

Shrey Aryan

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 [shrey183.github.io](https://github.com/shrey183)

Research Interests

Geometric analysis, nonlinear partial differential equations, and optimal transport.

Education

MIT, Cambridge, MA September 2022–present
Ph.D. in Mathematics; expected May 2027
Advisor: Tobias Colding

ETH Zürich, Switzerland September 2020–June 2022
M.S. in Mathematics
Thesis: Stability of Hardy–Littlewood–Sobolev Inequality
Advisor: Alessio Figalli

École Polytechnique, Palaiseau, France September 2017–June 2020
B.S. in Mathematics and Computer Science
Thesis: Existence of two-solitary waves with logarithmic distance for the nonlinear Klein–Gordon equation
Advisor: Yvan Martel

Honors and Fellowships

- Simons Dissertation Fellowship in Mathematics.
- Landis Fellowship, MIT.
- ESOP Scholarship, ETH Zürich.
- Class valedictorian at École Polytechnique.

Publications and Preprints

1. Contracting Transport Maps on Riemannian Manifolds (joint with Bang-Xian Han and Zhuo-Nan Zhu).
[arXiv:2607.27711](https://arxiv.org/abs/2607.27711) [math.DG].
2. Non-uniqueness of geodesic limits and a question of Grayson and Gage (joint with Tang-Kai Lee).
[arXiv:2608.04855](https://arxiv.org/abs/2608.04855) [math.DG].
3. Calabi-Yau Conjecture for Minimal Hypersurfaces in $\mathbb{R}^4$ with bounded geometry (joint with Alexander McWeeney and Giuseppe Tinaglia).
[arXiv:2608.04364](https://arxiv.org/abs/2608.04364) [math.DG].

4. Topological Half-Space Theorems for Minimal Hypersurfaces in $\mathbb{R}^4$ (joint with Alexander McWeeney).
[arXiv:2607.05755 \[math.DG\]](#).
5. Spectral Obstructions to Contracting Transport Maps on Curved Spaces.
[arXiv:2605.24705 \[math.DG\]](#).
6. On the Calabi–Yau Conjectures for Minimal Hypersurfaces in Higher Dimensions (joint with Alexander McWeeney).
[arXiv:2602.16048 \[math.DG\]](#).
7. Continuous-in-time Bubbling for the Energy-Critical Heat Flow.
[arXiv:2512.18840 \[math.AP\]](#).
8. Entropic Selection Principle for Monge’s Optimal Transport (joint with Promit Ghosal).
[arXiv:2502.16370 \[math.PR\]](#).
9. Soliton Resolution for the energy-critical nonlinear heat equation in the radial case.
[arXiv:2405.06005 \[math.AP\]](#). To appear in Analysis & PDE.
10. Free energy minimizers with radial densities: classification and quantitative stability (joint with Lauro Silini).
[arXiv:2412.03997 \[math.AP\]](#).
11. Improvement of Wu’s logarithmic Sobolev inequality via the Poisson–Föllmer process (joint with Yair Shenfeld and Pablo López Rivera), Electron. Commun. Probab. **30** (2025), Paper No. 91, 14 pp.; MR4989825.
12. Concavity for elliptic and parabolic equations in locally symmetric spaces with nonnegative curvature (joint with Michael Law), Calc. Var. Partial Differential Equations **64** (2025), no. 7, Paper No. 202, 17 pp.; MR4931465.
13. Trend to equilibrium for flows with random diffusion (joint with Matthew Rosenzweig and Gigliola Staffilani), Int. Math. Res. Not. IMRN **2024**, no. 10, 8764–8781; MR4749186.
14. Stability of Hardy Littlewood Sobolev inequality under bubbling, Calc. Var. Partial Differential Equations **62** (2023), no. 8, Paper No. 223, 42 pp.; MR4635800.
15. Existence of two-solitary waves with logarithmic distance for the nonlinear Klein-Gordon equation, Commun. Contemp. Math. **24** (2022), no. 1, Paper No. 2050091, 25 pp.; MR4378151.

Teaching and Mentoring

- Undergraduate Research Opportunities Program (UROP) mentor, MIT 2026
- Recitation leader, Multivariable Calculus, MIT 2025
- Teaching assistant, summer school in optimal transport, SLMath 2025
- Research Science Institute (RSI) mentor, MIT 2024
- Directed Reading Program mentor, MIT 2023

Talks

1. Convexity and Information Theory Workshop, Institut Henri Poincaré (forthcoming) 2027
2. Geometric Analysis Seminar, The University of Chicago 2026
3. Geometric Analysis Seminar, North Carolina State University 2026
4. Geometric Analysis Seminar, Beijing International Center for Mathematical Research 2026
5. Geometry and Topology Seminar, Lehigh University 2026
6. Geometric Analysis Seminar, Brown University 2026
7. AMS Sectional (Metric, Analytic, and Classical Methods in Differential Geometry), Boston 2026
8. AMS Sectional (Geometric Flows), Boston 2026
9. Analysis Seminar, Yale University 2026
10. Probability Seminar, Massachusetts Institute of Technology 2026
11. Analysis Seminar, Columbia University 2025
12. Colloquium Talk, Indian Statistical Institute 2025
13. Colloquium Talk, Kennesaw State University 2025
14. Graduate Lecture Series in Analysis and PDEs, Brown University 2025
15. Harmonic Analysis and Differential Equations Seminar, UC Berkeley 2024
16. Short Contributed Talk at the Nonlinear PDEs Summer School, UC Berkeley 2024

Academic Service

Seminar organization. PDE and Geometric Analysis Graduate Student Learning Seminar, MIT.

Refereeing. Crelle's Journal, Mathematische Annalen and Journal of Differential Geometry.