Brett Tregoning, PhD

bdtregoning@gmail.com
http://bdtregoning.github.io/
www.linkedin.com/in/bdtregoning
240-338-4496

Education

2016 – 2021 **Georgia Institute of Technology** School of Physics.
Thesis title: Investigation of spatiotemporal chaos using persistent homology
Doctor of Philosophy-Physics, President's Fellow

2012 – 2016 **Vanderbilt University**
Bachelor of Arts-Physics with Highest Honors
Thesis title: *Ps2- in a magnetic field : structure and stability in the M=0 state.*
Bachelor of Arts-Mathematics

Research Publications

Publications

1. **Tregoning**, **B.**, Mukherjee, S., Suri, B., Mischaikow, K., Paul, M. R., & Schatz, M. F. (2021). Quantifying plume statistics in spatiotemporally chaotic Rayleigh-Bénard convection using persistent homology (in preparation).
2. **Tregoning**, **B.**, & Stewart, S. G. (2014). Predicting navigational error of visual binary stars. *Naval Engineering Journal*, *126.4*, 169–172.
https://my.vanderbilt.edu/susanstewart/files/2015/05/Stewart_DEC2014.pdf

Theses

1. **Tregoning**, **B.** (2021). *Investigation of spatiotemporal chaos using persistent homology*.
2. **Tregoning**, **B.** (2016). *Ps2- in a magnetic field : Structure and stability in the m=0 state.*
http://hdl.handle.net/1803/7562

Conference Proceedings and Talks

1. Schatz, M., **Tregoning**, **B.**, Barnett, J., Yoda, M., & Grigoriev, R. (2019). Experimental Study of Roll-Hydrothermal Wave Coexistence in Convection Driven by Buoyancy and Thermocapillarity, In *72nd Annual Meeting of the APS Division of Fluid Dynamics (APS DFD 2019)*, Seattle, Washington, USA.
https://meetings.aps.org/Meeting/DFD19/Session/S08.3
2. **Tregoning**, **B.**, Mukherjee, S., Levanger, R., Cyranka, J., Mischaikow, K., Paul, M., & Schatz, M. (2019). Characterizing Spatiotemporal Dynamics in Fluid Flows using Persistent Homology, In *Invited Seminar at Los Alamos National Labs*, Los Alamos, New Mexico, USA.
3. **Tregoning**, **B.**, Mukherjee, S., Levanger, R., Xu, M., Cyranka, J., Mischaikow, K., Paul, M., & Schatz, M. (2019). Using Persistent Homology to Compare Chaotic Dynamics Between Experiments on and Simulations of Rayleigh-Bénard Convection, In *72nd Annual Meeting of the APS Division of Fluid Dynamics (APS DFD 2019)*, Seattle, Washington, USA.
https://meetings.aps.org/Meeting/DFD19/Session/G14.4

4 **Tregoning, B.**, Levanger, R., Cyranka, J., Mukherjee, S., Paul, M., Mischaikow, K., & Schatz, M. (2018). Using topology to identify large Lyapunov vector magnitude in Rayleigh-Bénard convection, In *71st Annual Meeting of the APS Division of Fluid Dynamics (APS DFD 2018)*, Atlanta, Georgia, USA. http://meetings.aps.org/Meeting/DFD18/Session/G33.5

Research Experience

Schatz Lab, Georgia Institute of Technology, School of Physics, Center for Non-linear Science
Advisors: Michael Schatz and Roman Grigoriev, 2016 – · · · ·

- Uses topological data analysis to study spatio-temporally chaotic fluid flows.
- Predicts the evolution of dynamical systems using machine learning.
- Detects exact coherent structures in dynamical systems using persistent homology.

Varga Group, Vanderbilt University, Physics Department
Advisor: Kalman Varga, 2015

- Studied quantum few-body problems.
- Calculated stability of positron-electron systems using a variational method.

United States Naval Observatory
Advisor: Susan G. Stewart, 2014

- Studied navigational astronomy.
- Quantified visual navigational error of binary star systems.
- Studied weather effects on sky visibility.

Bolotin Group, Vanderbilt University, Physics Department
Advisor: Kirill Bolotin, 2013 – 2014

- Studied experimental condensed matter physics.
- Gained experience exfoliating graphene.
- Gained clean-room training and experience.

Employment History

2016 – · · · ·	**Graduate Student Researcher,** Georgia Institute of Technology, School of Physics, Center for Non-linear Science.
2014 – 2016	**Tutor,** Vanderbilt Physics Department.
2015 Summer	**Undergraduate Research Assistant,** National Science Foundation International Research Experiences for Students, McGill University.
2014 Summer	**Undergraduate Research Assistant,** United States Naval Observatory.

Skills

Languages	English (fluent), Spanish (comprehension)
Coding	Python, MATLAB, Latex, R, C, C++
Scientific	Fluid Mechanics, Dynamical Systems, Topological Data Analysis, Machine Learning, Network Science, Data Science, Numerical Methods
Misc.	Teaching, tutoring, academic research, academic mentoring

Leadership Experience

2020 – · · · · **Diversity, Equity, and Inclusion Task Force,** Georgia Tech School of Physics

2015 – 2016 **Music Director,** WRVU Vanderbilt College Radio

2014 – 2016 **President,** Vanderbilt Quiz Bowl

2013 – 2015 **Secretary,** Vanderbilt Society of Physics Students

Awards and Honors

2016 **President's Fellow,** Georgia Institute of Technology.

Highest Honors, Vanderbilt University Physics Department.

2012,2014,2016 **Dean's List,** Vanderbilt University.

2014 **Sigma Pi Sigma Physics Honor Society,** Vanderbilt University Physics Department.

References

Available on Request