

Renato Ghini Bettiol

CUNY Lehman College and Graduate Center
Department of Mathematics
<http://www.lehman.edu/faculty/rbettiol>
✉ r.bettiol@lehman.cuny.edu

Curriculum vitae

Employment

- 2023 – present Associate Professor, City University of New York, Lehman College, Bronx, NY, USA
- 2021 – present Doctoral faculty member, City University of New York, Graduate Center, New York, NY, USA
- 2018 – 2023 Assistant Professor, City University of New York, Lehman College, Bronx, NY, USA
- 2015 – 2018 Hans Rademacher Instructor of Mathematics, University of Pennsylvania, Philadelphia, PA, USA

Research visits

- Fall 2024 Research Member, Simons Laufer Mathematical Sciences Institute, Berkeley, CA, USA
- Summer 2019 Visiting scientist, Max Planck Institute for Mathematics, Bonn, Germany
- Fall 2016 Postdoctoral fellow, Max Planck Institute for Mathematics, Bonn, Germany

Education

- 2015 Doctor of Philosophy (Ph.D.) in Mathematics, University of Notre Dame, USA
- 2012 Master of Science (M.Sc.) in Mathematics, University of Notre Dame, USA
- 2010 Master of Science (M.Sc.) in Mathematics, University of São Paulo, Brazil
- 2008 Bachelor of Science (B.Sc.) in Mathematics (with honors), University of São Paulo, Brazil

Research interests

Differential Geometry, Geometric Analysis, Partial Differential Equations

Grants and Awards

- 2022 – 2027 NSF CAREER: Curvature, Topology, and Geometric Partial Differential Equations, with new tools from Applied Mathematics (DMS-2142575, PI, \$499,964)
- 2023 Feliks Gross Award for Outstanding Scholarship, CUNY Academy for the Humanities and Sciences (\$1,000)
- 2023 – 2025 Fapesp SPRINT: Geometric Dynamics between São Paulo and New York (2022/14254-3, co-PI, \$13,200)
- 2019 – 2022 NSF Geometric Analysis: New Perspectives on Four-Dimensional Geometry (DMS-1904342, PI, \$220,855)
- 2019 – 2021 Fapesp SPRINT: Geometry and Dynamics between São Paulo and New York (2019/09045-3, co-PI, \$20,000)
- 2019 – 2020 PSC-CUNY Research Award: Bifurcation and local rigidity in Geometric Variational Problems (PI, \$3,500)
- 2016 – 2018 AMS-Simons Travel Grant (PI, \$4,000)
- Aug 2016 NSF Geometric Analysis: Smoky Great Plains Geometry Conference 2016 (DMS-1630367, co-PI, \$39,812)
- 2014 Member of the U.S. Delegation to the 2nd Heidelberg Laureate Forum (with NSF and ORAU support)

Publications and Preprints

36. *Bifurcations of Clifford tori in ellipsoids* (with P. Piccione)
submitted, arXiv:2309.13758
35. *Two results on the Convex Algebraic Geometry of sets with continuous symmetries* (with M. Kummer and R. Mendes)
Bull. Lond. Math. Soc., to appear arXiv:2408.03231
34. *Nonplanar minimal spheres in ellipsoids of revolution* (with P. Piccione)
Ann. Sc. Norm. Super. Pisa Cl. Sci., to appear, arXiv:2111.14995
33. *Curvature operators and rational cobordism* (with M. Goodman)
Adv. Math. 458 (2024), Paper No. 109995, MR 4815050, arXiv:2212.07548

32. *Geography of pinched four-manifolds* (with M. Kummer and R. Mendes)
Comm. Anal. Geom. 32 (2024), no. 5, 1255–1310, MR 4836035, arXiv:2106.02138
31. *Multiplicity of singular solutions to the fractional Yamabe problem on spheres* (with M. d. M. González and A. Maalaoui)
J. Differential Equations 389 (2024), 285–304, MR 4695635, arXiv:2302.11073
30. *Extremality and rigidity for scalar curvature in dimension four* (with M. Goodman)
Selecta Math. 30 (2024), no. 1, Paper No. 7, MR 4678416, arXiv:2205.00543
29. *Diameter and displacement of sphere involutions* (with E. Lauret)
Mat. Contemp. 57 (2023), 23–31, MR 4683406, arXiv:2205.05186
28. *Ricci flow does not preserve positive sectional curvature in dimension four* (with A. Krishnan)
Calc. Var. Partial Differential Equations 62 (2023), no. 1, Paper No. 13, MR 4505156, arXiv:2112.13291
27. *Full Laplace spectrum of distance spheres in symmetric spaces of rank one* (with E. Lauret and P. Piccione)
Bull. Lond. Math. Soc. 54 (2022), no. 5, 1683–1704, MR 4505727, arXiv:2012.02349
26. *Global bifurcation for a class of nonlinear ODEs* (with P. Piccione)
São Paulo J. Math. Sci. 16 (2022), no. 1, 486–507, MR 4426405, arXiv:2107.08181
25. *The first eigenvalue of a homogeneous CROSS* (with E. Lauret and P. Piccione)
J. Geom. Anal. 32 (2022), no. 3, Paper No. 76, MR 4363749, arXiv:2001.08471
24. *Subspace foliations and collapse of closed flat manifolds* (with A. Derdzinski, R. Mossa, and P. Piccione)
Math. Nachr. 295 (2022), no. 12, 2338–2356, arXiv:2002.05757
23. *Sectional curvature and Weitzenböck formulae* (with R. Mendes)
Indiana Univ. Math. J. 71 (2022), no. 3, 1209–1242, MR 4448583, arXiv:1708.09033
22. *Convex algebraic geometry of curvature operators* (with M. Kummer and R. Mendes)
SIAM J. Appl. Algebra Geom. 5 (2021), no. 2, 220–228, MR 4252070, arXiv:1908.03713
21. *Nonuniqueness of conformal metrics with constant Q -curvature* (with P. Piccione and Y. Sire)
Int. Math. Res. Not. IMRN 2021, no. 9, 6967–6992, MR 4251294, arXiv:1806.01373
20. *Instability and bifurcation* (with P. Piccione)
Notices Amer. Math. Soc. 67 (2020), no. 11, 1679–1691, MR 4201907
19. *Four-dimensional cohomogeneity one Ricci flow and nonnegative sectional curvature* (with A. Krishnan)
Comm. Anal. Geom. 27 (2019), no. 3, 511–527, MR 4003002, arXiv:1606.00778
18. *Teichmüller theory and collapse of flat manifolds* (with P. Piccione and A. Derdzinski)
Ann. Mat. Pura Appl. (4) 197 (2018), no. 4, 1247–1268, MR 3829569, arXiv:1705.08431
17. *Infinitely many solutions to the Yamabe problem on noncompact manifolds* (with P. Piccione)
Ann. Inst. Fourier (Grenoble) 68 (2018), no. 2, 589–609, MR 3803113, arXiv:1603.07788
16. *Strongly positive curvature* (with R. Mendes)
Ann. Global Anal. Geom. 53 (2018), no. 3, 287–309, MR 3785699, arXiv:1403.2117
15. *Three-manifolds with many flat planes* (with B. Schmidt)
Trans. Amer. Math. Soc. 370 (2018), no. 1, 669–693. MR 3717993, arXiv:1407.4165
14. *Deformations of free boundary CMC hypersurfaces* (with P. Piccione and B. Santoro)
J. Geom. Anal. 27 (2017), no. 4, 3254–3284. MR 3708014, arXiv:1411.0354
13. *Strongly nonnegative curvature* (with R. Mendes)
Math. Ann. 368 (2017), no. 3–4, 971–986. MR 3673642, arXiv:1511.07899
12. *Four-dimensional manifolds with positive biorthogonal curvature*
Asian J. Math 21 (2017), no. 2, 391–396. MR 3672264, arXiv:1502.02270
11. *Delauunay-type hypersurfaces in cohomogeneity one manifolds* (with P. Piccione)
Int. Math. Res. Not. IMRN, 2016, no. 10, 3124–3162. MR 3551832, arXiv:1306.6043

10. *Bifurcation of periodic solutions to the singular Yamabe problem on spheres* (with P. Piccione and B. Santoro) J. Differential Geom. 103 (2016), no. 2, 191-205. MR 3504948, arXiv:1401.7071
9. *Flag manifolds with strongly positive curvature* (with R. Mendes) Math. Z. 280 (2015), no. 3-4, 1031-1046. MR 3369365, arXiv:1412.0039
8. *On the equivariant implicit function theorem with low regularity and applications to geometric variational problems* (with P. Piccione and G. Siciliano) Proc. Edinb. Math. Soc. (2) 58 (2015), no. 1, 53-80. MR 3333978, arXiv:1009.5721
7. *Equivariant deformations of Hamiltonian stationary Lagrangian submanifolds* (with P. Piccione, B. Santoro) Mat. Contemp. 43 (2014), 61-88. MR 3426257, arXiv:1302.6970
6. *Equivariant bifurcation in geometric variational problems* (with P. Piccione and G. Siciliano) Progress in Nonlinear Differential Equations and Their Applications, Vol. 85 (2014), 103-133, Springer. MR 3330725, arXiv:1308.3268
5. *Deforming solutions of geometric variational problems with varying symmetry groups* (with P. Piccione and G. Siciliano) Transform. Groups 19 (2014), no. 4, 941-968. MR 3278856, arXiv:1403.4275
4. *Positive biorthogonal curvature on $S^2 \times S^2$* Proc. Amer. Math. Soc. 142 (2014), no. 12, 4341-4353. MR 3267002, arXiv:1210.0043
3. *Multiplicity of solutions to the Yamabe problem on collapsing Riemannian submersions* (with P. Piccione) Pacific J. Math. 266 (2013), no. 1, 1-21. MR 3105774, arXiv:1304.5510
2. *Bifurcation and local rigidity of homogeneous solutions to the Yamabe problem on spheres* (with P. Piccione) Calc. Var. Partial Differential Equations 47 (2013), no. 3-4, 789-807. MR 3070564, arXiv:1107.5335
1. *Genericity of nondegenerate geodesics with general boundary conditions* (with R. Giambò) Topol. Methods in Nonlinear Anal. 35 (2010), no. 2, 339-365. MR 2676821, arXiv:0910.4175

Book

1. *Lie Groups and Geometric Aspects of Isometric Actions* (with M. Alexandrino), Springer, 2015. MR 3362465

Invited talks (last 5 years)

- Feb 2024 Cornell University, Analysis Seminar. *Cohomogeneity one minimal hypersurfaces*
- Dec 2024 SLMath NFC Seminar, Berkeley, CA. *Cohomogeneity one minimal hypersurfaces*
- Nov 2024 Curvature and Geometric Analysis in Rome, Rome, Italy. *Cohomogeneity one minimal hypersurfaces*
- May 2024 Rutgers University Conference on Gauge Theory, Low-Dimensional Topology, and Geometric Analysis. *Curvature operators and rational cobordism*
- Apr 2024 AMS Sectional Meeting, Washington, DC. *Compactness of G -invariant minimal hypersurfaces*
- Apr 2024 AMS Sectional Meeting, Washington, DC. *Nonuniqueness of solutions to the singular fractional Yamabe problem on spheres*
- Feb 2024 Oberwolfach, Germany. *Curvature operators and rational cobordism*
- Sep 2023 Brown University, Geometric Analysis Seminar. *Bifurcating minimal surfaces in ellipsoids of revolution*
- Jul 2023 MATRIX, Creswick, Australia. Spectrum and Symmetry for Group Actions in Differential Geometry II. *A new Lie-theoretic approach to the Bochner technique*
- Jul 2023 ICMAT, Madrid, Spain. Geometry Day. *Curvature operators and rational cobordism*
- Jun 2023 IMAG, Granada, Spain. Summer School in Conformal Geometry and Non-Local operators. *Bifurcating minimal surfaces in ellipsoids of revolution*
- Apr 2023 Joint Northwestern-UChicago Geometric Analysis Seminar. *Curvature operators and rational cobordism*
- Apr 2023 Topology, Geometry, and Physics Seminar (Zoom). *Curvature operators and rational cobordism*
- Mar 2023 Carnegie Mellon University, Pittsburgh, PA. Center for Nonlinear Analysis Seminar. *Symmetry-breaking bifurcations for the overdetermined Serrin problem*

- Jan 2023 Joint Mathematics Meetings, Special Session on Riemannian Manifolds with Lower Scalar Curvature Bounds, Boston, MA. *New obstructions to positivity of curvature via twisted spinors*
- Nov 2022 Gromov, Hanke, Sormani, Yu's Not Only Scalar Curvature Online Seminar (Zoom). *Scalar curvature rigidity and extremality in dimension 4*
- Oct 2022 Rutgers University, Geometric Analysis Seminar. *Bifurcating minimal surfaces in ellipsoids of revolution*
- Oct 2022 Geometric Analysis: Past, Present and Future (YouTube). *Bifurcating minimal surfaces with symmetries*
- Oct 2022 CUNY Graduate Center, Harmonic Analysis and PDE Seminar. *Nonuniqueness of solutions to the fractional Yamabe problem*
- Jul 2022 University of Münster, Germany, Geometry Oberseminar. *Extremality and rigidity for scalar curvature in dimension 4*
- Jun 2022 University of Parma, Italy, Geometry Seminar. *Convex Algebraic Geometry: Introduction and Applications*
- Jun 2022 Convergence or Scalar Curvature Seminar (Zoom). *Extremality and rigidity for scalar curvature in dimension 4*
- Apr 2022 Johns Hopkins University, Analysis and PDE Seminar. *Minimal 2-spheres in ellipsoids of revolution*
- Mar 2022 University of Toronto, Geometry-Topology Seminar. *Bifurcating minimal 2-spheres in ellipsoids of revolution*
- Feb 2022 Columbia University, Geometry & Analysis Seminar. *Four-dimensional Ricci flow and sectional curvature*
- Nov 2021 Clark University (Zoom), Lefschetz Seminar. *Minimal 2-spheres in ellipsoids*
- Nov 2021 University of California at Berkeley, Differential Geometry Seminar. *Sectional curvature bounds from the perspective of Convex Algebraic Geometry*
- Sep 2021 III Encuentro Matemático del Caribe (Zoom), Plenary Talk. *Minimal 2-spheres in ellipsoids of revolution*
- Sep 2021 3o Encontro em Geometria Diferencial no RS (Zoom). *Minimal spheres in ellipsoids of revolution*
- Jul 2021 Mathematical Congress of the Americas (Zoom), Special Session. *Minimal 2-spheres in ellipsoids of revolution*
- May 2021 University of Chicago (Zoom), Geometric Analysis Seminar. *Minimal 2-spheres in ellipsoids of revolution*
- Apr 2021 Irish Geometry Seminar (Zoom). *Geography of pinched 4-manifolds*
- Apr 2021 Montana State University, Colloquium (Zoom). *Bifurcating minimal spheres in ellipsoids*
- Mar 2021 Bronx Community College, S-STEM Seminar. *How to recognize the shape of a world from within it?*
- Mar 2021 AMS Spring Eastern Virtual Sectional Meeting (Zoom). *Pinched 4-manifolds*
- Mar 2021 University of Notre Dame, Geometric Analysis Seminar (Zoom). *Geography of pinched 4-manifolds*

PhD Students

- 2024 – present John Kerin, CUNY Graduate Center
- 2021 – present Aditya Kumar, Johns Hopkins University (co-advised with Yannick Sire)
- Apr 2022 Sammy Sbiti, University of Pennsylvania (co-advised with Wolfgang Ziller)

Teaching experience

| | CUNY Lehman College | | CUNY Graduate Center |
|-------------|-------------------------------------|-------------|----------------------|
| Spring 2025 | Linear Algebra | | |
| Fall 2024 | Calculus I Lab | | |
| Spring 2024 | Independent study, Calculus I Lab | Spring 2024 | Riemannian Geometry |
| Fall 2023 | Linear and Semidefinite Programming | | |
| Spring 2023 | Linear and Semidefinite Programming | Spring 2023 | Comparison Geometry |
| Fall 2022 | Linear Algebra | | |
| Spring 2022 | Probability | | |
| Fall 2021 | Real Analysis | | |
| Spring 2021 | Probability | | |
| Fall 2020 | Real Analysis | | |
| Spring 2020 | Vector Calculus; Probability | | |
| Fall 2019 | Vector Calculus | | |
| Spring 2019 | Calculus I; Calculus II | | |
| Fall 2018 | Calculus I | | |

University of Pennsylvania

- Spring 2018 Calculus II; Differential Geometry
- Fall 2017 Calculus II
- Spring 2017 Calculus III; Topics in Riemannian Geometry
- Spring 2016 Linear Algebra II; Calculus I for the Wharton Business School - Active learning format, “flipped classroom”
- Fall 2015 Introduction to PDEs/Calculus IV

Teaching Awards

- 2016 *Good Teaching Award*, Department of Mathematics, University of Pennsylvania
- 2012 *Striving for Excellence in Teaching*, Kaneb Center for Teaching and Learning, University of Notre Dame

Committee work and institutional service

- 2024-present Member of the Lehman College School of Natural & Social Science Undergraduate Research Council
- 2022-present CUNY Graduate Center Curriculum and Examination Committee (Differential Geometry)
- 2019-present Chair of the Calculus Committee at Lehman College (Calculus coordinator)
- 2018-present Co-organizer of CUNY Geometric Analysis Seminar
- 2020-2023 CUNY Lehman College Senate Representative for the Department of Mathematics

Academic and professional service

Referee service (full reports and quick opinions, multiple times for some journals)

Advances in Mathematics, Annali di Matematica Pura ed Applicata, Annals of Global Analysis and Geometry, Archiv der Mathematik, Birkhäuser, Bulletin of the London Mathematical Society, Boletín de la Sociedad Matemática Mexicana, Calculus of Variations and PDEs, Communications in Analysis and Geometry, Communications in Contemporary Mathematics, Compositio Mathematica, Beiträge zur Algebra und Geometrie, CRC Press, Taylor & Francis Group, Differential Geometry and Applications, Documenta Mathematica, Geometriae Dedicata, Geometry and Topology, Geometric and Functional Analysis GAFA, Illinois Journal of Mathematics, Journal of Geometric Analysis, Journal of Geometry and Physics, Journal of Mathematical Analysis and Applications, Journal of Mathematical Physics, Journal of Topology and Analysis, Manuscripta Mathematica, Matematica Contemporanea, Mathematical Research Letters, Mathematische Annalen, Michigan Mathematical Journal, Nonlinear Analysis, Nonlinear Differential Equations and Applications, Oxford University Press, Proceedings of the AMS, Revista de la UMA, Revista Matemática Iberoamericana, Science China Mathematics, SIGMA, Tohoku Mathematical Journal, Transactions of the AMS

Panel service

- multiple years National Science Foundation, Division of Mathematical Sciences

Reviewer service

- 2015-present Mathematical Reviews (MathSciNet), Zentralblatt Math (zbMATH)

Organization of events

- 2025 Lead organizer of Workshop in Computational Geometric Analysis, New York, NY
- 2023 Co-organizer of CUNY Symposium on Recent Trends in Nonlinear and Geometric Analysis, New York, NY
- 2018 Co-organizer of 33rd Annual Geometry Festival, in honor of Eugenio Calabi’s 95th birthday, at the University of Pennsylvania, Philadelphia, PA
- 2016 Co-organizer of 3rd Smoky Great Plains Geometry Conference, “Reflections on Global Riemannian Geometry”, in honor of Karsten Grove’s 70th birthday, Townsend, TN
- 2013 Co-organizer of 11th Graduate Student Geometry and Topology Conference

Memberships

- American Mathematical Society (AMS), member since 2010
- Brazilian Mathematical Society (SBM), member since 2007
- National Alliance for Doctoral Studies in the Mathematical Sciences (Math Alliance), mentor since 2018