

Joshua Pughe-Sanford

GRADUATE RESEARCH ASSISTANT, CENTER FOR NON-LINEAR DYNAMICS

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Education

2017-Present	Georgia Institute of Technology , Atlanta, GA Ph.D. in Physics (Expected) M.S. in Mathematics (Expected) GPA: 3.9
2015-2017	Emory University , Decatur, GA B.S. in Physics with Highest Honors (Summa Cum Laude) Minor in Mathematics GPA: 3.9
2013-2015	Oxford College , Decatur, GA A.A. with Honors GPA: 3.9

Honors

2017-Present	Presidential Fellow , Georgia Institute of Technology
2017-Present	Phi Beta Kappa , Honors Society
2016-Present	Sigma Phi Sigma, Physics Honors Society
2015-Graduation	Dean's List, Emory University
2013-Present	Phi Eta Sigma, National Honors Society
2013-Graduation	Oxford Honor List, Oxford College

Publications

- S. Boettcher and J. Pughe-Sanford, “**Renormalization of Discrete-Time Quantum Walks with non-Grover Coins**,” *Journal of Statistical Mechanics: Theory and Experiment*, vol. 2018, sep 2017
- J. Pughe-Sanford, “Properties of Quantum Walks within Various One Dimensional Media,” *Honors Thesis*, 2017

For unpublished work, please see my website.

Conferences

- J. Pughe-Sanford and R. Grigoriev, “**Heteroclinic Connections as Predictors of Extreme Events in Weakly Turbulent Flow**.” APS DFD Seattle, 2019
- J. Pughe-Sanford, “Numerical Methods for Determining the Walk Dimension of Quantum Walks.” Emory University SIRE Symposium, 2017

Research Experience

Georgia Institute of Technology

Atlanta, GA

CENTER FOR NON-LINEAR SCIENCE

2018 - PRESENT

ADVISOR: R. GRIGORIEV

- Studies pattern formation and extreme events in non-linear, infinite-dimensional systems.
- Created a fast numerical scheme for determining the minimal distance between vectors in systems with arbitrarily many continuous symmetries.
- Developed an optimization toolbox for two-dimensional periodic extended systems that uses direct-adjoint iterations to determine exact coherent structures.

Emory University

Atlanta, GA

UNDERGRADUATE HONORS RESEARCH

2016 - 2018

ADVISOR: S. BOETTCHER

- Studied the asymptotic rate of expansion of quantum systems over self-similar graphs using the renormalization group.
- Identified the mode of recursion in one-dimensional quantum walks weighted with a “non-Grover coin”.
- Developed code to evolve a complex-valued distribution under the dynamics of an arbitrary one-dimensional potential.

UNDERGRADUATE JUST-FOR-FUN RESEARCH

2014 - 2015

ADVISOR: R. CONCEICAO

- Studied the Collatz Conjecture and its polynomial corollary.
- Derived a formula for predicting the total stopping time of all monic polynomials with coefficients in a ring of modulo n .

Princeton University

Princeton, NJ

SABRE COLLABORATION (DARK MATTER DETECTION EXPERIMENT)

2014 - 2018

ADVISOR: F. CALAPRICE

- Built experimental detectors that give off light when they interact with dark matter.
- Helped design and construct the Sabre scintillating-crystal detector.
- Helped design and commission the Sabre insertion system, built for the airtight, chemically resistant, and well-controlled insertion of Sabre's detectors into a collaborator's veto chamber.

BOREXINO COLLABORATION (NEUTRINO DETECTION EXPERIMENT)

2014 - 2018

ADVISOR: F. CALAPRICE

- Designed and constructed an automated, non-invasive, Bluetooth-enabled, liquid monitoring system. This system was used to regulate Princeton's polonium distillation system.
- Worked at the National Underground Laboratory at Gran Sasso, Italy determining the efficiency of Borexino's distillation system.
- Designed and built an enclosure that maximizes the yield of polonium depositions onto silver foils.

Work Experience

B-LineLogic

Atlanta, GA

CORE DEVELOPER

2014 - 2016

- Created a predictive-analytics engine for supply chain management.
- Developed system architecture for a distributed event correlation system.
- Managed relations with clients such as Delta Airlines and Cardinal Health.

Skills

Language	English (fluent) · Spanish (fluent) · Italian (conversational) · German (conversational)
Programming	Server Side Javascript · C++ · Java · CSS · HTML · Verilog · SQL
Software	SolidWorks · Matlab · Mathematica · Blender · Processing · Microsoft Office
Hardware	Arduino · FPGA

Projects

Coding	Developed a two-dimensional planet formation simulation in Python.
Robotics	Built a miniature self balancing, Segway-esque robot piloted by an Arduino.
Robotics	Built a robotic hand that mimics the motion of a user-worn glove.
Game Design	Created a 3D, single-player game with AI-controlled enemies.