

CONTACT
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WEBSITE
jank324.github.io

SKILLS

Machine learning, supervised learning, reinforcement learning, differentiable simulations and optimisation.

Scientific writing and presenting.

Interdisciplinary communication and collaboration.

Working knowledge of the physics and engineering of particle accelerators

Fast learner, always eager to engage with new subjects.

Distinguished sense for responsibility and the quality of my work.

LANGUAGES

English
Full professional proficiency

German
Native

Spanish
Basic

Jan Kaiser

Doctoral researcher with a passion for AI, currently researching reinforcement learning for the optimisation and control of particle accelerators.

EXPERIENCE

Deutsches Elektronen-Synchrotron DESY, Hamburg *Doctoral Researcher*

DECEMBER 2020 - PRESENT

Research reinforcement learning for the optimisation and control of particle accelerators, including differentiable simulations, surrogate modelling and neural virtual diagnostics.

Hamburg University of Technology, Hamburg *Teaching Assistant*

NOVEMBER 2016 - JANUARY 2020

Teach and supervise lab sessions in multiple modules related to computer science, including grading responsibilities.

Marquard & Bahls AG, Hamburg — IT Department Intern

JULY 2015 - SEPTEMBER 2015

Gain experience in the software development, procurement and support processes at a large international corporation.

EDUCATION

Hamburg University of Technology, Hamburg *Doctor of Philosophy (PhD) Computer Science*

MARCH 2021 - PRESENT

Preliminary dissertation title: Development and Application of Machine Learning-Assisted Algorithms for Control and Optimisation of Linear Particle Accelerators

Hamburg University of Technology, Hamburg *Master of Science (M. Sc.) Computer Science*

SEPTEMBER 2018 - OCTOBER 2020

Thesis: Monitoring Embedded Devices in the Loop using Recurrent Neural Networks

Hamburg University of Technology, Hamburg *Bachelor of Science (B. Sc.) Computer Science*

OCTOBER 2015 - AUGUST 2018

Thesis: Trajectory Anonymisation by Multivariate Microaggregation

PROJECTS & ASSOCIATIONS

Reinforcement Learning for Autonomous Particle Accelerators Collaboration (RL4AA)

Co-Founder

2023 - PRESENT

Co-Founding and maintenance of an international collaboration with the goal of fostering international collaboration and knowledge exchange by organising annual workshops and providing an online platform for discussion, help and topical news.

Cheetah - Differentiable Beam Dynamics Simulation Maintainer

2021 - PRESENT

I originally developed Cheetah, which is a fast particle accelerator optics simulation built on top of PyTorch for reinforcement learning and optimisation applications, providing features like unmatched execution speeds, GPU acceleration and automatic differentiation.

PUBLICATIONS

J. Kaiser, C. Xu, A. Eichler and A. Santamaria Garica. "**Bridging the Gap Between Machine Learning and Particle Accelerator Physics with High-Speed, Differentiable Simulations**," in *Physical Review Accelerators and Beams*, 2024.

A. Santamaria Garcia, L. Scomparin, C. Xu, S. Hirlaender, S. Pochaba, A. Eichler and J. Kaiser. "**The Reinforcement Learning for Autonomous Accelerators Collaboration**," in *15th International Particle Accelerator Conference (IPAC)*, 2024.

S. Hirlaender, L. Lamminger, S. Pochaba, J. Kaiser, C. Xu, A. Santamaria Garcia, L. Scomparin and V. Kain. "**Towards Few-Shot Reinforcement Learning in Particle Accelerator Control**," in *15th International Particle Accelerator Conference (IPAC)*, 2024.

A. Sulc, G. Hartmann, J. Maldonado, V. Kain, F. Rehm, A. Eichler, J. Kaiser, T. Wilksen, F. Mayet, R. Kammering, H. Tuennermann, J. St. John, H. Hoschouer, K. J. Hazelwood, T. Hellert, D. Ratner, W.-L. Hu and A. Bien. "**Towards Unlocking Insights from Logbooks Using AI**," in *15th International Particle Accelerator Conference (IPAC)*, 2024.

J. Kaiser, A. Eichler and A. Lauscher. "**Large Language Models for Human-Machine Collaborative Particle Accelerator Tuning through Natural Language**," in *arXiv*, 2024.

S. Tomin, J. Kaiser, N. M. Lockmann, T. Wohlenberg and I. Zagorodnov. "**Undulator Linear Taper Control at the European X-Ray Free-Electron Laser Facility**," in *Physical Review Accelerators and Beams*, 2024.

J. Kaiser, C. Xu, A. Eichler and A. Santamaria Garica. "**Cheetah: Bridging the Gap Between Machine Learning and Particle Accelerator Physics with High-Speed, Differentiable Simulations**," in *arXiv*, 2024.

R. Roussel, A. L. Edelen, T. Boltz, D. Kennedy, Z. Zhang, X. Huang, D. Ratner, A. Santamaria Garcia, C. Xu, J. Kaiser, A. Eichler, J. O. Lübsen, N. M. Isenberg, Y. Gao, N. Kuklev, J. Martinez, B. Mustapha, V. Kain, W. Lin, S. Maria Liuzzo, J. St. John, M. J. V. Streeter, R. Lehe and W. Neiswanger. "**Bayesian Optimization Algorithms for Accelerator Physics**," in *arXiv*, 2023.

J. Kaiser, C. Xu, A. Eichler, A. Santamaria Garcia, O. Stein, E. Bründermann, W. Kuropka, H. Dinter, F. Mayet, T. Vinatier, F. Burkart and H. Schlarb. "**Learning to Do or Learning While Doing: Reinforcement Learning and Bayesian Optimisation for Online Continuous Tuning**," in *arXiv*, 2023.

C. Xu, J. Kaiser, E. Bründermann, A. Eichler, A.-S. Müller and A. Santamaria Garcia. "**Beam Trajectory Control with Lattice-agnostic Reinforcement Learning**," in *Proceedings of the 14th International Particle Accelerator Conference (IPAC)*, 2023.

J. Kaiser, A. Eichler, S. Tomin and Z. Zhu. "**Machine Learning for Combined Scalar and Spectral Longitudinal Phase Space Reconstruction**," in *Proceedings of the 14th International Particle Accelerator Conference (IPAC)*, 2023.

Z. Zhu, S. Tomin and J. Kaiser. "**Application of Machine Learning in Longitudinal Phase Space Prediction at the European XFEL**," in *Proceedings of FEL2022*, 2022.

J. Kaiser, O. Stein and A. Eichler, "**Learning-based optimisation of particle accelerators under partial observability without real-world training**," in *Proceedings of the 39th International Conference on Machine Learning*, 2022.

O. Stein, J. Kaiser and A. Eichler, "**Accelerating linear beam dynamics simulations for machine learning applications**," in *Proceedings of the 13th International Particle Accelerator Conference*, 2022.

A. Eichler, E. Bründermann, F. Burkhart, J. Kaiser, W. Kuropka, A. Santamaria Garcia, O. Stein and C. Xu, "**First steps toward an autonomous accelerator, a common project between DESY and KIT**," in *Proceedings of the 12th International Particle Accelerator Conference*, 2021.

F. H. Bahnsen, J. Kaiser, and G. Fey, "**Designing recurrent neural networks for monitoring embedded devices**," in *2021 IEEE European Test Symposium (ETS)*, 2021.

J. Kaiser, K. Bavendiek and S. Schupp, "**Do we need real data? - Testing and Training Algorithms with Artificial Geolocation Data**," in *INFORMATIK 2019: 50 Jahre Gesellschaft für Informatik-Informatik für Gesellschaft*, 2019.