Dr Teresa Klatzer

Postdoctoral Researcher at the University of Edinburgh, UK | E-mail | Website | Scholar Profile | Github | Linkedin
Nationality: Austrian | Languages: German, English, French

Summary

Researcher at the intersection of **machine learning, Bayesian computation, and imaging inverse problems** with a strong background in computer science and mathematics. Skilled in **Python, PyTorch, and modern ML libraries**, and experienced in **algorithm design, uncertainty quantification, and large-scale experimentation**. Currently funded by the **Prob_AI Doctoral Prize Fellowship** to develop mathematical foundations of **trustworthy probabilistic AI for scientific imaging**, with the long-term vision of **leading an independent research program advancing the frontiers of AI for science**.

Education

University of Edinburgh — Sept 2021 – Aug 2025
PhD in Applied and Computational Mathematics — *Edinburgh, UK*
- Supervisors: Prof Konstantinos C. Zygalakis and Prof Marcelo Pereyra
- PhD thesis: Bayesian imaging with data-driven priors

Graz University of Technology — Oct 2012 – Sept 2014
MSc in Telematics (with distinction) — *Graz, Austria*
- Majors in Computational Intelligence and Software Technology
- Master's thesis: Bi-level optimization for support vector machines, supervised by Prof Thomas Pock

Graz University of Technology — Oct 2008 – Sept 2012
BSc in Telematics — *Graz, Austria*

Research Experience

Postdoctoral Researcher — Sept 2025 – Aug 2026
University of Edinburgh — *Edinburgh, UK*
- Funded by the Doctoral Prize Fellowship by the Prob_AI Hub
- Research area: Mathematical foundations of probabilistic AI for scientific imaging

Postgraduate Researcher — Sept 2021 – Aug 2025
University of Edinburgh — *Edinburgh, UK*
- Developed algorithms for efficient Bayesian computation incorporating machine learning models using PyTorch and Matlab
- Achieved state-of-the-art results for reconstructing photon-starved imaging data with integrated uncertainty quantification
- Contributed to convergence proofs for convex and data-driven machine learning priors
- Executed large-scale experiments using server infrastructure, benchmarked results, and published source code for reproducibility

Research Assistant — July 2014 – Sept 2017
Graz University of Technology — *Graz, Austria*
- Conducted research in the Computer Vision, Learning and Optimization Group, led by Prof Thomas Pock
- Contributed to the development of variational networks to solve a wide range of image reconstruction problems, including joint denoising and demosaicing, super-resolution, joint reconstruction and classification and medical image reconstruction
- Developed algorithms using convex and non-convex optimization strategies, bi-level optimization and algorithm unrolling
- Co-developed learning frameworks using Theano, TensorFlow, PyTorch and C++/CUDA

Publications

Klatzer, T., Melidonis, S., Pereyra, M., & Zygalakis, K. C. (2025). Efficient Bayesian Computation Using Plug-and-Play Priors for Poisson Inverse Problems. *arXiv*. https://arxiv.org/abs/2503.16222

Klatzer, T., Dobson, P., Altmann, Y., Pereyra, M., Sanz-Serna, J. M., & Zygalakis, K. C. (2024). Accelerated Bayesian Imaging by Relaxed Proximal-Point Langevin Sampling. *SIAM Journal on Imaging Sciences*, *17*(2), 1078–1117.

Effland, A., Hölzel, M., **Klatzer, T.**, Kobler, E., Landsberg, J., Neuhäuser, L., Pock, T., & Rumpf, M. (2018). Variational Networks for Joint Image Reconstruction and Classification of Tumor Immune Cell Interactions in Melanoma Tissue Sections. *Bildverarbeitung in der Medizin*, 334–340.

Hammernik, K., **Klatzer, T.**, Kobler, E., Recht, M. P., Sodickson, D. K., Pock, T., & Knoll, F. (2018). Learning a Variational Network for Reconstruction of Accelerated MRI Data. *Magnetic Resonance in Medicine*, *79*(6), 3055–3071.

Kobler, E., **Klatzer, T.**, Hammernik, K., & Pock, T. (2017). Variatonal Networks: Connecting Variational Methods and Deep Learning. *Pattern Recognition. GCPR German Conference on Pattern Recognition (GCPR)*, 281–293.

Klatzer, T., Soukup, D., Kobler, E., Hammernik, K., & Pock, T. (2017). Trainable Regularization for Multi-frame Superresolution. In V. Roth & T. Vetter (Eds.), *Pattern recognition* (pp. 90–100). Springer International Publishing.

Klatzer, T., Hammernik, K., Knobelreiter, P., & Pock, T. (2016). Learning Joint Demosaicing and Denoising Based on Sequential Energy Minimization. *IEEE International Conference on Computational Photography (ICCP)*, 1–11.

Klatzer, T. & Pock, T. (2015). Continuous hyper-parameter learning for support vector machines. *Proceedings of the 20th Computer Vision Winter Workshop, Seggau, Austria*.

Talks and Posters

WiML Workshop at NeurIPS, Vancouver, Canada. (2024). *Poster and contributed talk title: Mirror Langevin Dynamics with Plug-and-Play Priors for Poisson Inverse Problems*.

ICMS Workshop UQIPI24: UQ for Inverse Problems and Imaging, Edinburgh, UK. (2024). *Talk title: Bayesian Computation with Plug and Play Priors for Poisson Inverse Problems*.

Mini-symposium "Deep Unrolled Methods for Inverse Imaging Problems" at **SIAM Imaging** in Atlanta, Georgia, USA. (2024). *Talk title: Bayesian Computation with Plug and Play Priors for Poisson Inverse Problems*.

ICMS Workshop on Imaging Inverse Problems and Generating Models: Sparsity and Robustness versus Expressivity, Edinburgh, UK. (2024). *Poster title: Bayesian Computation with Plug-and-Play Priors for Poisson Inverse Problems*.

Mini-symposium "Advances in Bayesian Inverse Problems" at **SIAM Conference of Uncertainty Quantification** 2024, Trieste, Italy (Invited). (2024). *Talk title: Accelerating MCMC for UQ in Imaging Science by Relaxed Proximal-point Langevin Sampling*.

Applied Inverse Problems (AIP) Conference in Göttingen, Germany. (2023). *Talk title: Accelerating MCMC for Imaging Science by Using an Implicit Langevin Algorithm*.

Mathematics and Image Analysis (MIA) in Berlin, Germany. (2023). *Poster title: Accelerating MCMC by Using an Implicit Method with Applications in Imaging Science*.

ICMS Workshop on Interfacing Bayesian Statistics, Deep Learning, and Mathematical Analysis for Imaging Inverse Problems, Edinburgh, UK. (2023). *Poster title: Accelerating MCMC by Using an Implicit Method with Applications in Imaging Science*.

Mini-symposium on "Non-standard regularisation: theory and applications" at the Applied Inverse Problems (AIP) conference in Hangzhou, China. (2017). *Talk title: Deep Regularization*.

Interdisciplinary Data Science Workshop on "Mathematical imaging with partially unknown models" in Cambridge, UK. (2017). *Talk title: Learning Variational Networks for Solving Inverse Problems in Imaging*.

International Conference on Computational Photography, Chicago, IL. (2016). *Talk title: Joint Demosaicing and Denoising Based on Sequential Energy Minimization*.

Honors and Awards

Doctoral Prize Fellowship by the Prob_AI Hub   2025
- One year funding for probabilistic AI research as a stepping stone to becoming an independent researcher.

SIAM Travel Award and Laura Wisewell Travel Scholarship   2024
- Travel funding to attend the SIAM Imaging Science conference in Atlanta, GA, USA.

Laura Wisewell Travel Scholarship   2023
- Travel funding to attend the Mathematics and Image Analysis conference in Berlin, Germany.

Best Paper Award   2017
- German Conference on Pattern Recognition, Basel, Switzerland
- Paper title: "Variational Networks: Connecting Variational Methods and Deep Learning"

Best Paper Award   2015
- Computer Vision Winter Workshop, Seggau, Austria
- Paper title: "Continuous Hyper-parameter Learning for Support Vector Machines"

Scholarship of Excellence   2012
- Graz University of Technology

Teaching and Outreach

MSc coding project co-supervisor at the University of Edinburgh   Jan 2025 – July 2025
- Guided and reviewed contributions to the Deepinv Library, including a major refactoring the sampling module (#397)
- With Prof Marcelo Pereyra, Dr Tobías I. Liaudat and Dr Johnny Spence

University Tutor at the University of Edinburgh   Jan 2022 – Mai 2025
- Subjects: Machine Learning in Python, Calculus, Linear Algebra, Stochastic and Ordinary Differential Equations

Committee member of Piscopia   2023 - 2025
- Organizing activities supporting women and non-binary students pursuing a PhD in Mathematics

Presenter at the Edinburgh Science Festival   April 2023
- Performed stand-up comedy "My life with inverse problems" explaining my PhD topic to a general audience

Teaching Assistant at the Graz University of Technology   2010 – 2015
- Subjects: Convex Optimization, Analysis, Computer and Communication Networks

Summer Schools and Hackathons

BenchOpt Hackathon in Paris, France   June 2024
- Developed proof-of-concept for benchmarking sampling algorithms
- With Dr Tobías I. Liaudat, Dr Savvas Melidonis and Dr Johnny Spence

Spring school (invited) on Data-driven Inverse Problems in Biomedical Imaging   April 2023
Bonn, Germany

Summer school on Quantifying Uncertainty: Prediction and Inverse Problems   August 2022
Radboud University, Nijmegen, The Netherlands

Summer School on Mathematical and Numerical Methods in Image Processing   August 2016
Berlin Mathematical School, Germany

Machine Learning Summer School   Juli 2015
Max Planck Institute for Intelligent Systems Tübingen, Germany

Leadership Experience

Product Owner and Agile Coach   April 2020 – Aug 2021
Black Tusk GmbH   *Graz, Austria*
- Directed the development of medical software products, ensuring alignment with DIN EN ISO 13485 regulatory standards
- Managed product and portfolio strategies for interoperability solutions in healthcare, leveraging the HL7 FHIR standard
- Conducted customer interviews and performed comprehensive requirements engineering
- Facilitated Agile practices within the organization, mentoring teams in Scrum and Agile practices

Product Owner   Nov 2018 – March 2020
Denovo GmbH   *Graz, Austria*
- Directed several digitization projects within a fixed-price Agile framework, using Scrum practices
- Managed product backlogs, prioritized features to maximize business value, and fostered strong client relationships
- Led the development and deployment of an AI-driven tool for waste management

Project Manager for Digital Business Solutions   Jan 2018 – Oct 2018
Scoop and Spoon GmbH   *Graz, Austria*
- Led the development of software products, with responsibility for budget, time, project quality and controlling
- Led a pilot project integrating voice assistant technology for marketing
- Acted as key liaison between teams and all stakeholders

Skills and Expertise

Research areas: Inverse Problems, Imaging Science, Computational Statistics, Probabilistic Methods, Machine Learning, Uncertainty Quantification, Generative AI, Neural Networks, Variational Networks, Optimization, Computer Vision

Programming Languages: Python, Matlab, C++, C, CUDA, Java

Deep Learning Frameworks: PyTorch, TensorFlow

Libraries & Tools: Git, NumPy, Pandas, Scikit-learn, OpenCV, DeepInv, Hadoop

Management: Agile Software Development, Scrum, Coaching

References

Prof Konstantinos Zygalakis, University of Edinburgh, k.zygalakis@ed.ac.uk
Prof Marcelo Pereyra, Heriot-Watt University, Edinburgh, m.pereyra@hw.ac.uk
Dr Paul Dobson, Heriot-Watt University, Edinburgh, p.dobson_1@hw.ac.uk
Dr Tobías I. Liaudat, IRFU, CEA Paris-Saclay, Gif-sur-Yvette, France, tobias.liaudat@cea.fr