Jeffrey A. Oregero - Curriculum vitæ

University of Kansas
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August 12, 2025

Education

State University of New York at Buffalo

Department of Mathematics
2021: Ph.D. in Mathematics
Dissertation: *The focusing nonlinear Schrödinger equation with periodic boundary conditions: Spectral theory and semiclassical dynamics*
Advisor: Gino Biondini

Department of Economics
2013: M.A. in Economics

Ramapo College of New Jersey

Anisfield School of Business
2010: B.S. in Finance (*summa cum laude*)

Employment

University of Kansas
Department of Mathematics
Lawrence, KS 66045

Visiting Assistant Professor — Aug. 2023–

University of Central Florida
Department of Mathematics
Orlando, FL 32816

Postdoctoral Scholar — Jan. 2022–July 2023

Mathematical Sciences Research Institute (MSRI)
Berkeley, CA 94270

Postdoctoral Fellowship — Aug. 2021–Dec. 2021

Visiting appointments

Isaac Newton Institute (INI)
Cambridge, UK

Visiting Scholar — Aug. 2022–Sept. 2022

University of California, Berkeley
Berkeley, CA 94270

Visiting Scholar — Aug. 2021–Dec. 2021

Research interests

Nonlinear dispersive equations with an emphasis on integrable systems, direct and inverse spectral theory, singular asymptotics, stability, and soliton gases

Publications

1. "Experimental observation of the spatio-temporal dynamics of breather gases in a recirculating fiber loop", F. Copie, G. Biondini, J. Oregero, G. A. El, P. Suret, S. Randoux, (submitted: Optics Letters), arXiv:2507.04787

2. "On the modulation of wave trains in the Ostrovsky equation", M. A. Johnson, J. Oregero, W. P. Perkins, (submitted: Commun. Math. Phys.), arXiv:2505.21466

3. "Spectral estimates for non-self-adjoint Dirac operators", J. Oregero, (submitted: J. Spectr. Theory), arXiv:2504.02236

4. "Modulational stability of wave trains in the Camassa-Holm equation", M. A. Johnson and J. Oregero, J. Diff. Eqs. **446**, 113627 (2025), DOI 10.1016/j.jde.2025.113627

5. "Breather gas fission from elliptic potentials in self-focusing media", G. Biondini, G. A. El, X.-D. Luo, J. Oregero, A. Tovbis, Phys. Rev. E **111**, 014214 (2025), DOI 10.1103/PhysRevE.111.014204

6. "Elliptic finite-band potentials of a non-self-adjoint Dirac operator", G. Biondini, X.-D. Luo, J. Oregero and A. Tovbis, Adv. in Math. **429**, 109188 (2023), DOI 10.1016/j.aim.2023.109188

7. "On the spectrum of the periodic focusing Zakharov-Shabat operator", G. Biondini, J. Oregero, A. Tovbis, J. Spectr. Theory **12** (3): 939–992 (2022), DOI 10.4171/JST/432

8. "Semiclassical dynamics and coherent soliton condensates in self-focusing nonlinear media with periodic initial conditions", G. Biondini and J. Oregero, Stud. Appl. Math. **145** (3): 325–356 (2020), DOI 10.1111/sapm.12321

Seminars

1. *Soliton gases and nonlinear dispersive equations*,
Differential equations, Dynamical systems and Geometric analysis Seminar, University of Kansas, KS, Oct. 11, 2023

2. *The focusing nonlinear Schrödinger equation on the circle: an analytic approach*,
Differential equations, Dynamical systems and Geometric analysis Seminar, University of Kansas, KS, March 29, 2023

3. *Spectral theory of non-self-adjoint Dirac operators on the circle*,
Universality and Integrability in Random Matrix Theory and Interacting Particle Systems Seminar, Mathematical Sciences Research Institute, Berkeley, CA, Oct. 15, 2021

4. *The focusing nonlinear Schrödinger equation on the circle: spectral theory, elliptic finite-gap potentials, and soliton gases*,
   Integrable Systems and Random Matrix Theory Seminar, University of Michigan, MI, Oct. 11, 2021

Presentations

Invited talks:

1. *The Whitham modulation system for the Camassa-Holm equation: a functional analytic approach*,
   AMS Central Sectional Meeting, University of Kansas, KS, March 29–30, 2025
2. *Spectral validation of the Whitham modulation equations for the Camassa-Holm equation*,
   AMS Joint Mathematics Meeting (JMM), Seattle, WA, Jan. 8–11, 2025
3. *Recent developments in the spectral theory of soliton gases: soliton and breather gases of focusing systems of AKNS type*,
   SIAM Conference on Nonlinear Waves and Coherent Structures, Baltimore, MD, June 23–27, 2024
4. *Periodic gases in nonlinear dispersive hydrodynamics*,
   AMS Eastern Sectional Meeting, University at Buffalo, NY, Sept. 9–10, 2023
5. *Soliton gases, breather gases, and finite-gap solutions of integrable nonlinear wave equations*,
   SIAM Conference on Nonlinear Waves and Coherent Structures, University of Bremen, Germany, Aug. 30–Sept. 2, 2022
6. *The focusing Zakharov-Shabat eigenvalue problem and elliptic finite-band potentials*,
   12th IMACS Conference on Nonlinear Evolution Equations and Wave Phenomena, University of Georgia, GA, March 30–April 1, 2022
7. *Semiclassical Lax spectrum of Zakharov-Shabat systems with periodic potentials*,
   11th IMACS Conference on Nonlinear Evolution Equations and Wave Phenomena, University of Georgia, GA, April 17–19, 2019
8. *Small-dispersion limits for focusing NLS with periodic boundary conditions*,
   SIAM Conference on Nonlinear Waves and Coherent Structures, Orange, CA, June 11–14, 2018

Contributed talks:

9. *Periodic gases in nonlinear dispersive hydrodynamics*,
   19th Prairie Analysis Seminar, Kansas State University, KS, Nov. 3–4, 2023
10. *Spectral theory of a non-self-adjoint Dirac operator with a Jacobi elliptic potential*,
    18th Prairie Analysis Seminar, University of Kansas, KS, Oct. 28–29, 2022
11. *Zakharov-Shabat systems with periodic potentials*,
    Applied Math Days, Rensselaer Polytechnic Institute, NY, April 5–6, 2019
12. *Small dispersion limits of the focusing nonlinear Schrödinger equation with periodic boundary conditions*,
    Applied Math Days, Rensselaer Polytechnic Institute, NY, April 6–7, 2018

Posters:

13. *Semiclassical Floquet spectrum of periodic Zakharov-Shabat systems*,
    Workshop on Dispersive PDEs and Inverse Scattering, Fields Institute, Toronto, May 21–24, 2019

Awards and honors

- Postdoctoral Fellowship, Mathematical Sciences Research Institute (MSRI), $33,000 (2021)
- Doctoral Dissertation Fellowship, University at Buffalo, SUNY, $10,000 (2020)
- Student travel grant, SIAM, $650 (2018)
- Student travel grant, The Fields Institute, $1000 (2017)
- Ford Foundation Scholarship, $10,000 (2010)
- Member of *Delta Mu Delta* International Business Administration Honor Society
- Member of *Golden Key* International Honour Society for Academic Excellence
- Ramapo College Dean's list (2007–2010)

Teaching

University of Kansas, Department of Mathematics

- MATH 950 Partial Differential Equations — Fall 2025
- MATH 220 Applied Ordinary Differential Equations — Spring 2025
- MATH 220 Applied Ordinary Differential Equations
- MATH 699 Directed Reading - The unified transform method — Fall 2024
- MATH 647 Applied Partial Differential Equations
- MATH 647 Applied Partial Differential Equations — Spring 2024
- MATH 220 Applied Ordinary Differential Equations
- MATH 320 Elementary Differential Equations — Fall 2023

University of Central Florida, Department of Mathematics

- MAS 3105 Matrix and Linear Algebra — Spring 2023
- MAP 4303 Ordinary Differential Equations II — Fall 2022
- MAP 2302 Ordinary Differential Equations I — Spring 2022
- MAP 2302 Ordinary Differential Equations I — Spring 2022

Mathematical Sciences Research Institute (MSRI)

- No teaching (MSRI postdoctoral fellowship) — Fall 2021

Department of Mathematics, State University of New York at Buffalo:

- Mathematical Finance — Instructor
- Introduction to Differential Equations
- College calculus I, II
- Survey of Calculus and Its Applications I, II
- Survey of Partial Differential Equations — Teaching Assistant
- Introduction to Differential Equations
- Introduction to Linear Algebra
- College Calculus I, III
- Calculus for Business Students

Student mentoring

University of Kansas, Department of Mathematics

1. Vincent Jones
   "Add title"
   Master's Thesis, committee member, 2025

2. Bennett Kinder
   "Initial-boundary-value problems and the unified transform"
   Undergraduate project, project advisor, 2024

3. Haley Cabrera
   "Fitting empirical dynamical models to describe the effect of climate change on population dynamics of fish species in the North Atlantic"
   Undergraduate Research Award in Mathematics, project advisor, 2023

Professional service

Journal referee:

- SIAM Journal of Mathematical Analysis
- Advances in Mathematics
- Journal of Mathematical Physics
- Studies in Applied Mathematics
- Proceedings of the Royal Society A
- Journal of Nonlinear Science
- Physica D
- Journal of Nonlinear Waves
- Journal of Applied Mathematics and Physics (ZAMP)
- Applied Math Letters
- European Physical Journal Plus

Workshop/Seminar/Minisymposium Organization:

- Seminar: Differential equations, dynamical systems, and geometric analysis seminar,
  Department of Mathematics, University of Kansas, KS, Spring 2025

- Minisymposium: Recent advances in the analysis of integrable systems,
  AMS Central Sectional Meeting, University of Kansas, KS, March 29–30, 2025

- Minisymposium: Recent developments in dispersive partial differential equations,
  SIAM Nonlinear Waves and Coherent Structures, Baltimore, MD, June 23–27, 2024

- UCF/USF Workshop: Complex analytic methods with applications in orthogonal polynomials, integrable systems, and random matrix theory,
  University of Central Florida, Orlando, FL, Feb. 25–26, 2023

Central Florida Math Circle (https://sciences.ucf.edu/math/circle/)

- Lead the advanced group lessons Spring 2023

- Presentation: *Patterns in mathematics and nature* March 5, 2022

MSRI Postdoctoral Fellowship Program

- Organized a series of professional development seminars for MSRI postdocs Fall 2021

State University of New York at Buffalo Graduate Student Association (GSA)

- Treasurer–Department of Mathematics Sept. 2020–Aug. 2021

Anisfield School of Business student advisory board Jan. 2009–Feb. 2010

Professional skills

- Python
- Mathematica
- Matlab
- LaTeX
- R

Workshops and professional development

Isaac Newton Institute of Mathematical Sciences (INI) programme: Dispersive hydrodynamics: mathematics, simulation and experiments, with applications in nonlinear waves
(visit Aug. 2022–Sept. 2022)

(i) Analysis of dispersive systems,
Sept. 5–9, 2022
(ii) Integrable systems and applications,
Sept. 12–16, 2022

Mathematical Sciences Research Institute (MSRI) thematic program: Universality and Integrability in Random Matrix Theory and Interacting Particle Systems
(vist Aug. 2021–Dec. 2021)

(i) Universality and Integrability in Random Matrix Theory and Interacting Particle Systems, Part 1,
Aug. 23–27, 2021
(ii) Universality and Integrability in Random Matrix Theory and Interacting Particle Systems, Part 2,
Sept. 20–24, 2021
(iii) Integrable Structures in Random Matrix Theory and Beyond,
Oct. 18–22, 2021

Fields Institute focus program: Nonlinear Dispersive Partial Differential Equations and Inverse Scattering
(visit July 31–Aug. 12 2017)

(i) Summer School on Nonlinear Dispersive PDEs and Inverse Scattering,
July 31–Aug. 4, 2017
(ii) Workshop on Inverse Scattering and Dispersive PDEs in One Space Dimension,
Aug. 8–11, 2017