

Jingbo Wan

Curriculum Vitae

Department of Mathematics
Columbia University

jingbowanmath.github.io
Email: jw3976@columbia.edu

Education

Laboratoire Jacques-Louis Lions, Sorbonne Université	Sep 2025 –
CNRS Postdoctoral Fellow in Mathematics (Advisor: Jérémie Szeftel)	
Columbia University, New York, NY	2020 – May 2025
Ph.D. in Mathematics (Advisors: Elena Giorgi and Mu-Tao Wang)	
Hong Kong University of Science and Technology	2016 – 2020
B.Sc. in Mathematics, International Research Enrichment Track, First-Class Honours	

Research Interests

Mathematical General Relativity, Nonlinear Partial Differential Equations, Minimal Submanifolds and Geometric Flows

Publications

1. (Joint with Dawei Shen) *Formation of trapped surfaces for the Einstein–Maxwell–charged scalar field system*, arXiv:2504.19976 (2025).
2. (Joint with Sergiu Klainerman and Dawei Shen) *A canonical foliation on null infinity in perturbations of Kerr*, arXiv:2412.20119 (2024), submitted.
3. (Joint with Elena Giorgi) *Boundedness and decay for the Teukolsky system in Kerr–Newman spacetime II: The case $|a| \ll M$, $|Q| < M$ in axial symmetry*, *Adv. Theor. Math. Phys.* (to appear), arXiv:2407.10750.
4. *Sharp interior gradient estimate for area decreasing graphical mean curvature flow in arbitrary codimension*, arXiv:2407.05602 (2024), submitted.
5. (Joint with Man-Chun Lee and Luen-Fai Tam) *Rigidity of area non-increasing maps*, *Trans. Amer. Math. Soc.* (to appear), arXiv:2312.10940.
6. (Joint with Man-Chun Lee) *Rigidity of contracting map using harmonic map heat flow*, *Proc. Amer. Math. Soc.* (to appear), arXiv:2306.12258.
7. (Joint with Elena Giorgi) *Physical-space estimates for axisymmetric waves on extremal Kerr spacetime*, *J. Funct. Anal.* **287** (2024), no. 12, 110668.
8. (Joint with Florian Johne and Tsz-Kiu Aaron Chow) *Preserving positive intermediate curvature*, *J. Geom. Anal.* **33** (2023), 366.
9. (Joint with Nicholas Cheng-Hoong Chin and Frederick Tsz-Ho Fong) *Uniqueness theorems of self-conformal solutions to inverse curvature flows*, *Proc. Amer. Math. Soc.* **148** (2020), 4967–4982.

Invited Talks

Hyperbolic & Dispersive Equations on Curved Geometries <i>Topic: Hyperbolic estimate of nonlinear pos-spin Regge-Wheeler system</i>	SCGP Apr 2025
Mathematical GR and Hyperbolic PDE Seminar <i>Topic: Axisymmetric Solution of the Teukolsky System</i>	Virtual Sep 2024
Harmonic Analysis and Differential Equations Seminar <i>Topic: Axisymmetric Solution of the Teukolsky System</i>	UC Berkeley Sep 2024
Mini-workshop in Geometric Analysis <i>Topic: Sharp Interior Gradient Estimate for GMCF in Arbitrary Codimension</i>	SUSTech Aug 2024
Seminar ON Pure Mathematics <i>Topic: Sharp Interior Gradient Estimate for GMCF in Arbitrary Codimension</i>	HKUST Aug 2024
Topics in general relativity at Mathematics Münster <i>Topic: Axisymmetric Solution of the Teukolsky System</i>	Münster University Jul 2024
Westlake University Geometric Analysis Seminar <i>Topic: Rigidity of Area Non-Increasing Maps</i>	Westlake University Apr 2024
BIMCR Geometric Analysis Seminar <i>Topic: Rigidity of Area Non-Increasing Maps</i>	BIMCR Mar 2024
CUNY Geometric Analysis Seminar <i>Topic: Rigidity of contracting map using harmonic map heat flow</i>	CUNY Graduate Center Sep 2023
Geometric Analysis Seminar <i>Topic: Short course in semi-linear wave equation on blackholes</i>	CUHK Aug 2023
Seminar ON Pure Mathematics <i>Topic: Rigidity of contracting map using harmonic map heat flow</i>	HKUST Aug 2023
MIST 2023 Workshop on Geometry <i>Topic: Rigidity of contracting map using harmonic map heat flow</i>	CUHK Aug 2023
Joint Geometric Analysis Seminar <i>Topic: Wave equations on Blackholes</i>	CUHK Jun 2023
Columbia General Relativity & Geometric Analysis Seminar <i>Topic: The Existence of a Black Hole Due to Condensation of Matter</i>	Columbia University Oct 2022

Co-Organized Seminars

Informal Reading Seminar in GR <i>Topic: various aspects of general relativity</i>	Columbia University 2024 Fall
Student PDE Seminar <i>Topic: BV Functions and Regularity of the Minimal Surface</i>	Columbia University 2024 Fall
Student Geometric Analysis Seminar <i>Topic: Regularity Theory of the Monge-Ampère Equation</i>	Columbia University 2024 Spring
Student Geometric Analysis Seminar <i>Topic: Geometric Flows and Their Applications</i>	Columbia University 2023 Fall
Student Geometric Analysis Seminar <i>Topic: Scalar Curvature and Dihedral Rigidity</i>	Columbia University 2023 Spring
Student Geometric Analysis Seminar <i>Topic: Scalar Curvature and Topology</i>	Columbia University 2022 fall
Informal student GR seminar, over zoom <i>Topic: Semilinear wave equation on blackholes</i>	Columbia University 2021 fall

Summer Schools & Workshops

Singularities in Fluid and General Relativity	Singapore
<i>Program Workshop, NUS</i>	<i>Dec 16 2024 – Jan 10 2025</i>
Geometry and Analysis of Special Structures on Manifolds	Berkeley
<i>Program Workshop, SLMath</i>	<i>Nov 18 – Nov 22, 2024</i>
Recent Progress on Geometric Analysis and Riemannian Geometry	Berkeley
<i>Program Workshop, SLMath</i>	<i>Oct 21 – Oct 25, 2024</i>
Introductory Workshop: Special Geometric Structures and Analysis	Berkeley
<i>Program Workshop, SLMath</i>	<i>Sep 3 – Sep 6, 2024</i>
Introductory Workshop: New Frontiers in Curvature	Berkeley
<i>Program Workshop, SLMath</i>	<i>Aug 26 – Aug 30, 2024</i>
Geometric Analysis Workshop	Shenzhen
<i>Mini Workshop, SUSTech</i>	<i>Aug 18 – Aug 19, 2024</i>
Mathematics of General Relativity and Fluids	Crete
<i>Summer Graduate School, SLMath and FORTH</i>	<i>Jul 22 – Aug 2, 2024</i>
Symmetries and Dynamics of Extremal Black Holes	Princeton
<i>Workshop, PCTS, PGI</i>	<i>Mar 6 – Mar 8, 2024</i>
The Fifth Taiwan International Conference on Geometry	Taipei
<i>Mini courses & Conference, NTU</i>	<i>Jan 12 – Jan 19, 2024</i>
Mass, Einstein Constraint Equations, and Penrose Inequality	Stony Brook
<i>Conference, Simon Center</i>	<i>Sep 18 – Sep 22, 2023</i>
Nonlinear Aspects of General Relativity	Princeton
<i>Workshop, PCTS, PGI</i>	<i>Oct 10 – Oct 13, 2023</i>
Conference on Nonlinear Waves and Mathematical Relativity	Beijing
<i>Conference, Tsinghua</i>	<i>Jul 10 – Jul 14, 2023</i>
Rutgers Geometric Analysis Conference	Rutgers
<i>Mini Workshop, Rutgers</i>	<i>May 15 – May 16, 2023</i>
37th Geometry Festival	Princeton
<i>Workshop, Princeton</i>	<i>Apr 28 – Apr 30, 2023</i>
Northeast Workshop in Geometric Analysis (NEWGA)	Connecticut
<i>Mini Workshop, UConn</i>	<i>Nov 5 – Nov 6, 2022</i>
Cauchy Problem in General Relativity	Online
<i>EWM-EMS Summer School, Mittag-Leffler</i>	<i>Jun 13 – Jun 17, 2022</i>
Geometry of Submanifolds	Online
<i>Workshop, Tianyuan Center of Southeast China</i>	<i>Jul 20 – Jul 24, 2020</i>

Awards & Honors

Dean's Fellow	2020-Present
<i>Graduate School of Arts and Sciences, Columbia University</i>	
Academic Achievement Medal	2020
<i>Department of Mathematics, Hong Kong University of Science and Technology</i>	
Chern Class Achievement Scholarship	2020
<i>Department of Mathematics, Hong Kong University of Science and Technology</i>	
Chern Class Talent Scholarship	2017-2020
<i>Department of Mathematics, Hong Kong University of Science and Technology</i>	
First Runner-Up, Mr Armin and Mrs Lillian Kitchell Undergraduate Research Award	2019
<i>Undergraduate research competition held by Hong Kong University of Science and Technology</i>	
Epsilon Fund Award	2019
<i>Department of Mathematics, Hong Kong University of Science and Technology</i>	

University's Scholarship Scheme for Continuing Undergraduate Students	2017-2020
<i>Hong Kong University of Science and Technology</i>	
Dean's List	2016-2020
<i>Hong Kong University of Science and Technology</i>	
32th Chinese Physics Olympiad - First prize	2015
<i>within Guangdong Province</i>	
Pan Pearl River Delta Physics Olympiad - second prize	2014
<i>Hong Kong University of Science and Technology</i>	

Teaching

Spring 2025 Calculus II, Instructor
 Fall 2024 Accelerated Multivariable Calculus, Teaching Assistant
 Summer 2024 Analysis and Optimization, Instructor
 Spring 2024 Accelerated Multivariable Calculus, Teaching Assistant
 Fall 2023 Accelerated Multivariable Calculus, Teaching Assistant for second half of semester
 Fall 2023 Number theory and Cryptography, Teaching Assistant for first half of semester
 Spring 2023 Linear Algebra, Teaching Assistant
 Fall 2022 Linear Algebra, Teaching Assistant
 Spring 2022 Number theory and Cryptography, Teaching Assistant
 Fall 2021 Ordinary Differential Equations, Teaching Assistant
 Spring 2021 General Teaching Assistant in student Help Room for Calculus and Linear algebra
 Fall 2020 General Teaching Assistant in student Help Room for Calculus and Linear algebra