Curriculum Vitae
Demetre Kazaras

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Education and Work

2023 – current Assistant Professor **Michigan State University**, Mathematics

2020 – 2023 Postdoctoral Researcher **Duke University**, Mathematics (supervisor: Hugh Bray)

2017 – 2020 Postdoctoral Researcher **Stony Brook University**, Mathematics (supervisors: Michael Anderson, Marcus Khuri)

2013 – 2017 Ph.D. **University of Oregon**, Mathematics (advisor: Boris Botvinnik)

2011 – 2014 M.S. **University of Oregon**, Mathematics

2007 – 2011 B.A. **St. Mary's College of Maryland**, Mathematics (advisor: Ivan Sterling)

Research Interests

Differential geometry and smooth topology: Mathematical General Relativity, geometric PDE, minimal surfaces, comparison geometry, convergence of manifolds, low dimensional topology.

Publications

2023 D. Kazaras, A. Sing, K. Xu *Scalar curvature and volume entropy of hyperbolic 3-manifolds.* Preprint, arXiv:2312.00138.

2023 D. Kazaras, K. Xu *Drawstrings and flexibility in the Geroch conjecture.* Preprint, arXiv:2309.03756.

2023 B. Allen, E. Bryden, D. Kazaras *On the Stability of Llarull's Theorem in Dimension Three.* Preprint, arXiv:2305.18567.

2023 S. Hirsch, D. Kazaras, M. Khuri, Y. Zhang *Spectral Torical Band Inequalities and Generalizations of the Schoen-Yau Black Hole Existence Theorem.* Preprint, arXiv:2301.08270 .

2022 B. Allen, E. Bryden, D. Kazaras *Stability of the positive mass and torus rigidity theorems under integral curvature bounds.* Preprint, arXiv:2209.12857.

2022 S. Hirsch, D. Kazaras, M. Khuri, Y. Zhang *Rigid comparison geometry of Riemannian bands and open manifolds.* Preprint, arXiv:2210.04340.

2021 D. Kazaras, M. Khuri, D. Lee *Stability of the positive mass theorem under Ricci curvature lower bounds.* Preprint, arXiv:2111.05202.

2021 H. Bray, S. Hirsch, D. Kazaras, M. Khuri, Y. Zhang *Spacetime harmonic functions on asymptotically hyperbolic manifolds and mass.* Available upon request.

2021 H. Bray, S. Hirsch, D. Kazaras, M. Khuri, Y. Zhang *Spacetime Harmonic Functions and Applications to Mass.* **Perspectives in Scalar Curvature,** To appear.

2020 S. Hirsch, D. Kazaras, M. Khuri, *Spacetime Harmonic Functions and the Mass of 3-Dimensional Asymptotically Flat Initial Data for the Einstein Equations.* **Journal of Diff. Geom.** To appear.

2019 H. Bray, D. Kazaras, M. Khuri, D. Stern, *Harmonic Functions and The Mass of 3-Dimensional Asymptotically Flat Riemannian Manifolds.* Journal of Geometric Analysis, to appear.

2019 D. Kazaras, C. Sormani, and 12 undergraduate students, *Smocked metric spaces and their tangent cones.* **Missouri J. Math. Sci.** 33 (1) (2021) 27–99

2019 D. Kazaras, *Desingularizing positive scalar curvature* 4*-manifolds.* 2019. arXiv:1905.05306 (Accepted modulo revision to Math. Annalen)

2019 D. Kazaras, D. Ruberman, N. Saveliev, *On positive scalar curvature cobordisms and the conformal Laplacian on end-periodic manifolds.* **Commun. Anal. Geom.** To appear

2018 J. Basilio, D. Kazaras, C. Sormani, *An intrinsic flat limit of Riemannian manifolds with no geodesics.* **Geometriae Dedicata** (2019) 1–20

2017 B. Botvinnik, D. Kazaras, *Minimal hypersurfaces and bordism of postive scalar curvature metrics.* **Math. Annalen** (2017) vol. 371, no. 1-2, 189–224

2016 D. Kazaras, *Gluing Scalar-Flat Manifolds with Constant Mean Curvature on the Boundary.* Preprint 2016. arXiv:1601.05169

2015 X. Cao, M. Cerenzia, D. Kazaras, *Harnack Estimate for the Endangered Species Equation*, **Proceedings of the American Mathematical Society** (2015) vol. 143, no. 10, 4537–4545

2012 D. Kazaras, I. Sterling, *An Explicit Formula for the Spherical Curves with Constant Torsion*, **Pacific Journal of Mathematics** (2012) vol. 259, no. 2, 361–372

Selected Professional Activities

2023 current **MSU Geometry seminar** Coorganizer.

2023 current **MSU Geometric analysis reading seminar** Organizer and creator.

2022 Winter **JMM special session on Riemannian Manifolds with Lower Scalar Curvature Bounds** Coorganizer of special session with 20 scheduled participants.

2022 Summer **Curriculum development** Proposed and created curriculum for Math and Ethics class.

2022 Summer **Research with undergraduates** Developed and ran "Minimal surfaces modulo p" research program with four first and second year undergraduate students.

2022 Spring **Convergence or scalar curvature seminar** Co-organized and ran independent seminar.

2022 Spring **Department course evaluation review and update** Added questions on department/class climate, data analysis, followup actions.

2021 August **Math Department Bystander Training** Facilitator.

2021 – 2023 **Diversity Equity and Inclusion team** Duke University.

2021 Spring **AMS Paradigms** attendee.

2020 – 2023 **Geometry and Topology Seminar,** Duke University. Organizer.

2019 – 2020 **Geometry and Topology Seminar,** Stony Brook University. Coorganizer.

2018 – 2020 **The Geometric Analysis Learning Seminar,** Stony Brook University. Organizer of Professor X.X. Chen's seminar for graduate students and postdocs. Long-form weekly meetings on classical topics.

2018 – 2020 **The First and Second Year Seminar,** Stony Brook University. Coorganizer. Biweekly seminars targeting early graduate students, supporting professional development.

2019 Winter **Undergraduate Research in Metric Geometry,** Stony Brook University and CUNY Lehman College. Coorganizer with Christina Sormani. Developed a new undergraduate research program with 16 participants resulting in a paper.

2018 March **Spring School on Geometric Aspects of General Relativity,** Simons Center for Geometry and Physics. Organizer.

2014 – 2015 **Association for Women in Mathematics,** (University of Oregon chapter) Undergraduate mentoring program. Biweekly meetings with a student on a project in topological data analysis.

2014 – 2017 **Differential Geometry Seminar,** University of Oregon. Organizer. Weekly graduate student seminar in differential geometry. Organized special seminars in Ricci flow and Seiberg-Witten equations.

Refereeing

Journal of Differential Geometry, SIGMA, Annals of Global Analysis and Geometry, Communications in Math. Phys., J. London Math. Soc.

Selected Lectures

2023 Sept **Simons center: Mass, the Einstein Constraint Equations, and the Penrose Inequality Conjecture** *Stability of Llarull's Theorem in dimension 3.*

2022 June **Simons center: Recent Advances on Scalar Curvature Problems** *Comparison geometry and spacetime harmonic functions.*

2022 April **The CMSA General Relativity Conference** *Comparison geometry and spacetime harmonic functions.*

2022	February	**Convergence and scalar curvature** *Introduction to the mass in GR for geometers.*
2021	October	**University of Regensburg: Oberseminar Mathematical Physics** *Harmonic functions, mass, and stability of the positive mass theorem*
2021	October	**Duke University Geometry and topology seminar** *If Ricci is bounded below, then mass is in control!*
2021	July	**16th Marcel Grossman meeting: Mathematical Problems of Relativistic Physics** *The spacetime Laplace equation on initial data sets for Einstein's equations*
2021	April	**University of California Santa Barbra Differential Geometry seminar** *The spacetime Laplace equation on initial data sets for Einstein's equations*
2020	November	**Duke University Geometry and topology seminar** *The spacetime Laplace equation on initial data sets for Einstein's equations*
2020	October	**AMS Fall Sectional** (Special Session on Variational Aspects of Geometric Analysis) *Spacetime harmonic maps on asymptotically flat initial data sets*
2020	June	**University of Göttingen** (Geometry and Topology seminar) *Scalar curvature, mass, and harmonic maps*
2019	December	**University of Chicago** (Geometric Analysis Seminar) *Desingularizing positive scalar curvature 4-manifolds*
2019	November	**University of Miami** (Workshop of Geometric Analysis) *A new proof of the 3d positive mass theorem*
2019	August	**Shanghai Tech** (Colloquium) *Distinguishing Riemannian metrics of positive scalar curvature*
2019	July	**Cortona, Italy** (Geometry of Scalar Curvature) *Torical symmetrization and spherical Lipschitz bounds*
2019	June	**Centro de Investigación en Matemáticas (CIMAT)** (Mathematical Relativity: A Riemannian Approach) *Desingularizing positive scalar curvature 4-manifolds*
2019	March	**Simons Center for Geometry and Physics** (Convergence and low regularity in general relativity) *Desingularizing positive scalar curvature 4-manifolds*
2018	Dec.	**New York University (Courant Institute)** (NYU Scalar Curvature Workshop) *A SWIF Limit with no Geodesics*
2018	September	**Universität Regensburg** (Conference: Analytical problems in conformal geometry and applications) *Minimal hypersurfaces with free boundary and PSC bordism*
2018	March	**Simons Center for Geometry and Physics** (Workshop: Mass in General Relativity) *Minimal hypersurfaces with free boundary and bordisms of positive scalar curvature metrics*

2017	February	**University of Miami** (Diff. Geom. and Phys. Seminar) *Minimal hypersurfaces with free boundary and bordisms of positive scalar curvature metrics*
2016	November	**University of British Columbia** (Diff. Geom., Math. Phys., PDE Seminar) *Minimal hypersurfaces with free boundary and positive scalar curvature*
2016	April	**Wichita State University** (WSU Mathematics Lecture Series) *Gluing scalar-flat manifolds with minimal boundary conditions*
2016	July	**University of Calgary** (PIMS Summer School on Surgery and the Classification of Manifolds) *The Hirzebruch signature theorem*
2014	October	**Oregon State University** (Geometry and Topology Seminar) *Surgery of positive p-curvature metrics*

Teaching

2023	Spring	Solo instructor and creator of Math, Ethics, and society (Duke University). In-person instruction.
2022	Fall	Solo instructor for two sections of Intro to differential equations for engineering (Duke University). In-person instruction.
2022	Spring	Solo instructor for Graduate-level Partial Differential Equations (Duke University). In-person instruction. **Qualifying course**.
2021	Fall	Solo instructor for two sections of Intro to differential equations (Duke University). In-person instruction.
2021	Spring	Solo instructor for Intro to differential equations (Duke University). Remote instruction.
2020	Fall	Solo instructor for two sections of Intro to differential equations (Duke University). Remote instruction.
2019	Spring	Course coordinator and solo instructor for Intro to differential equations (Stony Brook University)
2019	Fall	Course coordinator and solo instructor for calculus C (Stony Brook University)
	Spring	Solo instructor for calculus A (Stony Brook University)
2018	Fall	Solo instructor for calculus 2 (Stony Brook University)
	Spring	Solo instructor for vector calculus (Stony Brook University)
2017	Fall	Solo instructor for introduction to logic and proof (Stony Brook University)
	Spring	Solo instructor for calculus 1 (University of Oregon)
2016	Fall	Teaching assistant for graduate-level real analysis (University of Oregon)
	Winter	Teaching assistant for business calculus (University of Oregon)
2015	Fall	Solo instructor for precalculus (University of Oregon)
	Summer	Solo instructor for introductory statistics (University of Oregon)
	Spring	Solo instructor for trigonometry (University of Oregon)
	Winter	Teaching assistant for business calculus (University of Oregon)
2014	Fall	Solo instructor for precalculus (University of Oregon)
	Summer	Solo instructor for business calculus (University of Oregon)
	Spring	Solo instructor for calculus (University of Oregon)
	Winter	Solo instructor for trigonometry (University of Oregon)
2013	Fall	Solo instructor for trigonometry (University of Oregon)
	Summer	Solo instructor for calculus (University of Oregon)
	Spring	Solo instructor for introductory statistics (University of Oregon)
	Winter	Solo instructor for precalculus (University of Oregon)

2012	Fall	Teaching assistant for introductory statistics (University of Oregon)
	Summer	Solo instructor for business calculus (University of Oregon)
	Spring	Teaching assistant for introductory statistics (University of Oregon)
	Winter	Solo instructor for precalculus (University of Oregon)
2011	Fall	Solo instructor for precalculus (University of Oregon)