

Gabriel Khan

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Professional Website
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EDUCATION AND ACADEMIC POSITIONS

IOWA STATE UNIVERSITY

Ames, Iowa

Assistant Professor, August 2020 to Present

UNIVERSITY OF MICHIGAN

Ann Arbor, Michigan

Postdoctoral Research Fellow, May 2018 to July 2020

Mentor: Jun Zhang

THE OHIO STATE UNIVERSITY

Columbus, Ohio

Ph.D, Mathematics, May 2018

Masters, Mathematics, May 2015

Advisor: Fangyang Zheng

Thesis: *On the Hermitian Geometry of k -Gauduchon Orthogonal Complex Structures*

BOSTON UNIVERSITY

Boston, Massachusetts

B.A. in Mathematics with distinction, Minor in Physics, magna cum laude, May 2012

Advisor: Glen Richard Hall

RESEARCH

RESEARCH GRANTS

1. Simons Collaboration Grant (\$42,000) 2021 - 2026

SCHOLARLY WORKS

1. Log-concavity and fundamental gaps on surfaces of positive curvature (with X.H. Nguyen, M. Tuerkoen and G. Wei). arxiv.org/abs/2211.06403
2. Negative curvature constricts the fundamental gap of convex domains (with X.H. Nguyen). arxiv.org/abs/2211.06404
3. When optimal transport meets information geometry (with J. Zhang). Introduction for a special issue in Information Geometry. (June 2022) arxiv.org/abs/2206.14791
4. *An illustrated introduction to Ricci flow Preprint*
5. *A hall of statistical mirrors* (with J. Zhang). To appear: Asian Journal of Mathematics. arxiv.org/abs/2109.13809
6. *Recent developments on the MTW tensor* (with J. Zhang). Proceedings of the 5th International Conference for Geometric Science of Information.
7. *Kähler-Ricci Flow preserves negative anti-bisectional curvature* (with F. Zheng). arxiv.org/abs/2011.07181

8. *The Geometry of Positively Curved Kähler Metrics on Tube Domains* (with J. Zhang and F. Zheng). arxiv.org/abs/2001.06155
9. *The Kähler Geometry of Certain Optimal Transport Problems* (with J. Zhang), *Pure and Applied Analysis* (May 2020). arxiv.org/abs/1812.00032

An extended abstract for these results appeared in the proceedings to the 4th International Conference for Geometric Science of Information under the title *Hessian Curvature and Optimal Transport*.

10. *Connections with torsion in (para-)complexified structures* (with J. Zhang). Contributed chapter to *Progress in Information Geometry: Theory and Applications* (March 2021).
11. *Statistical Mirror Symmetry* (with J. Zhang). *Differential Geometry and its Applications* (August 2020).
12. *A Conjectural Inequality for Visible Points in Lattice Parallelograms* (with M. Khan, J. Saha, and P. Zhao). *Proceedings of Combinatorial and Additive Number Theory IV* (September 2020), arxiv.org/abs/1909.01306
13. *On the Expected Total Curvature of Confined Equilateral Quadrilaterals*. , arxiv.org/abs/1902.06316
14. *Eigenvalue estimates without Bakry-Émery-Ricci bounds*. arxiv.org/abs/1901.06277
15. *Weitzenböck Connections as a Generalization of Dually Flat Connections* (with J. Zhang), *Information Geometry* (July 2019)

An extended abstract for these results appeared in the proceedings to the 4th International Conference for Geometric Science of Information under the title *New Geometry of Parametric Statistical Models*.

16. *Hall's Conjecture on Extremal Sets for Random Triangles*, *Journal of Geometric Analysis* (May 2019), arxiv.org/abs/1704.05913
17. *The Set of All Orthogonal Complex Structures on the Flat 6-Tori* (with B. Yang and F. Zheng), *Advances in Mathematics* (August 2017), arxiv.org/abs/1604.05745
18. *Eigenvalues of the Complex Laplacian on compact non-Kähler manifolds*, *Annals of Global Analysis and Geometry* (August 2017), arxiv.org/abs/1512.05044
19. *Revisiting Toom's Proof of Bulgarian Solitaire* (with T. Hart and M. Khan), *Annales des Sciences Mathématiques du Québec* 36(2) (December 2011)

SERVICE

EDITOR

Guest editor for a special issue on optimal transport for *Information Geometry*

GRANT REVIEWS

Simons Foundation Collaboration Grant Program

REFEREE/REVIEWER

Information Geometry, *Rose-Hulman Undergraduate Mathematics Journal*, *SIGMA*, *Pure and Applied Analysis*, *Math Reviews*, *Zentralblatt*

SELECTED TEACHING EXPERIENCE**IOWA STATE UNIVERSITY**

Calculus 1

Calculus 2

Calculus 3

Linear Algebra

Differential Equations

Real Analysis I

Manifolds, Tensors, and Differential Geometry

Fall 2020 -Present

Fall 2021

Fall 2020

Spring 2022, Fall 2022

Fall 2022

Spring 2021

Fall 2021

Spring 2023

UNIVERSITY OF MICHIGAN

Fall 2018 -Spring 2020

Readings in Information Geometry and Optimal Transport

Fall 2019

THE OHIO STATE UNIVERSITY

September 2013-December 2017

Introduction to ODEs and PDEs for Incoming Masters Students

Summer 2016

Introduction to Statistics for Incoming Masters Students

Summer 2016

EDUCATIONAL TESTING SERVICES

June 2017

AP Calculus Reader, Kansas City, Missouri

OTHER SKILLS

Mathematica

L^AT_EX typesetting

French and Spanish (reading)

Triathlon

USAT All-American 2017

Last updated: March 6, 2023