), Yale University S/2018
- Linear Algebra with Applications (MATH 222), Yale University F/2017
- Foundations of Algebraic Geometry (MATH 619), Yale University F/2017
- Linear Algebra with Applications (MAT 202), Princeton University S/2016

SERVICES

Co-organizer of:

- AIM Workshop: Moduli problems beyond geometric invariant theory, 2021
- Online Algebraic Geometry Seminar, 2020.
- BATMOBYLE (Bi-annual Algebraic and Tropical Meetings of Brown and Yale), 2017–present.
- Yale Algebraic and Tropical Geometry Seminar, 2017–2020.
- Princeton Algebraic Geometry Seminar, 2016–2017.

Referee for: *Advances in Mathematics*, *Annals of Mathematics*, *Bulletin of the London Mathematical Society*, *Compositio Mathematica*, *Forum of Mathematics Sigma*, *Geometric and Functional Analysis*, *International Mathematics Research Notices*, *Journal of Algebraic Geometry*, *Journal of the American Mathematical Society*, *Journal of Differential Geometry*, *Journal of the London Mathematical Society*, *Mathematical Proceedings of the Cambridge Philosophical Society*, *Peking Mathematical Journal*, *Proceedings of the American Mathematical Society*, *Proceedings of the London Mathematical Society*, *Pure and Applied Mathematics Quarterly*, *Transactions of the American Mathematical Society*.

Reviewer for: *Mathematical Reviews*, *Zentralblatt MATH*

LANGUAGES

Chinese (native), English (fluent)