

# Daniel Gedon

Postdoctoral Fellow in Machine Learning · Tübingen AI Center, University of Tübingen

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## RESEARCH INTERESTS

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Probabilistic machine learning, generative models, AI for scientific discovery, simulation-based inference, foundation models and LLMs, model discovery, uncertainty quantification.

## TECHNICAL SKILLS

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**Languages & frameworks:** Python (PyTorch, scikit-learn, numpy, pandas), Git

**Infrastructure:** SLURM, Hydra, Ray, Linux HPC clusters

**Methods:** Bayesian inference, simulation-based inference, generative models, transformers and LLMs (including pre-training from scratch), uncertainty quantification, hyperparameter optimization

## PROFESSIONAL EXPERIENCE

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**Postdoctoral Fellow**, Tübingen University, Tübingen AI Center, Germany Sep 2024 – Present

Advisor: Jakob H. Macke

- Research on probabilistic ML and LLMs for AI-driven scientific discovery: LLM-based automated model discovery, and generative models and neural density estimation for simulation-based inference.
- Maintainer of `sbi` (800+ GitHub stars), a Python package for simulation-based inference.
- Student supervision, mentoring, and co-organization of SBI hackathons.

**Satellite Attitude Control System Analyst**, Airbus Defence & Space, Germany Oct 2015 – Sep 2016

- High-precision satellite pointing error analysis using ESA PEET simulation software.
- AOCS/GNC system concept design for early-phase satellite missions.
- Sensor modeling and functional simulation of attitude determination.

## EDUCATION

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**Ph.D. in Machine Learning**, Uppsala University, Sweden Aug 2019 – Aug 2024

Advisor: Thomas B. Schön · Thesis: *On Deep Learning for Low-Dimensional Representations* [Thesis]

Topics: deep learning for clinical ECG analysis, deep state-space models for system identification, self-supervised and kernel methods for representation learning

Visiting researcher, Belkin lab, UC San Diego, Spring 2023

**M.Sc. in System and Control**, TU Delft, Netherlands Sep 2017 – Jul 2019

Thesis: *Tensor Network Kalman Filter for Large-Scale MIMO Systems* [Thesis]

**B.Eng. in Aerospace Engineering**, DHBW, Germany Sep 2012 – Sep 2015

## OPEN-SOURCE SOFTWARE

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**sbi** 2024 – present

Python package for simulation-based inference. 800+ GitHub stars. Maintainer. [github]

## GRANTS & AWARDS

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**WASP Postdoctoral Fellowship**, Knut and Alice Wallenberg Foundation Spring 2024

Two-year scholarship at the Institute of Science and Technology Austria (ISTA). Awarded; declined.

**WASP Research Grant**, Knut and Alice Wallenberg Foundation Spring 2023

Funding for three-month research visit to Mikhail Belkin's lab, UC San Diego.

## ACADEMIC SERVICE

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### Peer Review

*ML venues:* NeurIPS (2023–2025), ICLR (2024–2025), ICML (2025), AISTATS (2023–2024), UAI (2025)

*Other conferences:* IFAC WC (2023), CDC (2023), ECC (2023), MIR (2024), IEEE CCTA (2023)

*Journals:* Automatica (2023), IEEE CSS (2025), IEEE TC-SMC (2023), IEEE TIM (2023), IEEE Access (2023), BMJ (2022)

### Organization

SBI Hackathon (5 days), Tübingen, Germany

Mar 2025

SBI Hackathon/Tutorial (3 days), Grenoble, France

Jan 2026

## SUPERVISION

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Stefan Wahl, PhD student, Tübingen University

2025 – present

Philipp von Bachmann, MSc project, Uppsala University

Spring 2022

Theogene Habineza, MSc thesis, Uppsala University

Spring 2022

## TEACHING

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**Teacher**, Tübingen University, Germany

Sep 2024 – present

Seminar: Simulation-based inference (MSc); Seminar: ML Methods for Scientific Discovery (MSc); Teamproject: Benchmarking for Misspecified SBI (BSc) — Spring 2025

**Lecturer**, Uppsala University, Sweden

Sep 2023 – Aug 2024

Advanced Probabilistic Machine Learning, 1RT705 (MSc), Fall 2023

**Teaching Assistant**, Uppsala University & TU Delft

Oct 2018 – Aug 2024

Statistical ML, Advanced Probabilistic ML, System Identification, AI & ML for WASP PhD school — MSc/PhD level

## INVITED TALKS

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*Simulation-based inference and probabilistic model discovery with foundation models*

Dec 2025

Aiz, Seattle

*Deep Networks for System Identification: A Survey*

Sep 2023

ERNSI Workshop, Stockholm

*No Double Descent in PCA: Training and Pre-Training in High Dimensions*

Mar 2023

Belkin Lab Group Meeting, UC San Diego

Panel: *Training in Data Driven Life Science*

Nov 2022

SciLifeLab DDLS Annual Conference, Stockholm

*Deep Learning-based ECG Reading in the Emergency Department*

Nov 2022

Joint DSBS / FMS Meeting, Malmö

## OTHER EXPERIENCE

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### Solo Travel

Oct 2016 – Apr 2017

Long-distance hike, Greater Patagonian Trail, Patagonia. Language school: Spanish (Sucre, Bolivia).

### Voluntary Work

Apr 2017 – Aug 2017

Work with primary school children, elderly, and refugees. Ansbach, Germany.

## LANGUAGES

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German (native) · English (fluent) · Swedish (intermediate) · Spanish (beginner)

## PUBLICATIONS

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\* denotes equal contribution / joint supervision.

### Preprints

1. **A Deep Learning ECG Model for Localization of Occlusion Myocardial Infarction**  
Stefan Gustafsson, Antônio H. Ribeiro, **Daniel Gedon**, Petrus E.O.G.B. Abreu, Nicolas Pielawski, Gabriela M.M. Paixão, Antonio Luiz P. Ribeiro, Daniel Lindholm, Thomas B. Schön, Johan Sundström  
*medRxiv*, accepted at *Nature Communications*, 2025 [medRxiv]
2. **A Probabilistic Framework for LLM-Based Model Discovery**  
Stefan Wahl, Raphaela Schenk, Ali Farnoud, Jakob H. Macke, **Daniel Gedon**  
*arXiv*, 2026 [arXiv] [code]

### Peer-Reviewed Publications

1. **Effortless, Simulation-Efficient Bayesian Inference using Tabular Foundation Models**  
Julius Vetter, Manuel Gloeckler, **Daniel Gedon**\*, Jakob H. Macke\*  
*NeurIPS*, 2025 [arXiv] [OpenReview] [code]
2. **Deep Networks for System Identification: A Survey**  
Gianluigi Pillonetto, Aleksandr Aravkin, **Daniel Gedon**, Lennart Ljung, Antônio H. Ribeiro, Thomas B. Schön  
*Automatica*, 2025 [DOI] [arXiv]
3. **No Double Descent in Principal Component Regression: A High-Dimensional Analysis**  
**Daniel Gedon**, Antônio H. Ribeiro, Thomas B. Schön  
*ICML*, 2024 [OpenReview] [ICML] [code]
4. **Uncertainty Estimation with Recursive Feature Machines**  
**Daniel Gedon**, Amirhesam Abedsoltan, Thomas B. Schön, Mikhail Belkin  
*UAI*, 2024 [OpenReview] [code]
5. **Evaluating Regression and Probabilistic Methods for ECG-based Electrolyte Prediction**  
Philipp Von Bachmann, **Daniel Gedon**, Fredrik K. Gustafsson, Antônio H. Ribeiro, Erik Lampa, Stefan Gustafsson, Johan Sundström, Thomas B. Schön  
*Scientific Reports* 14, 15273, 2024 [DOI] [arXiv] [code]
6. **End-to-end Risk Prediction of Atrial Fibrillation from the 12-Lead ECG by Deep Neural Networks**  
Theogene Habineza, Antônio H. Ribeiro, **Daniel Gedon**, Joachim A. Behar, Antonio Luiz P. Ribeiro, Thomas B. Schön  
*Journal of Electrocardiology*, 2023 [DOI] [arXiv] [code]
7. **Screening for Chagas Disease from the Electrocardiogram using a Deep Neural Network**  
Carl Jidling, **Daniel Gedon**, Thomas B. Schön, Claudia Di Lorenzo Oliveira, Clareci Silva Cardoso, Ariela Mota Ferreira, Luana Giatti, Sandhi Maria Barreto, Ester C. Sabino, Antonio L. P. Ribeiro, Antônio H. Ribeiro  
*PLOS Neglected Tropical Diseases*, 2023 [DOI] [medRxiv] [code]
8. **Invertible Kernel PCA with Random Fourier Features**  
**Daniel Gedon**, Antônio H. Ribeiro, Niklas Wahlström, Thomas B. Schön  
*IEEE Signal Processing Letters*, 2023 [DOI] [arXiv] [code]
9. **Development and Validation of Deep Learning ECG-based Prediction of Myocardial Infarction in Emergency Department Patients**  
**Daniel Gedon**\*, Stefan Gustafsson\*, Erik Lampa, Antônio H. Ribeiro, Martin J. Holzmann, Thomas B. Schön, Johan Sundström  
*Scientific Reports* 12, 19615, 2022 [DOI]
10. **First Steps Towards Self-Supervised Pretraining of the 12-Lead ECG**  
**Daniel Gedon**, Antônio H. Ribeiro, Niklas Wahlström, Thomas B. Schön

*Computing in Cardiology (CinC)*, 2021 [DOI] [slides] [video]

11. **Deep State Space Models for Nonlinear System Identification**

**Daniel Gedon**, Niklas Wahlström, Thomas B. Schön, Lennart Ljung

*Proceedings of the 19th IFAC Symposium on System Identification (SYSID)*, 2021 [DOI] [arXiv] [code]

12. **Automatic 12-Lead ECG Classification using a Convolutional Network Ensemble**

Antônio H. Ribeiro, **Daniel Gedon**, Daniel Martins Teixeira, Manoel H. Ribeiro, Antonio L. Pinho Ribeiro, Thomas B. Schön, Wagner Meira Jr.

*Computing in Cardiology (CinC)*, 2020 [DOI] [code]

13. **Tensor Network Kalman Filter for LTI Systems**

**Daniel Gedon**, Pieter Piscaer, Kim Batselier, Carlas Smith, Michel Verhaegen

*27th European Signal Processing Conference (EUSIPCO)*, A Coruña, Spain, 2019 [DOI] [code]

14. **PointingSat – High Precision Pointing Error Analysis with ESA PEET v1.0**

Thomas Ott, Marc Hirth, Massimo Casasco, Simon Görries, **Daniel Gedon**, Alison Ponche

*10th International ESA Conference on Guidance, Navigation & Control Systems*, Salzburg, Austria, 2017 [Paper]