

Magdalena Czubak — Curriculum Vitae¹

Department of Mathematics
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Research Interests

Partial Differential Equations, Differential Geometry, Harmonic Analysis

Education

Ph.D. Mathematics, University of Texas at Austin, 2008
Advisor: Karen Uhlenbeck

B.S. Mathematics, Binghamton University, 2001

B.S. Computer Science, Binghamton University, 2001

Positions

Associate Professor, University of Colorado Boulder, Fall 2020-present

Assistant Professor, University of Colorado Boulder, Fall 2016-Summer 2020

Assistant Professor, Binghamton University, Fall 2011-Summer 2016

Research Member, Mathematical Sciences Research Institute, Fall 2015

Postdoctoral Fellow, University of Toronto, Fall 2008-Spring 2011

Publications & Preprints

1. *The Meyers-Serrin Theorem on Riemannian manifolds: a survey*, with Chi Hin Chan. arXiv:2405.13322.
2. *The Gauss formula for the Laplacian on hypersurfaces*, with Chi Hin Chan. arXiv:2212.11928.
3. *The restriction problem on the ellipsoid*, with Chi Hin Chan and Tsuyoshi Yoneda. *J. Math. Anal. Appl.* 527 (2023), no. 1, Paper No. 127358, 17 pp.
4. *Antithesis of the Stokes paradox on the hyperbolic plane*, with Chi Hin Chan. *J. Geom. Anal.* 31 (2021), no. 5, 5033–5072.
5. *Almost sure boundedness of iterates for derivative nonlinear wave equations*, with Sagun Chanillo, Dana Mendelson, Andrea Nahmod and Gigliola Staffilani. *Comm. Anal. Geom.* 28 (2020), no. 4, 943–977.
6. *Hodge decomposition of the Sobolev space H^1 on a space form of nonpositive curvature*, with Chi Hin Chan and Carlos Pinilla Suarez. arXiv:1812.11764.
7. *Liouville theorem for the stationary Navier-Stokes equation on a hyperbolic space*, with Chi Hin Chan. *J. Math. Anal. Appl.* 460 (2018), no. 1, 216–231.
8. *Asymptotic behavior of the steady Navier-Stokes equation on the hyperbolic plane*, with Chi Hin Chan and Che-Kai Chen. *Dynamics of Partial Differential Equations*, Vol. 14, No. 3 (2017), pp. 239-270.
9. *The formulation of the Navier-Stokes equations on Riemannian manifolds*, with Chi Hin Chan and Marcelo Disconzi. *Journal of Geometry and Physics* 121C (2017) pp. 335-346.
10. *Blowing up solutions to the Zakharov system for Langmuir waves*, with Yuri Cher and Catherine Sulem, in *Laser Filamentation: Mathematical Methods and Models* (CRM Series in Mathematical Physics) 2016; Springer;
11. *On the well-posedness of relativistic viscous fluids with non-zero vorticity*, with Marcelo M. Disconzi. *J. Math. Phys.* 57 (2016), no. 4, 042501, 21 pp.

¹Last updated on August 21, 2024

12. *Remarks on the weak formulation of the Navier-Stokes equations on the 2D hyperbolic space*, with Chi Hin Chan. Ann. Inst. H. Poincaré Anal. Non Linéaire 33 (2016), no. 3, 655–698.
13. *Topological defects in the abelian Higgs model*, (with Robert L. Jerrard. Discrete Contin. Dyn. Syst., Vol. 27 (2015), No. 5, 1933–1968.
14. *An ODE for boundary layer separation on a sphere and a hyperbolic space*, with Chi Hin Chan and Tsuyoshi Yoneda. Phys. D 282 (2014), 34–38.
15. *Low regularity well-posedness for the 2D Maxwell-Klein-Gordon equation in the Coulomb gauge*, with Nina Pikula. Commun. Pure Appl. Anal. 13 (2014), no. 4, 1669–1683.
16. *Interaction Morawetz estimate for the magnetic Schrödinger equation and applications*, with James Colliander and Jeonghun Lee. Adv. Differential Equations Vol. 19 (2014), no. 9/10, 805–832.
17. *Lower bound for the rate of blow-up of singular solutions of the Zakharov system in \mathbb{R}^3* , with James Colliander and Catherine Sulem. J. Hyperbolic Differential Equations, Vol. 10 (2013), no. 3, 523–536.
18. *Non-uniqueness of the Leray-Hopf solutions in the hyperbolic setting*, with Chi Hin Chan. Dynamics of Partial Differential Equations 10 (2013), no.1, 43–77.
19. *Stability and Unconditional Uniqueness of Solutions for Energy Critical Wave Equations in High Dimensions*, with Aynur Bulut, Dong Li, Nataša Pavlović and Xiaoyi Zhang. Comm. Partial Differential Equations, Vol. 38 (2013), no. 4, 575–607. arXiv:0911.4534.
20. *Eventual regularization of the slightly supercritical fractional Burgers equation*, with Chi Hin Chan and Luis Silvestre. Discrete Contin. Dyn. Syst., Vol. 27 (2010), no. 2, 847–861. A special issue Trends and Developments in DE/Dynamics Part I.
21. *Regularity of solutions for the critical N -dimensional Burgers’ equation*, with Chi Hin Chan. Ann. Inst. H. Poincaré Anal. Non Linéaire, Vol. 27 (2010), no. 2, 471–501.
22. *Local well-posedness for the $2 + 1$ dimensional Monopole Equation*. Analysis & PDE, Vol. 3, (2010), no. 2, 151–174.

Expository Publications & Advice

1. *In search of the viscosity operator on Riemannian manifolds*. (2024). Notices of the American Mathematical Society 71(01):08-16.
2. *Advice from our advisor: Karen Uhlenbeck*, co-editor with Steven Bradlow, and contributor. (2023). Notices of the American Mathematical Society 70(03):409-414.

Grants

DEI Impact Grant, University of Colorado Boulder, Co-PI, AY 2023-2024
 Co-PI: Padi Fuster, University of Colorado Boulder
 Co-PI: Flor Orosz Hunziker, University of Colorado Boulder

Simons Foundation Collaboration Grant, PI, 09/01/2018 - 08/31/2023
 “Fluid Flows on Manifolds”

Simons Foundation Collaboration Grant, PI, 09/01/2012 - 08/31/2018
 “Topics in Geometric PDE”

Vanderbilt International Research Grant, Co-PI, 06/2015 - 06/2016
 “The Navier-Stokes equations in curved backgrounds”
 Co-PI: Chi Hin Chan, National Chiao Tung University, Taiwan
 Co-PI: Marcelo Disconzi, Vanderbilt University, USA

Invited Talks

1. Colloquium, Florida International University, April 18, 2023
2. Workshop on geometry and analysis of fluid flows, with a special tribute to David Ebin on the occasion of his 80th birthday and retirement, Stony Brook University, January 19, 2023
3. Geometric Analysis Seminar, Brown University, Providence, November 15, 2022
4. Glimpses of Mathematics, Now and Then: A Celebration of Karen Uhlenbeck's 80th Birthday, Institute for Advanced Study, Princeton, September 18, 2022
5. AWM Research Symposium, Special Session on Deterministic and Probabilistic Approaches for Nonlinear PDEs, (online), June 17, 2022
6. SIAM PDE 2019, Minisymposium on Recent Progress in Incompressible Fluid Dynamics, La Quinta, December 14, 2019
7. Summer Workshop on Nonlinear Partial Differential Equations, Shing-Tung Yau Center, Hsinchu, Taiwan, July 5, 2019
8. Special Session on Analysis and Geometry of Nonlinear Evolution Equations, Joint Mathematics Meetings, Baltimore, January 17, 2019
9. Nonlinear Phenomena in Stockholm: Kinetic Meets Dispersive Conference, KTH Royal Institute of Technology, Stockholm, Sweden, November 20, 2018
10. Geometrical and Statistical Fluid Dynamics Workshop, Simons Center for Geometry and Physics, Stony Brook, October 17, 2017
11. Special Session on Nonlinear Dispersive PDE, AMS Fall Southeastern Sectional Meeting, University of Central Florida, Orlando, September 24, 2017
12. Special Session on Nonlinear and Stochastic Partial Differential Equations, Mathematical Congress of the Americas 2017, Montreal, July 28, 2017
13. Special Session on Nonlinear Dispersive PDE, Mathematical Congress of the Americas 2017, Montreal, July 26, 2017
14. Special Session on Qualitative and Quantitative Properties of Solutions to Partial Differential Equations, AMS Spring Eastern Sectional Meeting, Hunter College, New York, May 7, 2017
15. Shanks Workshop on Mathematical Aspects of Fluid Dynamics, Vanderbilt University, April 9, 2017
16. Special Session on Recent progress on nonlinear dispersive and wave equations, Joint Mathematics Meetings, Atlanta, January 6, 2017
17. Special Session on Women in Analysis and Partial Differential Equations, AMS Fall Central Sectional Meeting, University of St. Thomas, October 30, 2016
18. AMS Special Session on Nonlinear and Stochastic Partial Differential Equations, University of Denver, October 9, 2016
19. Colloquium, UC Santa Cruz, February 9, 2016
20. Colloquium, University of Colorado Boulder, January 14, 2016
21. PDE and Applied Math Seminar, UC Davis, January 12, 2016
22. SIAM PDE 2015, Scottsdale, Minisymposium on Nonlinear Parabolic Equations and Applications, December 10, 2015
23. SIAM PDE 2015, Scottsdale, Minisymposium on Analytical Methods in Fluid Mechanics, December 8, 2015
24. MSRI Workshop, Connections for Women: Dispersive and Stochastic PDE, August 19, 2015
25. Lecture series in DC Grad Summer School in PDE, George Washington University, July 26-July 30, 2015
26. Central Spring Sectional Meeting, AMS Special Session on Harmonic Analysis and Partial Differential Equations, March 14, 2015
27. Analysis and Geometry Seminar, University of Colorado, Boulder, October 28, 2014
28. PDE/Applied Math Seminar, Drexel University, May 22, 2014

29. Mathematical Finance, Probability, and PDEs Seminar, Rutgers University, April 8, 2014
30. Applied Math Seminar, University of Toronto, Canada, February 28, 2014
31. AMS Special Session on Dispersive and Geometric Partial Differential Equations, Joint Mathematics Meetings, Baltimore, January 18, 2014
32. SIAM PDE 2013, Orlando, Minisymposium on Water Waves, December 8, 2013
33. SIAM PDE 2013, Orlando, Minisymposium on Recent Advances in Nonlinear Dispersive Partial Differential Equations, December 7, 2013
34. PDE/Analysis Seminar, MIT, November 19, 2013
35. PDE Seminar, Vanderbilt University, November 15, 2013
36. Applied Analysis Seminar, Penn State University, April 8, 2013
37. AWM Research Symposium 2013, Santa Clara University, Special Session on Analysis of PDE in Newtonian and Non-Newtonian Fluid Mechanics, March 16, 2013
38. Geometry Seminar, Purdue University, November 5, 2012
39. Fall Eastern Sectional Meeting, Rochester Institute of Technology, AMS Special Session on Microlocal Analysis and Nonlinear Evolution Equations, September 23, 2012
40. Workshop on Evolution equations of physics, fluids, and geometry: asymptotics and singularities, Banff International Research Station, Canada, September 13, 2012
41. Workshop on Nonlinear Evolution Problems, Mathematisches Forschungsinstitut Oberwolfach, Germany, May 16, 2012
42. Spring Eastern Sectional Meeting, George Washington University, AMS Special Session on Nonlinear Dispersive Equations, March 17, 2012
43. Joint Mathematics Meetings, Boston, AMS Special Session on Stability Analysis for Infinite Dimensional Hamiltonian Systems, January 4, 2012
44. CMS Winter Meeting, Nonlinear PDE and Applications Session, Toronto, Canada, December 11, 2011
45. SIAM PDE11, Analysis of PDE arising in Fluid Dynamics Mini-Symposium, San Diego, November 16, 2011
46. Fall Southeastern Section Meeting, Wake Forest University, Special Session on Nonlinear Dispersive Equations, September 24, 2011
47. Analysis Seminar, University of North Carolina, Chapel Hill, September 23, 2011
48. 40 Years and Counting: AWM's Celebration of Women in Mathematics, Brown University Special Session on Nonlinear Wave Phenomena, September 17, 2011
49. Binghamton University, Colloquium, March 2011
50. Rutgers University-Camden, Colloquium, February 2011
51. Stony Brook University, Colloquium, February 2011
52. Southern California Analysis & PDE meeting, UCLA, November 2010
53. Thematic Program on Asymptotic Geometric Analysis, Fields Institute, Canada, October 2010
54. Applied Math Seminar, University of Toronto, Canada, October 2010
55. SIAM conference on Nonlinear Waves and Coherent Structures, Modulation of Nonlinear Solutions in Dispersive Partial Differential Equations, Philadelphia, August 2010
56. Nonlocal operators and partial differential equations, Będlewo, Poland, June 2010
57. Dispersive PDE Seminar, University of Toronto, Canada, June 2
58. Connections in Geometry and Physics, Perimeter Institute, May 2010
59. Analysis Seminar, University of Rochester, November 2009
60. AMS Special Session on Harmonic Analysis and PDE, Baylor University, October 2009
61. Dispersive PDE Seminar, University of Toronto, October 2009

62. Analysis Seminar, UT Austin, March 2009
63. Applied Math Seminar, University of Toronto, Canada, September 2008
64. AMS Special Session on Harmonic Analysis Applied to PDE, University of New Mexico, October 2007

Conferences & Workshops organized

- Co-organizer for the satellite conference in Boulder, Math for All, February 25, 2023 & April 6, 2024
- Co-organizer for the Special Session on Recent advances in the theory of fluid dynamics, Fall Western Sectional Meeting University of Utah, Salt Lake City, October 22-October 23, 2022
- Co-organizer for the satellite conference in Boulder, Math for All, February 5, 2022
- Co-organizer for the Special Session on Recent advances in the theory of fluid dynamics, Virtual AMS Fall Western Sectional Meeting, October 24-October 25, 2020
- Co-organizer for Geometry & Analysis Day, Department of Mathematics, University of Colorado Boulder, October 16, 2018
- Co-organizer for a minisymposium on PDEs in Fluid Dynamics: Analysis and Computation at the 3rd Annual Meeting of SIAM Central States Section, Colorado State University, Fort Collins, CO, September 29 - October 1, 2017
- Co-organizer for AMS Special Session on Recent progress on nonlinear dispersive and wave equations, JMM Atlanta, GA, January 12-January 14, 2017
- Co-organizer for Recent Advances in Hydrodynamics, Banff International Research Station, Canada, June 5-June 10, 2016;
- Co-organizer for Minisymposium on Nonlinear Partial Differential Equations at SIAM Analysis of PDE 2015, Scottsdale, Arizona, December 7-December 10, 2015
- Co-organizer for the Special Session on Hamiltonian PDE at the Fall Western Section Meeting, San Francisco State University, October 25-26, 2014;

Mentoring

Postdoctoral Fellows

Padi Fuster Aguilera, Fall 2021-present

PhD Students

Ian Miller, Fall 2019-present, University of Colorado Boulder

Albany Thompson, PhD May 2021, University of Colorado Boulder

Carlos Pinilla Suarez, PhD May 2021, University of Colorado Boulder

Braden Balentine, PhD May 2021, University of Colorado Boulder

Pearce Washabaugh, PhD May 2017, University of Colorado Boulder, supervised jointly with Stephen Preston

Undergraduate Research

Ram Ekstrom, *Fourier transform on manifolds*, Summer 2019-Spring 2020

Placement: Ph.D. student, University of Michigan

REU CU Boulder, *Pressure in the Navier-Stokes equations*, May 13-June 20, 2019

Undergraduate students: Alexander Koek, Ryan Mike; Graduate student: Ian Miller;

Justin Richman, *Well-Posedness of the Damped Wave Equation with Nonlinear Source Terms*, Fall 2017-Spring 2018

Placement: Ph.D. student, University of Illinois at Chicago

REU CU Boulder, *Local and global wellposedness of wave equations*, May 15-June 23, 2017

Undergraduate students: Ram Ekstrom, Ian Gossett, Justin Richman, Gabriel Tauber;
Graduate Student: Andrew Stocker;

Nina Pikula, Binghamton University, 6/2012-8/2013
Low regularity well-posedness for the 2D Maxwell-Klein-Gordon equation in the Coulomb gauge,
Commun. Pure Appl. Anal. 13 (2014), no. 4, 1669-1683.
Placement: Ph.D. Student, UC San Diego

Natham Aguirre, Binghamton University, 11/2011-1/2013
Well-posedness for energy critical magnetic Schrödinger equations.
Placement: Ph.D. Student, Pontifical Catholic University of Chile

Undergraduate Independent Studies

Dynamical Systems & PDE: Sam Serra, University of Colorado Boulder, Spring 2019
General Relativity: Rostislav Akhmechet, Nathaniel Lounsbury, Binghamton University, Spring 2015
Atmospheric and Oceanic Fluid Dynamics: Julien Sorci, Binghamton University, Spring 2015
PDE and Mathematical Biology: Navdep Kaur, Kristen Kohler, Binghamton University, Fall 2014, Spring 2015
Curves and Surfaces: Colin Guider, Nina Pikula, Binghamton University, Spring 2013
Yang Mills and Principal Bundles: Peter Pang, University of Toronto, Summer 2011

Teaching Honors

Marinus Smith Award nominee, University of Colorado Boulder, Spring 2019
Frederick V. Atkinson Teaching Award, University of Toronto, Spring 2011
Frank Gerth III Teaching Excellence Award, UT Austin, 2003

Teaching Experience

Instructor at University of Colorado Boulder

Math 6240 Differential Geometry 2: Riemannian Geometry, Fall 2024, Fall 2018
Math 6230 Differential Geometry 1, Spring 2024, Spring 2021, Spring 2020
Math 3430 Ordinary Differential Equations, Spring 2024, Fall 2019, Spring 2019, Fall 2018
Math 4470-5470 Partial Differential Equations, Fall 2023, Spring 2022, Fall 2020, Spring 2018, Fall 2017, Fall 2016
Math 8234 Topics in Differential Geometry: Harmonic functions and heat kernel, Fall 2021
Math 3001 Analysis 1, Spring 2021, Fall 2021
Math 4001-5001 Analysis 2, Fall 2019
Math 2400 Calculus 3, Instructor and Coordinator, Spring 2017
Math 6240 Differential Geometry 2: Sobolev Spaces on Manifolds, Fall 2016

Instructor at Binghamton University (SUNY)

Math 472 PDE and Mathematical Analysis, Spring 2016, Spring 2013
Math 471 Partial Differential Equations, Spring 2016, Spring 2014
Math 479 Real Analysis II, Spring 2015, Spring 2014, Spring 2012
Math 478 Real Analysis I, Fall 2014 (two sections), Fall 2011
Math 590F Graduate course in Partial Differential Equations, Spring 2013
Math 371 Ordinary Differential Equations, Fall 2012

Instructor at University of Toronto

Mat223S Linear Algebra I, Spring 2011
APM346 Partial Differential Equations, Fall 2010
Mat135Y Calculus, full year course: Fall 2009-Spring 2010
Mat135Y Calculus, full year course: Fall 2008-Spring 2009

Instructor at University of Texas at Austin

M316K Foundations of Arithmetic, Fall 2007 (two sections)

M305G Precalculus, Fall 2006

Graduate Learning Seminars Organizer, University of Colorado Boulder

Dispersive PDE, Spring 2019, Fall 2019

Cohomology, Fall 2018

Service to the profession

NSF grant reviewer

Journal referee

Outside thesis committees

Ph.D. Defense Committee member (not a principal advisor), Department of Mathematics, University of Texas at Austin, Summer 2021

Service at University of Colorado Boulder**University**

Honors Council representative for the Department of Mathematics, Fall 2016-present

Joint Colloquium with APPM co-organizer, September 24, 2019

Honors Thesis Committee outside-member for Department of Physics, Spring 2024, Fall 2020, Spring 2017

Department of Mathematics

Hiring Plan Committee member, Summer 2024-present

Instructor Reappointment/Promotion Committee member, Fall 2024

Graduate Committee member, Spring 2024, Fall 2017-Spring 2018

Hiring Committee Chair, Fall 2023

Ph.D. Defense Committee member (not a principal advisor), Fall 2023, Spring 2022, Summer 2021, Summer 2020, Fall 2016

Faculty mentor for a first year graduate student, Fall 2021-present

Executive Committee member, Fall 2021-Spring 2022

Teaching Quality Framework Action Team member, Fall 2020-Summer 2022

Instructor Reappointment Committee chair, Fall 2021

Faculty Classroom Peer Observation, Fall 2021, Fall 2017

PhD Comprehensive Exam Committee member (not a principal advisor), Fall 2022, Fall 2021, Summer 2019, Spring 2019

Math Club Talk, Fall 2021, Fall 2016

Undergraduate Honors Committee member, Spring 2022 (four committees), Spring 2021, Spring 2018 (two committees)

Math Club co-organizer, Fall 2018-Spring 2020

Hiring Committee member, Fall 2019, Fall 2016-Spring 2017

Faculty Comprehensive Review Committee member, Fall 2020, Summer/Fall 2019, Fall 2018

Co-organizer and panelist for Graduate School Informational Panel, Math Club, Spring 2019

Math 5905 Teacher Training panelist, January 30, 2019

Graduate School Fair, Department of Mathematics representative, Joint Mathematics Meetings, Baltimore, January 18, 2019

Geometry & Analysis Seminar co-organizer, Fall 2016-present

Master's Committee member, Spring 2020, Fall 2018, Spring 2018, Spring 2017

Preliminary Exam proctor, September 2020, August 2018

Math 2400-Calculus 3 coordinator, Spring 2017

Service at Binghamton University

Undergraduate Committee member, Fall 2011-Spring 2013, Spring 2016

Faculty Senate member, Fall 2012-Spring 2015, Spring 2016

Undergraduate Math Academic Advisor, Fall 2011-Spring 2015

Curriculum Development Committee member, April 2014-Spring 2015

MA Exam Committee member: December 15, 2014, April 30, 2015

Freshman Orientation Session, Faculty Advisor for Dept. of Math Sciences, July 29, August 1, 2014

Graduate Committee member, Fall 2013-Spring 2014

Transfer Students Orientation Session, Faculty Advisor for Dept. of Math Sciences, June 2013

Organizer for Analysis Seminar, Fall 2012-Spring 2013

Dean's Speaker Series for Dept. of Math. Sciences Co-organizer, Fall 2012-Spring 2013

Undergraduate Advising Committee member, Fall 2011-Spring 2013

Admissions Open House, Dept. of Math Sciences representative, October 2012

MA Exam Committee member, May 10, 2012

Visiting Panelist, Graduate school information panel, Colgate University, Fall 2011

Previous Service

Co-organizer for Dispersive PDE Seminar, University of Toronto, Fall 2010

Hosted visits from local high school classes in calculus lecture, University of Toronto, Fall 2008

Co-started & Co-organized Junior PDE Seminar (now Junior Analysis)-UT Austin, Fall 2004-Spring 2006

Professional Development Activities at University of Colorado Boulder

Doing It All: The first seven years, FTEP, March 7, 2019

What are your students learning, FTEP, February 12, 2019

Undergraduate research opportunities and you, FTEP, September 18, 2018

Flipping the class for the skeptic, FTEP, February 23, 2018

Time Management, FTEP, March 1, 2017

Addressing Challenging Situations in the Classroom, FTEP, February 9, 2017