Jonas Lührmann

Contact Information

Texas A&M University
Department of Mathematics
Blocker 620B
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Research   Nonlinear dispersive and hyperbolic equations, mathematical physics

Employment   *Texas A&M University*, Assistant Professor
August 2019 – present

Johns Hopkins University, J.J. Sylvester Assistant Professor
August 2016 – June 2019

Education   *ETH Zurich*, Ph.D. in mathematics
April 2016
Thesis advisor: Prof. Dr. Michael Struwe
Thesis co-advisor: Prof. Dr. Joachim Krieger
Thesis title: Deterministic and Probabilistic Global Existence Results for
Nonlinear Wave Equations

LMU Munich, Diplom Mathematik (Master's degree in mathematics)
July 2011
Thesis advisor: Prof. Dr. László Erdős
Thesis title: Mean-field quantum dynamics with magnetic fields

Publications   **Preprints**

[18] *On codimension one stability of the soliton for the 1D focusing cubic Klein-Gordon equation*, with W. Schlag, arXiv:2302.05273, 108 pp.

[17] *Stability of the catenoid for the hyperbolic vanishing mean curvature equation outside symmetry*, with S.-J. Oh, and S. Shahshahani, arXiv:2212.05620, 99 pp.

[16] *The wave maps equation and Brownian paths*, with B. Bringmann and G. Staffilani, arXiv:2111.07381, 99 pp.

Refereed journal articles

[15] *Soliton dynamics for the 1D quadratic Klein-Gordon equation with symmetry*, with Y. Li, **J. Differential Equations** 344 (2023), 172–202.

[14] *Asymptotic stability of the sine-Gordon kink under odd perturbations*, with W. Schlag, to appear in **Duke Math. J.**, 70 pp.

[13] *On modified scattering for 1D quadratic Klein-Gordon equations with non-generic potentials*, with H. Lindblad, W. Schlag, and A. Soffer, **Int. Math. Res. Not.** 2023 (2022), no. 6, 5118—5208. (90 pp.)

[12] *Probabilistic small data global well-posedness of the energy-critical Maxwell-Klein-Gordon equation*, with J. Krieger and G. Staffilani, to appear in **Arch. Ration. Mech. Anal.**, 78 pp.

[11] *Asymptotics for 1D Klein-Gordon equations with variable coefficient quadratic nonlinearities*, with H. Lindblad and A. Soffer, **Arch. Ration. Mech. Anal.** 241 (2021), no. 3, 1459–1527.

[10] *Asymptotic stability of harmonic maps on the hyperbolic plane under the Schrödinger maps evolution*, with A. Lawrie, S.-J. Oh, and S. Shahshahani, **Comm. Pure Appl. Math.** 76 (2023), no. 3, 453–584.

[9] *Decay and asymptotics for the 1D Klein-Gordon equation with variable coefficient cubic nonlinearities*, with H. Lindblad and A. Soffer, **SIAM J. Math. Anal.** 52 (2020), no. 6, 6379–6411.

[8] *Local smoothing estimates for Schrödinger equations on hyperbolic space*, with A. Lawrie, S.-J. Oh, and S. Shahshahani, to appear in **Mem. Amer. Math. Soc.**, 152 pp.

[7] *Almost sure local well-posedness and scattering for the 4D cubic nonlinear Schrödinger equation*, with B. Dodson and D. Mendelson, **Adv. Math.** 347 (2019), 619–676.

[6] *Almost sure scattering for the 4D energy-critical defocusing nonlinear wave equation with radial data*, with B. Dodson and D. Mendelson, **Amer. J. Math.** 142 (2020), no. 2, 475–504.

[5] *Concentration Compactness for Critical Radial Wave Maps*, with E. Chiodaroli and J. Krieger, **Annals of PDE** 4 (2018), no. 1, Art. 8, 148 pp.

[4] *Concentration Compactness for the Critical Maxwell-Klein-Gordon Equation*, with J. Krieger, **Annals of PDE** 1 (2015), no. 1, Art. 5, 208 pp.

[3] *On the almost sure global well-posedness of energy sub-critical nonlinear wave equations on $\mathbb{R}^3$*, with D. Mendelson, **New York J. Math.** 22 (2016), 209–227.

[2] *Random data Cauchy theory for nonlinear wave equations of power-type on $\mathbb{R}^3$*, with D. Mendelson, **Comm. Partial Differential Equations** 39 (2014), no. 12, 2262–2283.

[1] *Mean-field quantum dynamics with magnetic fields*, **J. Math. Phys.** 53 (2012), no. 2, 19 pp.

Proceedings and reports

- *On asymptotic stability of classical solitons in 1D nonlinear scalar field theories*, **Oberwolfach Reports** 30 (2022), pp. 1700–1703.

- *On asymptotic stability of solitons in classical 1D scalar field theories*, **Oberwolfach Reports** 26 (2022), pp. 1439–1442.

- *Probabilistic scattering for the 4D energy-critical defocusing nonlinear wave equation*, **Oberwolfach Reports** 27 (2017), pp. 1712–1715.

AWARDS &
GRANTS

NSF CAREER Grant DMS-2235233, PI, 2023–2028

NSF Conference Grant DMS-2230164, Co-PI, 2022

NSF Analysis Program Grant DMS-1954707, PI, 2020–2023

AMS-Simons Travel Grant, 2017–2019

ETH Medal for outstanding doctoral thesis, 2017

Scholarship of the German National Academic Foundation, 2007–2011

TEACHING

Texas A&M University: Instructor

Math 612 Partial Differential Equations, Spring 2023

Math 308 Differential Equations, Spring 2023

Math 611 Introduction to Ordinary and Partial Differential Equations, Fall 2022

Math 308 Differential Equations, Spring 2022

Math 410 Advanced Calculus II, Spring 2021

Math 689 Topics Course on Nonlinear Waves and Dispersive Equations, Spring 2021

Nonlinear Waves Working Seminar, Fall 2020

Math 410 Advanced Calculus II, Spring 2020

Math 412 Theory of Partial Differential Equations, Fall 2019

Johns Hopkins University: Instructor

Math 302 Differential Equations with Applications, Spring 2019 (two sections)

Math 632 Partial Differential Equations II, Fall 2018

Math 417 Partial Differential Equations with Applications, Spring 2018

Math 302 Differential Equations with Applications, Fall 2017 (two sections)

Math 405 Analysis I, Spring 2017

Math 106 Calculus I (Biology and Social Sciences), Fall 2016 (two sections)

ETH Zurich: Graduate Teaching Assistant

Measure and Integration, Spring 2016

Functional Analysis I, Fall 2015

Functional Analysis II, Spring 2015

Functional Analysis I, Fall 2014

Differential Geometry II, Spring 2014

Differential Geometry I, Fall 2013

Differential Geometry II, Spring 2013

Differential Geometry I, Fall 2012

Measure and Integration, Spring 2012

Analysis III, Fall 2011

LMU Munich: Undergraduate Teaching Assistant

Functional Analysis I, Spring 2010

Analysis III, Fall 2009

Analysis II, Spring 2009

ADVISING   Graduate Student Yongming Li
(Texas A&M University, September 2021 – present)

Postdoc Robert Booth
(Texas A&M University, September 2019 – May 2021)

Undergraduate Research by Jordan Hoffart
(Texas A&M University, November 2019 – August 2020)

Undergraduate Research by Jack Dalberg
(Texas A&M University, November 2019 – August 2020)

Independent Study "Lie Groups and the Peter-Weyl Theorem" by Advika Rajapakse
(Johns Hopkins University, Spring 2019)

Semester thesis project "Strichartz Estimates for the Schrödinger Equation" by Christian
Brennecke (ETH Zurich, Spring 2014)

Bachelor's thesis "Variants of the Minimax Principle" by Thomas Coutandin
(ETH Zurich, Spring 2012)

OUTREACH   SEE-Math 2020, 2021 Lecturer

Volunteer at the Texas A&M Mathematics and Statistics Fair
(22 February 2020, 26 February 2022)

Texas A&M University Math Circle Activity (25 January 2020)

SERVICE   **Conference and Workshop Organization**

Co-organizer of the "Texas Analysis and Mathematical Physics Symposium 2024", Texas
A&M University, 9-11 February 2024

Organizer of the workshop "Trends in Soliton Dynamics and Singularity Formation for
Nonlinear Dispersive PDEs", Texas A&M University, 21–23 October 2022

Co-organizer of mini-symposium "Nonlinear Waves and Applications" at the 3rd SIAM
TX-LA Annual Meeting at Texas A&M University (via Zoom), 17 October 2020

Co-organizer of mini-symposium "Nonlinear Waves and Applications" at the 2nd SIAM
TX-LA Annual Meeting at Southern Methodist University, Dallas, TX, 1–3 November
2019

Co-organizer of special session "Nonlinear Dispersive Equations" at the AMS Sectional
Meeting at the University of Central Florida, Orlando, FL, 23–24 September 2017

Seminar and Lecture Series Organization

Co-organizer of the TAMU Foias Lectures 2023

Co-organizer of the TAMU Nonlinear PDEs Seminar since Fall 2020

Co-organizer of the TAMU MPHA Seminar since Fall 2019

Co-organizer of the JHU Analysis & PDE Seminar 2017–2019

Refereeing

Advances in Mathematics, American Journal of Mathematics, Analysis & PDE, Annales
scientifiques de l'École normale supérieure, Annales de l'Institut Fourier, Annals of PDE,
Calculus of Variations and Partial Differential Equations, Communications in Mathemat-
ical Physics, Discrete and Continuous Dynamical Systems – Series A, Dynamics of PDE,
International Mathematics Research Notices, Inventiones, Journal of Differential Equa-
tions, Journal of Functional Analysis, Journal of Mathematical Physics, Journal of the
European Mathematical Society, Journal of Spectral Theory, Mathematical Research Let-
ters, Mathematische Annalen, Memoirs of the American Mathematical Society, Nonlin-
earity, Proceedings of the American Mathematical Society, Pure and Applied Analysis,
SIAM Journal on Mathematical Analysis, Stochastics and Partial Differential Equations:
Analysis and Computations, Transactions of the American Mathematical Society

CONFERENCE   *Harmonic Analysis and Partial Differential Equations*, University of Bonn, Bonn, Ger-
TALKS   many, 1 June 2023

Texas Differential Equations Conference, Texas A&M, College Station, TX, 2 Octo-
ber 2022

2nd IST Austria Summer School in Analysis and PDE, IST Austria, Vienna, Austria,
26 July 2022

Oberwolfach Workshop "Nonlinear Waves and Dispersive Equations", Mathematisches Forschungsinstitut Oberwolfach, Germany, 29 June 2022

Oberwolfach Workshop "Deterministic Dynamics and Randomness in PDE", Mathematisches Forschungsinstitut Oberwolfach, Germany, 23 May 2022

Workshop at BIRS: Dynamics in Geometric Dispersive Equations and the Effects of Trapping, Scattering and Weak Turbulence, Banff, Canada, 3 February 2020

Texas Analysis and Mathematical Physics Symposium, Rice University, Houston, TX, 1 February 2020

SIAM Texas-Louisiana Section Annual Meeting: Mini-symposium on Nonlinear Waves and Applications, Southern Methodist University, Dallas, TX, 2 November 2019

Workshop on Dispersive Wave Theory, Central China Normal University, Wuhan, China, 16 July 2019

IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Session on Dispersive Wave Equations and their Soliton Interactions, University of Georgia, Athens, GA, 18 April 2019

Joint Mathematics Meeting: AMS Special Session on Analysis and Geometry of Nonlinear Evolution Equations, Baltimore, MD, 17 January 2019

Nonlinear Phenomena in DC, George Washington University, 24 April 2018

AMS Sectional Meeting: Special Session on The Analysis of Dispersive Equations, Northeastern University, Boston, MA, 22 April 2018

AMS Sectional Meeting: Special Session on Nonlinear Dispersive Equations, University of Central Florida, Orlando, FL, 24 September 2017

Oberwolfach Workshop "Nonlinear Waves and Dispersive Equations", Mathematisches Forschungsinstitut Oberwolfach, Germany, 14 June 2017

AMS Sectional Meeting: Special Session on Harmonic Analysis and Dispersive PDE, North Carolina State University, Raleigh, NC, 12 November 2016

Singularity formation and long-time behavior in dispersive PDEs, The Mathematical Institute of the University of Bonn, 16 March 2016

SEMINAR & COLLOQUIUM TALKS	*Analysis & Applied Math Seminar*, University of Toronto, 10 March 2023

Caltech/UCLA/USC Joint Analysis Seminar, Caltech, 7 March 2023

Analysis & PDE Seminar, University of North Carolina at Chapel Hill, 22 February 2023

PDE Seminar, GeorgiaTech, 21 February 2023

Analysis Seminar, University of Texas at Austin, 11 January 2023

Colloquium, Rice University, 17 November 2022

Spectral Theory Seminar, Rice University, 16 November 2022

Analysis and PDE Seminar, Johns Hopkins University, 14 November 2022

Applied Analysis Seminar (via Zoom), Louisiana State University, 21 March 2022

ICERM Semester Program Seminar, ICERM, Brown University, 30 November 2021

Analysis/PDE Seminar, Brown University, 29 November 2021

PDE/Applied Math Seminar (via Zoom), UC Davis, 18 November 2021

PDE and Applied Math Seminar, University of Maryland, 4 November 2021

Applied Math Seminar (via Zoom), University of Victoria, Canada, 29 September 2021

Nonlinear PDEs Seminar (via Zoom), Texas A&M University, 21 September 2021

Analysis Seminar (via Zoom), University of Bielefeld, Germany, 20 November 2020

Geometry & Analysis Seminar (via Zoom), Rice University, 18 November 2020

Differential Equations Seminar (via Zoom), University of Michigan, 12 November 2020

Seminario EDP (via Zoom), Universidad de Chile, Chile, 10 November 2020

PDE/Analysis Seminar, MIT, 10 March 2020

MPHA Seminar, Texas A&M University, 22 November 2019

Analysis Seminar, Wuhan University, China, 19 July 2019

Analysis and PDE Seminar, Michigan State University, 13 March 2019

Analysis Seminar, Courant Institute, 13 September 2018

Mathematical Physics and Analysis Seminar, IST Austria, 3 July 2018

CMC Seminar, Korea Institute for Advanced Study, Seoul, 15 June 2018

Caltech/UCLA Joint Analysis Seminar, Caltech, 11 May 2018

PDE/Analysis Seminar, MIT, 8 May 2018

Analysis and PDE Seminar, University of North Carolina at Chapel Hill, 7 February 2018

PDE and Applied Math Seminar, University of Maryland, 26 October 2017

Calderón-Zygmund Analysis Seminar, University of Chicago, 8 May 2017

Analysis Seminar, University of Massachusetts Amherst, 12 April 2017

Analysis and Probability Seminar, University of Connecticut, 24 March 2017

Analysis Seminar, George Washington University, 6 December 2016

Analysis and PDE Seminar, Johns Hopkins University, 19 September 2016

PDE Seminar, University of Oxford, 25 February 2016

Analysis Seminar, ETH Zurich, 15 December 2015

Mathematical Physics and Analysis Seminar, IST Austria, 13 October 2015

Trimester Seminar, Hausdorff Institute Bonn, 27 June 2014

Analysis Seminar, EPF Lausanne, 23 May 2014

Zurich Graduate Colloquium, ETH Zurich, 28 May 2013

Analysis and Mathematical Physics Seminar, LMU Munich, 3 December 2010

ATTENDED CONFERENCES

Colloquium Trimester Nonlinear Wave Equations, IHES, June 2016

Nonlinear Evolution Problems, Oberwolfach, May 2016

New challenges in PDE: Deterministic dynamics and randomness in high and infinite dimensional systems, MSRI Berkeley, October 2015

Hausdorff Trimester Program Harmonic Analysis and Partial Differential Equations, Bonn, June - July 2014

Winter School on Nonlinear PDEs and Geometric Analysis, Ascona, January 2013

Oberwolfach Seminar: Dispersive Equations, Oberwolfach, October 2012

Nonlinear Hamiltonian Equations, Ascona, July 2012

Nonlinear Dispersive Equations, Zurich, June 2011

Quantum Theory – From Small to Large Scales, Les Houches, August 2010

LANGUAGES   German (Native), English (Fluent), French (Good), Spanish (Good)