

# Max Hallgren

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## 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 **Geometric regularity of blow-up limits of the Kähler-Ricci flow**, with W. Jian, J. Song, and G. Tian
- 2022 **Tangent Flows of Kähler Metric Flows**, with W. Jian <https://arxiv.org/abs/2202.06185>  
**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  $\kappa$ -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 **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 2023)  
**Tangent Flows of Kähler Metric Flows** Yale Geometric Analysis & Applications Seminar (Spring 2022, online)  
**The Tensor Maximum Principle** Australian 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 Wisconsin-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 I 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)