Xuwen Zhu

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Employment:

2020 –	Assistant Professor, Northeastern University
2020 Spring	Lecturer, MIT
2019 Fall	Uhlenbeck Postdoctoral Fellow, MSRI
2018 – 2019	Morrey Visiting Assistant Professor, UC Berkeley
2015 – 2018	Szegő Assistant Professor, Stanford University

Education:

2010 – 2015	Ph.D. Mathematics, Massachusetts Institute of Technology. Thesis advisor: Richard Melrose
2006 – 2010	B.S. Mathematics, Peking University, China.

Papers:

1. *Tian–Yau metrics: Fredholm theory, Hodge cohomology and moduli spaces.*
   Joint with Rafe Mazzeo. In preparation.

2. *Degenerating hyperbolic surfaces and spectral gaps for large genus.*
   Joint with Yunhui Wu and Haohao Zhang. arXiv:2201.03056
   Accepted by **Analysis** & **PDE**.

3. *Spherical conical metrics and harmonic maps to spheres.*
   Joint with Mikhail Karphukhin. arXiv:2104.10304
   Transactions of the AMS, Volume 375, Number 5, May 2022, Pages 3325–3350.

4. *Fundamental gaps of spherical triangles.* Joint with Shoo Seto and Guofang Wei.
   arXiv:2009.00229
   Annals of Global Analysis and Geometry 61, pages 1–19 (2022).

5. *Spectral properties of reducible conical metrics.* Joint with Bin Xu.
   arXiv:1909.00546
   Illinois Journal of Mathematics, Vol. 65, No. 2 (2021), 313–337.

6. *Conical metrics on Riemann surfaces, II: spherical metrics.*
   Joint with Rafe Mazzeo. arXiv:1906.09720
   International Mathematics Research Notices, Volume 2022, Issue 12, June 2022, Pages 9044–9113

7. *Rigidity of a family of spherical conical metrics.* arXiv:1902.02024
   New York Journal of Mathematics 26 (2020) 272–284.

8. *Spherical conic metrics and realizability of branched covers.* arXiv:1805.03312
   Proceedings of the AMS, Volume 147, Number 4, April 2019, Pages 1805-1815.

9. *Conical metrics on Riemann surfaces, I: the compactified configuration space and regularity.* Joint with Rafe Mazzeo. arXiv:1710.09781
   Geometry & **Topology** 24-1 (2020), 309–372.

10. *Boundary behaviour of Weil-Petersson and fiber metrics for Riemann moduli spaces.*
    Joint with Richard Melrose. arXiv:1606.01158
    International Mathematics Research Notices, Volume 2019, Issue 16, Pages 5012–5065.

11. *Eleven dimensional supergravity equations on edge manifolds.* arXiv:1507.02322
    Annales Henri Poincaré, Volume 19, Issue 8 (2018), 2347–2400.

12. *Eigenvalue resolution of self-adjoint matrices.* arXiv:1504.07581
    Pacific Journal of Mathematics, Vol. 288 (2017), No. 1, 241–255.

13. *Resolution of the canonical fiber metrics for a Lefschetz fibration.*
    Joint with Richard Melrose. arXiv:1501.04124
    Journal of Differential Geometry, Volume 108, Number 2 (2018), 295–317.

14. *Numerical Investigation of the Heat Partition Factor During Bolt Tightening.* Joint with
    Laila Guessous and Gary C. Barber.
    Tribology Transactions, Volume 54, Issue 1, 2010

Honors and Awards:

2023 – 2026	NSF Geometric Analysis DMS-2305363
	"Microlocal Analysis and Singularities"
2022 – 2023	College of Science Equity, Diversity, Inclusion, and Justice Faculty Award, NEU
2022	College of Science Excellence in Research Award, NEU
2019 – 2023	NSF Geometric Analysis DMS-1905398 (DMS-2041823 after transfer)
	"Moduli Spaces and Geometric Microlocal Analysis"
2019	AWM–NSF Travel Grant
2017 – 2019	AMS–Simons Travel Grant
2017	AWM–NSF Travel Grant
2014 – 2015	Graduate Student Appreciation Fellowship for excellent teaching, MIT
2010 – 2011	Presidential Fellowship, MIT

Talks:

2023 Mar	Analysis Seminar, Yale University
2023 Feb	Analysis and Geometry Seminar, Northeastern University
2022 Nov	"Geometrical Inverse Problems" Workshop, ESI (online)
2022 Oct	Math Club Faculty Talk, Northeastern University (online)
2022 Aug	"Geometry and physics of ALX metrics in gauge theory" Workshop, AIM (online)
2022 June	"Spherical surfaces and related topics", Cortona, Italy (online)
2022 June	International Conference on PDEs and Geometric Analysis, SJTU (online)
2022 Mar	March Speaker Series, AWM Northeastern (online)
2022 Jan	Webinar on Analysis & PDE (online)
2022 Jan	Analysis & PDE Seminar, UNC (online)
2021 Oct	Geometry and Physics Seminar, Boston University
2021 Sep	Topology and Geometry Seminar, UQAM (online)
2021 Sep	Topology Seminar, Northeastern University
2021 June	"What is..." Seminar, Northeastern University (online)
2021 June	"Analysis, Geometry and Topology of singular PDE", Oberwolfach (online)

2021 May	Workshop "Analysis on Singular Spaces", BIRS Oaxaca (online)
2021 May	Geometric Analysis Conference, Rutgers University (online)
2021 Mar	Differential Geometry Seminar, University of Iowa (online)
2020 Dec	Differential Geometry Seminar, SCMS (online)
2020 Dec	2020 Winter CMS Meeting Section "Geometric and Computational Spectral Theory" (online)
2020 Nov	Workshop "Geometry and analysis on singular spaces", USTC (online)
2020 Sep	Analysis-Geometry Seminar, Northeastern University (online)
2020 Jun	"Spectral Geometry in the Clouds" (online)
2020 Feb	PDE/Analysis Seminar, MIT
2020 Jan	Frontier of Analysis and Geometry of Teichmuller Spaces, TSIMF, China
2019 Dec	Geometry-Topology Seminar, University of Maryland
2019 Dec	Special Seminar, Brandeis University
2019 Dec	Special Seminar, Northeastern University
2019 Nov	Mathematical Colloquium, UC San Diego
2019 Nov	Iterated structures on manifolds seminar, MSRI
2019 Oct	"Recent Developments in Microlocal Analysis", MSRI
2019 Sep	Microlocal Analysis Regular Seminar, MSRI
2019 Aug	"Connections for Women: Microlocal Analysis", MSRI
2019 Aug	"Connections for Women: Holomorphic Differentials in Mathematics and Physics", MSRI
2019 July	Differentialgeometrie im Grossen, Oberwolfach, Germany
2019 June	Geometry Seminar, Tsinghua University, China
2019 June	Microlocal Analysis and Applications, SCMS, China
2019 May	Microlocal Methods in Analysis and Geometry, CIRM, France
2019 Apr	Harmonic Analysis and Differential Equations Student Seminar, UC Berkeley
2019 Apr	34th Geometry Festival, University of Maryland
2019 Apr	Topology Seminar, UC Berkeley
2019 Mar	Graduate Student Conference in Geometry and Topology, UIUC
2019 Mar	Department Colloquium, UIUC
2018 Oct	Riverside Mathematics Workshop for Excellence and Diversity, UC Riverside
2018 May	Informal Geometry & Topology Seminar, Stanford University
2018 Mar	Bay Area Microlocal Analysis Seminar, UC Berkeley
2017 Dec	Differential Geometry Seminar, UC Santa Barbara
2017 Oct	Informal Complex Analysis & PDE Seminar, Columbia University
2017 Oct	Differential Geometry & Geometric Analysis Seminar, Princeton University
2017 Oct	Geometry/Topology Seminar, Rutgers University
2017 Sep	PDE/Analysis Seminar, MIT
2017 Aug	Workshop "The Analysis of Gauge-Theoretic Moduli Spaces", BIRS, Canada
2017 Aug	SURIM, Stanford University
2017 July	Third Symposium on Spectral and Scattering Theory, Florianópolis, Brazil
2017 June	Workshop "Analysis and Topology in Interaction", Cortona, Italy
2017 June	Workshop "Sen Conjecture and Beyond", UCL, UK
2017 June	Geometric Analysis Seminar, Peking University, China

2017 June	Geometry and Physics Seminar, Tsinghua University, China
2017 June	Geometric Analysis Seminar, Shanghai Jiaotong University, China
2017 May	Differential Geometry/PDE Seminar, University of Washington
2017 May	May Midwestern Microlocal Meeting, Purdue University
2017 May	Geometry and Analysis Seminar, UC Santa Cruz
2017 Apr	PDE/Analysis Seminar, MIT
2017 Mar	PDE/Analysis Seminar, ANU, Australia
2017 Feb	Moduli Space Learning Seminar, Stanford University
2016 Dec	Workshop on "Geometric and Spectral Methods in Partial Differential Equations", CMO, Mexico
2016 Jul	Analysis Seminar, Shanghai Jiaotong University, China
2016 May	Paris/Berkeley/Bonn/Zurich Analysis Seminar, UC Berkeley
2015 Dec	Geometry and Analysis Seminar, UC Santa Cruz
2015 Nov	Departmental Colloquium, HKUST, Hong Kong
2015 Oct	Analysis & PDE Seminar, Stanford University
2015 Aug	Workshop on "Semi-classical Analysis: Spectral Theory and Resonances", Erwin Shrödinger Institute, Austria
2015 Jul	Workshop on Metric and Analytic Aspects of Moduli Spaces, Isaac Newton Institute, UK
2015 Apr	Student Harmonic Analysis and Differential Equations Seminar, UC Berkeley
2015 Apr	Bay Area Microlocal Analysis Seminar, Stanford University
2015 Feb	Mathematical Physics and Harmonic Analysis Seminar, Texas A&M University
2015 Jan	Mini-workshop on Semiclassical and Microlocal Analysis, USTC, China
2014 Nov	Geometric Analysis Reading Seminar, UCL, UK
2014 Nov	Geometric Scattering Theory and Applications Workshop, BIRS, Canada
2014 Nov	Students Analysis Seminar, MIT
2014 Oct	Analysis and Geometry Seminar, Northeastern University
2014 Oct	Scattering and Spectral Theory Seminar, Purdue University
2014 Oct	PDE/Analysis Seminar, MIT
2014 Oct	Student Differential Geometry Seminar, Harvard University
2013 Mar	Pure Math Graduate Student Seminar, MIT

Mini-courses:

2024 Jul	MSRI Graduate Summer School Minicourse (upcoming)
2019 Sep	MSRI Introductory Workshop: Microlocal Analysis
2016 Jul	Analysis Minicourse, YMSC, Tsinghua University, China

Conference and Program Organization:

2024 Summer	Co-organizer, Workshop "Moduli spaces and Singularities", CRM, Montreal (upcoming)
2024 Fall	Co-organizer, Program "Special Geometric Structures and Analysis", MSRI (upcoming)

Teaching Experience:

Northeastern:

2023 Fall	Math 5101 Graduate Analysis I
2023 Spring	Math 5122 Graduate Geometry I
2022 Fall	Math 7771 Reading in Geometry
2021 Fall	Math 1342 Calculus II for Science and Engineering Section 1 and Section 5
2020 Fall	Math 1342 Calculus II for Science and Engineering Section 1
2020 Fall	Math 5101 Graduate Analysis I: Functions of One Variable

UC Berkeley:

| 2019 Spring | Math 104 Introduction to Analysis Section 2 & 3, lecturer |
| 2018 Fall | Math 104 Introduction to Analysis Section 6, lecturer |

Stanford:

2018 Spring	MATH 205C Graduate Real Analysis, lecturer
2018 Spring	MATH 171 Fundamental Concepts of Analysis, lecturer
2017 Winter	MATH 20 Introductory Calculus, lecturer
2017 Winter	MATH 131P Partial Differential Equations I, lecturer
2016 Winter	MATH 20 Introductory Calculus, lecturer
2016 Fall	MATH 171 Fundamental Concepts of Analysis, lecturer
2015 Winter	MATH 131P Partial Differential Equations I, lecturer
2015 Fall	MATH 131P Partial Differential Equations I, lecturer
2015 Fall	MATH 175 Functional Analysis, lecturer

MIT:

2020 Spring	18.03 Differential Equations, recitation instructor and course administrator
2015 Summer	18.089 Review of Mathematics, lecturer
2014 Spring	18.06 Linear Algebra, recitation instructor and course administrator
2013 Fall	18.01 Calculus, recitation instructor and course administrator
2013 Spring	18.100C Real Analysis, course assistant
2012 Fall	18.01A/02A Calculus, recitation instructor

Mentoring Experience:

2021 –	PhD advising:
	Xuezhu Lu (co-advising with Ting Zhou, 2021-2023)
	Xin Shen (co-advising with Ting Zhou, 2023-)
2022 -	Undergraduate & Master Research:
	Nick Payne (2022 Spring - 2023 Spring)
2022 -	Undergraduate thesis committee member:
	Zhenxun Liu (2022)
2021 -	First-year graduate student mentor:
	Connor Anderson (2021-2022)
	Hongqin Zou (2022-2023)
	Alia Yusaini (2023-)
2021 -	Department of Mathematics Graduate Student Mentoring Program, Mentor:
	Changchang Liu, Esha Srivastava (2021-2022)
	Haolin Ji (2022-2023)

2014 Winter   Directed Reading Program (DRP)
2014 Summer Summer Program in Undergraduate Research (SPUR), MIT, preprints available
2013 Winter   Directed Reading Program (DRP)
2012 Summer Summer Program in Undergraduate Research (SPUR), MIT, project results
                available at http://math.mit.edu/research/undergraduate/spur

Other Conferences Attended:

2023 Jul   "Spectral Theory and Mathematical Relativity", ESI, Austria
2022 Aug   "Analytic and Geometric Aspects of Spectral Theory", BIRS, Oaxaca (online)
2021 Feb   "Recent Advances in Global Analysis" in Honor of Gerardo Mendoza (online)
2020 Oct   "Special holonomy and branes" Workshop, AIM (online)
2019 Nov   "Holomorphic Differentials in Mathematics and Physics" Workshop, MSRI
2019 Aug   MSRI Introductory Workshop: Holomorphic Differentials in Mathematics and
                Physics
2017 July   Analytical aspects of hyperbolic flows, Nantes, France
2016 June   "Analysis, Geometry and Topology of Stratified Spaces" Workshop, CIRM, France
2015 May   May Midwest Microlocal Meeting, Northwestern University
2012 Sep   "Weyl Law at 100" Workshop, Fields Institute, Canada
2012 Jul   Workshop on Spectral Invariants on Singular Spaces, CRM, Canada
2012 Jun   Inverse Problems Conference in honor of Gunther Uhlmann, UC Irvine
2011 Oct   Microlocal Methods in Scattering and Spectral Theory, Northwestern University

Outreach:

2021 –   Organizer, Graduate student mentoring program in Mathematics Department
                2021 Dec: Academic Career Panel
                2022 Mar: Industry Career Panel (virtual)
                2022 Oct: Kick-off Dinner
                2022 Nov: PhD/Postdoc Application Lunch Panel
                2023 Feb: Mid-year Lunch
                2023 Apr: End-of-Year Lunch
2021 –   Faculty advisor, AWM Northeastern University Chapter
2020 –   Founder and faculty advisor, Northeastern University MathEMA (Mathematics
                Engagement and Mentorship Association)
2021   Faculty reviewer, New England Future Faculty Workshop
2019 Fall   Panelist, MSRI Connection for Women Workshop
2016 – 2017 Organizer, Stanford Women in Math
2013 – 2015 Organizer, MIT Friends of the Arts
2011 – 2013 Chair, Graduate Women of MIT Mentoring Program

Service:

2018 –   Referee: Int. Math. Res. Not, J Geom Anal, Proc. Am. Math. Soc, Adv. Math.,
                Contemporary Mathematics series of the AMS, J.Éc. polytech. Math, Scientific
                Report
2023   Co-organizer, Math REU program

2021	Outside reviewer, NSERC
2020 - 2022	Member, INVEST hiring committee
2020 - 2022	Member, Department of Mathematics Graduate Committee
2020	Panelist, NSF-DMS
2014 – 2015	Organizer, Graduate Student Analysis Seminar

Miscellaneous experiences:

2013	Quantitative Research Intern, Citadel
2009	Undergraduate Researcher, Oakland University