

Education & Work Experience:

- 2009. B.S. Mathematics (with Highest Honors), University of Texas at Austin
- 2010. M.A. Mathematics, University of California Los Angeles
- 2014. Ph.D. Mathematics, University of California Los Angeles
 - Thesis: *Nonlinear Schrödinger equations at non-conserved critical regularity*
 - Advisors: Rowan Killip and Monica Visan
- 2014–2017: NSF Postdoctoral Fellow, Department of Mathematics, University of California, Berkeley
- 2017–2023: Assistant Professor, Department of Mathematics & Statistics, Missouri University of Science and Technology
- 2023–present: Assistant Professor, Department of Mathematics, University of Oregon

Research: Nonlinear partial differential equations, harmonic analysis, inverse problems.

External Funding.

- 2014–2017. NSF Postdoctoral Fellowship. ‘*Dynamics of Large Solutions to Critical Problems in Dispersive Partial Differential Equations*’. Award Number: 1400706. Amount Awarded: \$150,000.
- 2017–2019. AMS-Simons Travel Grant. Amount Awarded: \$4,000.
- 2018–2023. Simons Collaboration Grant. Award Number: 578746. Amount Awarded: \$42,000.
- 2022–2024. NSF Standard Grant. ‘*LEAPS-MPS: Long-time behavior for nonlinear dispersive equations.*’ Award Number: DMS-2137217 (Missouri S&T), DMS-2350225 (University of Oregon). Amount Awarded: \$169,677.

Publications and Preprints.

1. J. Murphy, *Intercritical NLS: critical \dot{H}^s -bounds imply scattering*. SIAM Journal on Mathematical Analysis **46** (2014), no. 1, 939–997.
2. J. Murphy, *The defocusing $\dot{H}^{1/2}$ -critical NLS in high dimensions*. Discrete and Continuous Dynamical Systems, Series-A **34** (2014), no. 2, 733–748.
3. C. Miao, J. Murphy, and J. Zheng, *The defocusing energy-supercritical NLS in four space dimensions*. Journal of Functional Analysis **267** (2014), no. 6, 1662–1724.
4. J. Murphy, *The radial defocusing nonlinear Schrödinger equation in three space dimensions*. Communications in Partial Differential Equations **40** (2015), no. 2, 265–308.
5. R. Killip, J. Murphy, and M. Visan, *The final-state problem for the cubic-quintic NLS with non-vanishing boundary conditions*. Analysis & Partial Differential Equations **9** (2016), no. 7, 1523–1574.
6. J. Murphy and F. Pusateri, *Almost global existence for cubic nonlinear Schrödinger equations in one space dimension*. Discrete and Continuous Dynamical Series, Series-A **37** (2017), no. 4, 2077–2102.
7. J. Murphy, *Subcritical scattering for defocusing NLS*. Expository article (2017).
8. R. Killip, J. Murphy, M. Visan, and J. Zheng, *The focusing cubic NLS with inverse-square potential in three space dimensions*. Differential Integral Equations **30** (2017), no. 3–4, 161–206.
9. B. Dodson, C. Miao, J. Murphy, and J. Zheng, *The defocusing quintic NLS in four space dimensions*. Annales de l’Institut Henri Poincaré C, Analyse non linéaire **34** (2017), no. 3, 759–787.
10. B. Dodson and J. Murphy, *A new proof of scattering below the ground state for the 3d radial focusing cubic NLS*. Proceedings of the American Mathematical Society **145** (2017), no. 11, 4589–4867.

11. R. Killip, S. Masaki, J. Murphy, and M. Visan, *Large data mass-subcritical NLS: critical weighted bounds imply scattering*. *Nonlinear Differential Equations and Applications NoDEA* **24** (2017), no. 4, 24:38.
12. J. Lu, C. Miao, and J. Murphy, *Scattering in H^1 for the intercritical NLS with an inverse-square potential*. *Journal of Differential Equations* **264** (2018), no. 5, 3174–3211.
13. B. Dodson and J. Murphy, *A new proof of scattering below the ground state for the non-radial focusing NLS*. *Mathematical Research Letters* **25** (2018), no. 6, 1805–1825.
14. R. Killip, J. Murphy, and M. Visan, *The initial-value problem for the cubic-quintic NLS with non-vanishing boundary conditions*. *SIAM Journal on Mathematical Analysis* **50** (2018), no. 3, 2681–2739.
15. J. Murphy, *Random data final-state problem for the mass-subcritical NLS in L^2* . *Proceedings of the American Mathematical Society* **147** (2019), no. 1, 339–350.
16. R. Killip, S. Masaki, J. Murphy, and M. Visan, *The radial mass-subcritical NLS in negative order Sobolev spaces*. *Discrete and Continuous Dynamical Systems, Series-A* **39** (2019), no. 1, 553–583.
17. R. Killip, J. Murphy, and M. Visan, *Almost sure scattering for the energy-critical NLS with radial data below $H^1(\mathbb{R}^4)$* . *Communications in Partial Differential Equations* **44** (2019), no. 1, 51–71.
18. S. Masaki, J. Murphy, and J. Segata, *Modified scattering for the 1d cubic NLS with a repulsive delta potential*. *International Mathematics Research Notices* 2019, no. 24, 7577–7603.
19. J. Murphy, *The nonlinear Schrödinger equation with an inverse-square potential*. *Nonlinear dispersive waves and fluids*, 215–225, *Contemporary Mathematics* **725** (2019).
20. A. Arora, B. Dodson, and J. Murphy, *Scattering below the ground state for the 2d radial nonlinear Schrödinger equation*. *Proceedings of the American Mathematical Society* **148** (2020), no. 4, 1653–1663.
21. C. Miao, J. Murphy, and J. Zheng, *The energy-critical nonlinear wave equation with an inverse-square potential*. *Annales de l’Institut Henri Poincaré C, Analyse non linéaire* **37** (2020), no. 2, 417–456.
22. S. Masaki, J. Murphy, and J. Segata, *Stability of small solitary waves for the 1d NLS with an attractive delta potential*. *Analysis & Partial Differential Equations* **13** (2020), no. 4, 1099–1128.
23. R. Killip, J. Murphy, and M. Visan, *Invariance of white noise for KdV on the line*. *Inventiones Mathematicae* **222**, no. 1, 203–282 (2020).
24. J. Murphy and Y. Zhang, *Numerical simulations for the energy-supercritical nonlinear wave equation*. *Nonlinearity* **33** (2020), no. 11, 6195–6220.
25. B. Dodson, A. Lawrie, D. Mendelson, and J. Murphy, *Scattering for defocusing energy subcritical nonlinear wave equations*. *Analysis & Partial Differential Equations* **13** (2020), no. 7, 1995–2090.
26. J. Murphy and K. Nakanishi, *Failure of scattering to solitary waves for long-range nonlinear Schrödinger equations*. *Discrete and Continuous Dynamical Systems, Series-A* **41** (2021), no. 3, 1507–1517.
27. J. Murphy, *A review of modified scattering for the 1d cubic NLS*. *RIMS Kokyuroku Bessatsu B88* (2021), 119–146.
28. J. Murphy, *Threshold scattering for the 2d radial cubic-quintic NLS*. *Communications in Partial Differential Equations* **46** (2021), no. 11, 2213–2234.
29. C. Guzmán and J. Murphy, *Scattering for the non-radial energy-critical inhomogeneous NLS*. *Journal of Differential Equations* **295** (2021), 187–210.
30. R. Killip, J. Murphy, and M. Visan, *Scattering for the cubic-quintic NLS: crossing the virial threshold*. *SIAM Journal on Mathematical Analysis* **53** (2021), no. 5, 5803–5812.
31. C. Miao, J. Murphy, and J. Zheng, *Scattering for the non-radial inhomogeneous NLS*. *Mathematical Research Letters* **28** (2021), no. 5, 1481–1504.
32. J. Murphy and T. Van Hoose, *Modified scattering for a dispersion-managed nonlinear Schrödinger equation*. *Nonlinear Differential Equations and Applications NoDEA* **29** (2022), no. 1, Art. 1, 11pp.
33. J. Murphy, *A simple proof of scattering for the intercritical inhomogeneous NLS*. *Proceedings of the American Mathematical Society*. **150** (2022), no. 3, 1177–1186.
34. M. Cardoso, L. G. Farah, C. Guzmán, and J. Murphy, *Scattering below the ground state for the*

- intercritical non-radial inhomogeneous NLS*. Nonlinear Analysis: Real World Applications. Volume 68, 2022, Article 103687.
35. J. Murphy, *The scattering map determines the nonlinearity*. Oberwolfach Reports (OWR) 2022/30.
 36. C. Hogan, J. Murphy, and D. Grow, *Recovery of a cubic nonlinearity for the nonlinear Schrödinger equation*. Journal of Mathematical Analysis and Applications. **522** (2023), no. 1, Article 127016.
 37. S. Masaki, J. Murphy, and J. Segata, *Asymptotic stability of solitary waves for the 1d NLS with an attractive delta potential*. Discrete and Continuous Dynamical Systems, Series-A **43** (2023), no. 6, 2137–2185.
 38. C. Miao, J. Murphy, and J. Zheng, *Threshold scattering for the focusing NLS with a repulsive potential*. Indiana University Mathematics Journal **72** (2023), no. 2, 409–453.
 39. J. Murphy and T. Van Hoose, *Well-posedness and blowup for the dispersion-managed nonlinear Schrödinger equation*. Proceedings of the American Mathematical Society **151** (2023), no. 6, 2489–2502.
 40. R. Killip, J. Murphy, and M. Visan, *The scattering map determines the nonlinearity*. Proceedings of the American Mathematical Society **151** (2023), no. 6, 2543–2557.
 41. A. Ardila and J. Murphy, *Threshold solutions for the 3d cubic-quintic NLS*. Communications in Partial Differential Equations **48** (2023), no. 5, 819–862.
 42. L. Campos and J. Murphy, *Threshold solutions for the intercritical inhomogeneous NLS*. SIAM Journal on Mathematical Analysis. **55** (2023), no. 4, 3807–3843.
 43. J. Murphy, *Recovery of a spatially-dependent coefficient from the NLS scattering map*. Communications in Partial Differential Equations. **48** (2023), no. 7-8, 991–1007.
 44. G. Chen and J. Murphy, *Stability estimates for the recovery of the nonlinearity from scattering data*. Pure and Applied Analysis **6** (2024), no. 1, 305–317.
 45. C. Hogan and J. Murphy, *Transmission of fast solitons for the NLS with an external potential*. Discrete and Continuous Dynamical Systems, Series-A **44** (2024), no. 5, 1166–1177.
 46. L. Campos, J. Murphy, and T. Van Hoose, *Averaging for the dispersion-managed NLS*. To appear in Communications in Contemporary Mathematics.
 47. S. Masaki, J. Murphy, and J. Segata, *Global dynamics below excited solitons for the non-radial NLS with potential*. To appear in Indiana University Mathematics Journal.
 48. G. Chen and J. Murphy, *Recovery of the nonlinearity from the modified scattering map*. To appear in International Mathematics Research Notices.
 49. A. Ardila and J. Murphy, *The cubic-quintic nonlinear Schrödinger equation with inverse-square potential*. Submitted.
 50. A. Ardila, J. Murphy, and J. Zheng, *Threshold dynamics for the 3d radial NLS with combined nonlinearity*. Submitted.
 51. R. Killip, J. Murphy, and M. Visan, *Determination of Schrödinger nonlinearities from the scattering map*. Submitted.
 52. J. Murphy, *A note on averaging and solitons for the dispersion-managed NLS*. Submitted.

Recent Invited Talks.

- 2019. Workshop on Harmonic Analysis and Nonlinear Partial Differential Equations, Research Institute for Mathematical Sciences, Kyoto University
- 2021. Joint Mathematics Meeting, AMS Special Session on Partial Differential Equations and Spaces of Holomorphic Functions (online)
- 2021. Bielefeld Analysis Seminar (online)
- 2021. Evolution Equations in Mathematical Physics: Dispersive and Hyperbolic, Tianjin University (online).
- 2021. University of Illinois Chicago, Analysis and Applied Mathematics Seminar (online)
- 2021. Institute for Applied Physics and Computational Mathematics, Beijing, China (online)
- 2021. Ningbo University Seminar, Zhejiang, China (online)

- 2022. Workshop: Nonlinear Waves and Dispersive Equations, Oberwolfach, Germany
- 2022. Inverse Problems in Analysis and Geometry, University of Helsinki, Finland.
- 2022. Workshop on Nonlinear Dispersive Wave Equations, Peking University (online).
- 2022. Saint Louis University Colloquium.
- 2022. Midwest PDE Seminar, University of Missouri Columbia.
- 2022. Prairie Analysis Seminar, University of Kansas.
- 2022. Institute for Applied Physics and Computational Mathematics, Beijing, China (online)
- 2022. University of Wisconsin PDE Seminar (online).
- 2022. Workshop on Scattering and Inverse Scattering, Johann Radon Institute for Computational and Applied Mathematics, Austrian Academy of Sciences (online).
- 2023. University of Washington Seminar.
- 2023. Purdue University Spectral and Scattering Seminar.
- 2023. Oregon State University Colloquium.
- 2023. IAS Workshop on Inverse Problems, Imaging and Partial Differential Equations, Hong Kong University of Science and Technology.
- 2023. One Day Workshop on Nonlinear Dispersive Equations, Hokkaido University.
- 2024. Joint Mathematics Meetings. AMS Special Session on Dynamics and Regularity of PDEs.

Teaching and Service:

Teaching Experience.

- 2009–2014. Teaching Assistant (University of California Los Angeles)
- 2010–2011. Academic Excellence Workshop Facilitator, Center for Excellence in Engineering and Diversity (University of California Los Angeles)
- 2014–2017. University of California Berkeley
- 2017–2023. Missouri University of Science & Technology
- 2023–present. University of Oregon

Awards and Funding.

- 2013. Robert Sorgenfrey Distinguished Teaching Award (University of California Los Angeles)
- 2018. Fellow of the Missouri Section of Project NExT.
- 2018–2019. University of Missouri System Affordable & Open Educational Resources Initiative Award. Amount Awarded: \$10,250
- 2020–2021. Missouri University of Science & Technology Outstanding Teaching Award
- 2021–2022. Missouri University of Science & Technology Outstanding Teaching Award

Courses Taught.

- University of California Berkeley: Partial Differential Equations, Complex Analysis, Ordinary Differential Equations, Mathematical Tools for the Physical Sciences
- Missouri University of Science and Technology: Calculus III, Differential Equations, Linear Algebra, Foundations of Mathematics, Advanced Calculus, Real Analysis, Complex Analysis, Mathematics of Medical Imaging, Harmonic Analysis
- University of Oregon: Ordinary Differential Equations, Fourier Analysis and Partial Differential Equations, Linear Algebra.

Graduate Students Supervised.

- 2021–present. Christopher Hogan (PhD, Missouri S&T)
- 2021–2023. Daniel Kovach (MS, Missouri S&T)

- 2020–2022. Timothy Van Hoose (MS, Missouri S&T)

Undergraduate Research Supervised.

- 2018–2023. Missouri S&T OURE Program. Students supervised: Nicholas Parris, Anzumaan Chakraborty, Galeg Selligman, Megan Benkendorf.
- 2022-2023. Funding through NSF grant. Madeline Kovaleski and Jerrett Martin (Missouri S&T).
- 2024. Funding through NSF grant. Ryan Harber (University of Oregon)

Department-level Service.

- Missouri University of Science and Technology: undergraduate curriculum committee, colloquium chair, graduate policy committee, website committee, Ingram Lecture committee, chair search committee, tenure-track search committee.
- University of Oregon: scholarships and awards committee, analysis seminar organizer, undergraduate math club advisor.

Professional Service.

- 2014–present. Peer reviewer for academic journals.
- 2014–present. Reviewer for AMS MathSciNet (MR AuthorID 1034475)
- 2018. Co-organizer, ‘Recent progress in nonlinear dispersive PDE’. Special session in the 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications; Taipei, Taiwan, July 5–9.
- 2020–2021. Co-organizer of the ‘MU-MST Joint Analysis Seminar’
- 2022–2023. National Science Foundation Reviewer

Outreach.

- 2017–2021. Talks for Undergraduates at University of Illinois Urbana Champaign, University of Missouri Columbia, Missouri S&T
- 2018–present. Mentor, National Alliance for Doctoral Studies in the Mathematical Sciences, F-GAP Program.
- 2021–2023. Faculty Advisor, Foundation for Undergraduate Mathematicians (Missouri S&T)
- 2023–present. Faculty Advisor, Undergraduate Mathematics Club (University of Oregon)
- 2024. Volunteer, Eugene Math Festival (University of Oregon)