Moritz Schaefer

Postdoctoral Fellow, Stanford University

moritzs@stanford.edu | +1 650-402-5496 | https://scholar.google.com/citations?user=9S9SsvEAAAAJ

ORID: 0000-0001-6489-1947

GitHub: github.com/moritzschaefer

Referees: *Prof. Jure Leskovec* (Stanford University), *Prof. Zinaida Good* (Stanford University), *Prof. Christoph Bock* (Medical University of Vienna / CeMM)

Research Profile

I develop human-interpretable AI systems that translate complex biomedical data into actionable biological insights. My future lab will advance this vision through (1) multimodal data integration of images and omics for streamlined pathology diagnosis, (2) foundation models for cell design, and (3) AI agents for accelerated research.

My recent work at the Medical University of Vienna combines LLM-based data curation with multimodal AI training to enable single cell data analysis through interactive chat interface *("CellWhisperer", Schaefer et al., 2025, Nature Biotechnology)*. At Stanford University, I actively progress this research direction by expanding the concept of text-based interactive analysis to histopathology images *("SpotWhisperer", Schaefer et al., 2025, bioRxiv)* in the context of large B cell lymphoma.
I further explored the potential of natural language for biomedical data analysis through text-based simulations with LLMs *("SimulateGPT", Schaefer et al., 2024, Computers in Biology and Medicine)* and plan to leverage this experience for streamlining community-scale analyses with LLM agents.
My research at the intersection of mechanistic biology and AI methods development draws from an interdisciplinary background, combining a Ph.D. in Systems Biology from ETH Zurich with a focus on gene regulation in embryonic development *(Schaefer et al., 2022, EMBO Reports)* as well as my Bachelor's and Master's studies in Computer Science and AI at TU Berlin.

Education & Research Appointments

Postdoctoral Fellow | 2025–Present

Stanford University, Stanford, CA (Advisors: Prof. Jure Leskovec & Prof. Zinaida Good)

Postdoctoral Researcher | 2022–2025

Medical University of Vienna & CeMM, Vienna, Austria (Advisor: Prof. Christoph Bock)

Dr. sc. (Ph.D.), Systems Biology | 2018–2022

ETH Zurich, Zurich, Switzerland (Advisors: Profs. Constance Ciaudo, Berend Snijder, Judith Zaugg)

M.Sc., Computer Science | 2016–2018

Technical University Berlin, Germany (Advisors: Prof. Manfred Opper, Dr. Andreas Steffen)

B.Sc., Computer Science | 2012–2016

Technical University Berlin, Germany
Jiao Tong University, Shanghai, China (Advisor: Prof. Baoliang Lu)

Selected Publications (* *Denotes equal contribution*)

Schaefer, M.*, Nonchev, K.*, Awasthi, A.*, Burton, J.*, Koelzer, V.H., Rätsch, G., & Bock, C. (2025). Molecularly informed analysis of histopathology images using natural language. *bioRxiv.*

Schaefer, M.*, Peneder, P.*, …, Menche, J., Tomazou, E.M., & Bock, C. (2025). Multimodal learning of transcriptomes and text enables interactive single-cell RNA-seq data exploration with natural-language chats. *Nature Biotechnology*. (in press)

> **Schaefer, M.***, Peneder, P.*, Malzl, D., …, Menche, J., Tomazou, E., & Bock, C. (2024). Joint Embedding of Transcriptomes and Text Enables Interactive Single-Cell RNA-seq Data Exploration via Natural Language. *ICLR 2024 Workshop on Machine Learning for Genomics Explorations*.

Datlinger, P.*, Pankevich, E. V.*, Arnold, C.D., …, **Schaefer, M.**, … & Bock, C. (2025). Systematic discovery of CRISPR-boosted CAR T cell immunotherapies. *Nature*.

Schaefer, M.*, Reichl, S.*, ter Horst, R.*, …, Bock, C., & Samwald, M. (2024). GPT-4 as a biomedical simulator. *Computers in Biology and Medicine.*

Schaefer, M.*, Nabih, A.*, …, Aebersold, R., Gatfield, D., & Ciaudo, C. (2022). Global and precise identification of functional miRNA targets in mESCs by integrative analysis. *EMBO reports.*

Müller, M.*, **Schaefer, M.***, …, Santoro, R., & Ciaudo, C. (2022). Argonaute proteins regulate a specific network of genes through KLF4 in mouse embryonic stem cells. *Stem Cell Reports.*

Müller, M., Fäh, T., **Schaefer, M.**, …, Ciaudo, C. (2022). AGO1 regulates pericentromeric regions in mouse embryonic stem cells. *Life Science Alliance*.

Grodzki, M., Bluhm, A.P., **Schaefer, M.**, Tagmount, A., Russo, M., Sobh, A., Rafiee, R., Vulpe, C.D., Karst, S.M., & Norris, M.H. (2022). Genome-scale CRISPR screens identify host factors that promote human coronavirus infection. *Genome Medicine*.

Schaefer, M. & Ciaudo, C. (2020). Prediction of the miRNA Interactome - Established Methods and Upcoming Perspectives. *Computational and Structural Biotechnology Journal*.

Schaefer, M., Clevert, D.A., Weiss, B., & Steffen, A. (2018). PAVOOC: Designing CRISPR sgRNAs Using 3D Protein Structures and Functional Domain Annotations. *Bioinformatics*.

Invited Talks & Conference Presentations

- **Google Genomics Deep Dive** (invited) | 2025
- **RNA-AI Conference**, Monte Verita, Switzerland | 2025
- **38th Chaos Communication Congress (38C3)** | 2024
- **CSHL Biological Data Science Meeting** | 2024
- **Dana Pe'er Lab, MSKCC**, New York | 2024
- **Max Delbrück Center (MDC) Berlin** (invited) | 2024 *Data Science & AI Lecture Series*
- **AbbVie** *(compensated)* | 2024
- **AstraZeneca Applied Data Science Seminar** (invited) | 2024
- **Virtual Workshop on Cell Perturbation Modeling** (invited) | 2024
- **EU-LIFE Utopia Conference** (invited) | 2024
- **C'est la Wien PhD Workshop** (invited) | 2023
- **47th Deep Learning Vienna Meetup** | 2023
- **Postdoc Networking Day Vienna** | 2022

Grants, Fellowships & Awards

Fellowships & Awards

- Student Fellowship "Deutschlandstipendium" (supported by GE & Carmeq), 2015–2018
- Ferry Porsche Prize (for exceptional performance in Math & Physics), 2011

Grant writing

- Second round "WWTF LS23 (Understanding Biology with AI/ML)", 2024
    - *Role: Lead-PI. Budget: €800,000. (top 25%)*

Teaching & Mentoring

Mentoring (informal)

- **Undergraduate Supervision**, Stanford University, 2025
    - *Wei Liu*, "Overexpression-based CAR T cell design with AI"
    - *Warren Xu*, "Single-Cell Level Histopathology Analysis"
- **PhD Student Co-Supervision**, MedUni Vienna, 2023–2025
    - *Animesh Awasthi*, "AI-driven enhancer design"
- **Master's Thesis Supervision**, MedUni Vienna, 2022–2023
    - *Fabian Traxler*, "Deep Learning antibody binding affinity prediction"

Teaching

- **Lecturer & Seminar Leader**, MedUni Vienna (2022–2024). Machine Learning module at MSc-level program "Molecular Precision Medicine"
- **Guest Lecturer**, TU Vienna (2023). Seminar: "Generative AI as a driver for biotechnology."
- **Teaching Assistant**, ETH Zurich (2021). MSc. workshop "Functional Genomics."

Academic Service & Leadership

Peer Review

- *Journals*: Bioinformatics
- *Conferences/Workshops*: NeurIPS (FM4LS Workshop), ICML (FM4LS Workshop)

Institutional Service

- Postdoc Representative, CeMM, 2023–2025
- EU-LIFE Postdoc Working Group Member, 2024–2025
- MedUni AI Institute Seminar Coordinator, 2022–2025
- PhD Application Screening Committee (ELLIS, MedUni Vienna), 2022–2024
- Academic Staff Representative (Treasurer, Dept. Conference Rep), ETH Zurich, 2019–2021

Community & Outreach

- Coordinator, Weekly GenAI Journal Club, 2025
- Organizer & Moderator, OILS (Open Innovation in Life Sciences) Panel Discussions, 2020–2021
- Presenter, Long Night of Research, Vienna, 2022 & 2024