Jake Reschke

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US Citizen

Research Interests

My current research interests are in mathematical climate modeling, in particular models of turbulent atmospheric processes. I am interested in using observations to improve models, and in evaluating the effect of using different parameterizations on numerical stability and sensitivity. My prior experience has involved using mathematics in modeling of many different phenomena. During my doctoral studies I derived rigorous mathematical results for interacting many-body quantum systems, where my main project involved studying disorder effects on the dynamics of quantum spin chains. During my masters studies I investigated geometric properties of inflationary cosmological models in general relativity.

Professional Experience

- **Visiting Student Researcher**, JPL Earth Science Section — Apr. 2021- Sep. 2021
  Research in physics for dry convective boundary layers and numerical methods for nonlinear partial differential equations.
- **Graduate Student Researcher**, UC Davis — Sep. 2016 - Mar. 2021
  Research in quantum statistical mechanics and effects of disorder on quantum dynamics.
- **Associate Instructor/Teaching Assistant**, UC Davis — Sep. 2016 - Mar. 2021
  Teaching assistant for lower and upper division and graduate level math courses. Instructor of record for upper division and lower division math courses.
- **Teaching Assistant**, CSU Northridge — Aug. 2014 - June 2016
  Instructor for lower division math discussion sections and lecture courses.
- **Intern**, AECOM, Environmental Division — June 2011-June 2013
  Assisted in environmental remediation and environmental impact studies.

Education

University of California, Davis — Davis, CA
Ph.D. in Mathematics. Advisor: Bruno Nachtergaele — 2021
Thesis: *Applications of Lieb-Robinson bounds to quantum dynamics with and without disorder*

California State University, Northridge — Northridge, CA
M.S. in Mathematics (With Distinction), Advisor: David Klein — 2016
Thesis: *Geometric extensions of Robertson-Walker spacetimes*

California State University, Northridge — Northridge, CA
B.S. in Honors in Physics, Minor in Mathematics (Summa Cum Laude) — 2014

Skills

- **MATLAB:** Proficient. Experienced in using Matlab to implement numerical methods for PDEs and ODEs.
- **LATEX:** Proficient. Routinely write scientific publications and course materials.
- **PYTHON:** Familiar
- **C++**: Somewhat familiar
- **ANALYTICAL:** Strong logical and mathematical skills. Experienced in applying mathematical tools to problems in physics and other natural sciences.

Scholarships and Awards

- 2019 **William Karl Schwarze Scholarship in Mathematics**, UC Davis Math Department
  For outstanding scholarship and exceptional promise of making a strong contribution as a mathematics educator.
- 2016 **Nathan O. Freedman Award for Outstanding Graduate Student**, CSU Northridge
  Highest honor for a graduate student, based on a record of distinguished scholarship and contributions to the field.
- 2016 **Award for Outstanding Performance as Teaching Associate**, CSU Northridge Math Department
- 2015-2016 **Graduate Fellow for Outstanding Research Promise**, CSU Northridge College of Science and Math
  Highly competitive award given annually to four MS students to fund an original research project.
- 2014 **John W. Nagle Outstanding Senior Award**, CSU Northridge Physics Department
  In recognition of outstanding scholarship and contributions to the department and the field of Physics.
- 2012 **Daniel Raponi Memorial Award**, CSU Northridge Physics Department
  Given to an outstanding physics major who, at an early stage, has made valuable contributions to the department.

Publications

1. Nachtergaele, B., **Reschke, J.**, "*Slow propagation in some disordered quantum spin chains*", Journal of Statistical Physics **182**, 12 (2021). Preprint: `ArXiv:1906.10167`
2. Gebert, M., Nachtergaele, B., **Reschke, J.**, Sims, R., "*Lieb-Robinson bounds and strongly continuous dynamics for a class of many-body fermion systems in* $\mathbb{R}^d$", Annales Henri Poincuré **21**, 3609-3637 (2020). Preprint: `ArXiv:1912.12552`
3. Klein, D., **Reschke, J.**, "*Pre-big bang geometric extensions of inflationary cosmologies*", Annales Henri Poincuré **19**, 565-606 (2018). Preprint: `ArXiv:1604.06372`
4. Klein, D., **Reschke, J.**, "*Velocity addition formulas in Robertson-Walker spacetimes*", Journal of Mathematical Physics **56**, 72501 (2015). Preprint: `ArXiv:1503.05208`

Presentations

- Student-Run Research Seminar, October 2019, Dept. of Mathematics, UC Davis. Invited talk: *Strongly continuous dynamics for a class of many-body fermion systems in* $\mathbb{R}^d$
- Great Lakes Mathematical Physics Meeting, June 2019, Oberlin College. Contributed talk: *Slow propagation in some disordered quantum spin chains*
- Workshop on Entanglement and Dynamical Systems, December 2018, Simons Center, Stony Brook University. Invited talk: *Slow transport in some one-dimensional disordered many-body systems*