Chi Li

CONTACT INFORMATION

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RESEARCH INTERESTS

Complex Geometry, Algebraic Geometry, Geometric Analysis

EDUCATION

Princeton University

Ph.D. in Mathematics, June 2012

- Dissertation Topic: Kähler-Einstein metrics and K-stability
- Advisor: Gang Tian

Peking University

M.S. in Mathematics, June 2007
B.A. in Mathematics, June 2004

PROFESSIONAL

Rutgers University - New Brunswick

Associate Professor, January 2021 to present

Purdue University

Associate Professor, August 2019 to December 2020
Assistant Professor, August 2015 to July 2019

Stony Brook University

Simons Instructor, August 2012 to July 2015

AWARDS AND HONORS

Invited Sectional Speaker, Algebraic and Complex Geometry & Geometry, ICM 2022.

NSF Grant: Canonical metrics and stability in complex geometry, Award Number 2305296, November 2023-October 2026.

NSF Grant: Kahler-Einstein metrics on Fano varieties, Award Number 1810867, July 2018-June 2022.

NSF Grant: Kahler-Einstein metrics on Fano manifolds, Award Number 1405936, July 2014-June 2018.

Alfred P. Sloan Research Fellow Award, 2017-2022.

PUBLICATIONS

[1] C. Li, Constant scalar curvature Kähler metric obtains the minimum of Mabuchi-energy, *International Mathematics Research Notices*, No.9, (2011), 2161-2175.

[2] C. Li, Greatest lower bounds on Ricci curvature for toric Fano manifolds, *Advances in mathematics*, 226 (2011) 4921-4932.

[3] C. Li, On the limit behavior of metrics in continuity method to Kähler-Einstein problem in toric Fano case, *Compositio Mathematicae* 148 (2012), 1985-2003.

[4] C. Li and C. Xu, Special test configurations and K-stability of Fano varieties, *Annals of Mathematics*, 180 (2014) 197-232.

[5] C. Li and S. Sun, *Conical Kähler-Einstein metric revisited*, Communications in Mathematical Physics, Vol. 331, Issue 3 (2014), 927-973.

[6] C. Li, Numerical Solutions of Kähler-Einstein metrics on $\mathbb{P}^2$ with conical singularities along a smooth quadric curve, *The Journal of Geometric Analysis*, Vol. 25, Issue 3 (2015), 1773-1797.

[7] C. Li, Remarks on logarithmic K-stability, *Communications in Contemporary Mathematics*, Vol. 17, Issue 02 (2015).

[8] C. Li and Y.A. Rubinstein, Appendix A to "Kähler-Einstein metrics with edge singularities by T. Jeffres, R. Mazzeo and Y.A. Rubinstein", *Annals of Mathematics*, 183 (2016), pp 162-166.

[9] C. Li, A Pohozaev identity and critical exponents of some complex Hessian equations, *Journal of Partial Differential Equations* (2016), no. 3, 175-194.

[10] C. Li, Yau-Tian-Donaldson correspondence for K-semistable Fano manifolds, *J. Reine Angew. Math.* 733 (2017), 55-85.

[11] C. Li, K-semistability is equivariant volume minimization, *Duke Mathematical Journal*, Vol. 166, Number 16 (2017), 3147-3218.

[12] C. Li, Minimizing normalized volumes of valuations, *Mathematische Zeitschrift*, Vol. 289 (2018), no. 1-2, 491-513.

[13] C. Li and Y. Liu, Kähler-Einstein metrics and volume minimzation, *Adv. Math.* 341 (2019), 440-492.

[14] C. Li, X. Wang and C. Xu, Quasi-projectivity of the moduli space of smooth Kähler-Einstein Fano manifolds, *Annales scientifiques de l'ENS* (4) 51 (2018), no. 3, 739-772.

[15] C. Li and C. Xu, Stability of valuations and Kollár components, *J. Eur. Math Soc. (JEMS)* 22 (2020), no. 8, 2573-2627.

[16] C. Li and C. Xu, Stability of valuations: higher rational rank, *Peking Math. J.* 1 (2018), no. 1, 1-79.

[17] C. Li, X. Wang and C. Xu, On the proper moduli spaces of smoothable Kähler-Einstein varieties, *Duke Math. J.* 168 (2019), no.8, 1387-1459.

[18] C. Li, G. Tian, Orbifold regularity of weak Kähler-Einstein metrics. *Advances in complex geometry*, 169-178, Contemp. Math., 735, Amer. Math. Soc., Providence, RI, 2019.

[19] C. Li, On the stability of extensions of tangent sheaves on Kähler-Einstein Fano/Calabi-Yau pairs, *Math. Ann.* 381 (2021), no. 3-4, 1943-1977.

[20] C. Li, Y. Liu and C. Xu, A guided tour to normalized volume, in *Geometric Analysis*, volume 333 of Progr. Math., 167-219, Birkäuser/Springer 2020.

[21] C. Li, On sharp rates and analytic compactifications of asymptotically conical Kähler metrics, *Duke Math. J.* 169 (2020), no. 8, 1397-1483.

[22] C. Li, G. Tian and F. Wang, On the Yau-Tian-Donaldson conjecture for singular Fano varieties, *Comm. Pure Appl. Math.* 74 (2021), no.8, 1748-1800.

[23] C. Li, X. Wang and C. Xu, Algebraicity of metric tangent cones and equivariant K-stability, *J. Amer. Math. Soc.* 34 (2021), no. 4, 1175-1214.

[24] C. Li, G. Tian and F. Wang, The uniform version of Yau-Tian-Donaldson conjecture for singular Fano varieties, *Peking Math. J.* 5 (2022), no.2, 383-426.

[25] C. Li, Geodesic rays and stability in the cscK problem, *Ann. Sci. Éc. Norm Super. (4)* 55 (2022), no. 6, 1529–1574.

[26] J. Han and C. Li, On the Yau-Tian-Donaldson conjecture for generalized Kähler-Ricci soliton equations, *Comm. Pure Appl. Math.* 76 (2023), no. 9, 1793-1867.

[27] C. Li, G-uniform stability and Yau-Tian-Donaldson conjecture for singular Fano varieties, *Invent. Math.* 227 (2022), no. 2, 661-744.

[28] J. Han and C. Li, Algebraic uniqueness of Kähler-Ricci flow limits and optimal degenerations of Fano varieties, accepted by *Geometry and Topology*, arXiv:2009.01010.

[29] C. Li, Notes on weighted Kähler-Ricci solitons, *Surveys in Geometric Analysis* 2021, Edited by G. Tian etc., Science Press Beijing.

[30] C. Li, K-stability and Fujita approximation, published in Volume: *Birational Geometry, Kähler-Einstein Metrics and Degenerations*, Springer Proceedings in Mathematics & Statistics, 409.

[31] C. Li, Canonical Kähler metrics and stability of algebraic varieties, published in *Proceedings of ICM 2022*, arXiv:2207.02604.

[32] C. Li, Analytical approximations and Monge-Ampère masses of plurisubharmonic singularities, accepted by *Int. Math. Res. Not. (IMRN)*, no. 1, 359-381.

[33] C. Li, Polarized Hodge structures for Clemens manifolds, accepted by *Math. Ann.*, arXiv:2202.10353.

[34] C. Li, Kähler structures for holomorphic submersions, accepted by *Demailly Memorial Issue of Pure and Applied Mathematics Quarterly (PAMQ)*, arXiv:2302.07220.

Invited Lectures

Non-Archimedean methods for Canonical Kähler metrics, 4-hour lecture courses, Summer School *Advances in Kähler Geometry*, Croisic, France (June 2023).

Kähler-Einstein metrics on Fano varieties, 3-hour lecture courses, Mini-Summer school, University of Sydney (January 2018).

K-stability, Ding stability and normalized volume, 3-hour Lecture courses in Tianyuan Advanced Seminar, BICMR, Beijing (March 2017)

Selected Talks

(1) *Optimal degeneration problems in Kähler geometry*, Colloquium Talk at University of Houston (September 2023).

(2) *Kähler structures for holomorphic submersions*, Upper New York State Geometric Analysis Workshop 2023, Cornell University (April 2023).

(3) *Kähler structures for holomorphic submersions*, Differential Geometry, Topology, and special structures Seminar, CUNY Graduate Center (April 2023).

(4) *Kähler structures for holomorphic submersions*, Oberwolfach Workshop: Komplexe Analysis – Differential and Algebraic methods in Kähler spaces (April 2023).

(5) *Polarized Hodge structures for Clemens manifolds*, Simons Center (August 2022).

(6) *Canonical Kähler metrics and stability of algebraic varieties*, ICM 2022 (July 2022).

(7) *Algebraic uniqueness of Kähler-Ricci flow limits on Fano varieties*, Smith Colloquium, University of Kansas (December 2021).

(8) *On the algebraic uniqueness of Kähler-Ricci flow limits on Fano manifolds*, Geometric Analysis Seminar, Princeton (September 2021).

(9) *YTD conjecture for weighted Kähler solitons and application*, Xiamen International Conference on Geometric Analysis (June 2021).

(10) *Recent progress on the cscK problem*, CUNY Geometric Analysis Seminar (April 2021).

(11) *An inhomogeneous optimal degeneration problem for Fano varieties*, Simons Conference on K-stability (September 2020).

(12) *Generalized YTD conjecture on Fano varieties*, Workshop on Geometric Analysis via Zoom, Dalian (September 2020).

(13) *Geodesic rays and stability in the cscK problem*, Seminar in Geometric Analysis via Zoom system, Beijing International Center for Mathematical Research (April 2020).

(14) *YTD conjecture and G-uniform stability*, AIM workshop: K-stability and related topics (January 2020)

(15) *Topics on Kähler-Einstein metrics*, Colloquium, Rutgers University-New Brunswick (December 2019)

(16) *Normalized volume and its applications*, Algebraic Geometry Seminar, University of Arizona (October 2019)

(17) *The uniform version of Yau-Tian-Donaldson conjecture for singular Fano varieties*, Trends in Modern Geometry 2019, Tsinghua University, Beijing (June 2019)

(18) *On some minimization problems in K-stability*, Algebraic Geometry Seminar, John-Hopkins University (April 2019)

(19) *Algebraicity of metric tangent cones via normalized volume and K-stability*, Math Department Colloquium, University of Michigan (Feb 2019)

(20) *On Yau-Tian-Donaldson conjecture for singular Fano varieties*, Hopkins-Maryland Complex Geometry Seminar, University of Maryland (November 2018)

(21) *Stable degeneration conjecture*, l'École Polytechnique (May 2018).

(22) *On the stability of extensions of tangent sheaves on Kähler-Einstein Fano/Calabi-Yau pairs*, Sino-French conference in Algebraic Geometry and Complex Geometry, Lyon (April 2018)

(23) *On Yau-Tian-Donaldson conjecture for singular Fano varieties*, Sichuan University (April 2018)

(24) *On the uniqueness of metric tangent cones at Klt singularities*, Algebraic and Tropical Geometry, Yale University (April 2018)

(25) *On Yau-Tian-Donaldson conjecture for singular Fano varieties*, University of Sydney (January 2018)

(26) *On metric tangent cones at Klt singularities*, Seminar of Algebra and Geometry, University of New Mexico (January 2018)

(27) *On metric tangent cones at Klt singularities*, Geometry seminar, Sichuan University (July 2017)

(28) *On metric tangent cones at Klt singularities*, Geometry Festival, Duke University (April 2017)

(29) *Stability of valuations on Klt singularities*, AIM workshop: Stability and moduli spaces (January 2017)

(30) *Sasaki-Einstein metrics and volume minimization*, International conference on Geometry, Topology and Applications, Florida International University (January 2017).

(31) *Kähler-Einstein metrics and volume minimization*, Differential Geometry Seminar, Princeton University (November 2016)

(32) *Minimizing normalized volume of valuations*, Algebraic Geometry Seminar, University of Utah (October 2016)

(33) *Kähler-Einstein metrics and volume minimization*, Differential Geometry Seminar, UC Berkeley (October 2016)

(34) *Minimizing normalized volumes of valuations*, Algebraic Geometry Seminar, University of Michigan (April 2016).

(35) *deFernex-Ein-Mustata type inequalities for klt singularities*, Geometry Seminar, University of Notre Dame (April 2016).

(36) *Moduli space of smoothable Kähler-Einstein $\mathbb{Q}$-Fano varieties*, Geometry Seminar, Sichuan University, Chengdu, China (July 2015).

(37) *Moduli space of smoothable Kähler-Einstein $\mathbb{Q}$-Fano varieties*, Conference: Trends in Modern Geometry, University of Tokyo, Japan (July 2015)

(38) *Moduli space of smoothable Kähler-Einstein $\mathbb{Q}$-Fano varieties*, Conference: Recent Advances in Kähler Geometry, Vanderbilt University (May 2015)

(39) *On rates and compactifications of asymptotically conical Calabi-Yau manifolds*, Workshop on Ricci Curvature, Northwestern University (May 2015)

(40) *On critical exponents for some complex Monge-Ampère equations*, Geometry Seminar, Sichuan University, Chengdu, China (July 2014)

(41) *On deformation of cones and neighborhoods of ample divisors*, Conference: Complex Geometry and Algebraic Geometry, BICMR, Beijing, China (July 2014)

(42) *On critical exponents for some complex Monge-Ampère equations*, Complex Monge-Ampère Equations on Compact Kähler manifolds, BIRS, Banff, Canada (April 2014)

(43) *A Pohozaev identity and critical exponents of some complex Hessian equations*, AMS Sectional Meeting: Interaction between Complex and Geometric Analysis, University of Maryland, Baltimore (March 2014)

(44) *On critical exponents for some complex Monge-Ampère equations*, RU-CUNY Symposium on Geometric Analysis, Rutgers University (December 2013)

(45) *On the construction of conical Kähler-Einstein metrics*, Workshop on Ricci curvature: limit spaces and Kahler geometry, ICMS, Edinburgh, UK (July 2013)

(46) *Yau-Tian-Donaldson correspondence for semistable Fano manifolds*, Young Mathematician Forum, BICMR, Beijing, China (June 2013)

(47) *On the construction of conical Kähler-Einstein metrics*, Workshop on Geometric Analysis, Ningxia University, Yinchuan, China (June 2013)

(48) *Yau-Tian-Donaldson correspondence for semistable Fano manifolds*, Workshop on Extremal Kähler Metrics, CRM, Montreal, Canada (May 2013)

(49) *On the construction of conical Kähler-Einstein metrics*, AMS Sectional Meeting: Special section on Complex Geometry and Microlocal Analysis, Boston College (April 2013)

(50) *Yau-Tian-Donaldson correspondence for semistable Fano manifolds*, Kähler Geometry on the Edge, Vanderbilt University (March 2013)

(51) *Special test configuration and K-stability of Fano varieties*, Algebraic Geometry and Number Theory Seminar, John Hopkins University (April 2013)

(52) *Special test configuration and K-stability of Fano varieties*, Mathematics Colloquium at Rutgers-Newark (September 2012)

(53) *On K-stability and log-K-stability in the Kahler-Einstein problem*, Workshop on Complex Algebraic Geometry, Oberwolfach, Germany (September 2011)

(54) *On the continuity methods in the Kahler-Einstein problem*, Workshop on Kahler geometry, Stony Brook University (May 2011)

Service

Graduate Committee, Rutgers University, 2023-2024

Geometry/Topology representative to the Personal Planning Committee, Rutgers University, Fall 2022

Mathematics PhD Admissions Committee, Rutgers University, 2021-2023

Co-Organizer of Rutgers Complex Geometry Seminar, 2023-Present

Co-Organizer of Rutgers Geometric Analysis Conference, May 2022

Co-Organizer of a special session on Complex Geometry in AMS meeting, Purdue University, March 2022.

Co-Organizer of the Geometric Analysis Seminar at Purdue University, Fall 2017-December 2020

AMS Mathscinet Reviewer, 2018-present

Journal Referee: *Advances in Mathematics*, *Annals of Mathematics*, *Bulletin of the French Mathematical Society*, *Communications in Contemporary Mathematics*, *Communications in Partial Differential Equations*, *International Mathematics Research Notices*, *International Journal of Mathematics*, *Journal of American Mathematical Society*, *Journal für die reine ind angewandte Mathematik*, *Journal of Geometric Analysis*, *Journal of Symplectic Geometry*, *Mathematische Annalen, Pacific Journal of Mathematics, Proceedings of the American Mathematical Society, etc.*

Mentoring

Reading Course on Complex Geometry for Ph.D. student: Kyobeom Song, Spring 2024.

Reading Course on Complex Geometry for Ph.D. students: Dhivya Prakash Raveendran Vijaya and Ching Hsien Lee Ching Hsien Lee, Fall 2022.

Postdoc mentoring: Dr. Jiyuan Han, 2018-2021 (now an assistant professor at Westlake University, Hangzhou, China).

Organizer of the Geometric Analysis Reading Seminar, Purdue University, Fall 2017-2020.

Qualify oral exam committee of Ph.D. candidate Che-Hung Huang.

Thesis defense committee of Ph.D. student Katherine Brubaker, Kuang-Ru Wu.

Teaching

Rutgers University

Differential Geometry	Spring 2024
Geometry	Fall 2023
Linear Algebra	Spring and Fall 2023
Introduction to Complex Geometry	Fall 2022
Calculus I	Fall 2022
Multivariable calculus	Spring 2021

Purdue University

Differential equations and partial differential equations	Fall 2020
Topics: Hermitian-Einstein and Kähler-Einstein metrics	Fall 2019
Algebra-Honors	Fall 2018
Introduction to Differential Geometry and Topology	Fall 2017, 2019
Elements of Algebra	Fall 2017
Linear algebra and applications	Spring 2017
Topics in Geometry: Kähler-Ricci flow	Fall 2016
Ordinary Differential Equations	Fall 2015

Stony Brook University

Linear Algebra	Spring 2015
Applied Complex Analysis	Fall 2014
Complex Geometry	Fall 2013
Calculus I-IV	2012 - 2014

Princeton University

Multivariable Calculus	Spring 2011