Accelerator ML Living Review

Summary Statistics

per_year: 11
per_category: 16
per_venue/journal: 68
per_keyword: 14
monthly_trends: 75

Papers

Machine learning as a service system for particle accelerator and its application in CSNS
Mei, Hao, Zhang, Yuliang, Peng, Na, Cheng, Sinong, He, Yongcheng, Xue, Kangjia, Wang, Lin, Li, Mingtao, Wu, Xuan, Zhu, Peng (2025)
Radiation Detection Technology and Methods

A generative adversarial network to improve integrated mode proton imaging resolution using paired proton-carbon data.
Simard M, Fullarton R, Volz L, Schuy C, Chung S, Baker C, Graeff C, Fekete CC. (2025)
Med Phys

A Time-Series Approach for Machine Learning-Based Patient-Specific Quality Assurance of Radiosurgery Plans
Buzzi S, Mancosu P, Bresolin A, Gallo P, La Fauci F, Lobefalo F, Paganini L, Pelizzoli M, Reggiori G, Franzese C, Tomatis S, Scorsetti M, Lenardi C, Lambri N. (2025)
Bioengineering (Basel)

A Supervised Machine Learning Framework for Multipactor Breakdown Prediction in High-Power Radio Frequency Devices and Accelerator Components: A Case Study in Planar Geometry
Asif Iqbal, John Verboncoeur, Peng Zhang (2025)
arXiv

Geoff: The Generic Optimization Framework & Frontend for Particle Accelerator Controls
Penelope Madysa, Sabrina Appel, Verena Kain, Michael Schenk (2025)
arXiv

Towards Agentic AI on Particle Accelerators
Antonin Sulc, Thorsten Hellert, Raimund Kammering, Hayden Hoschouer, Jason St. John (2025)
arXiv

Acceleration of Multi-Scale LTS Magnet Simulations with Neural Network Surrogate Models
Louis Denis, Julien Dular, Vincent Nuttens, Mariusz Wozniak, Benoît Vanderheyden, Christophe Geuzaine (2025)
arXiv

Application Of Large Language Models For The Extraction Of Information From Particle Accelerator Technical Documentation
Qing Dai, Rasmus Ischebeck, Maruisz Sapinski, Adam Grycner (2025)
arXiv

Predictive Hydrodynamic Simulations for Laser Direct-drive Implosion Experiments via Artificial Intelligence
Zixu Wang, Yuhan Wang, Junfei Ma, Fuyuan Wu, Junchi Yan, Xiaohui Yuan, Zhe Zhang, Jie Zhang (2025)
arXiv

Towards Foundation Models for Experimental Readout Systems Combining Discrete and Continuous Data
James Giroux, Cristiano Fanelli (2025)
arXiv

Towards generalizable deep ptychography neural networks
Albert Vong, Steven Henke, Oliver Hoidn, Hanna Ruth, Junjing Deng, Alexander Hexemer, Apurva Mehta, Arianna Gleason, Levi Hancock, Nicholas Schwarz (2025)
arXiv

FusionMAE: large-scale pretrained model to optimize and simplify diagnostic and control of fusion plasma
Zongyu Yang, Zhenghao Yang, Wenjing Tian, Jiyuan Li, Xiang Sun, Guohui Zheng, Songfen Liu, Niannian Wu, Rongpeng Li, Zhaohe Xu, Bo Li, Zhongbing Shi, Zhe Gao, Wei Chen, Xiaoquan Ji, Min Xu, Wulyu Zhong (2025)
arXiv

A Surrogate model for High Temperature Superconducting Magnets to Predict Current Distribution with Neural Network
Mianjun Xiao, Peng Song, Yulong Liu, Cedric Korte, Ziyang Xu, Jiale Gao, Jiaqi Lu, Haoyang Nie, Qiantong Deng, Timing Qu (2025)
arXiv

Machine Learning approach to classifying quench antenna signals
Plebani, Alberto, Barzi, Emanuela, Teyber, Reed (2025)
Thesis

Machine Learning for superconducting magnets application
Stabilini, Elisa (2025)
Thesis

Developing Machine Learning Models for Proton Computed Tomography and LHCb Particle Tracking
Ackernley, Thomas (2025)
Thesis

Batch spacing optimization by reinforcement learning
Remta, Matthias, Velotti, Francesco, Rezagholi, Sharwin (2025)
Phys.Rev.Accel.Beams

Road map for the tuning of hadronic interaction models with accelerator-based and astroparticle data
Albrecht, J., Becker Tjus, J., Behling, N., Blazek, J., Bleicher, M., Boelhauve, J., Cazon, L., Conceicao, R., Dembinski, H., Dietrich, L., Ebr, J., Ellbracht, J., Engel, R., Fedynitch, A., Fieg, M., Garzelli, M.V., Gaudu, C., Graziani, G., Gutjahr, P., Haungs, A., Huege, T., Hymon, K., Hünnefeld, Mirco, Kampert, K.-H., Kardum, L., Kolk, L., Korneeva, N., Kröninger, K., Maire, A., Menjo, H., Morejon, L., Ostapchenko, S., Paakkinen, P., Pierog, T., Plotko, P., Prosekin, A., Pyras, L., Pöschl, T., Rautenberg, Julian, Reininghaus, M., Rhode, W., Riehn, F., Roth, M., Sandrock, A., Sarcevic, I., Schmelling, M., Sigl, G., Sjöstrand, T., Soldin, D., Unger, M., Utheim, M., Vícha, J., Werner, K., Windau, M.E., Zhukov, V. (2025)
arXiv

Self-supervised physics-informed generative networks for phase retrieval from a single X-ray hologram
Yang, Xiaogang, Hailu, Dawit, Kulvait, Vojt■ch, Jentschke, Thomas, Flenner, Silja, Greving, Imke, Campbell, Stuart I., Hagemann, Johannes, Schroer, Christian G., Wong, Tak Ming, Moosmann, Julian (2025)
Opt.Express

A Supervised Machine Learning Framework for Multipactor Breakdown Prediction in High-Power Radio Frequency Devices and Accelerator Components: A Case Study in Planar Geometry

Iqbal, Asif, Verboncoeur, John, Zhang, Peng (2025)
arXiv

Analysis note: measurement of thrust in $e^{+}e^{-}$ collisions at $\sqrt{s}$ = 91 GeV with archived ALEPH data
Badea, Anthony, Baty, Austin, Bossi, Hannah, Chen, Yu-Chen, Chen, Yi, Zhang, Jingyu, Innocenti, Gian Michele, Maggi, Marcello, McGinn, Chris, Peters, Michael, Sheng, Tzu-An, Mikuni, Vinicius, Avaylon, Matthew, Komiske, Patrick, Metodiev, Eric, Thaler, Jesse, Nachman, Benjamin, Lee, Yen-Jie (2025)
arXiv

Machine learning application for particle accelerator optimization-a review
Isti Dian Rachmawati, Nazrul Effendy, Taufik Taufik (2025)
IAES International Journal of Artificial Intelligence

Machine Learning for Particle Accelerators
Elena Fol, Auralee Edelen (2025)
Unknown Venue

FORT-GCN: A Fault-tolerant and Adaptive Accelerator Design for Efficient Graph Convolutional Network Inference
Ke Wang, Yingnan Zhao, Ahmed Louri (2025)
ACM Transactions on Embedded Computing Systems

(*Invited*) Analog Signal Processing Technologies for Power-Efficient Neural Network Inference and Training
Bert Jan Offrein (2025)
Meeting abstracts/Meeting abstracts (Electrochemical Society. CD-ROM)

Machine learning based parametrization of the resolution function for the first experimental area of the n_TOF facility at CERN
Petar Žugec, Marta Sabaté-Gilarte, Michael Bacak, Vasilis Vlachoudis, Adria Casanovas, Francisco García-Infantes (2025)
Nuclear Science and Techniques

-Diagnosis of Nasopalatine Duct and Nasopalatine Duct Cyst in CBCT Images: A Radiomics-Based Machine Learning Approach
H Duyan Yüksel, B Büyük, B Evlice (2025)
Dentomaxillofacial Radiology

Integration of Machine Learning-Based Plasma Acceleration Simulations into Geant4: A Case Study with the PALLAS Experiment
A. Sytov, K. Cassou, V. Kubytskyi, M. Lenivenko, A. Huber (2025)
arXiv

Optimisation of the Accelerator Control by Reinforcement Learning: A Simulation-Based Approach
Anwar Ibrahim, Denis Derkach, Alexey Petrenko, Fedor Ratnikov, Maxim Kaledin (2025)
arXiv

Physics-Informed Super-Resolution Diffusion for 6D Phase Space Diagnostics
Alexander Scheinker (2025)
arXiv

Optimizing Beam-Plasma Interactions Through Jitter Analysis Using Start-to-End Simulations
Robin Hwang (2024)
arXiv

Virtual Pulse Reconstruction Diagnostic for Single-Shot Measurement of Free Electron Laser Radiation Power
Till Korten, Vladimir Rybnikov, Peter Steinbach, Najmeh Mirian (2024)

arXiv

Harnessing Machine Learning for Single-Shot Measurement of Free Electron Laser Pulse Power
Till Korten, Vladimir Rybnikov, Mathias Vogt, Juliane Roensch-Schulenburg, Peter Steinbach, Najmeh Mirian (2024)
arXiv

Data-Driven Gradient Optimization for Field Emission Management in a Superconducting Radio-Frequency Linac
Steven Goldenberg, Kawser Ahammed, Adam Carpenter, Jiang Li, Riad Suleiman, Chris Tennant (2024)
arXiv

Data-Driven Discovery of Beam Centroid Dynamics
Liam A. Pocher, Irving Haber, Thomas M. Antonsen Jr., Patrick G. O'Shea (2024)
arXiv

Design and development of advanced Al-Ti-V alloys for beampipe applications in particle accelerators
Kamaljeet Singh, Kangkan Goswami, Raghunath Sahoo, Sumanta Samal (2025)
arXiv

Machine Learning for Reducing Noise in RF Control Signals at Industrial Accelerators
M. Henderson, J. P. Edelen, J. Einstein-Curtis, C. C. Hall, J. A. Diaz Cruz, A. L. Edelen (2024)
arXiv

Surrogate Models studies for laser-plasma accelerator electron source design through numerical optimisation
G. Kane, P. Drobniak, S. Kazamias, V. Kubytskyi, M. Lenivenko, B. Lucas, J. Serhal, K. Cassou, A. Beck, A. Specka, F. Massimo (2025)
arXiv

Beamline Steering Using Deep Learning Models
Dexter Allen, Isaac Kante, Dorian Bohler (2024)
arXiv

Beam-based Identification of Magnetic Field Errors in a Synchrotron using Deep Lie Map Networks
Conrad Caliari, Adrian Oeftiger, Oliver Boine-Frankenheim (2024)
arXiv

Linac_Gen: integrating machine learning and particle-in-cell methods for enhanced beam dynamics at Fermilab
Abhishek Pathak (2024)
arXiv

Automated Anomaly Detection on European XFEL Klystrons
Antonin Sulc, Annika Eichler, Tim Wilksen (2024)
arXiv

Accelerator beam phase space tomography using machine learning to account for variations in beamline components
Andrzej Wolski, Diego Botelho, David Dunning, Amelia E. Pollard (2024)
arXiv

Large Language Models for Human-Machine Collaborative Particle Accelerator Tuning through Natural Language
Jan Kaiser, Annika Eichler, Anne Lauscher (2024)
arXiv

Accelerating Cavity Fault Prediction Using Deep Learning at Jefferson Laboratory
Monibor Rahman, Adam Carpenter, Khan Iftekharuddin, Chris Tennant (2024)
arXiv

Anomaly Detection of Particle Orbit in Accelerator using LSTM Deep Learning Technology
Zhiyuan Chen, Wei Lu, Radhika Bhong, Yimin Hu, Brian Freeman, Adam Carpenter (2024)
arXiv

Machine-learning approach for operating electron beam at KEK e^-/e^+ injector Linac
Gaku Mitsuka, Shinnosuke Kato, Naoko Iida, Takuya Natsui, Masanori Satoh (2024)
arXiv

Cheetah: Bridging the Gap Between Machine Learning and Particle Accelerator Physics with High-Speed, Differentiable Simulations
Jan Kaiser, Chenran Xu, Annika Eichler, Andrea Santamaria Garcia (2024)
arXiv

Beyond PID Controllers: PPO with Neuralized PID Policy for Proton Beam Intensity Control in Mu2e
Chenwei Xu, Jerry Yao-Chieh Hu, Aakaash Narayanan, Mattson Thieme, Vladimir Nagaslaev, Mark Austin, Jeremy Arnold, Jose Berlioz, Pierrick Hanlet, Aisha Ibrahim, Dennis Nicklaus, Jovan Mitrevski, Jason Michael St. John, Gauri Pradhan, Andrea Saewert, Kiyomi Seiya, Brian Schupbach, Randy Thurman-Keup, Nhan Tran, Rui Shi, Seda Ogrenci, Alexis Maya-Isabelle Shuping, Kyle Hazelwood, Han Liu (2023)
arXiv

Robust Errant Beam Prognostics with Conditional Modeling for Particle Accelerators
Kishansingh Rajput, Malachi Schram, Willem Blokland, Yasir Alanazi, Pradeep Ramuhalli, Alexander Zhukov, Charles Peters, Ricardo Vilalta (2024)
arXiv

Machine Learning For Beamline Steering
Isaac Kante (2023)
arXiv

Variational Autoencoders for Noise Reduction in Industrial LLRF Systems
J. P. Edelen, M. J. Henderson, J. Einstein-Curtis, C. C. Hall, J. A. Diaz Cruz, A. L. Edelen (2023)
arXiv

Resilient VAE: Unsupervised Anomaly Detection at the SLAC Linac Coherent Light Source
Ryan Humble, William Colocho, Finn O'Shea, Daniel Ratner, Eric Darve (2023)
arXiv

Time-drift Aware RF Optimization with Machine Learning Techniques
R. Sharankova, M. Mwaniki, K. Seiya, M. Wesley (2023)
arXiv

Distance Preserving Machine Learning for Uncertainty Aware Accelerator Capacitance Predictions
Steven Goldenberg, Malachi Schram, Kishansingh Rajput, Thomas Britton, Chris Pappas, Dan Lu, Jared Walden, Majdi I. Radaideh, Sarah Cousineau, Sudarshan Harave (2023)
arXiv

Learning to Do or Learning While Doing: Reinforcement Learning and Bayesian Optimisation for Online Continuous Tuning
Jan Kaiser, Chenran Xu, Annika Eichler, Andrea Santamaria Garcia, Oliver Stein, Erik Bründermann, Willi Kuropka, Hannes Dinter, Frank Mayet, Thomas Vinatier, Florian Burkart, Holger Schlarb (2023)
arXiv

From Compact Plasma Particle Sources to Advanced Accelerators with Modeling at Exascale
Axel Huebl, Remi Lehe, Edoardo Zoni, Olga Shapoval, Ryan T. Sandberg, Marco Garten, Arianna

Formenti, Revathi Jambunathan, Prabhat Kumar, Kevin Gott, Andrew Myers, Weiqun Zhang, Ann Almgren, Chad E. Mitchell, Ji Qiang, David Grote, Alexander Sinn, Severin Diederichs, Maxence Thevenet, Luca Fedeli, Thomas Clark, Neil Zaim, Henri Vincenti, Jean-Luc Vay (2023)
arXiv

Forecasting Particle Accelerator Interruptions Using Logistic LASSO Regression
Sichen Li, Jochem Snuverink, Fernando Perez-Cruz, Andreas Adelmann (2023)
arXiv

Learning Electron Bunch Distribution along a FEL Beamline by Normalising Flows
Anna Willmann, Jurjen Couperus Cabada■, Yen-Yu Chang, Richard Pausch, Amin Ghaith, Alexander Debus, Arie Irman, Michael Bussmann, Ulrich Schramm, Nico Hoffmann (2023)
arXiv

Physics-constrained 3D Convolutional Neural Networks for Electrodynamics
Alexander Scheinker, Reeju Pokharel (2023)
arXiv

Identification of Magnetic Field Errors in Synchrotrons based on Deep Lie Map Networks
Conrad Caliari, Adrian Oeftiger, Oliver Boine-Frankenheim (2023)
arXiv

Data-driven Science and Machine Learning Methods in Laser-Plasma Physics
Andreas Döpp, Christoph Eberle, Sunny Howard, Faran Irshad, Jinpu Lin, Matthew Streeter (2023)
arXiv

Applications of Differentiable Physics Simulations in Particle Accelerator Modeling
Ryan Roussel, Auralee Edelen (2022)
arXiv

Prior-mean-assisted Bayesian optimization application on FRIB Front-End tunning
Kilean Hwang, Tomofumi Maruta, Alexander Plastun, Kei Fukushima, Tong Zhang, Qiang Zhao, Peter Ostroumov, Yue Hao (2022)
arXiv

Fault Prognosis in Particle Accelerator Power Electronics Using Ensemble Learning
Majdi I. Radaideh, Chris Pappas, Mark Wezensky, Pradeep Ramuhalli, Sarah Cousineau (2022)
arXiv

Machine learning-based analysis of experimental electron beams and gamma energy distributions
M. Yadav, M. Oruganti, S. Zhang, B. Naranjo, G. Andonian, Y. Zhuang, Ö. Apsimon, C. P. Welsch, J. B. Rosenzweig (2023)
arXiv

Review of Time Series Forecasting Methods and Their Applications to Particle Accelerators
Sichen Li, Andreas Adelmann (2022)
arXiv

Automatic setup of 18 MeV electron beamline using machine learning
Francesco Maria Velotti, Brennan Goddard, Verena Kain, Rebecca Ramjiawan, Giovanni Zevi Della Porta, Simon Hirlaender (2022)
arXiv

Diagnostics for Linac Optimization With Machine Learning
R. Sharankova, M. Mwaniki, K. Seiya, M. Wesley (2022)
arXiv

Transverse phase space tomography in the CLARA accelerator test facility using image compression and machine learning
Andrzej Wolski, Mark A. Johnson, Matthew King, Boris L. Militsyn, Peter H. Williams (2022)
arXiv

Using Kernel-Based Statistical Distance to Study the Dynamics of Charged Particle Beams in Particle-Based Simulation Codes
Chad E. Mitchell, Robert D. Ryne, Kilean Hwang (2022)
arXiv

Neural Network Solver for Coherent Synchrotron Radiation Wakefield Calculations in Accelerator-based Charged Particle Beams
Auralee Edelen, Christopher Mayes (2022)
arXiv

Adaptive Machine Learning for Time-Varying Systems: Towards 6D Phase Space Diagnostics of Short Intense Charged Particle Beams
Alexander Scheinker, Spencer Gessner (2022)
arXiv

Differentiable Preisach Modeling for Characterization and Optimization of Accelerator Systems with Hysteresis
R. Roussel, A. Edelen, D. Ratner, K. Dubey, J. P. Gonzalez-Aguilera, Y. K. Kim, N. Kuklev (2022)
arXiv

Mixed Diagnostics for Longitudinal Properties of Electron Bunches in a Free-Electron Laser
J. Zhu, N. M. Lockmann, M. K. Czwalinna, H. Schlarb (2022)
arXiv

A Neural Network Model of a Quasi-Periodic Elliptically Polarizing Undulator in Universal Mode
Ryan Sheppard, Cameron Baribeau, Tor Pedersen, Mark Boland, Drew Bertwistle (2022)
arXiv

Physics-informed neural network method for modelling beam-wall interactions
Kazuhiro Fujita (2022)
arXiv

Anomaly Detection in Particle Accelerators using Autoencoders
Jonathan P. Edelen, Nathan M. Cook (2021)
arXiv

Input Beam Matching and Beam Dynamics Design Optimization of the IsoDAR RFQ using Statistical and Machine Learning Techniques
Daniel Koser, Loyd Waites, Daniel Winklehner, Matthias Frey, Andreas Adelmann, Janet Conrad (2021)
arXiv

Neural Networks for ID Gap Orbit Distortion Compensation in PETRA III
Bianca Veglia, Ilya Agapov, Joachim Keil (2024)
arXiv

Time-Delayed Koopman Network-Based Model Predictive Control for the FRIB RFQ
Jinyu Wan, Shen Zhao, Wei Chang, Yue Hao (2024)
arXiv

Uncertainty Aware ML-based surrogate models for particle accelerators: A Study at the Fermilab Booster Accelerator Complex
Malachi Schram, Kishansingh Rajput, Karthik Somayaji Peng Li, Jason St. John, Himanshu Sharma (2022)
arXiv

Quantifying Uncertainty for Machine Learning Based Diagnostic
Owen Convery, Lewis Smith, Yarin Gal, Adi Hanuka (2021)
arXiv

Uncertainty Quantification for Virtual Diagnostic of Particle Accelerators
Owen Convery, Lewis Smith, Yarin Gal, Adi Hanuka (2021)

arXiv

Adaptive Latent Space Tuning for Non-Stationary Distributions
Alexander Scheinker, Frederick Cropp, Sergio Paiagua, Daniele Filippetto (2021)
arXiv

Adaptive deep learning for time-varying systems with hidden parameters: Predicting changing input beam distributions of compact particle accelerators
Alexander Scheinker, Frederick Cropp, Sergio Paiagua, Daniele Filippetto (2021)
arXiv

Using LSTM recurrent neural networks for monitoring the LHC superconducting magnets
Maciej Wielgosz, Andrzej Skocze■, Matej Mertik (2017)
arXiv

Coincident Learning for Beam-based RF Station Fault Identification Using Phase Information at the SLAC Linac Coherent Light Source
Jia Liang, William Colocho, Franz-Josef Decker, Ryan Humble, Ben Morris, Finn H. O'Shea, David A. Steele, Zhe Zhang, Eric Darve, Daniel Ratner (2025)
arXiv

Using Convolutional Neural Networks to Accelerate 3D Coherent Synchrotron Radiation Computations
Christopher Leon, Petr M. Anisimov, Nikolai Yampolsky, Alexander Scheinker (2025)
arXiv

Explainable physics-based constraints on reinforcement learning for accelerator controls
Jonathan Colen, Malachi Schram, Kishansingh Rajput, Armen Kasparian (2025)
arXiv

Accelerator system parameter estimation using variational autoencoded latent regression
Mahindra Rautela, Alan Williams, Alexander Scheinker (2024)
arXiv

Long Short-Term Memory Networks for Anomaly Detection in Magnet Power Supplies of Particle Accelerators
Ihar Lobach, Michael Borland (2024)
arXiv

Leveraging Prior Mean Models for Faster Bayesian Optimization of Particle Accelerators
Tobias Boltz, Jose L. Martinez, Connie Xu, Kathryn R. L. Baker, Zihan Zhu, Jenny Morgan, Ryan Roussel, Daniel Ratner, Brahim Mustapha, Auralee L. Edelen (2025)
arXiv

Optimizing Dynamic Aperture Studies with Active Learning
D. Di Croce, M. Giovannozzi, E. Krymova, T. Pieloni, S. Redaelli, M. Seidel, R. Tomás, F. F. Van der Veken (2024)
arXiv

Neural Network Prior Mean for Particle Accelerator Injector Tuning
Connie Xu, Ryan Roussel, Auralee Edelen (2022)
arXiv

Applications of object detection networks at high-power laser systems and experiments
Jinpu Lin, Florian Haberstroh, Stefan Karsch, Andreas Döpp (2022)
arXiv

A Neural Network approach to reconstructing SuperKEKB beam parameters from beamstrahlung
S. Di Carlo, G. Bonvicini, N. A. Althubiti, R. Ayad, E. De La Cruz-Burelo, I. Domínguez, B. O. El Bashir, H. Farhat, J. Flanagan, R. Gillard, S. Izaguirre Gamez, K. Kanazawa, K. Kumara, D. Liventsev, P. L. M. Podesta-Lerma, D. Ricalde-Herrmann, D. Rodriguez Perez, G. Tejeda-Muñoz,

M. Tobiyama I. Heredia de la Cruz (2022)
arXiv

Optimizing a Superconducting Radiofrequency Gun Using Deep Reinforcement Learning
David Meier, Luis Vera Ramirez, Jens Völker, Bernhard Sick, Jens Viefhaus, Gregor Hartmann (2022)
arXiv

Uncertainty aware anomaly detection to predict errant beam pulses in the SNS accelerator
Willem Blokland, Pradeep Ramuhalli, Charles Peters, Yigit Yucesan, Alexander Zhukov, Malachi Schram, Kishansingh Rajput, Torri Jeske (2021)
arXiv

Adaptive Machine Learning for Time-Varying Systems: Low Dimensional Latent Space Tuning
Alexander Scheinker (2021)
arXiv

Fast, efficient and flexible particle accelerator optimisation using densely connected and invertible neural networks
Renato Bellotti, Romana Boiger, Andreas Adelmann (2021)
arXiv

Invertible Surrogate Models: Joint surrogate modelling and reconstruction of Laser-Wakefield Acceleration by invertible neural networks
Friedrich Bethke, Richard Pausch, Patrick Stiller, Alexander Debus, Michael Bussmann, Nico Hoffmann (2021)
arXiv

Improving Surrogate Model Accuracy for the LCLS-II Injector Frontend Using Convolutional Neural Networks and Transfer Learning
Lipi Gupta, Auralee Edelen, Nicole Neveu, Aashwin Mishra, Christopher Mayes, Young-Kee Kim (2021)
arXiv

A Novel Approach for Classification and Forecasting of Time Series in Particle Accelerators
Sichen Li, Mélissa Zacharias, Jochem Snuverink, Jaime Coello de Portugal, Fernando Perez-Cruz, Davide Reggiani, Andreas Adelmann (2021)
arXiv

Real-time Artificial Intelligence for Accelerator Control: A Study at the Fermilab Booster
Jason St. John, Christian Herwig, Diana Kafkes, Jovan Mitrevski, William A. Pellico, Gabriel N. Perdue, Andres Quintero-Parra, Brian A. Schupbach, Kiyomi Seiya, Nhan Tran, Malachi Schram, Javier M. Duarte, Yunzhi Huang, Rachael Keller (2021)
arXiv

Surrogate Modeling of the CLIC Final-Focus System using Artificial Neural Networks
J. Ogren, C. Gohil, D. Schulte (2021)
arXiv

Physics-Based Deep Neural Networks for Beam Dynamics in Charged Particle Accelerators
Andrei Ivanov, Ilya Agapov (2020)
arXiv

Introduction to Machine Learning for Accelerator Physics
Daniel Ratner (2020)
arXiv

Machine learning for design optimization of storage ring nonlinear dynamics
Faya Wang, Minghao Song, Auralee Edelen, Xiaobiao Huang (2019)
arXiv

Studies in Applying Machine Learning to LLRF and Resonance Control in Superconducting RF Cavities
Jorge Alberto Diaz Cruz, Sandra Biedron, Manel Martinez-Ramon, Salvador Sosa, Reza Pirayesh (2019)
arXiv

The model of an anomaly detector for HiLumi LHC magnets based on Recurrent Neural Networks and adaptive quantization
Maciej Wielgosz, Matej Mertik, Andrzej Skocze■, Ernesto De Matteis (2017)
arXiv

Machine learning for analysis of plasma driven Ion source
N. Joshi, O. Meusel, H. Podlech (2018)
arXiv

First Steps Toward Incorporating Image Based Diagnostics Into Particle Accelerator Control Systems Using Convolutional Neural Networks
A. L. Edelen, S. G. Biedron, S. V. Milton, J. P. Edelen (2016)
arXiv

Neural Networks for Modeling and Control of Particle Accelerators
A. L. Edelen, S. G. Biedron, B. E. Chase, D. Edstrom, S. V. Milton, P. Stabile (2016)
arXiv

Harnessing the Power of Gradient-Based Simulations for Multi-Objective Optimization in Particle Accelerators
Kishansingh Rajput, Malachi Schram, Auralee Edelen, Jonathan Colen, Armen Kasparian, Ryan Roussel, Adam Carpenter, He Zhang, Jay Benesch (2024)
arXiv

BOOSTR: A Dataset for Accelerator Control Systems
Diana Kafkes, Jason St. John (2021)
arXiv

Model-free and Bayesian Ensembling Model-based Deep Reinforcement Learning for Particle Accelerator Control Demonstrated on the FERMI FEL
Simon Hirlaender, Niky Bruchon (2022)
arXiv

Autonomous Control of a Particle Accelerator using Deep Reinforcement Learning
Xiaoying Pang, Sunil Thulasidasan, Larry Rybarcyk (2020)
arXiv

AI-Assisted Transport of Radioactive Ion Beams
Sergio Lopez-Caceres, Daniel Santiago-Gonzalez (2025)
arXiv

Bayesian Optimization Algorithms for Accelerator Physics
Ryan Roussel, Auralee L. Edelen, Tobias Boltz, Dylan Kennedy, Zhe Zhang, Fuhao Ji, Xiaobiao Huang, Daniel Ratner, Andrea Santamaria Garcia, Chenran Xu, Jan Kaiser, Angel Ferran Pousa, Annika Eichler, Jannis O. Lubsen, Natalie M. Isenberg, Yuan Gao, Nikita Kuklev, Jose Martinez, Brahim Mustapha, Verena Kain, Weijian Lin, Simone Maria Liuzzo, Jason St. John, Matthew J. V. Streeter, Remi Lehe, Willie Neiswanger (2024)
arXiv

SPIRAL2 Cryomodules Models: a Gateway to Process Control and Machine Learning
Adrien Vassal, Adnan Ghribi, François Millet, François Bonne, Patrick Bonnay, Pierre-Emmanuel Bernaudin (2021)
arXiv

Predicting Beam Transmission Using 2-Dimensional Phase Space Projections Of Hadron Accelerators
Anthony Tran, Yue Hao, Brahim Mustapha, Jose L. Martinex Marin (2022)

arXiv

Machine Learning for Orders of Magnitude Speedup in Multi-Objective Optimization of Particle Accelerator Systems
Auralee Edelen, Nicole Neveu, Yannick Huber, Mattias Frey, Christopher Mayes, Andreas Adelmann (2020)
arXiv

Machine learning assisted non-destructive transverse beam profile imaging
Zhanibek Omarov, Selcuk Haciomeroglu (2021)
arXiv

GAIA: A General AI Assistant for Intelligent Accelerator Operations
Frank Mayet (2024)
arXiv

AI-Enabled Operations at Fermi Complex: Multivariate Time Series Prediction for Outage Prediction and Diagnosis
Milan Jain, Burcu O. Mutlu, Caleb Stam, Jan Strube, Brian A. Schupbach, Jason M. St. John, William A. Pellico (2025)
arXiv

Automated GI tract segmentation using deep learning
Manhar Sharma (2023)
arXiv

Domain Adaptation of Automated Treatment Planning from Computed Tomography to Magnetic Resonance
Aly Khalifa, Jeff Winter, Inmaculada Navarro, Chris McIntosh, Thomas G. Purdie (2022)
arXiv

Superconducting radio-frequency cavity fault classification using machine learning at Jefferson Laboratory
Chris Tennant, Adam Carpenter, Tom Powers, Anna Shabalina Solopova, Lasitha Vidyaratne, Khan Iftekharuddin (2020)
arXiv

Generative Adversarial Networks (GAN) for compact beam source modelling in Monte Carlo simulations
David Sarrut, Nils Krah, Jean-Michel Létang (2019)
arXiv

Machine learning applied to single-shot x-ray diagnostics in an XFEL
A. Sanchez-Gonzalez, P. Micaelli, C. Olivier, T. R. Barillot, M. Ilchen, A. A. Lutman, A. Marinelli, T. Maxwell, A. Achner, M. Agåker, N. Berrah, C. Bostedt, J. Buck, P. H. Bucksbaum, S. Carron Montero, B. Cooper, J. P. Cryan, M. Dong, R. Feifel, L. J. Frasinski, H. Fukuzawa, A. Galler, G. Hartmann, N. Hartmann, W. Helml, A. S. Johnson, A. Knie, A. O. Lindahl, J. Liu, K. Motomura, M. Mucke, C. O'Grady, J-E. Rubensson, E. R. Simpson, R. J. Squibb, C. Såthe, K. Ueda, M. Vacher, D. J. Walke, V. Zhaunerchyk, R. N. Coffee, J. P. Marangos (2016)
arXiv

Action-Attentive Deep Reinforcement Learning for Autonomous Alignment of Beamlines
Siyu Wang, Shengran Dai, Jianhui Jiang, Shuang Wu, Yufei Peng, Junbin Zhang (2024)
arXiv

Image Segmentation using U-Net Architecture for Powder X-ray Diffraction Images
Howard Yanxon, Eric Roberts, Hannah Parraga, James Weng, Wenqian Xu, Uta Ruett, Alexander Hexemer, Petrus Zwart, Nickolas Schwarz (2023)
arXiv

Closing the loop: Autonomous experiments enabled by machine-learning-based online data analysis in synchrotron beamline environments

Linus Pithan, Vladimir Starostin, David Mare■ek, Lukas Petersdorf, Constantin Völter, Valentin Munteanu, Maciej Jankowski, Oleg Konovalov, Alexander Gerlach, Alexander Hinderhofer, Bridget Murphy, Stefan Kowarik, Frank Schreiber (2023)
arXiv

Artifact Identification in X-ray Diffraction Data using Machine Learning Methods
Howard Yanxon, James Weng, Hannah Parraga, Wenqian Xu, Uta Ruett, Nicholas Schwarz (2022)
arXiv

An efficient search-and-score algorithm for ancestral graphs using multivariate information scores
Nikita Lagrange, Herve Isambert (2024)
arXiv

Loss function to optimise signal significance in particle physics
Jai Bardhan, Cyrin Neeraj, Subhadip Mitra, Tanumoy Mandal (2024)
arXiv

Efficient Compression of Sparse Accelerator Data Using Implicit Neural Representations and Importance Sampling
Xihaier Luo, Samuel Lurvey, Yi Huang, Yihui Ren, Jin Huang, Byung-Jun Yoon (2024)
arXiv

Variable Rate Neural Compression for Sparse Detector Data
Yi Huang, Yeonju Go, Jin Huang, Shuhang Li, Xihaier Luo, Thomas Marshall, Joseph Osborn, Christopher Pinkenburg, Yihui Ren, Evgeny Shulga, Shinjae Yoo, Byung-Jun Yoon (2024)
arXiv

Inverse Surrogate Model of a Soft X-Ray Spectrometer using Domain Adaptation
Enrico Ahlers, Peter Feuer-Forson, Gregor Hartmann, Rolf Mitzner, Peter Baumgärtel, Jens Viefhaus (2025)
arXiv

Online tuning and light source control using a physics-informed Gaussian process Adi
A. Hanuka, J. Duris, J. Shtalenkova, D. Kennedy, A. Edelen, D. Ratner, X. Huang (2019)
arXiv

Deep-learning real-time phase retrieval of imperfect diffraction patterns from X-ray free-electron lasers
Sung Yun Lee, Do Hyung Cho, Chulho Jung, Daeho Sung, Daewoong Nam, Sangsoo Kim, Changyong Song (2024)
arXiv

A Two-Stage Machine Learning-Aided Approach for Quench Identification at the European XFEL
Lynda Boukela, Annika Eichler, Julien Branlard, Nur Zulaiha Jomhari (2024)
arXiv

Beam Detection Based on Machine Learning Algorithms
Haoyuan Li, Qing Yin (2023)
arXiv

Weakly supervised learning for pattern classification in serial femtosecond crystallography
Jianan Xie, Ji Liu, Chi Zhang, Xihui Chen, Ping Huai, Jie Zheng, Xiaofeng Zhang (2023)
arXiv

SpeckleNN: A unified embedding for real-time speckle pattern classification in X-ray single-particle imaging with limited labeled examples
Cong Wang, Eric Florin, Hsing-Yin Chang, Jana Thayer, Chun Hong Yoon (2023)
arXiv

Accurate and confident prediction of electron beam longitudinal properties using spectral virtual diagnostics
A. Hanuka, C. Emma, T. Maxwell, A. Fisher, B. Jacobson, M. J. Hogan, Z. Huang (2020)
arXiv

TempoRL: laser pulse temporal shape optimization with Deep Reinforcement Learning
Francesco Capuano, Davorin Peceli, Gabriele Tiboni, Raffaello Camoriano, Bed■ich Rus (2023)
arXiv

A Start To End Machine Learning Approach To Maximize Scientific Throughput From The LCLS-II-HE
Aashwin Mishra, Matt Seaberg, Ryan Roussel, Fred Poitevin, Jana Thayer, Daniel Ratner, Auralee Edelen, Apurva Mehta (2025)
arXiv

Combined track finding with GNN & CKF
Lukas Heinrich, Benjamin Huth, Andreas Salzburger, Tilo Wettig (2024)
arXiv

Improved selective background Monte Carlo simulation at Belle II with graph attention networks and weighted events
Boyang Yu, Nikolai Hartmann, Luca Schinnerl, Thomas Kuhr (2023)
arXiv

Towards Reliable Neural Generative Modeling of Detectors
Lucio Anderlini, Matteo Barbetti, Denis Derkach, Nikita Kazeev, Artem Maevskiy, Sergei Mokhnenko (2022)
arXiv

Hybrid Quantum Classical Graph Neural Networks for Particle Track Reconstruction
Cenk Tüysüz, Carla Rieger, Kristiane Novotny, Bilge Demirköz, Daniel Dobos, Karolos Potamianos, Sofia Vallecorsa, Jean-Roch Vlimant, Richard Forster (2021)
arXiv

Graph Generative Models for Fast Detector Simulations in High Energy Physics
Ali Hariri, Darya Dyachkova, Sergei Gleyzer (2021)
arXiv

Beyond 4D Tracking: Using Cluster Shapes for Track Seeding
Patrick J. Fox, Shangqing Huang, Joshua Isaacson, Xiangyang Ju, Benjamin Nachman (2021)
arXiv

Fast Data-Driven Simulation of Cherenkov Detectors Using Generative Adversarial Networks
Artem Maevskiy, Denis Derkach, Nikita Kazeev, Andrey Ustyuzhanin, Maksim Artemev, Lucio Anderlini (2019)
arXiv

Accelerating the BSM interpretation of LHC data with machine learning
Gianfranco Bertone, Marc Peter Deisenroth, Jong Soo Kim, Sebastian Liem, Roberto Ruiz de Austri, Max Welling (2016)
arXiv

Radar Pulse Deinterleaving with Transformer Based Deep Metric Learning
Edward Gunn, Adam Hosford, Daniel Mannion, Jarrod Williams, Varun Chhabra, Victoria Nockles (2025)
arXiv

Deep Spectrum Cartography: Completing Radio Map Tensors Using Learned Neural Models
Sagar Shrestha, Xiao Fu, Mingyi Hong (2022)
arXiv

Radar Emitter Classification with Attribute-specific Recurrent Neural Networks
Paolo Notaro, Magdalini Paschali, Carsten Hopke, David Wittmann, Nassir Navab (2019)

arXiv

Prediction of Infinite Words with Automata
Tim Smith (2016)
arXiv

Learning topological defects formation with neural networks in a quantum phase transition
Han-Qing Shi, Hai-Qing Zhang (2023)
arXiv

A Conceptual Development of Quench Prediction App build on LSTM and ELQA framework
Matej Mertik, Maciej Wielgosz, Andrzej Skocze■ (2016)
arXiv

High-Precision Inversion of Dynamic Radiography Using Hydrodynamic Features
Maliha Hossain, Balasubramanya T. Nadiga, Oleg Korobkin, Marc L. Klasky, Jennifer L. Schei, Joshua W. Burby, Michael T. McCann, Trevor Wilcox, Soumi De, Charles A. Bouman (2021)
arXiv

Physical knowledge improves prediction of EM Fields
Andrzej Dulny, Farzad Jabbarigargari, Andreas Hotho, Laura Maria Schreiber, Maxim Terekhov, Anna Krause (2025)
arXiv

Plasma Surrogate Modelling using Fourier Neural Operators
Vignesh Gopakumar, Stanislas Pamela, Lorenzo Zanisi, Zongyi Li, Ander Gray, Daniel Brennand, Nitesh Bhatia, Gregory Stathopoulos, Matt Kusner, Marc Peter Deisenroth, Anima Anandkumar, JOREK Team, MAST Team (2024)
arXiv

AI-assisted Optimization of the ECCE Tracking System at the Electron Ion Collider
C. Fanelli, Z. Papandreou, K. Suresh, J. K. Adkins, Y. Akiba, A. Albataineh, M. Amaryan, I. C. Arsene, C. Ayerbe Gayoso, J. Bae, X. Bai, M. D. Baker, M. Bashkanov, R. Bellwied, F. Benmokhtar, V. Berdnikov, J. C. Bernauer, F. Bock, W. Boeglin, M. Borysova, E. Brash, P. Brindza, W. J. Briscoe, M. Brooks, S. Bueltmann, M. H. S. Bukhari, A. Bylinkin, R. Capobianco, W. -C. Chang, Y. Cheon, K. Chen, K. -F. Chen, K. -Y. Cheng, M. Chiu, T. Chujo, Z. Citron, E. Cline, E. Cohen, T. Cormier, Y. Corrales Morales, C. Cotton, J. Crafts, C. Crawford, S. Creekmore, C. Cuevas, J. Cunningham, G. David, C. T. Dean, M. Demarteau, S. Diehl, N. Doshita, R. Dupre, J. M. Durham, R. Dzhygadlo, R. Ehlers, L. El Fassi, A. Emmert, R. Ent, R. Fatemi, S. Fegan, M. Finger, M. Finger Jr., J. Frantz, M. Friedman, I. Friscic, D. Gangadharan, S. Gardner, K. Gates, F. Geurts, R. Gilman, D. Glazier, E. Glimos, Y. Goto, N. Grau, S. V. Greene, A. Q. Guo, L. Guo, S. K. Ha, J. Haggerty, T. Hayward, X. He, O. Hen, D. W. Higinbotham, M. Hoballah, T. Horn, A. Hoghmrtsyan, P. -h. J. Hsu, J. Huang, G. Huber, A. Hutson, K. Y. Hwang, C. Hyde, M. Inaba, T. Iwata, H. S. Jo, K. Joo, N. Kalantarians, G. Kalicy, K. Kawade, S. J. D. Kay, A. Kim, B. Kim, C. Kim, M. Kim, Y. Kim, Y. Kim, E. Kistenev, V. Klimenko, S. H. Ko, I. Korover, W. Korsch, G. Krintiras, S. Kuhn, C. -M. Kuo, T. Kutz, J. Lajoie, D. Lawrence, S. Lebedev, H. Lee, J. S. H. Lee, S. W. Lee, Y. -J. Lee, W. Li, W. B. Li, X. Li, X. Li, X. Li, X. Li, Y. T. Liang, S. Lim, C. -h. Lin, D. X. Lin, K. Liu, M. X. Liu, K. Livingston, N. Liyanage, W. J. Llope, C. Loizides, E. Long, R. -S. Lu, Z. Lu, W. Lynch, D. Marchand, M. Marcisovsky, P. Markowitz, H. Marukyan, P. McGaughey, M. Mihovilovic, R. G. Milner, A. Milov, Y. Miyachi, A. Mkrtchyan, P. Monaghan, R. Montgomery, D. Morrison, A. Movsisyan, H. Mkrtchyan, A. Mkrtchyan, C. Munoz Camacho, M. Murray, K. Nagai, J. Nagle, I. Nakagawa, C. Nattrass, D. Nguyen, S. Niccolai, R. Nouicer, G. Nukazuka, M. Nycz, V. A. Okorokov, S. Oresic, J. D. Osborn, C. O'Shaughnessy, S. Paganis, S. F. Pate, M. Patel, C. Paus, G. Penman, M. G. Perdekamp, D. V. Perepelitsa, H. Periera da Costa, K. Peters, W. Phelps, E. Piasetzky, C. Pinkenburg, I. Prochazka, T. Protzman, M. L. Purschke, J. Putschke, J. R. Pybus, R. Rajput-Ghoshal, J. Rasson, B. Raue, K. F. Read, K. Roed, R. Reed, J. Reinhold, E. L. Renner, J. Richards, C. Riedl, T. Rinn, J. Roche, G. M. Roland, G. Ron, M. Rosati, C. Royon, J. Ryu, S. Salur, N. Santiesteban, R. Santos, M. Sarsour, J. Schambach, A. Schmidt, N. Schmidt, C. Schwarz, J. Schwiening, R. Seidl, A. Sickles, P. Simmerling, S. Sirca, D. Sharma, Z. Shi, T. -A. Shibata, C. -W. Shih, S. Shimizu, U. Shrestha, K.

Slifer, K. Smith, D. Sokhan, R. Soltz, W. Sondheim, J. Song, J. Song, I. I. Strakovsky, P. Steinberg, P. Stepanov, J. Stevens, J. Strube, P. Sun, X. Sun, V. Tadevosyan, W. -C. Tang, S. Tapia Araya, S. Tarafdar, L. Teodorescu, A. Timmins, L. Tomasek, N. Trotta, R. Trotta, T. S. Tveter, E. Umaka, A. Usman, H. W. van Hecke, C. Van Hulse, J. Velkovska, E. Voutier, P. K. Wang, Q. Wang, Y. Wang, Y. Wang, D. P. Watts, N. Wickramaarachchi, L. Weinstein, M. Williams, C. -P. Wong, L. Wood, M. H. Wood, C. Woody, B. Wyslouch, Z. Xiao, Y. Yamazaki, Y. Yang, Z. Ye, H. D. Yoo, M. Yurov, N. Zachariou, W. A. Zajc, W. Zha, J. Zhang, Y. Zhang, Y. X. Zhao, X. Zheng, P. Zhuang (2022)
arXiv

A Realistic Collimated X-Ray Image Simulation Pipeline
Benjamin El-Zein, Dominik Eckert, Thomas Weber, Maximilian Rohleder, Ludwig Ritschl, Steffen Kappler, Andreas Maier (2024)
arXiv

Online Electron Reconstruction at CLAS12
Tyson, Richard, Gavalian, Gagik (2025)
EPJ Web Conf.

Symplectic machine learning model for fast simulation of space-charge effects
Wan, Jinyu, Qiang, Ji, Hao, Yue (2025)
Phys.Rev.Accel.Beams

Application of quantum machine learning using variational quantum classifier in accelerator physics
Yin, He-Xing, Hu, Zhi-Yuan, Zeng, Huan-Huan, Guan, Jia-Bao, Wang, Ji-ke (2025)
arXiv

Laser wakefield electron acceleration simulation using physics-informed diffusion probabilistic models
Jech, Matej, Kovalenko, Alexander, Lazzarini, Carlo Maria, Grittani, Gabriele Maria (2025)
Proc.SPIE Int.Soc.Opt.Eng.

Geoff: The Generic Optimization Framework & Frontend for Particle Accelerator Controls
Madysa, Penelope, Appel, Sabrina, Kain, Verena, Schenk, Michael (2025)
SoftwareX

A Start To End Machine Learning Approach To Maximize Scientific Throughput From The LCLS-II-HE
Mishra, Aashwin, Seaberg, Matt, Roussel, Ryan, Poitevin, Fred, Thayer, Jana, Ratner, Daniel, Edelen, Auralee, Mehta, Apurva (2025)
arXiv

Using a neural network model to guide protection heater design in Nb$_{3}$Sn accelerator magnets
Bakrani Balani, Shahriar, Salmi, Tiina (2025)
Supercond.Sci.Technol.

Particle identification in the GlueX detector with machine learning
Habjan, Eric, Dube, Richard, McIntyre, James, Edo, Mezmur, Jones, Richard (2025)
arXiv

Prediction of Radio-quiet Gamma-Ray Pulsar Distances Using the Fundamental Plane Relation
Angüner, Ekrem O■uzhan (2025)
Astrophys.J.

Graph Neural Networks for particle tracking in NA62 Experiment
Plini, L., Tinti, G., Spadaro, T., Galasso, F. (2025)
Nuovo Cim.C

Reinforcement Learning for Charged Particle Beam Control to Minimize Injection Mismatch in Particle Accelerators

Balasooriya, Thilina, Yoo, Shinjae, Schoefer, Vincent, Tseng, Huan-Hsin, Gao, Yuan, Lin, Weijian, Silva, Chanaka De (2025)
Journal

Outlook towards deployable continual learning for particle accelerators
Rajput, Kishansingh, Lin, Sen, Edelen, Auralee, Blokland, Willem, Schram, Malachi (2025)
Mach.Learn.Sci.Tech.

An advanced pulse-avalanche stochastic model of long gamma-ray burst light curves
Maistrello, Manuele, Ferro, Lisa, Bazzanini, Lorenzo, Maccary, Romain, Guidorzi, Cristiano (2025)
Astron.Astrophys.

Application of ensemble machine learning algorithms and filtering techniques in slow orbit feedback systems of electron storage rings
Fan, Jiaqi, Liu, Weibin, Wang, Jiuqing, Wei, Yanru, Wei, Yuanyuan, Ji, Daheng (2025)
Phys.Rev.Accel.Beams

Integration of Machine Learning-Based Plasma Acceleration Simulations into Geant4: A Case Study with the PALLAS Experiment
Sytov, A., Cassou, K., Kubytskyi, V., Lenivenko, M., Huber, A. (2025)
arXiv

Optimisation of the Accelerator Control by Reinforcement Learning: A Simulation-Based Approach
Ibrahim, Anwar, Derkach, Denis, Petrenko, Alexey, Ratnikov, Fedor, Kaledin, Maxim (2025)
arXiv

Explainable physics-based constraints on reinforcement learning for accelerator controls
Colen, Jonathan, Schram, Malachi, Rajput, Kishansingh, Kasparian, Armen (2025)
arXiv

femto-PIXAR: a self-supervised neural network method for reconstructing femtosecond X-ray free electron laser pulses
Goetzke, Gesa, Plumley, Rajan, Hartmann, Gregor, Maxwell, Tim, Decker, Franz-Josef, Lutman, Alberto, Dunne, Mike, Ratner, Daniel, Turner, Joshua J. (2025)
Opt.Express

Deep Lie Map Networks:A novel Approach to Infer Nonlinear Synchrotron Optics from Beam Oscillations
Caliari, Conrad (2025)
Thesis

Reconstructing time-of-flight detector values of angular streaking using machine learning
Meier, David, Viefhaus, Jens, Hartmann, Gregor, Helml, Wolfram, Otto, Thorsten, Sick, Bernhard (2025)
Phys.Rev.Accel.Beams

Software Upgrades for the High-Luminosity LHC
Shope, David Richard (2025)
PoS

AI-Enabled Operations at Fermi Complex: Multivariate Time Series Prediction for Outage Prediction and Diagnosis
Jain, Milan, Mutlu, Burcu O., Stam, Caleb, Strube, Jan, Schupbach, Brian A., John, Jason M.St., Pellico, William A. (2025)
arXiv

Machine Learning Methods for Tau Lepton Identification and Search for the Supersymmetric Partner of the Tau Lepton Using CMS Run 2 Data
Shchedrolosiev, Mykyta (2025)
Thesis

Artificial intelligence for advancing particle accelerators
Ghribi, Adnan, Cassou, Kevin, Dalena, Barbara, Eichler, Annika, Guler, Hayg, Mistry, Andrew K., Oeftiger, Adrian, Shea, Thomas, Valentino, Gianluca, Welsch, Carsten P. (2025)
Europhys.News

Electron neutrino selection with deep neural networks for the ICARUS experiment
Koh, Dae Heun (2025)
Thesis

Real-Time event reconstruction for Nuclear Physics Experiments using Artificial Intelligence
Gavalian, Gagik (2025)
EPJ Web Conf.

Machine Learning for Optimized Polarization at Jefferson Lab
Jeske, Torri, Kasparian, Armen, Lawrence, David, Britton, Thomas, Schram, Malachi, Moran, Patrick, Fanelli, Cristiano, Guo, Jiawei, Jarvis, Naomi, Maxwell, James, Keith, Chris (2025)
EPJ Web Conf.

Applying the machine learning methods to determine the linear optics parameters in the ThomX collector ring
Klekots, D., Bezshyyko, O., Golinka-Bezshyyko, L., Kubytskyi, V., Chaikovska, I. (2024)
Nucl.Phys.Atom.Energy

Deep learning framework for fault detection in accelerators
Piekarski, Michal (2024)
JACoW

Optimizing Beam-Plasma Interactions Through Jitter Analysis Using Start-to-End Simulations
Hwang, Robin (2024)
arXiv

Machine Learning Applications for Improving Accelerator Operations
Lin, Lucy (2024)
Thesis

Virtual pulse reconstruction diagnostic for single-shot measurement of free electron laser radiation power
Korten, Till, Rybnikov, Vladimir, Steinbach, Peter, Mirian, Najmeh (2024)
Phys.Rev.Accel.Beams

Assessing the Performance of Deep Learning Predictions for Dynamic Aperture of a Hadron Circular Particle Accelerator
Di Croce, Davide, Giovannozzi, Massimo, Montanari, Carlo Emilio, Pieloni, Tatiana, Redaelli, Stefano, Van der Veken, Frederik F. (2024)
Instruments

Machine learning
Snuverink, Jochem (2024)
CERN Yellow Rep.School Proc.

Harnessing Machine Learning for Single-Shot Measurement of Free Electron Laser Pulse Power
Korten, Till, Rybnikov, Vladimir, Vogt, Mathias, Roensch-Schulenburg, Juliane, Steinbach, Peter, Mirian, Najmeh (2024)
Journal

Data-driven gradient optimization for field emission management in a superconducting radio-frequency linac
Goldenberg, Steven, Ahammed, Kawser, Carpenter, Adam, Li, Jiang, Suleiman, Riad, Tennant, Chris (2024)
Phys.Rev.Accel.Beams

Third-integer Resonant Extraction Regulation System for Mu2e
Narayanan, Aakaash (2024)
InspireHEP

Harnessing the power of gradient-based simulations for multi-objective optimization in particle accelerators
Rajput, Kishansingh, Schram, Malachi, Edelen, Auralee, Colen, Jonathan, Kasparian, Armen, Roussel, Ryan, Carpenter, Adam, Zhang, He, Benesch, Jay (2024)
Mach.Learn.Sci.Tech.

Machine learning-based non-destructive measurement of bunch length at FRIB
Wan, Jinyu, Plastun, Alexander, Ostroumov, Peter (2024)
JACoW

Beam emittance and Twiss parameters from pepper-pot images using physically informed neural nets
Knight, Ian, Mustapha, Brahim (2024)
JACoW

Advancements in backwards differentiable beam dynamics simulations for accelerator design, model calibration, and machine learning
Roussel, Ryan, Edelen, Auralee, Gonzalez-Aguilera, Juan Pablo, Lehe, Remi, Huebl, Axel, Kaiser, Jan, Santamaria Garcia, Andrea, Xu, Chenran, Eichler, Annika, Charleux, Grégoire (2024)
JACoW

Advanced algorithms for linear accelerator design and operation
Ong, Ysabella Kassandra, Bellan, Luca, Pisent, Andrea, Comunian, Michele, Fagotti, Enrico, Bortolato, Damiano, Montis, Maurizio, Giacchini, Mauro, Carletto, Osvaldo (2024)
JACoW

Adaptive machine learning with hard physics constraints and generative diffusion for 6D phase space diagnostics
Scheinker, Alexander (2024)
JACoW

Data-Driven Discovery of Beam Centroid Dynamics
Pocher, Liam A., Haber, Irving, Antonsen, Thomas M., O'Shea, Patrick G. (2024)
arXiv

Signal model parameter scan using Normalizing Flow
Saito, Masahiko, Morinaga, Masahiro, Kishimoto, Tomoe, Tanaka, Junichi (2024)
PoS

Towards Agentic AI on Particle Accelerators
Sulc, Antonin, Hellert, Thorsten, Kammering, Raimund, Houscher, Hayden, St. John, Jason (2024)
Journal

Machine learning for reducing noise in RF control signals at industrial accelerators
Henderson, M., Edelen, J.P., Einstein-Curtis, J., Hall, C.C., Cruz, J.A. Diaz, Edelen, A.L. (2024)
JINST

Continuous data-driven control of the GTS-LHC ion source at CERN
Kain, Verena, Rodriguez Mateos, Borja, Bruchon, Niky, Hirlaender, Simon, Küchler, Detlef (2024)
JACoW

Surrogate Models studies for laser-plasma accelerator electron source design through numerical optimisation
Kane, G., Drobniak, P., Kazamias, S., Kubytskyi, V., Lenivenko, M., Lucas, B., Serhal, J., Cassou, K., Beck, A., Specka, A., Massimo, F. (2024)
arXiv

Beamline Steering Using Deep Learning Models
Allen, Dexter, Kante, Isaac, Bohler, Dorian (2024)

arXiv

Beam-based identification of magnetic field errors in a synchrotron using deep Lie map networks
Caliari, Conrad, Oeftiger, Adrian, Boine-Frankenheim, Oliver (2024)
Phys.Rev.Accel.Beams

Towards efficient machine-learning-based reduction of the cosmic-ray induced background in X-ray imaging detectors: increasing context awareness
Poliszczuk, Artem, Wilkins, Dan, Allen, Steven W., Miller, Eric D., Chattopadhyay, Tanmoy, Schneider, Benjamin, Darve, Julien Eric, Bautz, Marshall, Falcone, Abe, Foster, Richard, Grant, Catherine E., Herrmann, Sven, Kraft, Ralph, Morris, R. Glenn, Nulsen, Paul, Orel, Peter, Schellenberger, Gerrit, Stueber, Haley R. (2024)
Proc.SPIE Int.Soc.Opt.Eng.

A Two-Stage Machine Learning-Aided Approach for Quench Identification at the European XFEL
Boukela, Lynda, Eichler, Annika, Branlard, Julien, Jomhari, Nur Zulaiha (2024)
arXiv

Reinforcement learning-trained optimisers and Bayesian optimisation for online particle accelerator tuning
Kaiser, Jan, Xu, Chenran, Eichler, Annika, Santamaria Garcia, Andrea, Stein, Oliver, Bründermann, Erik, Kuropka, Willi, Dinter, Hannes, Mayet, Frank, Vinatier, Thomas, Burkart, Florian, Schlarb, Holger (2024)
Sci.Rep.

Machine learning-based extraction of longitudinal beam parameters in the LHC
Iliakis, Konstantinos, Karlsen-Bæck, Birk Emil, Trad, Georges, Timko, Helga, Zampetakis, Michail, Argyropoulos, Theodoros (2024)
JACoW

High fidelity numerical modelling and condition monitoring applied to septum magnets at CERN
Kawa, Krzysztof, Szumlak, Tomasz, Kokkinos, Charilaos, Lackner, Friedrich (2024)
JACoW

Updates to Xopt for online accelerator optimization and control
Roussel, Ryan, Kennedy, Dylan, Boltz, Tobias, Baker, Kathryn, Mayes, Christopher, Edelen, Auralee (2024)
JACoW

Breaking new ground in data-intensive science: first insights from the LIV.INNO center for doctoral training
Welsch, Carsten (2024)
JACoW

The reinforcement learning for autonomous accelerators collaboration
Santamaria Garcia, Andrea, Eichler, Annika, Xu, Chenran, Kaiser, Jan, Scomparin, Luca, Schenk, Michael, Pochaba, Sabrina, Hirlaender, Simon (2024)
JACoW

Machine learning-based particle accelerator modeling
Emmanuel Goutierre (2024)
Laboratoire Interdisciplinaire des Sciences du Numérique

Modelization of an Injector With Machine Learning
Mathieu Debongnie, Maud Baylac, Frédéric Bouly, Nicolas Chauvin, Angélique Gatera, Tomas Junquera, Didier Uriot (2019)
10th International Particle Accelerator Conference

Field-Reliability Predictions Based on Statistical System Lifecycle Models
Lukas Felsberger, Dieter Kranzlmüller, Benjamin Todd (2018)
2nd International Cross-Domain Conference for Machine Learning and Knowledge Extraction (CD-MAKE)

A Machine Learning Technique for Dynamic Aperture Computation
Barbara Dalena, Mehdi Ben Ghali (2021)
12th International Particle Accelerator Conference

Surrogate Model for Linear Accelerator: A fast Neural Network approximation of ThomX's simulator
Emmanuel Goutierre, Christelle Bruni, Johanne Cohen, Hayg Guler, Michèle Sebag (2023)
IPAC 2023 - 14th International Particle Accelerator Conference

Physics-aware modelling of an accelerated particle cloud
Emmanuel Goutierre, Christelle Bruni, Johanne Cohen, Hayg Guler, Michèle Sebag (2023)
MLPS 2023 - Machine Learning and the Physical Sciences Workshop 23023 - At the 37th conference on Neural Information Processing Systems (NeurIPS)

Closing the loop: Autonomous experiments enabled by machine-learning-based online data analysis in synchrotron beamline environments
Linus Pithan, Vladimir Starostin, David Mare■ek, Lukas Petersdorf, Constantin Völter, Valentin Munteanu, Maciej Jankowski, Oleg Konovalov, Alexander Gerlach, Alexander Hinderhofer, Bridget Murphy, Stefan Kowarik, Frank Schreiber (2023)
HAL

Leveraging Subgraph Extraction for Performance Portable Programming Frameworks on DL Accelerators
Xiao Zhang, Huiying Lan, Tian Zhi (2018)
15th IFIP International Conference on Network and Parallel Computing (NPC)

From Compact Plasma Particle Sources to Advanced Accelerators with Modeling at Exascale
Axel Huebl, Remi Lehe, Edoardo Zoni, Olga Shapoval, Ryan T Sandberg, Marco Garten, Arianna Formenti, Revathi Jambunathan, Prabhat Kumar, Kevin Gott, Andrew Myers, Weiqun Zhang, Ann Almgren, Chad E Mitchell, Ji Qiang, David Grote, Alexander Sinn, Severin Diederichs, Maxence Thevenet, Luca Fedeli, Thomas Clark, Neil Zaim, Henri Vincenti, Jean-Luc Vay (2022)
20th Advanced Accelerator Concepts Workshop (AAC'22)

3D deep convolutional neural network segmentation model for precipitate and porosity identification in synchrotron X-ray tomograms
S. Gaudez, M. Ben Haj Slama, A. Kaestner, Manas Vijay Upadhyay (2022)
Journal of Synchrotron Radiation

Leveraging Serial MRI Radiomics and Machine Learning to Predict Risk of Radiation Necrosis in Patients with Brain Metastases Managed with Stereotactic Radiation and Immunotherapy
H. Elhalawani, L.A. Hammoudeh, D.N. Cagney, J.M. Qian, A. Martin, J. Zgrabik, J. Meyers, K.J. Pataki, K. Martin, Y. Khouj, C. Verry, W.L. Bi, O. Arnaout, S.M. Christ, B. Alexander, S. Tanguturi, R. Rahman, D. Haas-Kogan, A.A. Aizer (2022)
64th ASTRO Annual Meeting

Neural networks for rapid phase quantification of cultural heritage X-ray powder diffraction data
Victor Poline, Ravi Raj Purohit Purushottam Raj Purohit, Pierre Bordet, Nils Blanc, Pauline Martinetto (2024)
Journal of Applied Crystallography

Understanding error propagation in deep learning neural network (DNN) accelerators and applications
Guanpeng Li, Siva Kumar Sastry Hari, Michael B. Sullivan, Timothy Tsai, Karthik Pattabiraman, Joel Emer, Stephen W. Keckler (2017)

Unknown Venue

Survey and Benchmarking of Machine Learning Accelerators
Albert Reuther, Peter Michaleas, Michael Jones, Vijay Gadepally, Siddharth Samsi, Jeremy Kepner (2019)
Unknown Venue

A Survey of Accelerator Architectures for Deep Neural Networks
Yiran Chen, Yuan Xie, Linghao Song, Fan Chen, Tianqi Tang (2020)
Engineering

RBF neural net based classifier for the AIRIX accelerator fault diagnosis
J. C. Ribes, G. Delaunay, J. Delvaux, E. Merle, M. Mouillet (2000)
arXiv

Railway Wheel Impact Force and Alert Prediction Using Machine Learning Models
Gajendra Malviya, Shripad Salsingikar (2025)
AIRO Springer Series

RadiSimCLIP: A Radiology Vision-Language Model Pretrained on Simulated Radiologist Learning Dataset for Zero-Shot Medical Image Understanding
Minhui Tan, Qingxia Wu, Boyang Zhang, Genqiang Ren, Jianlong Nie, Zhong Xue, Xiaohuan Cao, Dinggang Shen (2025)
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Machine Learning for Precision Dental Diagnosis: Real-Time X-Ray Detection and Patient Record Integration—SmiloScope
M. S. Padmini, Asha Rani Mahadeva, Madhu Nagaraj, Namratha Gopinath (2025)
Information Systems Engineering and Management

A Living Review Pipeline for AI/ML Applications in Accelerator Physics
Adnan Ghribi (2025)
arXiv

A Living Review Pipeline for AI/ML Applications in Accelerator Physics
Ghribi, Adnan (2025)
arXiv

Preventive Maintenance of Mining Excavators Using Machine Learning: Enhancing Operational Efficiency and Cost-Effectiveness
Syed Adnan Ahmad, Prakash Kumar (2025)
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Dibya Tripathi, Kheelraj Pandey, A. K. Chauhan (2025)
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Prediction of Tensile Strength and Impact Strength in Fused Deposition Modeling Using a Machine Learning Pipeline
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TAIDL: Tensor Accelerator ISA Definition Language with Auto-generation of Scalable Test Oracles
Devansh Jain, Marco Frigo, Jai Arora, Akash Pardeshi, Zhihao Wang, Krut Patel, Charith Mendis (2025)
Proceedings of the 2025 58th IEEE/ACM International Symposium on Microarchitecture

BitL: A Hybrid Bit-Serial and Parallel Deep Learning Accelerator for Critical Path Reduction
Seunghyun Lee, Dongho Ha, Sungbin Kim, Sungwoo Kim, Hyunwuk Lee, Won Woo Ro (2025)
Proceedings of the 2025 58th IEEE/ACM International Symposium on Microarchitecture

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Sensors

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Bin-bin Guo, Yimin Mao, A Yaser, Neelakandan Chandrasekaran, Le Kang, Wenhao Li, Decheng Miao (2025)
Communications in Computer and Information Science

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AIJ Journal of Technology and Design

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Smart and Sustainable Built Environment

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Pathak, Abhishek, Hanlet, Pierrick, Miceli, Tia (2025)
Journal

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Mechanisms and Machine Science

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Advanced Functional Materials

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Institute of Electrical and Electronics Engineers (IEEE)

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Arabian Journal for Science and Engineering

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Proceedings of the International Workshop on Application-driven Point Cloud Processing and 3D Vision

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Frontiers of Computer Science

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Springer Science and Business Media LLC

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arXiv

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arXiv

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Shelbaya, Olivier, Jung, Paul, Kester, Oliver, Hassan, Omar (2025)
JACoW

Deep Learning-Based Classification of Spine X-Ray Images Using Attention Mechanisms
Asaram Pandurang Janwale, Minal Dutta, Savita Mohurle, Vaduguru Venkata Ramya (2025)
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Juhwan Lee, Mohamed H.E. Makhlouf, Sadeer Al-Kindi, Ammar Hoori, Tao Hu, Hao Wu, Justin Kim, Sanjay Rajagopalan, David Wilson (2025)
Circulation

A data-driven hybrid method combining experiments, finite element modeling and machine learning for impact response prediction of TPU composites
Shunqi Zhang, Luca Lomazzi, Dayou Ma, Andrea Manes (2025)
International Journal of Structural Integrity

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Olivia Jullian Parra, Julián García Pardiñas, Lorenzo Del Pianta Pérez, Maximilian Janisch, Suzanne Klaver, Thomas Lehéricy, Nicola Serra (2025)
Machine Learning: Science and Technology

ESTIMATIVA DE VIDA ÚTIL REMANESCENTE DE PLACAS CERÂMICAS UTILIZADAS EM FILTRAGEM DE MINÉRIO DE FERRO ATRAVÉS DE MODELO DE CONFIABILIDADE E MÉTODOS DE MACHINE LEARNING APLICADOS A VARIÁVEIS DE PROCESSO INDUSTRIAL DE UM SISTEMA PIMS
ROBERT BENTO FLORENTINO, LUIZ GUSTAVO LOURENÇO MOURA (2025)
Anais do Encontro Nacional de Engenharia de Produção

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