Shashank Sule

CONTACT INFORMATION

1304 William E. Kirwan Hall
University of Maryland
College Park, MD 20740-4015

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EDUCATION

University of Maryland, College Park 2020−2026

Ph.D. candidate in Applied Mathematics, Statistics, and Scientific Computation.
Advisor(s): Maria K. Cameron, Wojciech Czaja.

Amherst College 2016−2020

A.B. Mathematics, *summa cum laude*
Thesis: Two Multiresolution Frameworks on Graphs

Massachusetts Institute of Technology Spring 2019

Special Student in the Mathematics Department

Budapest Semesters in Mathematics Fall 2018

RESEARCH INTERESTS

Manifold learning, explainable deep learning, and optimization with applications to molecular dynamics and inverse problems in MRI.

SKILLS

Advanced: MATLAB, R, Python (including `TensorFlow`, `Pytorch`, `scikitlearn`, `OpenMM`), Julia. Intermediate: Macaulay2, Mathematica. Beginner: C++.

Github: `https://github.com/ShashankSule`

PAPERS
* INDICATES ALPHABETICAL AUTHOR ORDER

8. *Learning collective variables that respect permutational symmetry.* Jiaxin Yuan, **Shashank Sule**, Yeuk Yin Lam, and Maria Cameron. J. Chem. Phys. 28 September 2025; 163 (12): 124101. .

7. *Sharp estimates for target measure diffusion maps and applications to the committor problem*. **Shashank Sule**, Luke Evans, K. Maria Cameron. 2025. Applied and Computational Harmonic Analysis, Volume 79, 101803, ISSN 1063-5203.

6. *On the limits of neural network explainability via descrambling*. **Shashank Sule**, Richard G. Spencer, Wojciech Czaja. Applied and Computational Harmonic Analysis, Volume 79, 2025, 101793, ISSN 1063-5203, `https://doi.org/10.1016/j.acha.2025.101793.`.

5. *Learning collective variables that preserve transition rates.* **Shashank Sule**, Arnav Mehta, and Maria Cameron. (In review, arXiv: `https://arxiv.org/abs/2506.01222`).

4. *Neumann eigenmaps for landmark embedding.* **Shashank Sule** and Wojciech Czaja. In 15th International Conference on Sampling Theory and Applications (Oral Presentation).

3. *Input layer regularization and automated regularization hyperparameter tuning for myelin water estimation using deep learning.* Mirage Modi, **Shashank Sule**, Jonathan Palumbo, Michael Rozowski, Mustapha Bouhrara, Wojciech Czaja, Richard G. Spencer. 2025. (Under revision, arXiv: `https://arxiv.org/pdf/2501.18074`)

2. **Neural network-based speech reconstruction from undersampled STFT magnitude data.* Wojciech Czaja, Canran Ji, **Shashank Sule**, and Matthias Wellershoff. In 2024 32nd European Signal Processing Conference (EUSIPCO) (pp. 406-410). IEEE.

1. **Sobolev orthogonal polynomials on the Sierpinski gasket.* Jiang, Qingxuan, Tian Lan, Kasso A. Okoudjou, Robert S. Strichartz, **Shashank Sule**, Sreeram Venkat, and Xiaoduo Wang. Journal of Fourier Analysis and Applications 27, no. 3 (2021): 38.

In preparation

Scaling in diffusion maps is improved by δ-nets. **Shashank Sule**.

TIKILR: A deep declarative architecture for nonlinear inverse problems with applications to MRI. **Shashank Sule**, Richard G. Spencer, Wojciech Czaja.

Generalized Neural Collapse in the Orthoplex regime. James Alcala, Vladimir Kobzar, Dustin Mixon, Sanghoon Na, **Shashank Sule**, Yangxinyu Xie.

Invited talks

Sampling Theory and Applications (SAMPTA), University of Vienna May. 2025

Shanks conference, Vanderbilt University May. 2025
Minisymposium on symmetric subspace configurations

Joint Mathematics Meetings Jan. 2025
Contributed Paper Session on Numerical Analysis

Joint Mathematics Meetings Jan. 2025
AMS MRC Special Session on Explainable, Adversarial, and Interpretable AI

AMS Mathematical Research Community (MRC) Jun. 2024
MRC on Explainable, Adversarial, and Interpretable AI

SIAM Conference on Mathematical Aspects of Materials Science May 2024
Reduced modeling and computations in mathematical materials science

Institute of Mathematical and Statistical Innovation, UChicago Apr. 2024
Learning Collective Variables and Coarse Grained Models

University of Maryland Feb. 2024
Scientific Machine Learning: Theory and Applications Feb. 2024

University of Maryland Mar. 2023
Rare Events: Analysis, Numerics, and Applications

Joint Mathematics Meetings Jan. 2020
AMS Contributed Session on Functional Analysis,
Operator Theory, and Operator Algebras I

Southeastern Undergraduate Mathematics Workshop Aug. 2019
Georgia Institute of Technology

Invited posters

Institute of Mathematical and Statistical Innovation, UChicago Nov. 2024

NSF workshop on Rare Events

Institute of Mathematical and Statistical Innovation, UChicago Apr. 2024
Learning Collective Variables and Coarse Grained Models

Flatiron Institute Dec. 2023
Measure Transport, Diffusion Processes and Sampling Workshop

ICERM, Brown University May 2023
Optimal transport in data science

University of Maryland Mar. 2023
Rare Events: Analysis, Numerics, and Applications

University of Maryland Oct. 2022
Fall Fourier Talks

Universita di Genova Sept. 2022
Applied Harmonic Analysis and Machine Learning Summer School

Ohio State University Aug. 2019
Young Mathematicians Conference

AWARDS & FELLOWSHIPS

Mark E. Lachtmann award	May 2025
Monroe Martin Prize for Physics and Mathematics	May 2024
Michael Brin Graduate Fellowship	Aug. 2020–Jun. 2024
Dean's Fellowship, University of Maryland	Aug. 2020–Jun. 2022
The Robert H.Breusch Prize for the best undergraduate thesis in Mathematics and Statistics	May 2020
Hauptman summer research fellowship	Jun. 2023-Aug. 2023
The Walker Award in Mathematics and Statistics	May 2020
Jacob K. Goldhaber Travel Grant:	Sept. 2022
Amherst Memorial Fellowship	Aug. 2020–Jun. 2021
Loeb Center Summer Experience Fellowship	Jun. 2019
Sarles Fellowship, Amherst College	Jun. 2018
Gregory S. Call Academic Internship	Aug. 2017–May 2018
Davis United World College Scholarship	Aug. 2016–May 2020
First Place and Outstanding Award (SCUDEM 2018)	Apr. 2018

RESEARCH & EMPLOYMENT EXPERIENCE

Research Intern Jun 2025-Aug 2025
Prescient Design, Genentech

Graduate Research Fellow Jan 2022-Jan 2024
National Institute on Aging, NIH
Supervisor: Dr. Richard Spencer (UMD)

PhD Research Intern Jun. 2021–Aug. 2021
Centre for Bioinformatics and Computational Biology, UMD
Supervisor: Dr. Michael Cummings (UMD)

SPUR/REU Research Fellow Jun. 2019–Aug. 2019
Analysis on Fractals, Cornell University
Supervisor: Dr. Kasso Okoudjou (MIT)

Summer Undergraduate Research Fellow Jun. 2018–Aug. 2018

Comptuational Algebraic Geometry, Amherst College
Supervisor: Dr. Gabriel Sosa Castillo

Teaching Experience

Teaching Assistant, University of Maryland

- MATH 115− Precalculus — Fall 2023

Activities

Co-organizer — Apr. 2025
SIAM DMV Conference on Applied Mathematics

MRC Assistant — Jun. 2024
AMS MRC on Explainable, Adversarial, and Interpretable AI

AMSC Student representative — Aug. 2024−
Graduate Student Council for AMSC, Math, and Stats, UMD.

Treasurer — Aug. 2023−Aug. 2024
Graduate Student Council for AMSC, Math, and Stats, UMD.

Committee Member — Nov. 2022−May 2023
Budget and Finances Committe

Co-organizer — Aug. 2022−Aug. 2023
RIT on ML for Rare Events, UMD Mathematics

Co-organizer — Jan 2022−Dec. 2022
RIT on Deep Learning, UMD Mathematics

Computing coordinator — Aug. 2021−Aug. 2022
Norbert Wiener Center, UMD
UMD Graduate Student Government

Co-Chair — Spring 2018
Amherst College International Students' Association