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 (September 1st 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 AND MANAGEMENT EXPERIENCE

Grants Received

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

Other Management Experience

1. Local coordinate support, Lead PI Ulrik Lund Andersen with local PI Jørgen Ellegaard Andersen (2022-2026), "Scalable Continuous Variable Cluster State Quantum Technologies." European Union's Horizon Europe.
2. Local coordinate support, Lead PI Tobias Gehring with local PI Jørgen Ellegaard Andersen (2023-2025), "Danish Quantum Communication Infrastructure." European Union's Digital Europe programme.
3. Local coordinate support, Lead PI Jørgen Ellegaard Andersen (2023-2025), "New Machine Learning Methods for Daily Trading Activities", Jyske Bank, Denmark.

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. *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*.

2. 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.

3. 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.

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. 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.

6. Maria Kjaergaard, Katrine Prier Lindvig, Katrine Holtz Thorhauge, Peter Andersen, Johanne Kragh Hansen, Nanna Kastrup, 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.

*7. 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.*

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

Articles

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

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

Conferences

Spring Annual Research Conference. Agnes Scott College. Decatur, GA, USA. 2012
Southeastern Conference for Undergraduate Women in Math. Clemson, SC, USA. 2013
BSM EUR Conference. Budapest Semesters in Mathematics. Budapest, Hungary. 2013
Nebraska Conference for Undergraduate Women in Math. Lincoln, NE, USA. 2014
Spring Annual Research Conference. Agnes Scott College. Decatur, GA, USA.2014
Southeastern Conference for Undergraduate Women in Math. Durham, NC, USA. 2015
Joint Mathematics Meetings. Denver, CO, USA.2019
Daubechies 64. Hasselt University and Park Molenheide, Belgium. 2018
SIAM Conference on Dynamical Systems (DS19). Snowbird, UT, USA. 2019
Data Science Consortium Conference. Michigan Institute for Data Science (MIDAS). Ann Arbor, MI, USA. 2019
SIAM Conference on Mathematics of Data Science (MDS20). (Canceled due to COVID-19). 2020
International conference for Woman Mathematicians in Sciences. Odense, Denmark. 2023
Joint Mathematics Meetings, San Francisco CA, USA 2024
Scientific Quantum Conference. Odense, Denmark. 2024
International Conference for Woman in Mathematics. Copenhagen, Denmark. 2024
Workshop in honor of Ingrid Daubechies at Duke University. Durham NC, USA 2024.

Tutorials

Summer Workshop in Mathematics (SWiM). 2017
3D Morphometrics and Image Analysis Workshop 2019
3D Morphometrics and Image Analysis Workshop 2020
Robotics Elite Summer School. Odense, Denmark. 2022
DIREC seminar on quantum computing. Odense, Denmark. 2023

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 Blaabjerb 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

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

TEACHING
University of Southern Denmark
AI503: Calculus. Fall 2024
FF501: First Year Project. Spring 2024

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

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