

Eric Sabo

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EDUCATION

- 08/2014 - **Ph.D Student, Mathematics**,
School of Mathematics, Georgia Technical Institute of Technology.
Focus on applications of **geometry**, **topology**, and **scientific computing** to **quantum information theory**.
Advisors: Kenneth Brown (School of Chemistry & Biochemistry)
Evans Harrell (School of Mathematics)
- 08/2007 - **M.S., B.S., Mathematics**,
05/2014 *Department of Mathematical Sciences, University of Delaware.*
Focus on **applied mathematics** and **numerical analysis**.
- 08/2007 - **M.S., B.S., Physics**,
08/2014 *Department of Physics and Astronomy, University of Delaware.*
Focus on **theoretical physics** and **theoretical high-energy physics**.

PUBLICATIONS

MATH

- 2016 **Garoufalidis, S., Sabo, E., Scott, S., "Exact Computation of the n -Loop Invariants of Knots." *Experimental Mathematics* 25.2 (2016): 125-129.**
- 2014 **Cummings, L., et al. "Effects Of Membrane Morphology On Separation Efficiency" (2014).**
- 2013 **Brubaker, N., et al. "Refinements to the Study of Electrostatic Deflections: Theory and Experiment." *European Journal of Applied Mathematics* 24.03 (2013): 343-370.**
- 2012 **Tilley, B., et al. "Modeling Industrial Coalescers: Droplet Dynamics" (2012).**
- 2011 **Siddique, J., et al. "An Experimental Investigation of the Theory of Electrostatic Deflections." *Journal of Electrostatics* 69.1 (2011): 1-6.**

PHYSICS

- 2014 **Sabo, E., "R-Symmetry Violation in an Era of Precision Cosmology." (Master's thesis).**
- 2013 **Civiletti, M., et al. "R-Symmetry Breaking in Supersymmetric Hybrid Inflation." *Physical Review D* 88.10 (2013): 103514.**

CONFERENCE PRESENTATIONS

- 03/2015 **Career, Research, and Innovation Development Conference (CRIDC).**
"Exact Computation of the n -Loop Invariants of Knots."
- 06/2012 **Mathematical Problems in Industry (MPI).**
"Modeling Industrial Coalescers: Droplet Dynamics"
- 03/2011 **SIAM/MAA Mid-Atlantic Regional Applied Mathematics Student Conference.**
Invited panelist: "Undergraduate Panel Discussion: COMAP Mathematical Contest in Modeling"

- 10/2010 **Shenandoah Undergraduate Mathematics and Statistics (SUMS) Conference.**
"Refinements to Traditional Electrostatic MEMS Models"

PROFESSIONAL DEVELOPMENT

CAREER ORIENTED

- 03/2018 - **QISE-NET Fellowship Awardee,**
Georgia Institute of Technology, IBM.
This fellowship through the Quantum Information Science and Engineering Network (U. Chicago, Harvard, NSF, and others) is designed to connect graduate students with an industry sponsor.
- 05/2017 - **NSF REU Research Mentor,**
08/2017 *School of Chemistry & Biology, Georgia Institute of Technology.*
Research advisor to an undergraduate on tensor networks and quantum error correction.
- 08/2015 - **Assistant TA Coordinator,**
05/2016 *School of Mathematics, Georgia Institute of Technology.*
Assistant teaching assistant coordinator in charge of graduate and undergraduate students. Interviewed and hired sixty incoming undergraduate teaching assistants for the upcoming semester.
- 06/2015 - **NSF REU Research Mentor,**
08/2015 *School of Mathematics, Georgia Institute of Technology.*
Research advisor to six under represented undergraduate students from local community colleges.
- 08/2014 - **Event Organizer: High School Mathematics Competition,**
07/2016 *School of Mathematics, Georgia Institute of Technology.*
Volunteer **principle organizer** of an annual (Georgia) state-wide mathematics competition that typically draws around 500 people.
- 08/2013 - **Full-Time Instructor,**
08/2014 *Department of Mathematical Sciences, University of Delaware.*
Full-time instructor position teaching a minimum of 12 credit hours per semester. (Course list below.)

RELATED RESEARCH EXPERIENCE

MATH

- 08/2015 - **Optimal Path Finding,**
05/2016 *School of Mathematics, Georgia Institute of Technology.*
Advisor: Kang, S.
Extended the path optimization with limited sensing ability (POLSA) algorithm and developed an analytic framework for questions inspired by numerical results. Extensions include three dimensions and full-surveillance of 2D and 3D surfaces.
- 08/2014 - **Topological Quantum Invariants,**
05/2015 *School of Mathematics, Georgia Institute of Technology.*
Advisor: Garoufalidis, S.
Exact and numerical **scientific computation** of quantum invariants via knot theory and Feynman diagrams. This work has application towards topological quantum field theory. Involves the development, analysis, and representation of large data sets using platforms such as **Hadoop**.

06/2014 **Mathematical Problems in Industry (MPI).**

Advisors: Hurwitz, M., Pall Corporation

MPI is a week long problem solving **workshop** that attracts leading applied mathematicians and scientists from **academia, industry, and national laboratories**. During the workshop, engineers and scientists from industry interact with the academic participants on problems of interest to their companies. Problems are often presented with minimal or no foresight into their solutions, and it is up to participants to quickly become an expert in what they have decided are relevant tools for the task. In my experience, participants naturally form groups examining different aspects of the same problem. In this year I applied fractal geometry. I was also instrumental in merging the different approaches into a coherent summary paper, oral presentation, and thorough write-up at the end of the workshop.

06/2012 **Mathematical Problems in Industry (MPI).**

Advisors: Tilley, B., Department of Mathematics, Worcester Polytechnic Institute

Witelski, T., Department of Mathematics, Duke University

Hurwitz, M., Whitney, S., Pall Corporation

See above for description. In this year I applied partial dynamics, fluid mechanics, and numerical methods. I was also instrumental in merging the different approaches into a coherent summary paper, oral presentation, and thorough write-up at the end of the workshop.

06/2009 - **Electrostatically Actuated Microelectromechanical Systems,**

08/2014 *Department of Mathematical Sciences, University of Delaware.*

Advisor: Pelesko, J.

The goal of this project was to analyze and predict the stable operating regions of electrostatically actuated microelectromechanical systems (MEMS). This included both **theory and experiment**. Here, I was in charge of the literature review; the design, construction, and execution of experiments; **leadership** and organization of collaborators; and the physical laboratory itself. This project was carried out with a member of Penn State University (PSU) and resulted in two publications. Potential extension of research to pressure based systems.

PHYSICS

01/2017 - **Quantum Information Theory And Quantum Coding Theory,**

School of Chemistry & Biochemistry, Georgia Institute of Technology.

Advisor: Brown, K.

Keywords: quantum information, quantum error correcting codes, tensor networks

06/2012 - **SUSY Hybrid Inflation,**

08/2014 *Department of Physics and Astronomy, University of Delaware.*

Advisor: Shafi, Q., Bartol Research Institute

The goal of this project was to further develop the theory of supersymmetric (SUSY) hybrid inflation. My initial contribution was in the form of **high performance computing** to compare and contrast our model against the (then) upcoming high-precision Planck **satellite data**. This project has resulted in one publication with more work in progress. My current contribution is both in computing and theory.

Teaching Experience: Lead Instructor

06/2017 - **OMED: Challenge - Math 1000,**

07/2017 *Office of Minority Educational Development, Georgia Institute of Technology.*

Challenge is a five-week intensive program that is held every summer for incoming Georgia Tech freshman. During Challenge students study Calculus 1, Calculus 2, General Chemistry, Chemistry for Chemistry based majors, Computer Science, and Academic Writing/Seminar on a daily basis.

06/2017 - **OMED: Challenge - Math 2000,**

07/2017 *Office of Minority Educational Development, Georgia Institute of Technology.*

- 08/2016 **Tech Prep: The Calculus Advantage,**
School of Mathematics, Georgia Institute of Technology.
 Designed especially for the rigorous Georgia Tech environment, this non-credit, residential program reviews fundamental calculus concepts as well as strategies critical for academic success in calculus and other first-year courses. Here I covered various hand-picked topics from a second or third semester precalculus.
- 08/2015 **Tech Prep: The Calculus Advantage,**
School of Mathematics, Georgia Institute of Technology.
 This year I covered all of a standard calculus course through advanced integration techniques in ten days.
- 2013, 2014 **Precalculus For Scientists And Engineers,**
Department of Mathematical Sciences, University of Delaware.
- 01/2014 **Calculus 1,**
Department of Mathematical Sciences, University of Delaware.
- 02/2014 - 05/2014 **Analytic Geometry and Calculus B,**
Department of Mathematical Sciences, University of Delaware.

HONORS & AWARDS

COMPETITIONS

- 2010 - 2012 **MCM: The Mathematical Contest in Modeling,**
University of Delaware.
 02/2010: **Finalist**, 2254 teams (84% international) from 13 countries.
 02/2011: **Meritorious**, 2775 teams (88% international) from 16 countries.

MEMBERSHIPS & UNIVERSITY SERVICE

- 08/2014 - **American Mathematical Society (AMS),**
 President, Georgia Tech Chapter 08/2018 - 05/2019.
- 08/2007 - **American Physical Society (APS).**
- 08/2008 - **Society of Industrial and Applied Mathematics (SIAM).**

VOLUNTEER OPPORTUNITIES

- 08/2014 - **Trees Atlanta.**
- 09/2013 - 05/2014 **Math Circles.**
- 2013 **Delaware Science Olympiad.**

TECHNICAL SKILLS

COMPUTER SKILLS

- | | |
|---------------|-----------------------------------|
| * C++ | * Fortran |
| * F# | * Java |
| * Julia | * L ^A T _E X |
| * Linux/Unix | * Maple |
| * Mathematica | * MATLAB |
| * Python | * Sage |