

# Andreas Habring

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## Education

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- PhD in applied mathematics**, University of Graz, Austria 2020 - 2023
- Promotio sub auspiciis Praesidentis rei publicae (highest distinction for a doctorate in Austria: summa cum laude in high school, GPA 1.0 for all of University including the doctorate)
  - Advisor: Prof. Martin Holler
  - Thesis: Mathematical analysis and application of data-driven methods for inverse imaging problems
- Law degree**, University of Graz, Austria 2022 - today
- Out of personal interest
- MSc and BSc in applied mathematics**, Graz University of Technology, Austria 2015 - 2020
- GPA 1.0 (highest possible score)
- A-levels technical high school**, HTBLuVA Salzburg, Austria 2009 - 2014

## Experience

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- Postdoctoral researcher**, Graz University of Technology, Austria 2024 - today
- Vision, Learning, and Optimization group of Prof. Thomas Pock
  - Research on mathematical image processing, Bayesian imaging, machine learning in particular for training of energy-based models, development of sampling algorithms etc.
  - Teaching and supervision of BSc and MSc theses
- Data scientist**, AVL List GmbH Graz, Austria 2024 - 2024
- Battery health estimation and failure prediction
- University Assistant**, University of Graz, Austria 2020 - 2023
- Research in mathematical image processing, inverse problems, machine learning, data science
  - Teaching computational math, advanced analysis, stochastics etc.
- Teaching assistant**, Graz University of Technology, Austria 2016 - 2020
- Teaching several math exercise classes for engineering students

## Publications

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- Andreas Habring and Martin Zach. *Forward-KL Convergence of Time-Inhomogeneous Langevin Diffusions*. 2026. arXiv: 2601.22349 [math.NA]. URL: <https://arxiv.org/abs/2601.22349>
- Josef Simbrunner, Clemens Krenn, et al. *Computation of a Consistent System Matrix for Cone-beam Computed Tomography*. 2025. arXiv: 2511.12235 [math.OA]. URL: <https://arxiv.org/abs/2511.12235>
- Andreas Habring. *On the Time Derivative of the KL Divergence for a Generalized Langevin Annealing Scheme*. 2025. arXiv: 2511.11956 [math.OA]. URL: <https://arxiv.org/abs/2511.11956>
- Alexander Falk, Andreas Habring, et al. *An Inertial Langevin Algorithm*. 2025. arXiv: 2510.06723 [math.NA]. URL: <https://arxiv.org/abs/2510.06723>
- Andreas Habring, Martin Holler, et al. "Chapter 1 - Energy-based models for inverse imaging problems". In: *Machine Learning Solutions for Inverse Problems: Part A*. ed. by Andreas Hauptmann, Bangti Jin, and Carola-Bibiane Schönlieb. Vol. 26. Handbook of Numerical Analysis. Elsevier, 2025, pp. 1–76. DOI: <https://doi.org/10.1016/bs.hna.2025.09.001>
- Muhamed Kuric, Martin Zach, et al. *The Gaussian Latent Machine: Efficient Prior and Posterior Sampling for Inverse Problems*. 2025. arXiv: 2505.12836 [eess.IV]. URL: <https://arxiv.org/abs/2505.12836>
- Andreas Habring, Alexander Falk, et al. "Diffusion at Absolute Zero: Langevin Sampling Using Successive Moreau Envelopes". In: *SIAM Journal on Imaging Sciences* 19.1 (2026), pp. 35–77. DOI: 10.1137/25M1745830

- Andreas Habring, Alexander Falk, and Thomas Pock. “Diffusion at Absolute Zero: Langevin Sampling Using Successive Moreau Envelopes [conference paper]”. In: *2025 IEEE Statistical Signal Processing Workshop (SSP)*. IEEE. 2025, pp. 61–65
- Lorenz Fruehwirth and Andreas Habring. *Ergodicity of Langevin Dynamics and its Discretizations for Non-smooth Potentials*. 2024. arXiv: 2411.12051 [math.NA]. URL: <https://arxiv.org/abs/2411.12051>
- Andreas Habring and Martin Holler. “Neural-network-based regularization methods for inverse problems in imaging”. In: *GAMM-Mitteilungen* 47.4 (2024), e202470004
- Andreas Habring, Martin Holler, and Thomas Pock. “Subgradient Langevin Methods for Sampling from Nonsmooth Potentials”. In: *SIAM Journal on Mathematics of Data Science* 6.4 (2024), pp. 897–925
- Dominik Narnhofer, Andreas Habring, et al. “Posterior-Variance–Based Error Quantification for Inverse Problems in Imaging”. In: *SIAM Journal on Imaging Sciences* 17.1 (2024), pp. 301–333
- Andreas Habring and Martin Holler. “A note on the regularity of images generated by convolutional neural networks”. In: *SIAM Journal on Mathematics of Data Science* 5.3 (2023), pp. 670–692
- Christian Aarset, Andreas Habring, et al. “Unsupervised energy disaggregation via convolutional sparse coding”. In: *IEEE Transactions on Consumer Electronics* 70.1 (2023), pp. 4303–4310
- Andreas Habring and Martin Holler. “A generative variational model for inverse problems in imaging”. In: *SIAM Journal on Mathematics of Data Science* 4.1 (2022), pp. 306–335

## Teaching experience

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### Courses

- Convex optimization (Graz University of Technology) S 2026
- Image processing and pattern recognition (Graz University of Technology) W 2025
- Introduction to Scientific Writing (Graz University of Technology) W 2025
- Convex optimization (Graz University of Technology) S 2025
- Stochastik 1 (University of Graz) W 2023
- Analysis 3 (University of Graz) W 2022
- Computermathe (University of Graz) W 2022
- Advanced Analysis (University of Graz) W 2021
- Naturwissenschaftliches Rechnen (University of Graz) W 2020
- Analysis T1 (TU Graz) W 2019
- Mathematik C (TU Graz) W 2018

**Supervision** of bachelor’s and master’s theses on the following topics:

- Markov chains
- Bayesian imaging
- Medical imaging
- Generative modeling
- Variational inverse problems

## Selected conferences

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### Invited talks

- ESI Workshop on "Applications of Tomographic Methods" 2026

### Other talks

- EUROPT Conference on Advances in Continuous Optimization 2026
- Invited talk: ESI Workshop on "Applications of Tomographic Methods" 2026
- I<sup>3</sup> Italian Inverse problems & Imaging meeting 2026
- Minisymposium organizer at ENUMATH 2025 2025
- IEEE Statistical Signal Processing Workshop 2025
- BASP Frontiers 2025
- GAMM Annual Meeting 2023
- GAMM Workshop on Computational and Mathematical Methods in Data Science 2022
- IMA Conference on Inverse Problems from Theory to Application 2022

- SIAM Conference on Imaging Science 2022
- 2nd Alps-Adriatic Inverse Problems Workshop 2021
- International Conference on Computational Harmonic Analysis 2021
- Minisymposium organizer at IFIP TC7 Conference on System Modelling and Optimization 2021

## Awards and honors

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- **Best Paper Award** IEEE SSP 2025, first place 2025
- **Promotio sub auspiciis Praesidentis rei publicae** Grant of € 9.000 2025
- **Scholarship** 2021 Gene Golub SIAM Summer School, full travel and accommodation expenses 2021
- **Best Paper Award** Doctoral School Mathematics and Scientific Computing Graz 2021
- **Early Student Award** Österreichische Mathematische Gesellschaft 2018

## Research interests

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Mathematical imaging, (Bayesian) inverse problems, sampling algorithms, variational regularization, optimization, stochastic differential equations, functional analysis, partial differential equations.

## Academic services

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Reviews for ICML, SIAM Journal on Imaging Sciences (SIIMS), Bernoulli Journal, IEEE Transactions on Computational Imaging, and Springer Signal, Image and Video Processing.

## Miscellaneous

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- **Languages:** German (native), English
- **Programming:** Python, Matlab, C++ (basics)
- **Other technical skills:** Solid technical and physical knowledge due to attending a technical school with engineering bias and successful completion of university courses about theoretical mechanics, thermodynamics, quantum physics, and experimental physics
- **Hobbies:** Weightlifting, gymnastics, CrossFit, politics, concerts