

# Shan Shan Curriculum Vitae

## EDUCATION

- Ph.D. Duke University, Mathematics, 2014-2019  
Title: “*Probabilistic models on fiber bundles*”.  
Advisor: Ingrid Daubechies, Ph.D.
- B.A. Agnes Scott College, Mathematics *summa cum laude*, 2010-2014

## SCIENTIFIC FOCUS AREAS

- 1) Quantum computing and its applications, especially in the continuous variable formalism
- 2) Geometric and statistical methodology for shape analysis
- 3) Mathematical framework for machine learning and high-dimensional data analysis

## PROFESSIONAL APPOINTMENTS

- Associate Professor, University of Southern Denmark  
Department of Mathematics and Computer Science, 2024-present
- Assistant Professor, University of Southern Denmark  
Department of Mathematics and Computer Science, 2022-2024
- Postdoctoral Research Fellow, University of Southern Denmark  
Department of Mathematics and Computer Science, 2021-2022  
Advisor: Jørgen Ellegaard Andersen, PhD.
- Postdoctoral Research Fellow, Duke University  
Department of Mathematics, 2019-2020  
Advisor: Ingrid Daubechies, PhD

## GRANTS RECEIVED

- 1) Active: Affiliated researcher. “Topological Photonic Quantum Computing and its Applications.” Danmarks Innovationsfond: 23.74 million kr. 2024-2029. Lead PI Jørgen Ellegaard Andersen.
- 2) Active: coPI, “Quantum Mathematics for Quality Decisions in the Liver Clinic.” Region Syddanmarks Innovationspulje: 2 million kr. 2023-2025. Lead PI Maja Theile
- 3) Completed: coPI. “Quantum Computing in Clinical Research.” Danish Institute of Advanced Study: 0.3 million kr. 2022. Lead PI Jørgen Ellegaard Andersen.

## HONORS 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

## PUBLICATIONS

(authors are listed first-to-last, \*authors are listed alphabetically, +student mentored)

### *Peer-reviewed publications*

#### Articles

- \*1. Jørgen Ellegaard Andersen, Anne-Marie Mai, Jakob Blaabjerg Møller(+), *Shan Shan*. 2024. ‘He Has the Whole Package: Lyrics, Melodies, Enigmatic, mythical’: Images of Bob Dylan – Results of Questionnaire. *Aktualitet - Litteratur, Kultur Og Medier*, s. 1-33.
2. Maria Kjaergaard, Katrine Prier Lindvig, Katrine Holtz Thorhauge, Peter Andersen, Johanne Kragh Hansen, Nanna Kastrop, Jane Møller Jensen, Camilla Dalby Hansen, Stine Johansen, Mads Israelsen, Nikolaj Torp, Morten Beck Trelle, *Shan Shan*, Sönke Detlefsen, Steen Antonsen, Jørgen Ellegaard Andersen, Isabel Graupera,

Pere Ginés, Maja Thiele, Aleksander Krag. **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.

3. Genesis Lara Granados, Juliet Greenwood, Stephen Secor, *Shan Shan*, Brandon Hedrick, Patricia Brennan. **2022**. Examining the shape and size of female and male genitalia in snakes using three-dimensional geometric morphometrics. *Biological Journal of the Linnean Society*, 136.3, 466-476.
4. Sara Rolfe, Steve Pieper, Arthur Porto, Kelly Diamond, Julie Winchester, *Shan Shan*, Henry Kirveslahti, Doug Boyer, Adam Summers, Murat Maga. **2021**. SlicerMorph: An open and extensible platform to retrieve, visualize and analyze 3D morphology. *Methods in Ecology and Evolution*. 12(10): 1816-1825.
5. Ethan Fulwood, *Shan Shan*, Julia Winchester, Henry Kirveslahti, Robert Ravier, Shahar Kovalsky, Ingrid Daubechies & Doug Boyer. **2021**. Reconstructing dietary ecology of extinct strepsirrhines (Primates, Mammalia) with new approaches for characterizing and analyzing tooth shape. *Paleobiology*. 47(4):612-631.
6. Ethan Fulwood, *Shan Shan*, Julia Winchester, Henry Kirveslahti, Tingran Gao, Doug Boyer, Ingrid Daubechies. **2021**. Insights from macroevolutionary modelling and ancestral state reconstruction into the radiation and historical dietary ecology of Lemuriformes (Primates, Mammalia). *BMC Evolutionary Biology*. 21, 60.
7. *Shan Shan*, Shahar Z. Kovalsky, Julie M. Winchester, Doug M. Boyer, Ingrid Daubechies. **2019**. ariaDNE: A Robustly Implemented Algorithm for Dirichlet Energy of the Normal. *Methods in Ecology and Evolution*.

#### Book chapters

8. *Shan Shan*, Ingrid Daubechies. **2023**. Diffusion Maps: Using the Semigroup Property for Parameter Tuning. *Theoretical Physics, Wavelets, Analysis, Genomics*. Springer, 409-424.

#### Non peer-reviewed publications

##### Preprint

9. Felix Risbro Hjerrild(+), *Shan Shan*, Doug Boyer, Ingrid Daubechies. **2024**. signDNE: A python package for ariaDNE and its sign-oriented extension. arXiv preprint. arXiv:2409.05549.

#### Dissertation

10. Shan Shan. **2019**. Probabilistic models on fiber bundles. Duke University. PhD dissertation.

## PRESENTATIONS

### Seminars

- 2024 Research Center of Mathematics and Interdisciplinary Sciences of Shandong University.
- 2024 IMADA talk, University of Southern Denmark. Odense, Denmark.
- 2024 BigQ Seminar at Danmarks Tekniske Universitet. Lyngby, Denmark.
- 2023 Danish Meteorological Institute. Copenhagen, Denmark.
- 2020 University of Ottawa. Ottawa, Canada. (Canceled due to COVID-19)
- 2019 Memorial Sloan Kettering Cancer Center. New York City, NY, USA.
- 2019 Math and statistics seminar, Mount Holyoke College. South Hadley, MA, USA.
- 2017 Math Slam Research Symposium at Duke University. Durham, NC, USA.

### Conferences

- 2024 Workshop in honor of Ingrid Daubechies at Duke University. Durham NC, USA
- 2024 Scientific Quantum Conference. Odense, Denmark.
- 2024 Joint Mathematics Meetings, San Francisco CA, USA
- 2024 International Conference for Woman in Mathematics. Copenhagen, Denmark.
- 2023 DIREC/SDU workshop on quantum computing. Odense, Denmark.
- 2023 International conference for Woman Mathematicians in Sciences. Odense, Denmark.
- 2020 SIAM Conference on Mathematics of Data Science. (Canceled due to COVID-19).

- 2019 SIAM Conference on Dynamical Systems. Snowbird, UT, USA.
- 2019 Joint Mathematics Meetings. Denver, CO, USA.
- 2019 Data Science Consortium Conference. Michigan Institute for Data Science (MIDAS). Ann Arbor, MI, USA.
- 2018 Daubechies 64. Hasselt University and Park Molenheide, Belgium.
- 2015 Southeastern Conference for Undergraduate Women in Math. Durham, NC, USA.
- 2014 Spring Annual Research Conference. Agnes Scott College. Decatur, GA, USA.
- 2014 Nebraska Conference for Undergraduate Women in Math. Lincoln, NE, USA.
- 2013 Southeastern Conference for Undergraduate Women in Math. Clemson, SC, USA.
- 2013 BSM EUR Conference. Budapest Semesters in Mathematics. Budapest, Hungary.
- 2012 Spring Annual Research Conference. Agnes Scott College. Decatur, GA, USA.

### **Tutorials**

- 2022 Robotics Elite Summer School. Odense, Denmark.
- 2020 3D Morphometrics and Image Analysis Workshop. University of Washington. Friday Harbor WA, USA.
- 2019 3D Morphometrics and Image Analysis Workshop. University of Washington. Friday Harbor WA, USA.
- 2017 Summer Workshop in Mathematics (SWiM). Duke University. Durham NC, USA.

### **SUPERVISION OF STUDENTS**

#### **Master students**

- 2024 Tobias Fiskbæk Juul (Biochemistry and Molecular Biology), co-supervisor: Maria Timofeeva and Veit Schwämmle, University of Southern Denmark
- 2024 Asmus Tørsleff (Quantum information), co-supervisor: Ulrik Lund Andersen and Jørgen Ellegaard Andersen, University of Copenhagen and Danish Technical University
- 2023 Jakob Blaabjerg Møller (Data science), co-supervisor: Jørgen Ellegaard Andersen, University of Southern Denmark

#### **Bachelor students**

- 2024 Felix Risbro Hjerrild (Applied Mathematics), University of Southern Denmark
- 2024 Kristoffer Hagedorn Larsen (Applied Mathematics), University of Southern Denmark,
- 2021 Martin Christensen and Jeppe Vinkel Beier (Robotics), co-supervisor: Henrik Gordon Petersen, University of Southern Denmark
- 2019 Ashka Stephen (Computer Science), co-supervisor: Sayan Mukherjee, Duke University

### **TEACHING**

#### **University of Southern Denmark**

AI503: Calculus. Fall 2024, Fall 2025

FF501: First Year Project. Spring 2024, Spring 2025

#### **Mount Holyoke College**

Stat 140: Introduction to the Ideas and Applications of Statistics. Fall 2020

#### **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

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

#### **Conferences**

- 2024 Co-organizer with Shira Faigenbaum and Ingrid Daubechies. Special session “Computational Techniques to Study the Geometry of the Shape Space” at Joint Mathematics Meetings. San Francisco, CA, USA.
- 2023 Co-organizer with Jørgen Ellegaard Andersen, Peter van Loock, Damian Markham. Special session “Quantum computing in its NISQ era” at Nordic Congress of Mathematics. Aalborg, Denmark.
- 2017 Co-organizer with Sarah Ritchey, Triangle Area Graduate Mathematics Conference. Durham, NC, USA.

**Seminars**

2016 Co-organizer with Sarah Ritchey. Math Graduate-Faculty Seminar. Duke University.

2015 Co-organizer with Sarah Ritchey. Math Graduate-Faculty Seminar. Duke University.

**Workshops**

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

**PROFESSIONAL SERVICE**

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

**PROGRAMMING SKILL**

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