SARAH CASSIE BURNETT

Hedrick assistant adjunct professor

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GOAL

To advance research in applied mathematics, with a focus on fluid dynamics and scientific computing, while providing innovative and effective teaching in applied mathematics and related fields.

SKILLS

Languages: Python, JavaScript, HTML, C++, C, PHP, SQL, CSS, MATLAB, Mathematica.

K-12 Outreach: Girls Talk Math

Recent Award: 2022 L'Oreal For Women in Science

EDUCATION

2016 - 2021	**Doctor in Philosophy in Applied Math and Scientific Computing**	**The University of Maryland, College Park**
2011 - 2015	**Bachelors of Science in Applied Mathematics**	**The University of North Carolina, Chapel Hill**
2011 - 2015	**Bachelors of Arts in Physics**	**The University of North Carolina, Chapel Hill**

PUBLICATIONS

- Lee, W., J. D. Woo, L. F. Triplett, Y. Gu, S. C. Burnett, L. Ding, and A. L. Bertozzi "A comparative study of dynamic models for gravity-driven particle-laden flows" Applied Mathmatics Letters, (accepted September 2024).

- Burnett, S. C.. "Predicting the magnetic field of the three-meter spherical Couette experiment." Diss. University of Maryland, College Park, (2021).

- Burnett, S. C., K. G. Honnell, S. D. Ramsey, and R. L. Singleton Jr. "Verification Studies for the Noh Problem using Non-ideal Equations of State and Finite Strength Shocks." J. Verif. Valid. Uncert. 3.2 (2018).

- Ramsey, S. D., Z. M. Boyd, and S. C. Burnett. "Solution of the Noh problem using the universal symmetry of the gas dynamics equations." Shock Waves 27.3 (2017): 477-485.

- Burnett, S. C., Sheppard, D. G., Honnell, K. G., and Sjostrom, T. "Sesame-style decomposition of KS-DFT molecular dynamics for direct interrogation of nuclear models." AIP Conference Proceedings. Vol. 1979. No. 1. AIP Publishing, 2018.

- Yorke, C. E., Howard, A. D., Burnett, S. C., Honnell, K. G., Ramsey, S. D., and Singleton Jr, R. L. "Extension of the planar Noh problem to aluminum, iron, copper, and tungsten." AIP Conference Proceedings. Vol. 1979. No. 1. AIP Publishing, 2018.

WORK EXPERIENCE

2022 –
L'Oreal USA Fellow

Postdoctoral Researcher — University of California, Los Angeles
- Researching the affects of particle size in a slurry mixture moving down a straight incline.
- Analyzing the equilibrium profile of particles of different densities in a spiral concentrator.
- Implementing hybrid-aysymptotic models and data assimilation to assist tracking particles in microfluidic devices.
- Mentor for 14 undergraduate students.

2017 – 2022
NSF Graduate Fellow

Graduate Research Assistant — The University of Maryland, College Park
Ran and analyzed the simulation data to assess the viability of using the measured external magnetic field of the 3-meter spherical Couette experiment to represent the internal dynamics of the velocity and magnetic field. Used machine learning techniques to predict the surface magnetic fields in time.

2015 – 2018

Computational Physicist — Los Alamos National Laboratory
- Verification studies of the Noh problem for different equations of state using recent analytic solutions.
- Quantum molecular dynamics simulations of liquid Aluminum.

2014, 2015

Undergraduate Research Assistant — University of California, Los Angeles
- Performed and analyzed particle-laden flows down a straight incline. We conducted bidensity experiments and high-concentration experiments.

2013 – 2015

Undergraduate Research Assistant — University of North Carolina, Chapel Hill
- As part of the Joint Applied Math and Marine Sciences Fluids Lab, I worked on the Taylor pipe flow experiment and wrote an undergraduate thesis.

TEACHING EXPERIENCE

2022 –

Program in Computing Instructor — University of California, Los Angeles
- Introduction to Computing: C++ (Winter 2022, Winter 2023).
- Python with Applications (Spring 2022, Summer 2022, Spring 2023, Fall 2024).
- Introduction to Internet Programming (Fall 2022, Winter 2023, Fall 2023, Winter 2023, Fall 2024).

| 2016 – 2021 | **Graduate Teaching Assistant** | **The University of Maryland, College Park** |

- Teaching Assistant for Differential Equations, Calculus 2, and Linear Algebra.
- Lecturer for Multivariable Calculus and Math Modeling and Probability.

AWARDS AND RECOGNITION

| March 2024 | **United States Association for Computational Mechanics Travel Award** | **University of California, Los Angeles** |

- Awarded to support presenting at the World Congress on Computational Mechanics (WCCM) and Pan American Congress on Computational Mechanics (PANACM).

| November 2022 | **L'Oréal USA for Women in Science Postdoctoral Fellowship** | **University of California, Los Angeles** |

- Awarded for my work in STEM to support my research my particle-laden flow research.
- `https://www.youtube.com/watch?v=RluRFGniYZc`

| June 2023 | **Instructional Improvement Programs Grant** | **University of California, Los Angeles** |

- Project Title: "Maximizing the utility of discussions and teaching assistants in PIC 10A to improve students' learning experience"
- Award sponsored my material development for the introductory C++ graduate student-lead discussions.

| September 2020 | **AWM Student Chapter Award for Fundraising & Sustainability** | **University of Maryland** |

- American Women in Mathematics (AWM) award given for the support I raised for the Girls Talk Math Camp.

| March 2020 | **George A. Snow Memorial Award** | **University of Maryland** |

- Award given to a member of the Department of Physics who has personally helped advance the representation of women in physics.

| March 2020 | **The Ann G. Wylie Dissertation Fellowship** | **University of Maryland** |

- Fellowship supporting students with excellent qualifications in the latter stages of writing their dissertations.

| March 2020 | **The Mathematical Association of America (MAA) Tensor Women and Mathematics Grant** | **University of Maryland** |

- Grant awarded to fully fund the 2021 Girls Talk Math Summer Program (program moved virtual).

| January 2020 | **University of Maryland Women of Influence Award** | **University of Maryland** |

- This award recognizes members of the community for their contributions to mentorship, social justice, and advocacy for women.

| July 2019 | **Graduate Research Opportunities Worldwide (GROW) Award** | **NSF GRFP / ISTerre, Grenoble, France** |

- Additional funding for research in magnetohydrodynamics models.

| April 2019 | **Ruth Davis Fellowship for Math and Physics** | **University of Maryland** |

- Graduate student selected for her achievements in Math and Physics.

| April 2019 | **Adele's Circle of Women Scholarship** | **University of Maryland** |

- Recognizes leadership and contributions to empowering women at the University of Maryland and beyond.

| April 2019 | **Jacob K. Goldhaber Travel Grant** | **University of Maryland** |

- Awarded by UMD Graduate School to support travel for research presentations.

| March 2019 | **The Mathematical Association of America (MAA) Tensor Women and Mathematics Grant** | **University of Maryland** |

- Grant awarded to fully fund the 2019 Girls Talk Math Summer Program.

| April 2018 | **Society for Industrial and Applied Mathematics (SIAM) Award of Recognition** | **University of Maryland** |

- SIAM College Park Chapter Award of Recognition.

| April 2018 | **AMSC Leadership Award** | **University of Maryland** |

- Applied Mathematics & Statistics and Scientific Computation (AMSC) Award given for organization and leadership efforts in the Math Department.

| April 2016 | **National Science Foundation (NSF) Graduate Research Fellowships Program (GRFP) Fellowship** | **NSF** |

- Graduate research fellowship lasting for 5 years starting Fall 2016.

| August 2015 | **Honors for Applied Mathematics** | **University of California, Los Angeles** |

- Received Honors for completing a thesis and merit requirements.

April 2015	**Highest Honors for Senior Thesis**	University of California, Los Angeles

· Received Highest Honors after presenting a thesis and completing a report for the Taylor Pipe Flow experiment.

K-12 OUTREACH

June 23, 2023	**Girls Talk Math Program**	University of Maryland

· Made an interactive Python data processing workshop. Showed high school students how to track fluids in images using Google Colab interactive Python notebooks.

May 22, 2022	**Girls Talk Math – Virtual Spring Event**	University of Maryland

· Directed the virtual Girls Talk Math spring Saturday event alongside Dr. Angela Robinson, Victoria Whitley, and JJ Guan. Included a Wikipedia edit-a-thon, mentor lunch, keynote by Talitha Washington, and mathematical escape rooms.

Jul. 6 – Aug. 2, 2020	**National Virtual Girls Talk Math Summer Program**	UNC, UMD, UCLA, University of Minnesota

· Organized the first virtual summer camp along with the founders and new leaders. Developed curriculum on RSA Cryptography, Patterns & Fractals, and Knot Theory. Hosted workshops, wrote the Patterns & Fractals packet, and led virtual lab tours.

February 8, 2020	**Girls Talk Math – Winter Event**	University of Maryland

· Directed the winter Saturday event at UMD alongside Dr. Angela Robinson. Featured a Wikipedia edit-a-thon, mentor lunch, keynote by Talitha Washington, and mathematical escape rooms.

June 17 – 28, 2019	**Girls Talk Math – Summer Enrichment Program**	University of Maryland

· Directed the 2-week program. Led curriculum development, creating 6 new materials including the Patterns and Fractals packet. Coordinated 30 volunteers and 40 participants, maintained the website, and secured full funding through an MAA grant.

July 9 – 20, 2018	**Girls Talk Math – Summer Enrichment Program**	University of Maryland

· Co-organized the first Girls Talk Math summer program at UMD. Students explored advanced math topics, recorded podcasts on famous female mathematicians, and shared their work through blog posts on the website I developed.

June 19 – 30, 2017	**Girls Talk Math – Summer Program**	University of North Carolina

· Full-time Scientific Computing group leader in dynamical systems. Worked with camp founders to bring Girls Talk Math to Maryland the following year.

April 2017 & 2018	**Maryland Day**	University of Maryland

· Launched a vortex ring cannon and explained the underlying physics to visitors.

March 4, 2016	**EYH Conference Workshop**	Santa Fe

· Performed fluid demonstrations in two 90-minute sessions for 5th-8th grade girls.

January 15, 2016	**Conference for Undergraduate Women in Physics**	Old Dominion University

· Invited to speak on working in industry and recruitment for LANL.

Spring 2015 & 2014	**UNC Science Expo**	University of North Carolina, Chapel Hill

· Led activities allowing children to experience the effects of non-Newtonian fluids by running through a cornstarch mixture.

March 13, 2015	**Marjorie Lee Browne Day – Women and Math Mentoring Program**	North Carolina Central University

· Invited to lead physics demonstrations for 8th grade girls.

CONFERENCES

July 23, 2024	**16th WCCM and 4th PANACM Conference**	Vancouver, B.C.

· Presented a talk and a poster on the various particle-laden flow project in the Applied Math Lab.

Nov. 20, 2023	**American Physical Society (APS) Division of Fluid Dynamics (DFD) Conference**	Washington, D.C.

· Presented a talk on predicting the trajectories of particles in micro-centrifuge devices.

Dec. 15, 2021	**American Geophysical Union (AGU) Fall Meeting**	New Orleans, LA (virtual)

· Presented a talk on probe placement of the 3-meter experimental data.

Nov. 21, 2021	**APS DFD Conference**	Phoenix, AZ

· Presented a talk on PCA of 3-meter experimental and simulation data.

May 8, 2020	**European Geosciences Union**	**Vienna, Austria (virtual)**
	· Presented a talk on updates of the 3-meter experiments and simulations.	
Jan. 19, 2020	**Joint Mathematics Meeting (JMM)**	**Denver, CO**
	· Presented in the Inclusive Excellence session on Girls Talk Math Summer Program. Judged the MAA Undergraduate Poster Session.	
Dec. 12, 2019	**AGU Fall Meeting**	**San Francisco, CA**
	· Presented on simulations and data analysis of 3-meter experiments and 3D numerical simulations.	
Nov. 8, 2019	**Royal Astronomical Society Specialist Discussion Meeting**	**London, UK**
	· Presented a poster on machine learning techniques applied to the MHD 3-meter Couette experiment.	
May 21, 2019	**SIAM Conference on Applications of Dynamical Systems**	**Snowbird, UT**
	· Presented a talk on data assimilation for predicting magnetohydrodynamics in spherical shells.	
Jan. 17, 2019	**JMM**	**Baltimore, MD**
	· Presented a poster in the MAA Outreach Session on Girls Talk Math Summer Program.	
	· Judged the MAA Undergraduate Poster Session.	
Dec. 12, 2018	**AGU Fall Meeting**	**Washington, D.C.**
	· Presented a talk on LETKF application for kinematic 2D dynamo.	
Nov. 19, 2018	**APS DFD**	**Atlanta, GA**
	· Presented on LETKF application for kinematic 2D dynamo.	
Dec. 12, 2017	**AGU Fall Meeting**	**New Orleans, LA**
	· Presented a poster on LETKF application for chaotic nonlinear systems.	
Nov. 21, 2017	**APS DFD**	**Denver, CO**
	· Presented on LETKF application for chaotic nonlinear systems.	
Jul. 9, 2017	**APS Shock Compression of Condensed Matter**	**St. Louis, MO**
	· Presented on QMD simulations of aluminum in the liquid regime.	
Oct. 15, 2016	**Mid-Atlantic APS Conference**	**University of Delaware**
	· Presented a poster on theory and verification of the Noh problem.	
May 18, 2016	**ASME Verification and Validation Symposium**	**Las Vegas, NV**
	· Presented theory and verification of the Noh problem.	
Nov. 24, 2015	**APS DFD**	**Boston, MA**
	· Presented a talk on shock formation in high concentration particle-laden flows.	
Jan. 16, 2015	**Conference for Undergraduate Women in Physics**	**Duke University**
	· Presented a poster and a talk on particle-laden flow and pipe flow.	
Nov. 23, 2014	**APS DFD**	**San Francisco, CA**
	· Presented a poster on my bidensity particle-laden flows down an incline experiment.	
Jan. 17, 2014	**Conference for Undergraduate Women in Physics**	**University of Maryland**
	· Presented a talk on my Taylor pipe flow experiments.	

WORKSHOPS

Sep. 8 – 10, 2020	**SPP Summer School on Machine Learning in Geosciences**	**Neustadt/Weinstr.**
	· Invited speaker on machine learning in geodynamo modeling.	

LANGUAGES

English - Native, **Spanish** - Advanced

HOBBIES

Biking, **Knitting**