

Kai Xu

Morrey Visiting Assistant Professor, Department of Mathematics, UC Berkeley, CA 94720.

Contact: kaixu@berkeley.edu

Website: kaixu631.github.io

Employment

Morrey Visiting Assistant Professor, UC Berkeley, Jul 2025 – Jun 2026

Supervisor: Richard Bamler

Education

Ph.D. in Mathematics, Duke University, Aug 2020 – May 2025

Thesis: “The weak inverse mean curvature flow: existence theories and applications”

Advisor: Hubert Bray

B.S. in Mathematics, Peking University, Sep 2016 – Jul 2020

Thesis: “Domination relations in four-dimensional geometries”

Supervisor: Yi Liu

Publications and preprints

1. *Connected sum of manifolds with spectral Ricci lower bounds*
Joint with G. Antonelli, preprint (2025), [arxiv:2505.18320](https://arxiv.org/abs/2505.18320), submitted.
2. *3-Manifolds with positive scalar curvature and bounded geometry*
Joint with O. Chodosh, Y. Lai, preprint (2025), [arxiv:2502.09727](https://arxiv.org/abs/2502.09727), submitted.
3. *Codimension 2 drawstrings with scalar curvature lower bounds*
Joint with D. Kazaras, preprint (2025), [arxiv:2501.09149](https://arxiv.org/abs/2501.09149), submitted.
4. *A sharp spectral splitting theorem*
Joint with G. Antonelli, M. Pozzetta, preprint (2024), [arxiv:2412.12707](https://arxiv.org/abs/2412.12707), submitted.
5. *Inverse mean curvature flow with outer obstacle*
Preprint (2024), [arxiv:2405.15181](https://arxiv.org/abs/2405.15181), submitted.
6. *New spectral Bishop-Gromov and Bonnet-Myers theorems and applications to isoperimetry*
Joint with G. Antonelli, preprint (2024), [arxiv:2405.08918](https://arxiv.org/abs/2405.08918), submitted.
7. *Scalar curvature and volume entropy of hyperbolic 3-manifolds*
Joint with D. Kazaras, A. Song, preprint (2023), [arxiv:2312.00138](https://arxiv.org/abs/2312.00138), accepted by **J. Eur. Math. Soc.**
8. *Drawstrings and flexibility in the Geroch conjecture*

- Joint with D. Kazaras, preprint (2023), [arxiv:2309.03756](#), submitted.
9. *A topological gap theorem for the π_2 -systole of positive scalar curvature 3-manifolds*
Preprint (2023), [arxiv:2307.01922](#), **Duke Math. J.** 174(8), 1647-1664.
 10. *Isoperimetry and the properness of weak inverse mean curvature flow*
Calc. Var. Partial Differential Equations 63, 216 (2024).
 11. *Dimension constraints in some problems involving intermediate curvature*
Preprint (2023), [arxiv:2301.02730](#), **Trans. Amer. Math. Soc.** 378 (2025), 2091-2112.
 12. *On closed surfaces with nonnegative curvature in the spectral sense*
Preprint (2022), [arxiv:2211.11715](#), submitted.
-

Invited talks

1. May 2025: Geometric analysis seminar, National Center for Theoretical Sciences.
 2. May 2025: Simons Workshop on Geometric Analysis, New York University / Courant Institute.
 3. Apr 2025: Geometry-Topology seminar, University of Pennsylvania.
 4. Apr 2025: Geometry seminar, Lehigh University.
 5. Feb 2025: Differential geometry seminar, UC Irvine.
 6. Feb 2025: Differential geometry seminar, UC Berkeley.
 7. Nov 2024: Graduate student seminar, Simons Laufer Mathematical Institute.
 8. Oct 2024: Analysis seminar, Cornell University.
 9. Apr 2024: Geometric analysis seminar, Peking University / BICMR (online).
 10. Apr 2024: Geometry seminar, Michigan State University.
 11. Mar 2024: Geometric analysis and topology seminar, New York University / Courant Institute.
 12. Mar 2024: Geometry seminar, Chinese University of Hong Kong.
 13. Feb 2024: BIRS workshop: "Recent advances in comparison geometry", IASM Hangzhou, China.
 14. Nov 2023: Geometry and topology seminar, Duke University.
 15. Oct 2023: Geometric analysis seminar, University of Chicago.
 16. Oct 2023: Geometry seminar, Westlake University (online).
 17. Oct 2023: Geometry seminar, Stanford University.
 18. Jul 2023: CUHK-CUNY Compactness and scalar curvature workshop (online).
 19. Oct 2022: Geometry seminar, North Carolina State University.
-

Teaching

Spring 2025: Math 421 (differential geometry) & 621 (graduate differential geometry), grading.
Fall 2024: Math 333 (complex analysis) & 611 (algebraic topology), grading.
Summer 2024: Math 353 (ordinary and partial differential equations), TA.
Spring 2024: Math 218D (linear algebra), discussion leader.
Fall 2023: Math 111L (calculus), lab TA.
Summer 2023: Math 353 (ordinary and partial differential equations), TA.
Spring 2023: Math 111L (calculus), lab TA.

Fall 2022: Math 553 (asymptotic and perturbation methods), 555 (ODE), grading.

Spring 2022: Math 621 (differential geometry) & 411 (topology), grading.

Fall 2021: Math 111L (calculus), lab TA.

Mentoring

Summer 2022: DoMath program at Duke, project manager.

Awards and Fellowships

Oct 2019: Yizheng Alumnus Scholarship

Jun 2019: Scholarship in the Elite Education Program of Pure Mathematics

* Last update: Jul 2, 2025.