

Zhenfu Wang

- CONTACT INFORMATION** Department of Mathematics,
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- RESEARCH INTERESTS** Analysis and Partial Differential Equations, especially Mean Field limit for many particle systems and analysis of Kinetic equations. Distribution Sampling Algorithms based on interacting particle systems.
- EMPLOYMENT** Hans Rademacher Instructor of Mathematics, University of Pennsylvania, July 2017 -
- EDUCATION** **University of Maryland**, College Park, MD, USA.
Ph.D. in Mathematics, Sept 2012 - May 2017
- Dissertation Title: “Mean field limit for stochastic particle systems with singular forces”.
 - Advisor: Professor Pierre-Emmanuel Jabin.
- Nanjing University**, Nanjing, Jiangsu, China.
B.S. in Mathematics, Sept 2008- July 2012. Major GPA: 96/100 (Rank: 1/130.)
- Thesis Title: “Nekhoroshev estimates for symplectic perturbations of quasiconvex Hamiltonian systems”.
 - Advisor: Professor Chong-Qing Cheng.
- PUBLICATIONS**
- With P.-E. Jabin, *Mean Field Limit and Propagation of Chaos for Vlasov Systems with Bounded Forces*. Journal of Functional Analysis. **271** (2016) 3588–3627.
 - With P.-E. Jabin, *Mean field limit for stochastic particles systems*. In N. Bellomo, P. Degond, and E. Tadmor Eds., Active Particles Volume 1, Theory, Methods, and Applications”, Birkhauser-Springer, 2017.
 - *Mean field limit for stochastic particle systems with singular forces*. PhD Dissertation. <http://hdl.handle.net/1903/19885>. University of Maryland, College Park. 2017.
 - With P.-E. Jabin, *Quantitative estimates of propagation of chaos for stochastic systems with $W^{-1,\infty}$ kernel*. Inventiones Mathematicae. **214** (2018) 523–591. (This article has been presented by Prof. Laure Saint-Raymond in the famous Bourbaki Seminar. See her article <http://www.bourbaki.ens.fr/TEXTES/1143.pdf> for a nice introduction of our program on the mean field limit.)
 - With R. M. Strain, *Uniqueness of bounded solutions for the homogeneous relativistic Landau equation with Coulomb interactions*. Quart. Appl. Math. (2019)
 - With D. Bresch and P.-E. Jabin, *On Mean Field Limit and Quantitative Estimates with a Large Class of Singular Kernels: Application to the Patlak-Keller-Segel Model*. C. R. Acad. Sciences, Section Maths. (2019)

- With D. Bresch and P.E. Jabin, Modulated Free Energy and Mean Field Limit. Séminaire Laurent Schwartz — EDP et applications. (2019-2020), Talk no.2, 22p.
- With D. Bresch and P.-E. Jabin, *Mean Field Limit and Quantitative Estimates with a Large Class of Singular Kernels*. Long paper, almost completed. (2019)
- With Z. Shen and H. Hassani, *Sinkhorn Barycenter via Functional Gradient Descent*. Submitted to ICML 2020.

AWARDS

- Ann G. Wylie Dissertation Fellowship, University of Maryland, 2016-2017.
- Research Supported by NSF Grant 1312142 (Many Particle Systems), 2014 - 2016.
- Travel Grant from Department of Mathematics, University of Maryland, Summer 2015 & May 2016.
- Dean's fellowship, University of Maryland, 2012-2014.
- National Encouragement Fellowship, Nanjing University, 2011.
- National Scholarship, Nanjing University, 2010.
- Citigroup merit scholarship, 2009.
- SHK scholarships, 2008-2012.

Invited TALKS

- June 5-9, 2020. Special session "Stochastic Analysis and Large Scale Interacting Systems", AIMS meeting 2020, Atlanta, GA.
- June 5-9, 2020. Special session "Irregular flows in PDEs", AIMS meeting 2020, Atlanta, GA.
- March 27, 2020. Analysis seminar, Columbia University, New York City, NY.
- March 14, 2020. Special session "Nonlocal PDEs and Applications", AMS sectional meeting, University of Virginia, Charlottesville, VA.
- Feb. 27, 2020. Special talk at Courant Institute, New York University, NY.
- Feb. 19, 2020. Math Colloquium, University of Wisconsin, Madison, WI.
- Dec. 11, 2020. Special session "Mean field limit of interacting particle systems", SIAM meeting 2019, La Quinta, CA.
- Oct. 21 -25, 2019. Young Researchers Workshop: Ki-Net 2012-2019 University of Maryland, College Park, MD.
- Oct. 13, 2019. Special session "Recent Trends in Geometrical PDEs and Mathematical Physics" at AMS Fall 2019 Eastern Sectional Meeting, Binghamton, NY.
- Sept. 11, 2019. Ki-Net/CSCAMM Conference "Formation of small scales in nonlinear PDEs", College Park, MD.
- June 27, 2019. Talk at Beijing International Center for Mathematical Research, Peking University, Beijing, China.
- June 25, 2019, Analysis Seminar talk at Yau Mathematical Center, Tsinghua University, China.
- June 13, 2019, Invited special session talk (Applied PDE session) at CAIMS 2019, Canada.
- May 2, 2019, PDE/applied math seminar at Drexel University, Philadelphia, PA.

- March 6, 2019, PDE seminar at University of Minnesota, Twin Cities. Minneapolis, MN.
- Jan. 11, 2019. Two talks at Yau Mathematical Science Center, Tsinghua University, China.
- Jan. 3, 2019, Seminar talk at Nanjing University, Nanjing, China.
- Nov. 16, 2018 Analysis Seminar at CUNY, Graduate Center, New York City, NY.
- Nov. 5, 2018 Probability seminar at Indiana University Bloomington, IN.
- Oct. 23, 2018, Young Researchers Workshop: Kinetic descriptions in theory and applications, CSCAMM, University of Maryland, College Park, MD.
- June 18, 2018, Talk for Mauro Maggioni's group in John Hopkins University, Baltimore, MD.
- May 10, 2018, Seminar on Stochastic Processes 2018, Brown University, Providence, RI.
- Apr. 24, 2018, Probability seminar at UPenn, Philadelphia, PA.
- Dec. 21, 2017, Talk at Yau Mathematical Science Center, Tsinghua University, China.
- Nov. 8, 2017, Analysis seminar at Binghamton University, SUNY, NY.
- Oct. 13-15, 2017, Northeastern Analysis Meeting, 2017. Albany, NY.
- Sept. 14, 2017, Analysis seminar at UPenn, Philadelphia, PA.
- Sept. 9-10, 2017, Special Session on Nonlocal PDEs in Fluid Dynamics, AMS sectional meeting, Deton, TX, 2017.
- Apr. 3, 2017, PDE/Geometric Analysis Seminar at University of Wisconsin, Madison, WI.
- Nov 28 - Dec 2, 2016, Young Researchers Workshop: Stochastic and deterministic methods in kinetic theory, Duke University, NC.

**CONFERENCES
ATTENDED**

- Mathematical Frontiers in the analysis of many particle systems, July 1-5, 2019, University of Cambridge, UK.
- Seminar on Stochastic Processes 2019, Mar. 13-16, 2019, University of Utah, Salt Lake City, UT.
- Conference in Memory of John N. Mather, Oct. 1- Oct. 3, 2018, Princeton University, Princeton.
- Conference on Nonlinear Waves, May 14-17, 2018, Brown University, Providence.
- Recent advances on particle systems in kinetic theory, May 8-12, 2017, University of Texas, Austin, TX.
- Selected topics in transport phenomenon: deterministic and probabilistic aspects. Apr. 18-21, 2017, CSCAMM, University of Maryland, College Park, MD.
- Seminar on Stochastic Processes 2017, Mar. 8-11, 2017, University of Virginia, Charlottesville, VA.
- Transport phenomena in collective dynamics: from micro to social hydrodynamics, Nov 1-4, 2016, FIM, ETH-Zurich, Swiss. (Supported by FIM ETH-Zurich and KiNet.)

- New Trends in Quantum and Classical Kinetic Equations and Related PDEs, Oct 6-8, 2016, University of Wisconsin, Madison. (Supported by KiNet and NSF Grant 1312142.)
- Mixing and Mixtures in Geo- and Biophysical Flows: A focus on Mathematical Theory and Numerical Methods, May 23-27, 2016, CSCAMM, University of Maryland, College Park, MD.
- Seminar on Stochastic Processes 2016, Mar 16-19, 2016, University of Maryland, College Park, MD.
- Collective Dynamics in Biological and Social Systems, Nov 19 - 22, 2015, Department of Mathematics, Duke University, Durham, NC. (Supported by KiNet.)
- Young Researchers Workshop: Kinetic theory with applications in physical sciences, Nov 9 - 13, 2015, CSCAMM, University of Maryland, College Park, MD.
- Analysis and Computation in Kinetic Theory, Nov 4 - 6, 2015, Department of Mathematics, Stanford University, Stanford, CA. (Supported by KiNet.)
- Analysis of PDEs of Fluid Mechanics and Related Models (Mini-school and workshop), Oct 10-13, 2015, Rice University, Houston, TX. (Supported by Rice University.)
- The 8th International Congress on Industrial and Applied Mathematics, Aug 10-14, 2015, Beijing, China. (Supported by NSF Grant 1312142 and UMD Math Department Travel Grant.)
- Young Researchers Workshop: Multiscale phenomena: modeling, analysis and computation, Oct 27 - 31, 2014, CSCAMM, University of Maryland, College Park, MD.
- Inaugural Chicago Summer School In Analysis, June 30 - Jul 11, 2014, University of Chicago, Chicago, IL. (Supported by the University of Chicago RTG grant DMS-1246999.)
- Modern Perspectives in Applied Mathematics: Theory and Numerics of PDEs, Apr 28 - May 2, 2014 Bethesda, MD.

TEACHING EXPERIENCE

Instructor at UPenn

- Lower Level Courses:
MATH 170, Ideas in Mathematics, Spring 2018.
MATH 115, Calculus II, Fall 2018.
- Math Major Undergraduate Core Courses:
MATH 360, Advanced Calculus I, Spring 2019.
MATH 361, Advanced Calculus II, Spring 2018.
- Graduate Courses:
AMCS 602, Applied Linear Algebra, Fall 2017, Fall 2018 and Fall 2019. (Graduate Course for Applied Mathematics PhD students.)
MATH 648-649/STAT 930-931, Fall 2019 and Spring 2020. (Probability Sequence for MATH and STAT PhD students.)

Graduate Teaching Assistant at University of Maryland, College Park

- Leading Discussion for MATH 140 (Calculus I), Fall 2013.
- Leading Discussion for MATH 240 (Linear Algebra), Spring 2014.
- Leading Discussion for MATH 461 (Linear Algebra for Scientists and Engineers), Fall 2016.

Grader at University of Maryland, College Park

- Grader for MATH 411 (Advanced Calculus II), Fall 2012 & Spring 2013.
- Grader for STAT 100 (Elementary Statistics and Probability), Summer I, 2013.
- Grader for MATH 462 (Partial Differential Equations), Summer II, 2013.
- Grader for AMSC 466 (Introduction to Numerical Analysis), Fall 2015.

MENTORING

- Mentor of the Independent Study of Linjun Li (1st year PhD student) at Penn Math, Spring, 2019. Topic: the dimension free structure of the non-homogeneous random matrices.
- Supervisor of the reading seminar, Spring 2020. Topic: Trajectory-wise Otto Calculus. Two PhD students, Da Wu and Jiaming Xia, are enrolled.
- Mentor of Math & Physics major undergraduate student Rajath Shetty in the Directed Reading Program, Summer 2015.
Topic: *Stochastic Calculus and its applications in PDEs*.
- Mentor of Math major undergraduate student Laura Zimmer in the Directed Reading Program, Fall 2016.
Topic: *Derivation of Black-Scholes options formula*.

SERVICE @Penn Co-organizer of Penn Analysis Seminar (2017-2020).

Mentor of a master student Wenxin Zhang at Penn Math, 2018-2019.

Mentor of a 2nd year PhD student Da Wu at Penn Math since Fall 2019. We had already completed a project on the mean field limit. We are working on a project on Contingency Tables.

Committee member of Da Wu's preliminary oral exam at Penn Math.

Served in the preliminary exam committee in the academic year 2017-2018.

Served in the Colloquium committee and the Make-up/AP Exam committee in the academic years 2018-2019 and 2019-2020.

Mentor for Anusha Krishnan for Post-doc job search.

Mentor for Linjun Li (PhD student) for independent studies.

REFEREE FOR JOURNALS Communications in Mathematical Physics, Kinetic Related Models, SIAM Journal of Mathematical Analysis, Nonlinearity, Communications in PDEs, Discrete & Continuous Dynamical Systems. Mathematical Reviews.

ADDITIONAL INFORMATION Language: English (Proficient) & Chinese (Native).
Programming & Software: C++, MATLAB, LaTeX.