Philipp Becker

Machine Learning Researcher

Citizenship: German | Languages: German (native), English (fluent)

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Experience

Postdoctoral Research Scientist

Paris, France

Meta Superintelligence Labs - Fundamental AI Research (FAIR) *since 10/2025*

- Conducting fundamental research towards an RL-first approach to Vision-Language-Action (VLA) models.
- Advancing representation and world modeling techniques to improve the efficiency and generalization of embodied agents.
- Rapidly prototyping using agentic AI workflows and scaling distributed training pipelines across multi-node GPU clusters.

Research Intern

Cambridge, United Kingdom

Samsung R&D Institute UK, AI Center - Cambridge, Gen AI Team *11/2024 - 04/2025*

- Researched linear attention for efficient, large multimodal diffusion transformers in text-to-image applications - results published at ICCV.
- Trained and evaluated generative AI models using distillation and fine-tuning approaches across multiple GPUs and nodes.
- Worked towards bringing state-of-the-art text-to-image models to mobile phones while contributing to the team's research codebase.

Doctoral Researcher

Karlsruhe & Tübingen, Germany

Karlsruhe Institute of Technology (KIT), Autonomous Learning Robots Lab (Since 01/2020)
Bosch Center for Artificial Intelligence, Robert-Bosch-GmbH (05/2019-12/2019) *05/2019 - 09/2025*

- Developed probabilistic state-space models for RL under uncertainty and multimodal representations.
- Researched how to learn versatile, effective, and safe behavior by imitation and reinforcement learning.
- Advanced information-theoretic trust-region methods for policy learning, applied to LLM post-training.
- Supervised 25+ Bachelor and Master students, often with other labs or industrial partners, leading to 8 co-author publications.
- Set up and maintained lab GPU infrastructure (SLURM cluster, desktop pool), coordinated access to large-scale public compute, supported the establishment of two labs, organized a 150+ graduate ML course as Head TA, and guest lectured on model-based RL.

Research Scientist

Karlsruhe, Germany

FZI Research Center for Information Technology, (FZI Forschungszentrum Informatik) *04/2023 - 07/2024*

- Successfully evaluated structured reinforcement learning approaches for control applications of an industry customer.
- Contributed to securing funding for the EU Horizon project XSCAVE (€8M total, €950K to FZI from 2025 to 2028), aimed at advancing AI-driven planning and control for heavy machinery in industries like forestry and mining.
- Collaborated on research grant proposals with academic and industry partners, focusing on AI for production, energy, and heavy machinery.

Research Assistant

Darmstadt, Germany

Technical University of Darmstadt, Intelligent Autonomous Systems *04/2016 - 02/2019*

- Developed a software stack for point cloud-based active segmentation with real and simulated robots in C++ using ROS and PCL.
- Collaborated on robotics projects, including a policy learning toolbox, feasibility studies on real robots, and setting up simulations.

Education

PhD (Dr. Ing.) in Computer Science, Machine Learning

Karlsruhe, Germany

Karlsruhe Institute of Technology, Autonomous Learning Robots Lab - Advisor: Prof. Gerhard Neumann *01/2020 - 10/2025*

- Thesis: Probabilistic World and Behavior Models for Embodied Agents

Master of Science in Autonomous Systems (Computer Science)

Darmstadt, Germany

Technical University of Darmstadt *11/2016 - 04/2019*

Bachelor of Science in Computer Science

Darmstadt, Germany

Technical University of Darmstadt *04/2014 - 10/2016*

Research Expertise

7 first-author and 20 co-author papers at ICML, ICLR, NeurIPS, TMLR, RLC, RSS, CoRL, IROS, ICRA, and their workshops.

- **Architectures:** Efficient linear attention for diffusion transformers, probabilistic state-space models, structured priors
- **Optimization & Policy Learning:** Trust-region RL across LLM post-training and control, information-theoretic density estimation
- **Representation Learning:** Predictive and action-free representation learning for VLAs, Multimodal representations for RL.
- **World Models:** Probabilistic and uncertainty-aware latent dynamics for control, diffusion and JEPA-style world models

Key Publications (see 🎓 for full list)

TROLL: Trust Regions Improve Reinforcement Learning for Large Language Models *ICLR (Oral)*

P. Becker*, N. Freymuth*, S. Thilges, F. Otto, G. Neumann (* shared first author) *2026*

AMBER: Adaptive Mesh Generation by Iterative Mesh Resolution Prediction *NeurIPS*

N. Freymuth, T. Würth, N. Schreiber, ⋯ , **P. Becker**, L. Kärger, G. Neumann *2025*

EDiT: Efficient Diffusion Transformers with Linear Compressed Attention *ICCV*

P. Becker, A. Mehrotra, R. Chavhan, M. Chadwick, L. Morreale, M. Noroozi, A. G. C. P. Ramos, S. Bhattacharya *2025*

Geometry-aware RL for Manipulation of Varying Shapes and Deformable Objects *ICLR (Oral)*

T. Hoang, H. Le, **P. Becker**, V. Anh Ngo, G. Neumann *2025*

Efficient Off-Policy Learning for High-Dimensional Action Spaces *ICLR*

F. Otto, **P. Becker**, V. Anh Ngo, G. Neumann *2025*

Combining Reconstruction and Contrastive Methods for Multimodal Representations in RL *RLC*

P. Becker, S. Mossburger, F. Otto, G. Neumann *2024*

KalMamba: Towards Efficient Probabilistic State Space Models for RL under Uncertainty *Workshop, ICML & RLC*

P. Becker, N. Freymuth, G. Neumann *2024*

PointPatchRL - Masked Reconstruction Improves Reinforcement Learning on Point Clouds *CoRL*

B. Gyenes, N. Franke, **P. Becker**, G. Neumann *2024*

Beyond Deep Ensembles: A Large-Scale Evaluation of Bayesian Deep Learning under Distribution Shift *NeurIPS*

F. Seligmann, **P. Becker**, M. Volpp, G. Neumann *2023*

On Uncertainty in Deep State Space Models for Model-Based Reinforcement Learning *TMLR*

P. Becker, G. Neumann *2022*

Inferring Versatile Behavior from Demonstrations by Matching Geometric Descriptors *CoRL*

N. Freymuth, N. Schreiber, **P. Becker**, A. Taranovic, G. Neumann *2022*

End-to-End Learning of Hybrid Inverse Dynamics Models for Precise and Compliant Impedance Control *RSS*

M. Reuss, N. van Duijkeren, R. Krug, **P. Becker**, V. Shaj, G. Neumann *2022*

Specializing Versatile Skill Libraries using Local Mixture of Experts *CoRL*

O. Celik, D. Zhou, G. Li, **P. Becker**, G. Neumann *2021*

Differentiable Trust Region Layers for Deep Reinforcement Learning *ICLR*

F. Otto, **P. Becker**,V. Anh Ngo, H. Ziesche, G. Neumann *2021*

Expected Information Maximization: Using the I-Projection for Mixture Density Estimation *ICLR*

P. Becker, O. Arenz, G. Neumann *2020*

Recurrent Kalman Networks: Factorized Inference in High-Dimensional Deep Feature Spaces *ICML*

P. Becker, H. Pandya, G. Gebhardt, C. Zhao, J. Taylor, G. Neumann *2019*

Skills

Programming	Python (Expert), Deep CS Fundamentals (C/C++, Java background)
ML Frameworks and Scaling	PyTorch, Multi-GPU/Multi-node training, JAX, TensorFlow
AI-Accelerated Development	Agentic Workflows, LLM-Assisted Research Prototyping
Infrastructure and Robotics	Linux, Slurm (cluster deployment & admin) , Git, MuJoCo, Real-World Robot Control