

Sam Gijzen

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Machine learning researcher working on foundation models (multimodal representation learning and generative modeling) for scientific and biological data with a focus on time series.

Selected Publications

Flow Matching with In-Context Priors for Out-of-Distribution Brain Dynamics [link]

NeurIPS 2026, GIJSEN, S, LUKOMSKI, M, SCHULZ, M, RITTER, K

Conditioning mechanisms for diffusion transformers enabling generation under unseen experimental conditions, with strong OOD generalization.

Predicting Unseen Scientific Interactions: Conditional Flow Models Hallucinate Non-Additive Effects [link]

NeurIPS 2026, Oral at AIDaR workshop, GIJSEN, S, SEILER, M, RITTER, K

Analysis framework for interaction recovery and hallucination of flow and diffusion models across scientific domains.

Brain-Semantoks: Learning Semantic Tokens of Brain Dynamics with a Self-Distilled Foundation Model [link]

ICLR 2026, GIJSEN, S, SCHULZ, M, RITTER, K

Self-distilled foundation model for brain dynamics. Pretrains in 2 hours, achieves strong downstream performance without finetuning, and exhibits log-linear scaling on cross-dataset downstream tasks.

EEG-Language Pretraining for Highly Label-Efficient Clinical Phenotyping [link]

ICML 2025, GIJSEN, S, RITTER, K

First multimodal EEG-language model. Self-supervised pretraining with natural language supervision enables label-efficient clinical phenotyping via a multiple-instance learning extension of the infoNCE loss.

Self-supervised deep learning for encoding pathological between-subject information in EEG data [link]

ICLR 2025, LMRL Workshop, GIJSEN, S, RITTER, K

Experience

Postdoctoral Researcher in Machine Learning

Germany

TÜBINGEN AI CENTER, HERTIE INSTITUTE FOR AI IN BRAIN HEALTH

Jan. 2023 - PRESENT

- Self-supervised/representation learning: developed contrastive methods for physiological time series (EEG), including multi-modal settings with natural language supervision. Analyzed failure modes of self-distillation for noisy, high-dimensional signals and proposed fixes.
- Foundation models for biological time series: multimodal contrastive pretraining and stabilized self-distillation - with strong downstream transfer and robust to distribution shifts.
- Generative modeling: developed diffusion transformer methods to generate realistic time series under out-of-distribution conditioning, enabling in-silico experiments.
- Led a team to 7th / 1,183 in the 2025 NeurIPS EEG Competition with a multi-modal fusion architecture

Research Assistant

London, UK

KING'S COLLEGE LONDON, DEPARTMENT OF NEUROIMAGING

Jul. 2017 - Sep. 2018

- Pharmaco-imaging and analysis (time series, ICA) leading to two publications
- Project coordination and communication with scientists, radiologists, pharmacological industry, and medical staff

Internship

London, UK

KING'S COLLEGE LONDON, DEPARTMENT OF NEUROIMAGING

Nov. 2016 - Jul. 2017

- ICA for pharmaco-imaging timeseries

Research Assistant

Maastricht, Netherlands

MAASTRICHT UNIVERSITY

Aug. 2016 - Nov. 2016

- Designing, programming, and piloting experimental work using high-field MRI

Education

PhD + Dr. rer. nat. in Computational Cognitive Neuroscience

Berlin, Germany

NEUROCOMPUTATION AND NEUROIMAGING UNIT, FREIE UNIVERSITÄT BERLIN

Oct. 2018 - Dec. 2022

- Computational modeling of learning and decision-making via probabilistic inference and Bayesian model comparison
- Competitive doctoral program (Mind and Brain - 10% Acceptance)
- Winner of DAAD International Research Scholarship (2 per year)
- Thesis: The brain as a generative model: information-theoretic surprise in learning and action [link]

MSc Research Master in Cognitive and Clinical Neuroscience

Maastricht, Netherlands

MAASTRICHT UNIVERSITY

Oct. 2015 - Sep. 2017

BSc Psychology

Maastricht, Netherlands

MAASTRICHT UNIVERSITY

Oct. 2012 - Sep. 2015

Selected Talks

[Oral] AIDaR Workshop @ Neural Information Processing Systems (NeurIPS)

Paris, France, 2026

[Poster] Neural Information Processing Systems (NeurIPS)

Paris, France, 2026

[Poster] International Conference on Learning Representations (ICLR)

Rio de Janeiro, Brazil, 2026

[Oral] Recent Advances in Machine Learning for Healthcare, PariSanté Campus

Paris, France, 2026

[Poster] International Conference on Machine Learning (ICML)

Vancouver, Canada, 2025

[Poster] LMRL Workshop @ International Conference on Learning Representations (ICLR)

Singapore, 2025

[Oral] Neural Traces: Advanced M/EEG Methods and Clinical Applications

Berlin, Germany, 2024

Skills

Techniques

Self-Supervised Learning, Representation Learning, Time series, Multimodal ML, Flow Matching, Hypothesis Testing

Languages

Python, SQL, MATLAB

Machine Learning

Pytorch (distributed training; DDP), Scikit-Learn, SciPy, PyMC, NumPy, Pandas

Tools/Infra

SLURM, Docker, Cloud (AWS/c-gen), Git, Bash

Communication

English (Fluent), Dutch (Mother Tongue), German (Intermediate)