SHAN SHAN

CURRICULUM VITAE 2024

CONTACT INFORMATION

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PROFESSIONAL APPOINTMENTS

University of Southern Denmark — Odense, Denmark
Assistant Professor, Mathematics and Computer Science — 2022 -*present*
Postdoctoral Research Fellow, Mathematics and Computer Science — 2021 - 2022

Duke University — Durham, NC, USA
Postdoctoral Research Fellow, Mathematics — 2019 - 2020

EDUCATION

Duke University — Durham, NC, USA
Ph.D. in Mathematics — 2014 - 2019
Thesis Title: *Probabilistic Models on Fiber Bundles*
Thesis Advisor: Ingrid Daubechies

Agnes Scott College — Atlanta, GA, USA
B.A. in Mathematics *summa cum laude* — 2010 - 2014

Budapest Semesters in Mathematics — Budapest, Hungary
Undergraduate Study Abroad Program — 2013

RESEARCH INTERESTS

- Quantum computing and its applications
- Geometric and statistical methodology for shape analysis
- Mathematical framework for machine learning and high-dimensional data analysis

PUBLICATIONS

Published Articles

7. **Shan, S.** & Daubechies, I. (2023). Diffusion Maps: Using the Semigroup Property for Parameter Tuning. Theoretical Physics, Wavelets, Analysis, Genomics. Springer, 409-424.

6. Kjaergaard, M., Lindvig, K. P., Thorhauge, K. H., Andersen, P., Hansen, J. K., Kastrup, N., Jensen, J. M., Hansen, C. D., Johansen, S., Israelsen, M., Torp, N., Trelle, M. B., **Shan, S.**, Detlefsen, S., Antonsen, S., Andersen, J. E., Graupera, I., Ginés, P., Thiele, M. & Krag, A. (2023). Performance of Enhanced Liver Fibrosis test, FIB-4, and NAFLD fibrosis score in a screening study of 3,387 participants. Journal of Hepatology. 79, 2, 277-286.

5. Granados, G., Greenwood, J., Secor, S., **Shan, S.**, Hedrick, B., & Brennan, P. (2022). Examining the shape and size of female and male genitalia in snakes using three-dimensional geometric morphometrics, Biological Journal of the Linnean Society.

4. Rolfe, S., Pieper, S., Porto, A., Diamond, K., Winchester, J., **Shan, S.**, Kirveslahti, H., Boyer, D., Summers, A., & Maga, M. (2021). SlicerMorph: An open and extensible platform to retrieve, visualize and analyse 3D morphology. Methods in Ecology and Evolution, 12, 1816-1825.

3. Fulwood, E. L., **Shan, S.**, Winchester, J., Kirveslahti, H., Ravier, R., Kovalsky, S., Daubechies, I., & Boyer, D. (2021). Insights from macroevolutionary modelling and ancestral state reconstruction into the radiation and historical dietary ecology of Lemuriformes (Primates, Mammalia). BMC ecology and evolution, 21(1), 1-13.

2. Fulwood, E. L., **Shan, S.**, Winchester, J., Kirveslahti, H., Gao, T., Boyer, D., & Daubechies, I. (2020). Dietary adaptation in lemurs, analyzed using new approaches to describing functional properties of tooth shape. The FASEB Journal, 34(S1), 1-1.

1. **Shan, S.**, Kovalsky, S., Winchester, J., Boyer, D., & Daubechies, I. (2019). ariaDNE: A robustly implemented algorithm for Dirichlet energy of the normal. Methods in Ecology and Evolution, 10(4), 541-552.

Manuscripts in preparation

2. J.E. Andersen & **Shan, S.**. Using Gaussian Boson Sampling to Approximate Gaussian Expectation Problems.

1. **Shan, S.**, Buch, A. G., Petersen, H. G., & Andersen, J. E. Robust fitting with Gaussian Boson Sampling.

Software

2. **Shan, S.**, Winchester, J., Kirveslahti, H., Gao, T., Boyer, D. Auto3dgm Slicer Extention (2019). `https://github.com/ToothAndClaw/auto3dgmSlicerExtension`

   This package is a Slicer extension written in Python for automatically spreading landmarks and aligning mesh type data.

1. **Shan, S.** AriaDNE (2018). `http://doi.org/10.5281/zenodo.1465949`

   This Matlab package implements the robust DNE algorithm on mesh type data.

PRESENTATIONS

Invited Talks

15. Using Gaussian Boson Samplers to approximate Gaussian expectations. (2024). Scientific Quantum Conference. Odense, Denmark.

14. Exploring statistical shape analysis with manifolds and fiber bundles. (2024). Joint Mathematics Meetings. San Francisco, USA.

13. Introduction to Quantum Computing. (2023). Danish Meteorological Institute.

12. Gaussian Boson Sampling. (2023). DIREC seminar. Odense, Denmark.

11. Quantum Computing and its Applications in the NISQ Era. (2023). Woman Mathematicians in Sciences. Odense, Denmark.

10. Gaussian Boson Sampling and Its Applications. (2022). University of Southern Denmark. Odense, Denmark.

9. Motion Segmentation with Quantum Computing. (2021). Robotics Elite Summer School. University of Southern Denmark. Odense, Denmark.

8. Probabilistic models on fiber bundles. (2020). SIAM Conference on Mathematics of Data Science (MDS20). (Canceled due to COVID-19).

7. Probabilistic models on fiber bundles. (2020). University of Ottawa. Ottawa, Canada. (Canceled due to COVID-19).

6. Probabilistic models on fiber bundles. (2020). Memorial Sloan Kettering Cancer Center. New York City, NY, USA.

5. Math and statistics in teeth and bones. (2019). Mount Holyoke College. South Hadley, MA, USA.

4. Probabilistic models on fiber bundles. (2019). Data Science Consortium. Michigan Institute for Data Science (MIDAS). Ann Arbor, MI, USA.

3. Probabilistic models on fiber bundles. (2019). Statistical Analysis in Biophysics and Climate Symposium, SIAM Conference on Dynamical Systems (DS19). Snowbird, UT, USA.

2. Biologically relevant features on surfaces representing teeth and bones. (2018). Daubechies 64. Hasselt University and Park Molenheide, Belgium.

1. Math + Tooth. (2017). Math Slam Research Symposium. Duke University. Durham, NC, USA.

Contributed Talks

7. Probabilistic models on fiber bundles. (2020). AMS Contributed Paper Session on Probability Theory, Stochastic Processes and Statistics, Joint Mathematics Meetings. Denver, CO, USA.

6. Extremal Sets of Vertices of the Hypercube over GF(2). (2015). Southeastern Conference for Undergraduate Women in Math. Durham, NC, USA.

5. Extremal Sets of Vertices of the Hypercube over GF(2). (2014). Spring Annual Research Conference. Agnes Scott College. Decatur, GA, USA.

4. Periodicity of third-order linear recurrence sequences. (2014). Nebraska Conference for Undergraduate Women in Math. Lincoln, NE, USA.

3. Extremal Sets of Vertices of the Hypercube over GF(2). (2013). BSM EUR Conference. Budapest Semesters in Mathematics. Budapest, Hungary.

2. Periodicity of third-order linear recurrence sequences. (2013). Southeastern Conference for Undergraduate Women in Math. Clemson, SC, USA.

1. Periodicity of third-order linear recurrence sequences. (2012). Spring Annual Research Conference. Agnes Scott College. Decatur, GA, USA.

Contributed Posters

3. Generating anatomical surfaces for primates. (2019). Research Computing Symposium. Duke University. Durham, NC, USA.

2. Ancestral state reconstruction for surfaces. (2018). Curves and Surfaces. Arcachon, France

1. Periodicity of third-order linear recurrence sequences. (2014). Undergraduate poster session, Joint Mathematics Meetings. Baltimore, MD, USA.

PROFESSIONAL SERVICE

Reviewer: *Electronic Journal of Statistics*, *IEEE BITS Magazine*, *American Journal of Physical Anthropology*

ORGANIZATION OF CONFERENCES, SEMINARS & WORKSHOPS

Conferences

2024 *Co-organizer*. Special session " Computational Techniques to Study the Geometry of the Shape Space" at Joint Mathematics Meetings. San Francisco, CA, USA.

2023 *Co-organizer*. Special session "Quantum computing in its NISQ era" at Nordic Congress of Mathematics. Aalborg, Denmark.

2017 *Co-organizer*. Triangle Area Graduate Mathematics Conference. Durham, NC, USA.

Seminars

2021 *Co-organizer*. Math/Stat Seminar. Mount Holyoke College.

2015, 2016 *Co-organizer*. Math Graduate-Faculty Seminar. Duke Univeristy.

2017 *Co-organizer*. Graduate Student Sponsored Colloquia. Duke Univeristy.

Workshops

2018 Co-organizer. Summer Workshop in Mathematics (SWiM). Duke Univeristy.

PRIZES AND AWARDS

2020 SIAM Early Career Travel Award
2019 SIAM Student Travel Award
2014 Phi Beta Kappa, Agnes Scott College
2014 Outstanding Presentation Award, Joint Mathematics Meetings
2013 Wilson Asbury Higgs Mathematics Scholarship, Agnes Scott College
2013 Highest Honor, Budapest Semesters in Mathematics
2013 Departmental Award for Excellence in Study, Agnes Scott College
2012 Dana Leadership Scholar, Agnes Scott College

SUPERVISING AND MENTORING ACTIVITIES

Master Student Research Advising

2023 Jakob Blaabjerb Møller, University of Southern Denmark

Bachelor Student Research Advising

2021 Martin Christensen and Jeppe Vinkel Beier, University of Southern Denmark
2020 Amaya Choksi, Mount Holyoke College
2019 Ashka Stephen, Duke University

Mentoring Activities

2017 *Co-organizer*. Noethoerian Ring Women in Math Mentoring Program. Duke University
2016 *Co-founder and Vice President*. SIAM student chapter. Duke University

TEACHING

Bachelor Courses at University of Southern Denmark

MM571: First Year Project — Spring 2024

Undergraduate Courses at Mount Holyoke College

Stat 140: Introduction to the Ideas and Applications of Statistics — Fall 2020 Module 1
Stat 140: Introduction to the Ideas and Applications of Statistics — Fall 2020 Module 2

Undergraduate Courses at Duke University

Math 106L: Laboratory Calculus and Functions II — Spring 2018
Math 122L: Introductory Calculus II with Applications — Fall 2016
Math 105L: Laboratory Calculus and Functions I — Fall 2015

Workshop Instructor

3D Morphometrics and Image Analysis Winter Workshop — 2020
3D Morphometrics and Image Analysis Summer Workshop — 2019
Summer Workshop in Mathematics (SWiM) — 2017

Teaching Assistant at Duke University

Math/Chem 89S: Science in Cooking — Spring 2020
Math 111L: Laboratory Calculus and Functions I — Fall 2014

PROGRAMMING SKILLS

Proficient in high-performance programming in Python, Matlab, C/C++, R.

MEDIA COVERAGE

2019 “Beautiful Math with Shan Shan, " Duke Research Computing Minute Marvels.
`https://rc.duke.edu/mm/`