Max Hallgren

Department of Mathematics
Rutgers University
Hill Center - Busch Campus
110 Frelinghuysen Road
Piscataway, NJ 08854-8019, USA

Mobile: 315-694-3330

Email: mh1564@scarletmail.rutgers.edu

Areas of specialization

Ricci Flow, Geometric Analysis

Education

2016-2022	**PhD in Mathematics**, Cornell University: –M.S. received in 2018 –Advisor: Xiaodong Cao –Research Area: Ricci Flow, Geometric Analysis
2017	**Visiting Student**, Fields Institute –Thematic Program on Geometric Analysis, Fall 2017 semester
2012-2016	**B.A. in Mathematics**, Cornell University

Employment

2022-	**NSF Mathematical Sciences Postdoctoral Research Fellowship**, Rutgers University

Grants, honors & awards

2022	**Mathematical Sciences Postdoctoral Research Fellowship**, National Science Foundation
2019	**Hutchinson Fellowship**, Cornell University –Awarded for excellence in research, provides one semester of teaching relief
2017	**Eleanor Norton York Award**, Cornell University
2016	**Summa cum Laude**, Cornell University
	Harry S. Kievel Prize in Mathematics, Cornell University

Publications & talks

Papers and Preprints

Dates on the left denote the year uploaded to arxiv.

2023	**Kähler-Ricci Tangent Flows are Infinitesimally Algebraic,** https://arxiv.org/abs/2312.06577
	Geometric regularity of blow-up limits of the Kähler-Ricci flow, with W. Jian, , J. Song, and G. Tian https://arxiv.org/abs/2310.08610
2022	**Tangent Flows of Kähler Metric Flows,** with W. Jian, *J. für die Reine und Angew. Math* (2023)
	Canonical Surgeries in Rotationally Invariant Ricci Flow, with T. Buttsworth and Y. Zhang https://arxiv.org/abs/2201.09387
2021	**Ricci Flow with Ricci Curvature and Volume Bounded Below,** https://arxiv.org/abs/2104.03386
2020	**The Entropy of Ricci Flows with Type-I Scalar Curvature Bounds,** *Advances in Mathematics* 418, (2023)
2019	**Local Stability of Einstein Metrics Under Ricci Iteration,** With T. Buttsworth *Journal of Functional Analysis* 280, No. 2 (2021)
2018	**Nonexistence of Noncompact Type-I Ancient Three-Dimensional κ-Solutions of Ricci Flow with Positive Curvature,** *Communications in Contemporary Mathematics* 21, No. 06, (2019)
2017	**A Differential Harnack Inequality for the Newell-Whitehead-Segel Equation,** With D. Booth, J. Burkart , X. Cao, Z. Munro, J. Snyder, T. Stone *Anal. Theory Appl.*, 35 (2019), pp. 192-204.

Talks

2023	**Geometric Regularity of Singularity Models of the Kähler-Ricci Flow** Princeton Geometric Analysis Seminar (Fall 2023)
	Geometric Regularity of Singularity Models of the Kähler-Ricci Flow CUHK Geometric Analysis Seminar (Fall 2023)
	Geometric Regularity of Singularity Models of the Kähler-Ricci Flow PDE and Geometric Analysis Seminar, University of Connecticut (Fall 2023)
	Tangent Flows of Kähler Metric Flows Geometric Flows and Applications, ICMS (Summer 2023)
	Tangent Flows of Kähler Metric Flows Workshop on Ricci Flow, UC San Diego (Spring 2023)
	Tangent Flows of Kähler Metric Flows Ricci Flow and Related Topics, University of Warwick (Spring 2023)
	Tangent Flows of Kähler Metric Flows Rutgers Geometric Analysis Seminar (Spring 2023)
2022	**Nonsmooth Limits of Kähler-Ricci Flows** Rutgers-Newark Colloquium (Fall 2022)
	Tangent Flows of Kähler Metric Flows Yale Geometric Analysis & Applications Seminar (Spring 2022, online)
	The Tensor Maximum Principle Austrilian Geometric PDE Seminar (Spring 2022, online)
	Ricci Flow with a Lower Bound on Ricci Curvature and Volume University of Iowa Differential Geometry Seminar (Spring 2022, online)
	Ricci Flow with a Lower Bound on Ricci Curvature and Volume GeoTop Seminar at the University of Copenhagen (Winter 2022, online)
2021	**Ricci Flow with a Lower Bound on Ricci Curvature and Volume** Online seminar "Metric Measure Spaces and Convergence" (Fall 2021, online)
	Ricci Flow with a Lower Bound on Ricci Curvature and Volume Beijing International Center for Mathematical Research (Spring 2021, online)
	Ricci Flow with a Lower Bound on Ricci Curvature and Volume City University of New York Geometric Analysis Seminar (Spring 2021, online)
2020	**Singular Ricci Flows** Cornell Geometric Analysis Seminar (Fall 2020, online)
	Entropy convergence of Ricci flows with a Type-I scalar curvature bound University of Wisconson-Madison Geometry and Topology Seminar (Fall 2020)

Almost Splitting Theorem University of California at San Diego Cheeger-Colding Seminar (3-part talk) (Summer 2020, online)

Quantitative Stratification University of California at San Diego Cheeger-Colding Seminar (2-part talk) (Summer 2020, online)

2019 **Entropy convergence of Ricci flows with a Type-I scalar curvature bound.** Rutgers Complex Analysis and Geometry Seminar (Fall 2019)

Entropy convergence of Ricci flows with a Type-I scalar curvature bound. Cornell Analysis Seminar (Fall 2019)

2018 **Backward Uniqueness for Parabolic Equations**. Bonn University Summer School: Unique Continuation and Inverse Problems (Fall 2018)

2016 **Neckpinch Singularities in Ricci Flow.** Cornell Geometric Analysis Seminar (2-part talk) (Fall 2016)

Curvature, Topology, and Pinched Spheres. Cornell Undergraduate Math Club (Spring 2016)

Teaching

2023 **Lecturer**, Rutgers University

- Calculus 1 for the Mathematical and Physical Sciences (Fall 2023)

2017-2022 **Teaching Assistant**, Cornell University

- Differential Geometry (Spring 2022)

- Applied Complex Analysis (Fall 2021)

- Graduate Differentiable Manifolds (Fall 2020)

- Graduate Applied Functional Analysis (Spring 2020)

- Partial Differential Equations (Spring 2019)

- Theoretical Linear Algebra and Calculus (Fall 2018)

- Graduate Partial Differential Equations (Spring 2018, Spring 2020)

- Calculus for the Life Sciences (Spring 2017)

2019 **Instructor**, Cornell University

- Calculus I (Fall 2019)

2014-2015 **Tutor**, Cornell University Math Support Center (August 2014-December 2015)

Service

2020 **Mentor,** Cornell University Directed Reading Program (Spring 2021-Spring 2022)

2017 **Co-organizer,** Cornell Olivetti Seminar (Spring 2017)

2016 **Mentor,** Cornell Research Experience for Undergraduates in "Nonlinear Heat Equations" (Summer 2016)