WASHINGTON MIO

Education

B.S., Mathematics, Universidade Estadual de Campinas, Brazil, 1978
M.S., Mathematics, Instituto de Matemática Pura e Aplicada (IMPA), Rio de Janeiro, Brazil, 1980
Ph.D., Mathematics, Courant Institute of Mathematical Sciences, New York University, 1984

Academic Positions

2005–present, Professor, Department of Mathematics, Florida State University
2018–2024, Chair, Department of Mathematics, Florida State University
1995–2005, Associate Professor, Department of Mathematics, Florida State University
1990–1995, Assistant Professor, Department of Mathematics, Florida State University
1989–1990, Lecturer, Department of Mathematics, University of Pennsylvania
1988–1989, Visiting Assistant Professor, Department of Mathematics, Cornell University
1987–1988, Visiting Researcher, Courant Institute of Mathematical Sciences, New York University
1984–1987, Assistant Professor, Instituto de Matemática Pura e Aplicada, Brazil

Awards and Honors

1. Distinguished Research Professor, Florida State University, since 2023

2. Roger W. Roberts Professor in Mathematics, Florida State University, endowed professorship, since 2022

3. Fellow, American Mathematical Society, Class of 2015

4. American Mathematical Society Invited Address, Southeastern Sectional Meeting, Oxford, MS, 2013

5. Best paper award, 2nd International Conference on Computer Vision Theory and Applications (VISAPP), Barcelona, Spain, 2007

6. 2006 Innovator, Office of Research and Office of Intellectual Property Development & Commercialization, Florida State University

7. Full sabbatical leave, Florida State University, Fall 2003.

8. Teaching Incentive Program Award for excellence in teaching, Florida State University, 1995

9. American Mathematical Society Travel Award to attend the International Congress of Mathematicians, 1994 and 1998

10. Conselho Nacional de Desenvolvimento Científico e Tecnológico, Brazil, postdoctoral fellowship, 1987–1989

11. Conselho Nacional de Desenvolvimento Científico e Tecnológico, Brazil, graduate fellowship, 1980–1984

12. Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP), undergraduate research fellowship, Brazil, 1978

External Contracts & Grants

1. National Science Foundation, Mio (PI and lead investigator, FSU), Mémoli (PI, Ohio State University), *The Topology of Functional Data on Random Metric Spaces, Graphs and Graphons*, 08/01/17–07/31/20, project total: $535K, FSU: $355K, no-cost extension to 07/31/21

2. National Science Foundation, Mio (PI and lead investigator, FSU), Mukherjee (PI, Duke, Statistics), *Collaborative Research: Topological Methods for Parsing Shapes and Networks and Modeling Variation in Structure and Function*, 09/01/14–08/31/17, project total: $624,101, FSU: $312,886, no-cost extension to 08/31/18

3. National Institutes of Health, R01DE019638, Marcucio (PI, UC San Francisco), Hallgrímsson (PI, Calgary), Mio (co-I, FSU), Fish (co-I, UMass Lowell), Cheverud (co-I, Loyola), *The Role of Continuous Phenotypic Variation in Structural Defects of the Face*, FSU subcontract: $237K, 01/01/16–12/31/17

4. National Institutes of Health, Spritz (PI, Colorado-Denver, Medicine), Klein (co-PI, UC San Francisco, Medicine), Hallgrimsson (co-I, Calgary, Medicine), Mio (co-I, FSU, Mathematics), *Developing 3D Craniofacial Morphometry Data and Tools to Transform Dysmorphology*, 05/16/14–04/30/16

5. National Science Foundation, DBI-1262351, Punyasena (PI and Lead Investigator, UIUC), Mio (PI, FSU), Fowlkes (PI, UC Irvine). *Collaborative Research: ABI Innovation: Breaking Through the Taxonomic Barrier of Fossil Pollen Identification Using Bioimage Informatics*, 08/01/13–07/31/16, no-cost extension to 07/31/17, FSU: $300K, project total: $1.1M

6. National Institutes of Health, collaborative research supplement, Marcucio (PI, UC San Francisco, Medicine), Hallgrimsson (PI, Calgary, Medicine), Mio (PI of FSU sub-award), 09/01/13–08/31/15, no-cost extension to 08/31/16, FSU sub-award: $230K

7. National Science Foundation, Mio (PI and Lead Investigator, FSU), Fowlkes (PI, UC Irvine), Grimm (PI, Washington University), Mueller (PI, Virginia Tech), Punyasena (PI, Illinois, Urbana-Champaign), Rugonyi (PI, Oregon Health & Science University), Shyu (PI, Missouri, Columbia), and Yang (PI, Carnegie Mellon). *Collaborative Research: Biological Shape Spaces, Transforming Shape Into Knowledge*, 09/15/10–09/14/13, no-cost extension to 09/14/14, project total: $2.2M, FSU:$296K

8. National Science Foundation, DMS-0713012, Mio (PI) and Liu (co-PI). *Novel Computational Methods for the Analysis, Synthesis and Simulation of Shape of Surfaces*, 09/01/07–08/31/11, no-cost extension to 08/31/12, $656K

9. National Institutes of Health, Toga (PI, UCLA), Houle (PI of FSU subcontract), Mio (co-PI), Liu (co-PI), and Deng (co-PI). Driving Biological Project (DBP) of Center for Computational Biology (CCB), UCLA, *Developmental Origin of Phenotypic Variation in Drosophila Melanogaster*, 08/01/07–07/31/10. FSU subcontract: $536,620

10. National Science Foundation, CCF-0514743, Mio (PI), Liu (co-PI), and Srivastava (co-PI). *Algorithmic Riemannian Geometry for a Statistical Analysis of Images*, 7/2005–6/2008, no-cost extension to 06/2009, $300,397

11. Army Research Office, Srivastava (PI), Mio (co-PI), Liu (co-PI), and Klassen (co-PI). *Research on Statistical Shape Theory for Applications in Image Understanding*, 2004-2007, $322,684

12. Army Research Office, Defense University Research Instrumentation Program, Srivastava (PI), Mio (co-PI), Liu (co-PI), and Baker (co-PI). *A Laboratory for Real-Time Computer Vision Applications*, 2003-2004, $347,000

13. National Science Foundation, DMS-0345242, Mio (PI), Klassen (co-PI), Srivastava (co-PI), and Liu (co-PI). *Stochastic Shape Analysis for Tracking Objects in Images and Videos*, 2003-2004, $100K

14. National Science Foundation, DMS-0071693, Mio (PI) and Bryant (co-PI). *Topology of Generalized Manifolds*, 2000–2002, $60,000

15. National Science Foundation, DMS-9626624, Mio (PI) and Bryant (co-PI). *The Topology of Generalized Manifolds*, 1996–1999, $76,000

16. National Science Foundation, DMS-9300935, Bryant (PI) and Mio (co-PI). *The Topology of Generalized Manifolds*, 1993–1996, $130,200

Professional Societies

1. Fellow and Life Member, American Mathematical Society (AMS)

2. Member, Society for Industrial and Applied Mathematics (SIAM)

Selected Publications (from a total of 100)

1. W. Mio, *On Boundary-Link Cobordism*, Math. Proc. Camb. Phil. Soc. 101 (1987), 258–266.

2. D. Hacon and W. Mio, *Self-Linking Invariants of Embeddings in the Metastable Range*, Math. Ann. 279 (1987), 165–168.

3. W. Mio, *Non-linearly Equivalent Representations of Quaternionic 2-Groups*, Trans. Amer. Math. Soc. 315 (1989), 305–321.

4. W. Mio, *On the Geometry of Homotopy Invariants of Links*, Math. Proc. Camb. Phil. Soc. 111 (1992), 291–298.

5. J. Levine, W. Mio and K. Orr, *Links with Vanishing Homotopy Invariant*, Comm. Pure Appl. Math. 46 (1993), 213–220.

6. J. Bryant, S. Ferry, W. Mio and S. Weinberger, *The Topology of Homology Manifolds*, Bull. Amer. Math. Soc. 28 (1993), 324–328.

7. J. Bryant, S. Ferry, W. Mio and S. Weinberger, *Topology of Homology Manifolds*, Ann. of Math. 143 (1996), 435–467.

8. J. Bryant and W. Mio, *Transversality in Generalized Manifolds*, Topology and Its Applications 94 (1999), 7–12.

9. J. Bryant and W. Mio, *Embeddings of Homology Manifolds in Codimension ≥ 3*, Topology 38 (1999), 811–821.

10. J. Bryant and W. Mio, *Embeddings in Generalized Manifolds*, Trans. Amer. Math. Soc. 352 (1999), 1131–1147.

11. W. Mio, *Homology Manifolds*, Ann. of Math. Studies, Study 145, Surveys on Surgery Theory: vol. 1, Princeton University Press, 2000, 323–343.

12. W. Mio and A. Ranicki, *The Quadratic Form E_8 and Exotic Homology Manifolds*. Proc. of the Workshop on Exotic Homology Manifolds (Oberwolfach, Germany, 2003), Monographs on Geometry and Topology 9 (2006), 33–66.

13. J. Bryant, S. Ferry, W. Mio, and S. Weinberger, *Desingularizing Homology Manifolds*, Geometry and Topology 11 (2007), 1289–1314.

14. J. Bryant, S. Ferry, W. Mio, *UV^k-Mappings on Homology Manifolds*, Algebraic and Geometric Topology 13 (2013), 2141–2170.

15. E. Klassen, A. Srivastava, W. Mio, and S. Joshi, *Analysis of Planar Shapes Using Geodesic Paths on Shape Manifolds*, IEEE Trans. on Pattern Analysis and Machine Intelligence 26 (2004), 372–383.

16. A. Srivastava, S. Joshi, W. Mio and X. Liu, *Statistical Shape Analysis: Clustering, Learning and Testing*, IEEE Trans. Pattern Analysis and Machine Intelligence 27 (2005), 590–602.

17. W. Mio, A. Srivastava, and S. Joshi, *On Shape of Plane Elastic Curves*, International Journal of Computer Vision, 73 (2007), 307–324.

18. W. Mio, J. C. Bowers, X. Liu, *Shape of Elastic Strings in Euclidean Space*, International Journal of Computer Vision 82 (2009), 96–112.

19. X. Liu, Y. Shi, I. Dinov, W. Mio, *A Computational Model of Multidimensional Shape*, International Journal of Computer Vision 89(1), 2010.

20. L. Mander, M. Li, W. Mio, C. Fowlkes, S. Punyasena, *Identification of Grass Pollen Through the Quantitative Analysis of Surface Ornamentation and Texture*, Proc. Royal Soc. B. 280 (2013), 20131905.

21. J. Bates and W. Mio, *Density Estimators of Gaussian Type on Closed Riemannian Manifolds*, Journal of Mathematical Imaging and Vision 50(1-2) (2014), 53–59.

22. B. Hallgrimsson, W. Mio, R. Marcucio, R. Spritz, *Let's Face It – Complex Traits Are Just Not That Simple*, PLOS Genetics 10(11) (2014):e1004724,

23. Q. Xu, H. Jamniczky, D. Hu, R. M. Green, R. S. Marcucio, B. Hallgrimsson, W. Mio, *Correlations Between the Morphology of Sonic Hedgehog Expression Domains and Embryonic Craniofacial Shape*, Evolutionary Biology 42(3) (2015), 379–386

24. J. Cole, M.F. Manyama, J.R. Larson, D.K. Liberton, T.M. Ferrara, S.L. Riccardi, M. Li, W. Mio, O.D. Klein, S.A. Santorico, B. Hallgrimsson, R.A. Spritz, *Genomewide Association Study of Facial Variation in African Children Identifies Association of SCHIP1 and PDE8A with Facial Size*, PLoS Genetics 12(8) (2016): e1006174. doi:10.1371/journal.pgen.1006174

25. D.H. Díaz Martínez, C. Lee, P. Kim, W. Mio, *Probing the Geometry of Data with Diffusion Fréchet Functions*, Appl. Comput. Harmon. Anal. (2018). doi: 10.1016/j.acha.2018.01.003

26. D.H. Díaz Martínez, F. Mémoli, W. Mio, *The Shape of Data and Probability Measures*, Appl. Comput. Harmon. Anal. (2018). doi: 10.1016/j.acha.2018.03.003

27. M. Li, M.H. Frank, V. Coneva, W. Mio, D. Chitwood, C. Topp, *The Persistent Homology Mathematical Framework Provides Enhanced Genotype-to-Phenotype Associations for Plant Morphology*, Plant Physiology, 2018. doi: 10.1104/pp.18.00104

28. H. Hang, F. Mémoli, W. Mio, *A Topological Study of Functional Data and Fréchet Functions of Metric Measure Spaces*, J Appl. and Comput. Topology (2019). https://doi.org/10.1007/s41468-019-00037-8

29. J. Curry, H. Hang, W. Mio, T. Needham, O.B. Okutan, *Decorated Merge Trees for Persistent Topology*, J Appl. and Comput. Topology (2022). https://doi.org/10.1007/s41468-022-00089-3

30. J. Curry, W. Mio, T. Needham, O.B. Okutan, F. Russold, *Stability and Approximations for Decorated Reeb Spaces*, 2024 Symposium on Computational Geometry (SoCG). Preprint: arXiv:2312.01982

Selected Presentations (from more than 110)

1. Topology Seminar, The University of Chicago, Spring 1988.

2. Mathematics Colloquium, SUNY at Albany, Spring 1989.

3. Invited talk, Georgia Topology Conference, Summer 1992.

4. Plenary Lecture, International Meeting on Knots and Links, Siegen, Germany, 1993.

5. Plenary lecture, NSF-CBMS Conference on Controlled Topology and the Characterization of Manifolds, University of Tennessee, Knoxville, 1994.

6. Plenary Lecture, XI Encontro Brasileiro de Topologia, Brazil, 1998.

7. Invited talk, Workshop on Exotic Homology Manifolds, Oberwolfach, Germany, 2003.

8. Invited talk, Workshop on Statistical Inferences on Shape Manifolds, American Institute of Mathematics, 2005.

9. Mathematics Colloquium, University of Tennessee at Knoxville, June 2005.

10. Invited talk, Ulam Centennial Conference, Gainesville, FL, 2009.

11. Invited talk, Barrett Memorial Lectures, University of Tennessee, Knoxville, 2010.

12. Invited talk, Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, North Carolina, 2011.

13. Invited talk, Workshop on Nonparametrics and Geometry, Prague, Czech Republic, 2011.

14. 2011 Sampson Lectures, Bates College, Maine.

15. Invited talk, Workshop on Geometry and Statistics in Bioimaging: Manifolds and Stratified Spaces, Sandbjerg Estate, Denmark, 2012.

16. American Mathematical Society Invited Address, Southeastern Sectional Meeting, Oxford, MS, 2013.

17. Colloquium, Universidad Nacional Autónoma de México (UNAM), Cuernavaca, Mexico, April 2013.

18. Café y Matemáticas, Outreach Lecture, Universidad Autónoma de la Ciudad de México (UACM), Mexico City, April 2013.

19. Invited lecture, Applied Topology at Będlewo, Poland, July 2013.

20. Invited talk, CANSSI–SAMSI workshop on Geometric Topological and Graphical Model Methods in Statistics, Fields Institute, Toronto, 2014

21. Invited talk, mini-workshop on Geometry and Statistics on Manifolds and Stratified Spaces, Oberwolfach, Germany, 2014

22. Seminar talk, Fudan University, Shanghai, China, 2015

23. Invited talk, mini-symposium at ICIAM 2015, Beijing, China

24. Invited talk, Conference on Geometry and Data Analysis, University of Chicago, 2015

25. Colloquium, Institute for Mathematical Stochastics, Georg-August-Universität Göttingen, 2016

26. Invited talk, Applied Topology in Będlewo, Poland, Summer 2017

27. Invited talk, Workshop on Statistics for Data with Geometric Structure, Oberwolfach, Germany, 2018

28. Invited talk, mini-symposium on Topological Image Analysis: Methods, Algorithms, Applications, SIAM Imaging Science Conference, Bologna, Italy, 2018

29. Colloquium, SUSTECH, Shenzhen, China, May 2020 (online)

30. Randomness in Topology and Its Applications, Institute for Mathematical and Statistical Innovation (IMSI), Chicago, IL, March 2023

31. XXIII Encontro Brasileiro de Topologia, Salvador, Brazil, August 2024

32. Conference on Interactions of Statistics and Geometry, Institute of Mathematical Sciences, Singapore, October 2024

Doctoral Students Supervised

(Graduation date shown if applicable)

1. Xinyang Liu, Ph.D. 2010
2. Yu Fan, Ph.D. 2012
3. Jonathan Bates, Ph.D. 2013
4. Qiuping Xu, Ph.D. 2015
5. Diego H Díaz Martínez, Ph.D. 2016
6. Mao Li, Ph.D. 2016
7. Serdar Cellat, Ph.D. 2018 (co-supervisor Giray Ökten)
8. Haibin Hang, Ph.D. 2020
9. Mehdi Abdi-Anbouhi, Ph.D. 2022
10. Pan Fang, current
11. Ece Karacam, current

Postdoctoral Scholars Supervised

1. Osman Berat Okutan, 2019–2022