

**SHAN SHAN**  
CURRICULUM VITAE 2024

## CONTACT INFORMATION

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## PROFESSIONAL APPOINTMENTS

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<b>University of Southern Denmark</b> <i>Assistant Professor, Mathematics and Computer Science</i>	Odense, Denmark 2022 -present
<b>University of Southern Denmark</b> <i>Postdoctoral Research Fellow, Mathematics and Computer Science</i>	Odense, Denmark 2021 - 2022
<b>Duke University</b> <i>Postdoctoral Research Fellow, Mathematics</i>	Durham, NC, USA 2019 - 2020

## EDUCATION

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<b>Duke University</b> Ph.D. in Mathematics Thesis Title: <i>Probabilistic Models on Fiber Bundles</i> Thesis Advisor: Ingrid Daubechies	Durham, NC, USA 2014 - 2019
<b>Agnes Scott College</b> B.A. in Mathematics <i>summa cum laude</i>	Atlanta, GA, USA 2010 - 2014
<b>Budapest Semesters in Mathematics</b> Undergraduate Study Abroad Program	Budapest, Hungary 2013

## RESEARCH INTERESTS

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

## PUBLICATIONS

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### *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 Extension (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**

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#### *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**

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

### **ORGANIZATION OF CONFERENCES, SEMINARS & WORKSHOPS**

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#### *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 University.

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

#### *Workshops*

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

## PRIZES AND AWARDS

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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

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### *Master Student Research Advising*

2023 Jakob Blaabjerg 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

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### *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

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

## MEDIA COVERAGE

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