

Jihao Liu 刘济豪

CURRICULUM VITAE

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RESEARCH INTERESTS

Birational geometry, singularities, foliations, and explicit birational geometry.

EMPLOYMENT

2024 – present	Peking University , School of Mathematical Sciences Assistant Professor / Researcher.
2021 – 2024	Northwestern University , Department of Mathematics Boas Assistant Professor. Mentor: Yuchen Liu.

EDUCATION

2015 – 2021	University of Utah , Salt Lake City, USA Ph.D. in Mathematics. Advisor: Christopher D. Hacon FRS.
2011 – 2015	Peking University , Beijing, China B.S. in Mathematics. Undergraduate advisor: Gang Tian.

PUBLISHED PAPERS

Listed by year of journal publication, most recent first.

1. 2026 **Exceptional Fano varieties with small minimal log discrepancy.** Louis Esser, **Jihao Liu**, Chengxi Wang. *Math. Res. Lett.* **33** (2026), no. 1, 161–198. [arXiv:2406.03570](#), [doi:10.4310/MRL.260502161650](#).
2. 2026 **Sarkisov program for algebraically integrable and threefold foliations.** Yifei Chen, **Jihao Liu**, Yanze Wang. *Int. Math. Res. Not.* **2026**, no. 6, 1–19. [arXiv:2505.15115](#), [doi:10.1093/imrn/rnag045](#).
3. 2026 **A generalized non-vanishing theorem for surfaces.** **Jihao Liu**, Lingyao Xie. *Pure Appl. Math. Q.* (special volume in honor of Caucher Birkar) **22** (2026), no. 1, 235–244. [arXiv:2410.15457](#), [doi:10.4310/PAMQ.250306164159](#).
4. 2025 **Flop between algebraically integrable foliations on potentially klt varieties.** Yifei Chen, **Jihao Liu**, Yanze Wang. *Int. J. Math.* **36** (2025), 2550035. [arXiv:2410.05764](#), [doi:10.1142/S0129167X25500351](#).
5. 2025 **Minimal model program for algebraically integrable foliations on klt varieties.** **Jihao Liu**, Fanjun Meng, Lingyao Xie. *Compos. Math.* **161** (2025), 3213–3276. [arXiv:2404.01559](#), [doi:10.1112/S0010437X25102807](#).
6. 2025 **On the equivalence between the effective adjunction conjectures of Prokhorov–Shokurov and of Li.** Jingjun Han, **Jihao Liu**, Qingyuan Xue. *Algebra Number Theory* **19** (2025), no. 11. [arXiv:2312.15397](#), [doi:10.2140/ant.2025.19.2261](#).

7. 2025 **On explicit bounds of Fano threefolds.** Caucher Birkar, **Jihao Liu**. *J. Reine Angew. Math. (Crelle's J.)* (2025). [arXiv:2311.06732](https://arxiv.org/abs/2311.06732), [doi:10.1515/crelle-2025-0056](https://doi.org/10.1515/crelle-2025-0056).
8. 2025 **On termination of flips and exceptionally non-canonical singularities.** Jingjun Han, **Jihao Liu**. *Geom. Topol.* **29** (2025), no. 1, 399–441. [arXiv:2209.13122](https://arxiv.org/abs/2209.13122), [doi:10.2140/gt.2025.29.399](https://doi.org/10.2140/gt.2025.29.399).
9. 2025 **Uniform rational polytopes for Iitaka dimensions.** Guodu Chen, Jingjun Han, **Jihao Liu**. In: *Higher Dimensional Algebraic Geometry: A Volume in Honor of V. V. Shokurov* (C. D. Hacon, C. Xu eds.), London Math. Soc. Lecture Note Ser., Cambridge Univ. Press (2025), 43–68. [arXiv:2208.04663](https://arxiv.org/abs/2208.04663).
10. 2025 **Relative Nakayama–Zariski decomposition and minimal models for generalized pairs.** **Jihao Liu**, Lingyao Xie. *Peking Math. J.* (2025), no. 8, 299–349. [arXiv:2207.09576](https://arxiv.org/abs/2207.09576), [doi:10.1007/s42543-023-00076-2](https://doi.org/10.1007/s42543-023-00076-2).
11. 2025 **On generalized lc pairs with b-log abundant nef part** (with an Appendix by J. Han). Junpeng Jiao, **Jihao Liu**, Lingyao Xie. *Front. Math.* (2025). [arXiv:2202.11256](https://arxiv.org/abs/2202.11256), [doi:10.1007/s11464-025-0033-0](https://doi.org/10.1007/s11464-025-0033-0).
12. 2025 **ACC for minimal log discrepancies of terminal threefolds.** Jingjun Han, **Jihao Liu**, Yujie Luo. *Adv. Math.* **480** (2025), 110457. [arXiv:2202.05287](https://arxiv.org/abs/2202.05287), [doi:10.1016/j.aim.2025.110457](https://doi.org/10.1016/j.aim.2025.110457).
13. 2025 **Number of singular points on projective surfaces.** **Jihao Liu**, Lingyao Xie. *Chin. Ann. Math. Ser. B* **46** (2025), 713–724. [arXiv:2103.04522](https://arxiv.org/abs/2103.04522), [doi:10.1007/s11401-025-0035-y](https://doi.org/10.1007/s11401-025-0035-y).
14. 2024 **On effective Iitaka fibrations and existence of complements.** Guodu Chen, Jingjun Han, **Jihao Liu**. *Int. Math. Res. Not.* (2024), no. 10, 8329–8349. [arXiv:2301.04813](https://arxiv.org/abs/2301.04813), [doi:10.1093/imrn/rnad253](https://doi.org/10.1093/imrn/rnad253).
15. 2024 **Uniform rational polytopes of foliated threefolds and the global ACC.** **Jihao Liu**, Fanjun Meng, Lingyao Xie. *J. Lond. Math. Soc.* **109** (2024), no. 6, e12950. [arXiv:2306.00330](https://arxiv.org/abs/2306.00330), [doi:10.1112/jlms.12950](https://doi.org/10.1112/jlms.12950).
16. 2024 **Complements, index theorem, and minimal log discrepancies of foliated surface singularities.** **Jihao Liu**, Fanjun Meng, Lingyao Xie. *Eur. J. Math.* **10** (2024), no. 6. [arXiv:2305.06493](https://arxiv.org/abs/2305.06493), [doi:10.1007/s40879-023-00719-9](https://doi.org/10.1007/s40879-023-00719-9).
17. 2024 **Infinitesimal structure of log canonical thresholds.** **Jihao Liu**, Fanjun Meng, Lingyao Xie. *Doc. Math.* **29** (2024), no. 3, 703–732. [arXiv:2209.11369](https://arxiv.org/abs/2209.11369), [doi:10.4171/dm/952](https://doi.org/10.4171/dm/952).
18. 2024 **ACC for minimal log discrepancies of exceptional singularities.** Jingjun Han, **Jihao Liu**, Vyacheslav V. Shokurov. *Peking Math. J.* (2024), 1–33. [arXiv:1903.04338](https://arxiv.org/abs/1903.04338), [doi:10.1007/s42543-024-00091-x](https://doi.org/10.1007/s42543-024-00091-x).
19. 2023 **Semi-ampleness of NQC generalized log canonical pairs.** **Jihao Liu**, Lingyao Xie. *Adv. Math.* **427** (2023), 109126. [arXiv:2210.01731](https://arxiv.org/abs/2210.01731), [doi:10.1016/j.aim.2023.109126](https://doi.org/10.1016/j.aim.2023.109126).
20. 2023 **Existence of flips for generalized lc pairs.** Christopher D. Hacon, **Jihao Liu**. *Camb. J. Math.* **11** (2023), no. 4, 795–828. [arXiv:2105.13590](https://arxiv.org/abs/2105.13590), [doi:10.4310/CJM.2023.v11.n4.a1](https://doi.org/10.4310/CJM.2023.v11.n4.a1).
21. 2023 **On global ACC for foliated threefolds.** **Jihao Liu**, Yujie Luo, Fanjun Meng. *Trans. Amer. Math. Soc.* **376** (2023), no. 12, 8939–8972. [arXiv:2303.13083](https://arxiv.org/abs/2303.13083), [doi:10.1090/tran/9053](https://doi.org/10.1090/tran/9053).
22. 2023 **On the fixed part of pluricanonical systems for surfaces.** **Jihao Liu**, Lingyao Xie. *Math. Nachr.* **296** (2023), 2046–2069. [arXiv:2202.11260](https://arxiv.org/abs/2202.11260), [doi:10.1002/mana.202200088](https://doi.org/10.1002/mana.202200088).
23. 2023 **Remark on complements on surfaces.** **Jihao Liu**. *Forum Math. Sigma* **11** (2023), e42. [arXiv:2208.09184](https://arxiv.org/abs/2208.09184), [doi:10.1017/fms.2023.35](https://doi.org/10.1017/fms.2023.35).

24. 2023 **Divisors computing minimal log discrepancies on lc surfaces.** Jihao Liu, Lingyao Xie. *Math. Proc. Camb. Philos. Soc.* **175** (2023), no. 1, 107–128. [arXiv:2101.00138](#), [doi:10.1017/S0305004123000051](#).
25. 2023 **On effective birationality for sub-pairs.** Jingjun Han, Jihao Liu. *Int. J. Math.* **34** (2023), no. 6, Article No. 2350029. [arXiv:2007.01849](#), [doi:10.1142/S0129167X23500295](#).
26. 2021 **An optimal gap of minimal log discrepancies of threefold non-canonical singularities.** Jihao Liu, Liudan Xiao. *J. Pure Appl. Algebra* **225** (2021), no. 9. [arXiv:1909.08759](#), [doi:10.1016/j.jpaa.2021.106674](#).
27. 2021 **Sarkisov program for generalized pairs.** Jihao Liu. *Osaka J. Math.* **58** (2021), no. 4. [arXiv:1802.03926](#), [doi:10.18910/84956](#).
28. 2020 **Bounded deformations of (ε, δ) -log canonical singularities.** Jingjun Han, Jihao Liu, Joaquín Moraga. *J. Math. Sci. Univ. Tokyo* **27** (2020), no. 1, 1–28. [arXiv:1903.07202](#), pdf.

PAPERS TO APPEAR

Accepted but not yet published. Listed by arXiv posting date, most recent first.

1. 2024 **Volume of algebraically integrable foliations and locally stable families.** Jingjun Han, Junpeng Jiao, Mengchu Li, Jihao Liu. To appear in *Trans. Amer. Math. Soc.* [arXiv:2406.16604](#).
2. 2023 **The minimal volume of surfaces of log general type with non-empty non-klt locus.** Jihao Liu, Wenfei Liu. To appear in *Algebr. Geom.* [arXiv:2308.14268](#).
3. 2023 **ACC for lc thresholds for algebraically integrable foliations.** Omprokash Das, Jihao Liu, Roktim Mascharak. To appear in *Selecta Math.* [arXiv:2307.07157](#).
4. 2023 **Optimal bounds on surfaces.** Jihao Liu, Vyacheslav V. Shokurov. To appear in *Algebraic Geometry and Physics*. [arXiv:2305.19248](#).
5. 2018 **Toward the equivalence of the ACC for a -log canonical thresholds and the ACC for minimal log discrepancies.** Jihao Liu. To appear in *Algebraic Geometry and Physics*. [arXiv:1809.04839](#).

PREPRINTS

Listed by arXiv posting date, most recent first.

1. 2026 **Examples of infinitely many (-1) -curves with higher genus on elliptic surfaces.** Sichen Li, Jihao Liu. [arXiv:2605.27926](#).
2. 2026 **Boundedness of total Cartier indices for rational singularities in families.** Jihao Liu, Ruicheng Hu, Sheng Qin. [arXiv:2605.22782](#).
3. 2026 **Shokurov's global index conjecture for threefold foliations.** Jihao Liu, Sheng Qin. [arXiv:2605.22735](#).
4. 2026 **A question on klt type varieties of Han and Jiang.** Jihao Liu. [arXiv:2605.22250](#).
5. 2026 **On a question of Mauri and Moraga.** Jihao Liu. [arXiv:2605.22052](#).
6. 2026 **Optimal bounds in bend-and-break for foliations.** Jihao Liu, Zeming Sun, Jiedong Jiang. [arXiv:2605.20754](#).
7. 2026 **An example of a very non-movable effective divisor.** Jihao Liu. [arXiv:2605.20594](#).

8. 2026 **On a question of Kollár and Kovács.** Jihao Liu. [arXiv:2605.20585](#).
9. 2026 **The minimal volume of stable surfaces of rank one.** Jihao Liu, Wenfei Liu. [arXiv:2605.05641](#).
10. 2026 **Birational boundedness of stable families.** Paolo Cascini, Jihao Liu, Calum Spicer, Roberto Svaldi. [arXiv:2604.24106](#).
11. 2026 **Existence of the minimal model program for log canonical generalized pairs.** Zhengyu Hu, Jihao Liu. [arXiv:2603.03817](#).
12. 2026 **Dual complexes of qdlt Fano type models and strong complete regularity.** Jihao Liu, Konstantin Loginov. [arXiv:2603.03588](#).
13. 2025 **Non-algebraicity of non-abundant foliations and abundance for adjoint foliated structures.** Jihao Liu, Zheng Xu. [arXiv:2510.04419](#).
14. 2025 **Variation of algebraically integrable adjoint foliated structures.** Paolo Cascini, Jihao Liu, Fanjun Meng, Roberto Svaldi, Lingyao Xie. [arXiv:2510.02498](#).
15. 2025 **Boundedness in general type MMP and fivefold effective termination / Effective termination of general type MMPs in dimension at most five.** Jingjun Han, Jihao Liu, Lu Qi (first paper only), Ziquan Zhuang. [arXiv:2506.20183v1](#) / [arXiv:2509.01501](#).
16. 2025 **Non-vanishing implies numerical dimension one abundance.** Jihao Liu, Zheng Xu. [arXiv:2505.05250](#).
17. 2025 **On finite generation and boundedness of adjoint foliated structures.** Paolo Cascini, Jingjun Han, Jihao Liu, Fanjun Meng, Calum Spicer, Roberto Svaldi, Lingyao Xie. [arXiv:2504.10737](#).
18. 2025 **Classification of threefold enc cDV quotient singularities.** Jingjun Han, Jihao Liu. [arXiv:2501.01024](#).
19. 2024 **ACC for local volumes.** Jingjun Han, Jihao Liu, Lu Qi. [arXiv:2408.15090](#).
20. 2024 **Minimal model program for algebraically integrable adjoint foliated structures.** Paolo Cascini, Jingjun Han, Jihao Liu, Fanjun Meng, Calum Spicer, Roberto Svaldi, Lingyao Xie. [arXiv:2408.14258](#).
21. 2023 **Minimal model program for algebraically integrable foliations and generalized pairs.** Guodu Chen, Jingjun Han, Jihao Liu, Lingyao Xie. [arXiv:2309.15823](#).
22. 2023 **Vanishing theorems for generalized pairs.** Bingyi Chen, Jihao Liu, Lingyao Xie. [arXiv:2305.12337](#).
23. 2022 **Second largest accumulation point of minimal log discrepancies of threefolds.** Jihao Liu, Yujie Luo. [arXiv:2207.04610](#).
24. 2018 **Accumulation point theorem for generalized log canonical thresholds.** Jihao Liu. [arXiv:1810.12381](#).
25. 2017 **On invariance of plurigenera for foliated surface pairs.** Jihao Liu. [arXiv:1707.07092](#).

CONFERENCE AND WORKSHOP TALKS

Selected; seminar talks omitted.

- Apr 2026 *Existence of the minimal model program for log canonical generalized pairs.*
Algebraic Geometry Workshop 2026, YMSC, Tsinghua University.
- Feb 2026 *Boundedness of algebraically integrable foliations.*
Algebraic Geometry Workshop, Sydney Mathematical Research Institute.

- Jan 2026 *Birational geometry of algebraically integrable adjoint foliated structures.*
Workshop on Algebraic Geometry and Complex Geometry in Osaka, The University of Osaka.
- Dec 2025 *Boundedness of Fano algebraically integrable foliations.*
Conference on Algebraic Geometry, TSIMF, Sanya.
- Dec 2025 *Boundedness of Fano algebraically integrable foliations* (online).
Birational Geometry and Related Topics, XJTU, Suzhou.
- Jun 2025 *Adjoint foliated structures in birational geometry.*
Higher Dimensional Geometry and Foliations, Imperial College London.
- Jun 2025 *Abundance conjecture when $\nu \leq 1$.*
Southeastern Algebraic Geometry Symposium VIII.
- Dec 2024 *Birational geometry of adjoint foliated structures.*
Sanya Algebraic Geometry Workshop.
- Dec 2024 *Adjoint foliated structures on surfaces.*
2024 代数几何研讨会, Tongji University.
- Nov 2024 *Some optimal bounds in explicit birational geometry.*
2024 重庆理工大学代数几何会议, Chongqing University of Technology.
- Dec 2023 *Minimal model program for algebraically integrable foliations.*
Sanya Algebraic Geometry Workshop.
- Jun 2023 *Multiplicities on lc places.*
Birational Geometry Workshop, Tsinghua University.
- May 2023 *Optimal bounds for algebraic invariants of surfaces.*
Simons Conference on Higher Dimensional Geometry, Simons Center.
- Aug 2022 *ACC for mlds for terminal threefolds.*
Midwest Algebraic Geometry Graduate Conference, UIC.
- May 2022 *On Shokurov's ACC conjecture for mlds in dimension 3.*
JAMI Conference 2022 (in honor of Shokurov's 70th birthday), Johns Hopkins University.
- Aug 2021 *Existence of flips for generalized pairs.*
2021 Workshop on Algebraic Geometry: Generalised Pairs and Applications (online).
- Jul 2020 *Complements and ACC for minimal log discrepancies.*
Simons Conference on Rationality (online).

CONFERENCES AND SEMINARS ORGANIZED

- Aug 2026 Conference on Foliation, Fibration, and Moduli.
Westlake University, Hangzhou, August 24–29, 2026.
With Chuanhao Wei (local organizer) and Paolo Cascini.
- Jul 2026 5th National Algebraic Geometry Conference.
Peking University, July 6–10, 2026. Local organizer.
With Ruochuan Liu, Zhiyu Tian, Qizheng Yin.
- Aug 2025 Summer School on Birational Geometry of Foliations.
Peking University, August 18–22, 2025.
With Paolo Cascini, Jingjun Han, Fanjun Meng, Calum Spicer, Roberto Svaldi, Lingyao Xie.

May 2025	Conference on Explicit Birational Geometry. Peking University, May 28 – June 1, 2025.
May 2025	6th Beijing Algebraic Geometry Day. Peking University, May 9, 2025. Local organizer.
Nov 2024	2nd Beijing Algebraic Geometry Day. Peking University, November 23, 2024. Local organizer.
Aug 2024	1st Conference on Foliation and Birational Geometry. Fudan University, August 26–30, 2024. With Meng Chen, Chen Jiang, Jingjun Han.
2024 – present	Peking University Algebraic Geometry Seminar. With Fumiaki Suzuki (from 2025), Zhiyu Tian, Qizheng Yin.
2024 – present	Beijing Algebraic Geometry Day (joint workshop series with the Chinese Academy of Sciences, Tsinghua University, and Capital Normal University).
2021 – 2024	Northwestern Algebraic Geometry Seminar. Co-organized over six semesters with Yuchen Liu and rotating co-organizers (Charles Stibitz, Kai Huang, Ananth Shankar).
2019 – 2020	Utah Algebraic Geometry Reading Seminar. University of Utah, Fall 2019 – Spring 2020.

TEACHING

PEKING UNIVERSITY

Spring 2026	代数几何 II (Algebraic Geometry II) — instructor.
Fall 2025	代数几何 I (Algebraic Geometry I) — instructor.
Spring 2025	代数几何专题 (Topics in Algebraic Geometry) — instructor.

NORTHWESTERN UNIVERSITY

Winter 2024	Math 230-2 — Multivariable Integral Calculus. Instructor and course coordinator (sections 31, 41).
Fall 2023	Math 220-1 — Single-Variable Differential Calculus. Instructor (sections 71, 81).
Winter 2023	Math 220-2 — Single-Variable Integral Calculus. Instructor (sections 31, 41).
Fall 2022	Math 228-1 — Multivariable Differential Calculus for Engineering. Instructor (sections 71, 81).
Winter 2022	Math 228-1 — Multivariable Differential Calculus for Engineering. Instructor and course coordinator (sections 41, 51).
Fall 2021	Math 220-1 — Single-Variable Differential Calculus. Instructor (sections 41, 53).

UNIVERSITY OF UTAH

2017 – 2021	Math 1090 (Business Algebra) — instructor, Spring 2021, Fall 2020, Fall 2019. Math 2250 (Differential Equations) — teaching assistant, Fall 2018, Spring 2018. Math 1320 (Engineering Calculus) — teaching assistant, Spring 2017.
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REFEREEING

Refereed for the following journals (in alphabetical order):

Acta Mathematica Sinica (English Series) · Advances in Mathematics · Algebra and Number Theory · Algebraic Geometry and Physics · Annals of Mathematics · Communications in Analysis and Geometry · Compositio Mathematica · Electronic Research Archive · Épijournal de Géométrie Algébrique · European Journal of Mathematics · Forum of Mathematics, Sigma · International Journal of Mathematics · International Mathematics Research Notices · Journal für die reine und angewandte Mathematik (Crelle's Journal) · Journal of Algebra · Journal of Algebraic Geometry · Journal of Differential Geometry · Journal of the European Mathematical Society · Journal of the Institute of Mathematics of Jussieu · Journal of the London Mathematical Society · Manuscripta Mathematica · Mathematische Annalen · Michigan Mathematical Journal · Pacific Journal of Mathematics · Peking Mathematical Journal · Proceedings of the American Mathematical Society · Proceedings of the London Mathematical Society · Pure and Applied Mathematics Quarterly · Selecta Mathematica · Surveys in Differential Geometry.

Also refereed for *Higher Dimensional Algebraic Geometry: A Volume in Honor of V. V. Shokurov* (London Math. Soc. Lecture Note Ser.). Formerly a reviewer for Mathematical Reviews.