Aaron Naber

Professor of Mathematics
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Degrees:

B.S. Mathematics, Pennsylvania State University, 2005.

Ph.D. Mathematics, Princeton University, 2009.

   Advisor: Gang Tian; Thesis: Ricci Solitons and Collapsed Spaces.

Employment:

Massachusetts Institute of Technology, Moore Instructor, 2009–2012.

Massachusetts Institute of Technology, Assistant Professor, 2012–2013.

Northwestern University, Associate Professor, 2013–2015.

Northwestern University, Professor, 2015–

Northwestern University, Kenneth F. Burgess Professor of Mathematics, 2015–2024

Institute for Advanced Study, Professor of Mathematics 2024–

Honours:

Princeton Centennial Fellowship, 2008–2009.

ICM 2014 Section Speaker, Geometry.

Sloan Fellow, 2014.

Kenneth F. Burgess Professor of Mathematics, 2015–.

Fellow of the American Mathematical Society, 2017.

New Horizons Prize in Mathematics, 2017.

Minerva Distinguished Visitor at Princeton, 2018.

Simons Investigator, 2023.

ICBS Frontiers of Science Award, 2024.

Fermat Prize in Mathematics, 2024.

Member of the National Academy of Sciences, 2024.

ICBS Frontiers of Science Award, 2025.

Select Publications

Energy Identity for Stationary Harmonic Maps (w/ Valtorta), **preprint** (2024) .

Fundamental Groups and the Milnor Conjecture (w/ Brué and Semola), **Annals of Mathematics** 201 (2025), no. 1, 225–289.

Boundary regularity and stability for spaces with Ricci bounded below (w/ E. Brue and D. Semola), **Inventiones**, Vol 228 (2022), 539–686.

L^2 Curvature Bounds on Spaces with Bounded Ricci Curvature (w/ W. Jiang), **Annals of Mathematics** 193 (2021), no. 1, 107–222.

Rectifiability of Singular Sets in Noncollapsed Spaces with Ricci Curvature bounded below (w J. Cheeger and W. Jiang), **Annals of Mathematics** 193 (2021), no. 2, 407–538.

Energy Identity for Stationary Yang-Mills (w/ D. Valtorta), **Inventiones**, 216 (2019), no. 3, 847-925.

Rectifiable-Reifenberg and the Regularity of Stationary and Minimizing Harmonic Maps (w/ D. Valtorta), **Annals of Mathematics** (2) 185 (2017), no. 1, 131–227.

Ricci Curvature and Bochner Formulas for Martingales (w/ R. Haslhofer), **Comm. Pure. Applied Math.** 71 (2018), no. 6, 1074–1108.

Einstein Manifolds and the Codimension Four Conjecture (w/ J. Cheeger), **Annals of Mathematics** 182, 1093–1165, 2014.

Characterizations of Bounded Ricci Curvature on Smooth and NonSmooth Spaces **preprint**, 2013.

Lower Bounds on Ricci Curvature and Quantitative Behavior of Singular Sets (with J. Cheeger), **Inventiones Math.** 191 (2013), 321–339.

Sharp Hölder continuity of tangent cones for spaces with a lower Ricci curvature bound and applications (with T. Colding), **Annals of Mathematics**, 176 (2012), Issue 2, 1173–1229.

Publications

Compact Manifolds with Unbounded Nilpotent Fundamental Groups and Positive Ricci Curvature (w/ Brué and Semola), **preprint** (2025).

Fukaya-Yamaguchi Conjecture in Dimension Four (w/ Brué and Semola) **preprint** (2025).

Rectifiable Reifenberg and uniform positivity under almost Calibrations (w/ Edelen and Valtorta), **preprint** (2024).

Energy Identity for Stationary Harmonic Maps (w/ Valtorta), **preprint** (2024) .

Six Dimensional Counterexample to the Milnor Conjecture (w/ Brué and Semola), **preprint** (2024).

Lower Ricci Curvature and Nonexistence of Manifold Structure (w/ Hupp and Wang), **Geometry and Topoloy** 29(2025), no. 1, 443–477.

Stability of Tori under Lower Sectional Curvature (w/ Brué and Semola), **Geometry and Topology** 28(2024) no. 8, 3961–3972.

Fundamental Groups and the Milnor Conjecture (w/ Brué and Semola), **Annals of Mathematics** 201 (2025), no. 1, 225–289.

Codimension Four Regularity of Generalized Einstein Structures (w/ X. Fu and J. Streets), accepted to **Math. Ann.**, 387(2023), no 3-4, 2001–2059.

Convergence and Regularity of Manifolds with Scalar Curvature and Entropy Lower Bounds (w/ M.C. Lee and R. Neumayer), Prospectives in Scalar Curvature, Chapter 3, **World Scientific Publishing** 2022.

Differential Harnack Inequalities on Path Space (w/ R. Haslhofer and E. Kopfer), **Adv. Math.** 410 (2022), part A

Boundary regularity and stability for spaces with Ricci bounded below (w/ E. Brue and D. Semola), **Inventiones**, Vol 228 (2022), 539–686.

d_p Convergence and ϵ-Regularity Theorems for Entropy and Scalar Curvature Lower Bounds (w/ M.C. Lee and R. Neumayer), accepted to **Geometry and Topology.**

Rectifiability of Singular Sets in Noncollapsed Spaces with Ricci Curvature bounded below (w J. Cheeger and W. Jiang), **Annals of Mathematics** 193 (2021), no. 2, 407–538.

L^2 Curvature Bounds on Spaces with Bounded Ricci Curvature (w/ W. Jiang), **Annals of Mathematics** 193 (2021), no. 1, 107–222.

Conjectures and Open Questions on the Structure and Regularity of Spaces with Lower Ricci Curvature Bounds, **SIGMA**, 16 (2020), 104.

Quantitative Estimates on the Singular Sets of Alexandrov Spaces (w/ N. Li), **Peking Math. J.**, 3 (2020), no. 2, 203–234.

Lecture Notes on Rectifiable Reifenberg for Measures, **Harmonic Analysis and Applications**, 289–346,IAS/Park City Math. Ser., 27, Amer. Math. Soc.

Effective Reifenberg theorems in Hilbert and Banach spaces (w/ N. Edelen and D. Valtorta), **Math. Ann.** 374 (2019), no. 3-4, 1139-1218.

Energy Identity for Stationary Yang-Mills (w/ D. Valtorta), **Inventiones**, 216 (2019), no. 3, 847-925.

Stratification for the singular set of approximate harmonic maps (w/ D. Valtorta), **Math. Z.** 290 (2018), no 3-4, 1415–1455, 2017.

Ricci Curvature and Bochner Formulas for Martingales (w/ R. Haslhofer), **Comm. Pure. Applied Math.** 71 (2018), no. 6, 1074–1108.

The Singular Structure and Regularity of Stationary and Minimizing Varifolds (w/ D. Valtorta), **J.Eur. Math. Soc. (JEMS)**, (2020), no. 10, 3305–3382.

Rectifiable-Reifenberg and the Regularity of Stationary and Minimizing Harmonic Maps (w/ D. Valtorta), **Annals of Mathematics** (2) 185 (2017), no. 1, 131–227.

Quantitative Reifenberg theorem for measures (w N. Edelen and D. Valtorta), **accepted Math. Zeitschrift**, 2017.

Characterizations of the Ricci Flow (w/ R. Haslhofer), **J. Eur. Math. Soc.** 20 (2018), no. 5, 1269–1302.

Topology and ϵ-regularity Theorems on Collapsed Manifolds with Ricci Curvature Bounds (w/ R. Zhang), **Geom. Topol.** 20 (2016), no. 5, 2575–2664.

Quantitative regularity for p-harmonic maps (w/ D. Valtorta and G. Veronelli), **Comm. Anal. Geom.** 27 (2019), no. 1, 111–159.

Einstein Manifolds and the Codimension Four Conjecture (w/ J. Cheeger), **Annals of Mathematics** 182, 1093–1165, 2014.

Structure Theory of Metric-Measure Spaces with Lower Ricci Curvature Bounds I (with A. Mondino), **J. Eur. Math. Soc.** 21 (2019), no. 6, 1809–1854.

Volume estimates on the critical sets of solutions to elliptic PDEs (with D. Valtorta), **Comm. Pure Appl. Math.** 70 (2017), no. 10, 1835–1897.

Quantitative Stratification and the Regularity of Harmonic Map Flow (w. J Cheeger and R. Haslhofer), **Calc. of Var. and PDE** 53 (2015), no 1-2, 365–381.

Characterizations of Bounded Ricci Curvature on Smooth and NonSmooth Spaces **preprint**, 2013.

Sharp Estimates on the First Eigenvalue of the p-Laplacian with negative Ricci Lower Bound (w/ D. Valtorta), **Math. Z.** 227 (2014), no 3-4, 867–891.

Quantitative Stratification and Critical Sets of Elliptic Equations (with J. Cheeger and D. Valtorta), **Comm. Pure Appl. Math.** 68 (2015), no. 2, 173–209.

Quantitative Stratification and the Regularity of the Mean Curvature Flow (with J. Cheeger and R. Haslhofer), **Geom. Funct. Anal.** 23 (2013), no. 3, 828–847.

New Logaritmic Sobolev Inequalities and an ϵ-regularity Theorem for the Ricci Flow (with H. Hein), **Comm. Pure Appl. Math.** 67 (2014), no. 9, 1543–1561.

Lower Ricci Curvature, Branching, and Bi-Lipschitz Structure of Uniform Reifenberg Spaces (with T. Colding), **Advances in Mathematics**, Vol 249 (2013), 348-ÂĂÂŞ-358.

Characterization of Tangent Cones of Noncollapsed Limits with Lower Ricci Bounds and Applications (with T. Colding), **Geometric and Functional Analysis** Vol 23, Issue 1 (2013), 134–148.

Quantitative Stratification and the Regularity of Harmonic Maps and Minimal Currents (with J. Cheeger), **Communications on Pure and Applied Mathematics** Vol 66, Issue 6 (2013), 965–990.

Lower Bounds on Ricci Curvature and Quantitative Behavior of Singular Sets (with J. Cheeger), **Inventiones Math.** 191 (2013), 321–339.

Sharp Hölder continuity of tangent cones for spaces with a lower Ricci curvature bound and applications (with T. Colding), **Annals of Mathematics**, 176 (2012), Issue 2, 1173–1229.

Geometric Structures of Collapsing Riemannian Manifolds II: N*-bundles and Almost Ricci Flat Spaces (with G. Tian), **J. Reine Angew. Math.** 744 (2018), 103-132.

Geometric Structures of Collapsing Riemannian Manifolds I (with G. Tian), **Survey's in Geometric Analysis and Relativity in Honor of Richard Schoen's 60th Birthday**, International Press, 2010.

Noncompact Shrinking 4-Solitons with Nonnegative Curvature, **J. Reine Angew. Math.**, 645 (2010), 125-153.

Some Geometry and Analysis on Ricci Solitons, **preprint**, 2006.