

RUOBING ZHANG

CURRICULUM VITAE

Address Department of Mathematics **Email:** rzhang573@wisc.edu
University of Wisconsin-Madison
Madison, Wisconsin, 53706

Research Areas

Differential geometry, geometric analysis, metric Riemannian geometry, complex geometry, and conformal geometry

Education

- **Princeton University**, Ph.D. in Mathematics, May 2016
 - ▷ **Thesis:** Regularity, quantitative geometry and curvature bounds
 - ▷ **Advisors:** Alice Chang and Paul Yang
- **Yantai University (China)**, B.S. in Mathematics, July 2011

Appointments

- Associate Professor of Mathematics, University of Wisconsin-Madison 08/2024 – ~
- Assistant Professor of Mathematics, Princeton University 09/2020 – 08/2024
- James H. Simons Instructor, Stony Brook University 09/2016 – 08/2020

Visiting Positions

- Distinguished Visiting Professor, Chinese Academy of Sciences Summer 2023
- Visiting Research Scholar, ShanghaiTech University Spring 2019
- Visiting Scholar, Academia Sinica (Taipei) January 2019
- RTG Visiting Research Scholar, Princeton University Fall 2018
- Visiting Scholar, Academia Sinica (Taipei) January 2018

Awards/Grants

- 2023 International Congress of Chinese Mathematicians Best Paper Award
Article: *Nilpotent structures and collapsing Ricci-flat metrics on K3 surfaces* [Journal]
- NSF Grant [DMS-2304818](#) (August 1, 2023 – July 31, 2026):
Metric geometry and analysis on Einstein manifolds
- NSF Grant [DMS-1906265](#) (June 1, 2019 – May 31, 2023):
Geometric analysis of Einstein manifolds and their generalizations

Publications

Published/Accepted

1. *Torelli-type theorems for gravitational instantons with quadratic volume growth* (with G. Chen and J. Viaclovsky), to appear in **Duke Mathematical Journal** (2023) [arXiv]

2. *Hodge theory on ALG* manifolds* (with G. Chen and J. Viaclovsky), to appear in **Journal für die reine und angewandte Mathematik** (2023) [[arXiv](#)]
3. Collapsing geometry of hyperkähler 4-manifolds and applications (with S. Sun), to appear in **Acta Mathematica** (2022) [[arXiv](#)]
4. *Nilpotent structures and collapsing Ricci-flat metrics on K3 surfaces* (with H.-J. Hein, S. Sun and J. Viaclovsky), **Journal of the American Mathematical Society**, 35 (2022), no.1, 123-209 [[Journal](#)] [[arXiv](#)]
5. *A Liouville theorem on asymptotically Calabi spaces* (with S. Sun), **Calculus of Variations and Partial Differential Equations** 60 (2021), no.3, 1-43 [[Journal](#)] [[arXiv](#)]
6. *Collapsing Ricci-flat metrics on elliptic K3 surfaces* (with G. Chen and J. Viaclovsky), **Communications in Analysis and Geometry**, 28 (2020), no.8, 2019-2133 [[Journal](#)] [[arXiv](#)]
7. *Regularity and rigidity for nonlocal curvatures in conformal geometry* (with W. Chen), **Journal of Mathematical Studies**, 53 (2020), no.4, 436-470 [[Journal](#)]
8. *A note on the collapsing geometry of hyperkähler four manifolds* (with Shouhei Honda and Song Sun), **Science China Mathematics**, 62 (2019), no.11, 2195-2210 [[Journal](#)] [[Preprint](#)]
9. *Nonlocal curvature and topology of locally conformally flat manifolds*, **Advances in Mathematics**, 335 (2018), 130-169. [[Journal](#)] [[arXiv](#)]
10. *A direct method of moving spheres on fractional order equations* (with W. Chen and Y. Li), **Journal of Functional Analysis**, 272 (2017), no. 10, 4131-4157 [[Journal](#)] [[arXiv](#)]
11. *Topology and ϵ -regularity theorems on collapsed manifolds with Ricci curvature bounds* (with A. Naber), **Geometry and Topology**, 20 (2016), no.5, 2575-2664 [[Journal](#)] [[arXiv](#)]

Preprints

1. *Geometric structures of collapsing metric measure spaces with Ricci curvature bounds* (with S. Honda), preprint, 2024
2. *Energy bounds, orbifold compactness, and diffeomorphism finiteness of Poincaré-Einstein spaces* (with F. Wang), preprint, 2024
3. *Compactness and uniqueness problems of Poincaré-Einstein manifolds* (with A. Chang and P. Yang), preprint, 2024
4. *Singular set of degenerate and singular elliptic equations on Poincaré-Einstein manifolds* (with X. Jiang and Y. Sire), submitted, 2023 [[arXiv](#)]
5. *Asymptotically Calabi metrics and weak Fano manifolds* (with H.-J. Hein, S. Sun, and J. Viaclovsky), submitted, 2023 [[arXiv](#)]
6. *Complex structure degenerations and collapsing of Calabi-Yau metrics* (with S. Sun), submitted, 2020 [[arXiv](#)]

Special Lectures and Colloquia

1. *Department Colloquium*, University of Miami, 05/2024
2. *2023 International Congress of Chinese Mathematicians: Best Paper Award Lecture*, Shanghai Institute for Mathematics and Interdisciplinary Sciences, 01/2024
3. *Young Mathematician Lecture Series*, National University of Singapore, 10/2023
4. *Department Colloquium*, University of Kansas, 09/2023
5. *School Colloquium*, Shanghai Jiaotong University, 07/2023

6. *School Colloquium*, Zhejiang University, 06/2023
7. *Distinguished Lecture*, Arbeitsgruppen Differentialgeometrie (Augsburg-Fribourg-Karlsruhe-Stuttgart), 05/2023
8. *SCMS Lecture*, Shanghai Center Math. Sci., Fudan University, 01/2023
9. *Westlake Forum*, Westlake University, Hangzhou, China, 11/2022
10. *Institute Colloquium*, Chinese Academy of Sciences, 08/2022

Conference Talks

1. *Pacific Rim Complex-Symplectic Geometry Conference*, Institute for Basic Science, Korea, 07/2024
2. *Moduli spaces and singularities*, Centre de Recherches Mathématiques, Montréal, 05/2024
3. *Rutgers Gauge Theory, Low-Dimensional Topology, and Geometric Analysis Conference*, Rutgers University, 05/2024
4. *2024 Eastern AMS Sectional Meeting: Recent Developments in Geometric Analysis*, Howard University, 04/2024
5. *2023 International Congress of Chinese Mathematicians*, Shanghai Institute for Mathematics and Interdisciplinary Sciences, 01/2024
6. *2023 Conference on Differential Geometry and Geometric Analysis*, National Tsinghua University (Hsinchu), 12/2023
7. *2023 Simons Math Summer Workshop: The SYZ Conjecture and Collapsing Calabi-Yau manifolds*, Simons Center, 08/2023
8. *Annual Workshop on Geometric Analysis 2023*, Ürümqi China, 06/2023
9. *Symposium on Geometry in Honor of Eugenio Calabi's 100th Birthday*, University of Science and Technology of China, 06/2023
10. *Oberwolfach Workshop: Hypoelliptic Operators in Geometry*, 05/2023
11. *36th Annual Geometry Festival*, Courant Institute of Mathematical Sciences, New York University, 04/2022
12. *2021 Simons Collaboration on Special Holonomy in Geometry, Analysis and Physics Annual Meeting*, Simons Foundation, New York, 09/2021
13. *Geometric PDE and Applications to Problems in Conformal and CR Geometry*, Banff International Research Station, 05/2021
14. *Riemannian Topology Research Conference* (Augsburg-Fribourg-Karlsruhe), 04/2021
15. *Conference on Geometric analysis and PDEs*, Shanghai Jiaotong University, 04/2020
16. *Geometric Invariance and Partial Differential Equations*, Academia Sinica and Tsinghua University, 01/2020
17. *Pacific Rim Complex-Symplectic Geometry Conference*, ShanghaiTech University, 07/2019
18. *Trends in Modern Geometry 2019*, Tsinghua University, 06/2019
19. *Conference for the 10th Enhanced Program for Graduate Study*, Peking University, 05/2019
20. *The Third Symposium in Geometry and Differential Equations*, University of Science and Technology of China, 05/2019
21. *Geometric Invariance and Partial Differential Equations*, Institute of Mathematics, Academia Sinica, 01/2019

22. *The Structure of Collapsed Special Holonomy Spaces*, Duke University, 04/2018
23. *Topology and Curvature Lower Bounds*, Mathematisches Forschungsinstitut Oberwolfach, 11/2017
24. *AMS Spring Eastern Sectional Meeting*, City University of New York, 05/2017
25. *AMS Fall Eastern Sectional Meeting*, Rutgers University, 11/2015
26. *Workshop on Riemannian Convergence Theory*, Stony Brook University, 11/2015
27. *AMS Fall Western Sectional Meeting*, California State University, 10/2015
28. *Workshop on Geometric Analysis*, Peking University, 06/2015
29. *Workshop on Ricci Curvature*, Northwestern University, 05/2015
30. *Graduate Students Geometry & Topology Conference*, Notre Dame University, 04/2013

Advanced Mini-Courses

1. *Metric geometry of the Ricci curvature*, Expository Lectures for the Calabifest, University of Science and Technology of China, 06/2023
2. *Degenerations of Riemannian metrics*, Chinese Academy of Sciences, 06/2023
3. *Topics in metric Riemannian geometry*, University of Wisconsin-Madison, 05/2023
4. *Riemannian geometry: a metric entrance*, Chern Institute of Mathematics, Nankai University, Tianjin, China, 07/2021
5. *Structure theory of Einstein spaces*, Tsinghua University, Beijing, China, 07/2019
6. *Geometry of collapsed Calabi-Yau spaces*, Capital Normal University, Beijing, China, 07/2019

Selected Seminar Talks

- **2024**

1. *Geometric Analysis Seminar*, Brown University, 04/2024
2. *Geometry Seminar*, Lehigh University, 04/2024
3. *Geometry and Topology Seminar*, Stony Brook University, 04/2024
4. *Analysis Seminar*, Columbia University, 02/2024

- **2023**

1. *Northwestern-UIC Complex Geometry Seminar*, Northwestern University, 10/2023
2. *Analysis and PDE Seminar*, National University of Singapore, 10/2023
3. *Geometry Seminar*, University of Kansas, 09/2023
4. *Geometric Analysis Seminar*, Sun Yat-Sen University, 06/2023
5. *BIMSA-BIT Differential Geometry Seminar*, Beijing Institute of Technology, 06/2023
6. *Geometry & Analysis Seminar*, UC Santa Cruz, 05/2023
7. *Joint Princeton-Rutgers Geometric PDEs Seminar*, 04/2023
8. *Geometry Seminar*, Indian Institute of Science, 04/2023

9. *Geometric Analysis Seminar*, University of Maryland, 03/2023
10. *Lisbon Geometry Seminar*, Instituto Superior Tecnico in Lisbon, 03/2023
11. *Geometry & Topology Seminar*, Stony Brook University, 02/2023
12. *Topology Seminar*, Texas A & M University, 02/2023
13. *Differential Geometry Seminar*, University of Texas, Dallas, 01/2023
14. *Analysis Seminar*, UC Irvine, 01/2023

• **2022**

1. *Geometry Seminar*, Pennsylvania State University, 10/2022
2. *Geometry and Topology Seminar*, University of Pennsylvania, 10/2022
3. *Differential and Symplectic Geometry Seminar*, University of Minnesota, 09/2022
4. *Geometry and Topology Seminar*, University of Wisconsin-Madison, 09/2022
5. *Geometric Analysis Seminar*, Zhejiang University, 05/2022
6. *Geometry and Physics Seminar*, University of Boston, 04/2022
7. *PDE and Differential Geometry Seminar*, University of Connecticut, 04/2022
8. *Analysis Seminar*, Johns Hopkins University, 04/2022
9. *Geometric Analysis Seminar*, Capital Normal University, Beijing, 03/2022

• **2021**

1. *Geometric Analysis Seminar*, BICMR, Peking University, 12/2021
2. *Geometry Seminar*, University of Florence, 11/2021
3. *Geometric analysis and PDEs Seminar*, Shandong University, 11/2021
4. *Geometry and Topology Seminar*, Rutgers University, 10/2021
5. *Geometry Seminar*, Beijing Insitute of Technology, 08/2021
6. Summer school on Ricci and scalar curvature, Tongji University, 07/2021
7. *Geometric Analysis Seminar*, USTC, China, 05/2021
8. *Differential Geometry Seminar*, UC Santa Barbara, 04/2021
9. *Differential Geometry Seminar*, University of Iowa, 03/2021 and 04/2021

• **2020**

1. *Geometry Seminar*, Chern Institute of Mathematics, Nankai University, 07/2020
2. *Geometric Analysis Seminar*, University of Chicago, 03/2020
3. *Nonlinear Analysis Seminar*, Rutgers University, 02/2020

• **2019**

1. *Geometric Analysis Seminar*, CUNY Graduate Center, 11/2019
2. *PDE Seminar*, Georgia Institute of Technology, 10/2019
3. *Geometric Analysis Seminar*, UC Santa Cruz, 10/2019
4. *Differential Geometry Seminar*, University of Minnesota, 10/2019

5. *Geometry & Topology Seminar*, UW Madison, 10/2019
6. *Geometry & Physics Seminar*, Boston University, 10/2019
7. *Differential Geometry Seminar*, Princeton University, 09/2019
8. *Geometric Analysis Seminar*, Cornell University, 09/2019
9. *Geometry & Topology Seminar*, Stony Brook University, 09/2019
10. *Geometric Analysis Seminar*, Sun Yat-Sen University, 07/2019
11. *Nonlinear Analysis Seminar*, Chinese Academy of Sciences, 07/2019
12. *Differential Geometry Seminar*, Tianjin University, 07/2019
13. *Differential Geometry Seminar*, Tongji University, 06/2019
14. *Differential Geometry Seminar*, Nanjing University, 05/2019
15. *Differential Geometry Seminar*, Capital Normal University, 04/2019
16. *Differential Geometry Seminar*, Zhejiang University, 04/2019
17. *Geometric Analysis Seminar*, Shanghai Jiaotong University, 03/2019

• **2018**

1. *Differential Geometry Seminar*, Princeton University, 12/2018
2. *Geometry & Topology Seminar*, Stony Brook University, 11/2018
3. *Differential Geometry Seminar*, Purdue University, 10/2018
4. *Differential Geometry Seminar*, CUNY Graduate Center, 10/2018
5. *Differential Geometry Seminar*, Karlsruhe Institut für Technologie, 05/2018
6. *Geometry & Topology Seminar*, Stony Brook University, 04/2018
7. *Geometry Seminar*, University of California, Santa Barbara, 03/2018

• **2014-2017**

1. *Differential Geometry Seminar*, Princeton University, 12/2017
2. *Geometry & Topology Seminar*, Indiana University, 10/2017
3. *Analysis Seminar*, Johns Hopkins University, 10/2016
4. *Geometry & Topology Seminar*, Stony Brook University, 09/2016
5. *Nonlinear Analysis Seminar*, Rutgers University, 12/2015
6. *Geometry Seminar*, City University of New York, 12/2015
7. *Geometry & Topology Seminar*, University of Toronto, 11/2015
8. *Analysis Seminar*, Yeshiva University, 10/2015
9. *Geometry Seminar*, University of California, Santa Barbara, 10/2015
10. *Felix Klein Geometry Seminar*, University of Notre Dame, 09/2015
11. *Geometry and Topology Seminar*, Stony Brook University, 09/2015
12. *Geometric Analysis Seminar*, Tsinghua University, Beijing, China, 06/2015
13. *Geometry Seminar*, Capital Normal University, Beijing, China, 06/2015
14. *Geometric Analysis Seminar*, Tsinghua University, Beijing, China, 07/2014

Organizing Services

- *The 4th Joint Princeton-SJTU Conference on Geometric Analysis & PDEs*, 06/2024
- *2023 Pacific Rim Complex-Symplectic Geometry Conference*, 07/2023
- *The 3rd Joint Princeton-SJTU Conference on Geometric Analysis & PDEs*, 06/2023
- *The 37th Annual Geometry Festival*, 04/2023
- **Annual Princeton Horizons Lecture and Seminar** *discussing societal impacts of the mathematics profession*, 04/2023
- *The 2nd Joint Princeton-SJTU Conference on Geometric Analysis & PDEs*, 06/2022
- *The 1st Princeton-SJTU-MPIM (Leipzig) Joint Conference on Geometric Analysis & PDEs*, 07/2021
- *Differential Geometry & Geometric Analysis Seminar (Princeton University)*, Fall 2020 - present
- *Geometry & Topology Seminar (Stony Brook)*, Fall 2019-Summer 2020
- *Princeton-IAS joint seminar on geometric measure theory*, Fall 2018
- *Geometric analysis learning seminar (Stony Brook)*, Fall 2016-Spring 2018
- *Geometric analysis learning seminar (Princeton University)*, 2015-2016

Departmental Services

- Mathematics Department Climate and Inclusion Committee 2023 – present
- Graduate Admission Committee 2020 and 2022
- Students Advising:
 - Graduate students: David Degen, Xin Qian
 - Undergraduate students: Sara Ansari, Nianli Peng

Teaching Experience

- (Graduate) *Topics in geometry*: metric geometry of Einstein spaces, Fall 2023
- (Graduate) *Advanced topic course in Riemannian geometry*: Spring 2018
- *Complex analysis (proof based)*: Fall 2022
- *Advanced linear algebra with applications (proof based)*: Spring 2023, Spring 2024
- *Mathematical analysis and Fourier analysis (proof based)*: Spring 2019
- *Honors linear algebra (proof based)*: Spring 2022
- *Single variable calculus*: Spring 2014, Spring 2018, Spring 2020
- *Analysis I (proof based)*: Fall 2020
- *Multivariable calculus*: Spring 2017, Fall 2018, Fall 2019, Fall 2021
- *Precalculus*: Fall 2016