

# Accelerator ML Living Review

## Summary Statistics

per\_year: 11  
per\_category: 16  
per\_venue/journal: 3  
per\_keyword: 14  
monthly\_trends: 74

## Papers

### **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

### **Accelerating Transformers in Online RL**

Daniil Zelezetsky, Alexey K. Kovalev, Aleksandr I. Panov (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

### **TrackFormers Part 2: Enhanced Transformer-Based Models for High-Energy Physics Track Reconstruction**

Sascha Caron, Nadezhda Dobрева, Maarten Kimpel, Uraz Odyurt, Slav Pshenov, Roberto Ruiz de Austri Bazan, Eugene Shalugin, Zef Wolffs, Yue Zhao (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

**TrackFormers Part 2: Enhanced Transformer-Based Models for High-Energy Physics Track Reconstruction**

Caron, Sascha, Dobрева, Nadezhda, Kimpel, Maarten, Odyurt, Uraz, Pshenov, Slav, Bazan, Roberto Ruiz de Austri, Shalugin, Eugene, Wolffs, Zef, Zhao, Yue (2025)  
InspireHEP

**Fast, accurate, and precise detector simulation with vision transformers**

Favaro, Luigi, Giammanco, Andrea, Krause, Claudius (2025)  
InspireHEP

**The promise of artificial intelligence-assisted radiotherapy for prostate cancer in Morocco: a transformational opportunity**

Fadila Kouhen, Meryem Naciri, Hanae El Gouache, Nadia Errafiy, Abdelhak Maghous (2025)  
OpenAlex

**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

**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

**A Hybrid Neural Network for High-Throughput Attosecond Resolution Single-shot X-ray Pulse Characterization**

Jack Hirschman, Benjamin Mencer, Razib Obaid, Amanda Shackelford, Ryan Coffee (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

**Microsecond-Latency Feedback at a Particle Accelerator by Online Reinforcement Learning on Hardware**

Luca Scomparin, Michele Caselle, Andrea Santamaria Garcia, Chenran Xu, Edmund Blomley, Timo Dritschler, Akira Mochihashi, Marcel Schuh, Johannes L. Steinmann, Erik Bründermann, Andreas Kopmann, Jürgen Becker, Anke-Susanne Müller, Marc Weber (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 (2024)  
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 Caliori, Adrian Oeftiger, Oliver Boine-Frankenheim (2024)  
arXiv

**Time-inversion of spatiotemporal beam dynamics using uncertainty-aware latent evolution reversal**

Mahindra Rautela, Alan Williams, Alexander Scheinker (2024)  
arXiv

**Linac\_Gen: integrating machine learning and particle-in-cell methods for enhanced beam dynamics at Fermilab**

Abhishek Pathak (2024)  
arXiv

**Towards latent space evolution of spatiotemporal dynamics of six-dimensional phase space of charged particle beams**

Mahindra Rautela, Alan Williams, Alexander Scheinker (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

**Efficient 6-dimensional phase space reconstruction from experimental measurements using generative machine learning**

Ryan Roussel, Juan Pablo Gonzalez-Aguilera, Auralee Edelen, Eric Wisniewski, Alex Ody, Wanming Liu, Young-Kee Kim, John Power (2024)

arXiv

**A conditional latent autoregressive recurrent model for generation and forecasting of beam dynamics in particle accelerators**

Mahindra Rautela, Alan Williams, Alexander Scheinker (2024)

arXiv

**Synthesizing Particle-in-Cell Simulations Through Learning and GPU Computing for Hybrid Particle Accelerator Beamlines**

Ryan T. Sandberg, Remi Lehe, Chad E. Mitchell, Marco Garten, Andrew Myers, Ji Qiang, Jean-Luc Vay, Axel Huebl (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  $Se^-/e^+$  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

**Uncertainty Aware Deep Learning for Particle Accelerators**

Kishansingh Rajput, Malachi Schram, Karthik Somayaji (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 Kuroпка, 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 Caliri, 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 tuning**

Kilean Hwang, Tomofumi Maruta, Alexander Plastun, Kei Fukushima, Tong Zhang, Qiang Zhao, Peter Ostroumov, Yue Hao (2022)

arXiv

**Neural Networks as Effective Surrogate Models of Radio-Frequency Quadrupole Particle Accelerator Simulations**

Joshua Villarreal, Daniel Winklehner, Daniel Koser, Janet Marie Conrad (2024)

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 Hirlander (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

**Next Generation Computational Tools for the Modeling and Design of Particle Accelerators at Exascale**

Axel Huebl, Remi Lehe, Chad E. Mitchell, Ji Qiang, Robert D. Ryne, Ryan T. Sandberg, Jean-Luc Vay (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

**Explainable Machine Learning for Breakdown Prediction in High Gradient RF Cavities**

Christoph Obermair, Thomas Cartier-Michaud, Andrea Apollonio, William Millar, Lukas Felsberger, Lorenz Fischl, Holger Severin Bovbjerg, Daniel Wollmann, Walter Wuensch, Nuria Catalan-Lasheras, Marçà Boronat, Franz Pernkopf, Graeme Burt (2022)  
arXiv

**Mixed Diagnostics for Longitudinal Properties of Electron Bunches in a Free-Electron Laser**

J. Zhu, N. M. Lockmann, M. K. Czwalińska, 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

**Recurrent Neural Networks for anomaly detection in the Post-Mortem time series of LHC superconducting magnets**

Maciej Wielgosz, Andrzej Skocze<sup>■</sup>, Matej Mertik (2017)  
arXiv

**Using LSTM recurrent neural networks for monitoring the LHC superconducting magnets**

Maciej Wielgosz, Andrzej Skocze<sup>■</sup>, 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 Snuerink, 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

**Hopfield Network based Control and Diagnostics System for Accelerators**

N. Joshi, O. Meusel, H. Podlech (2018)

arXiv

**The model of an anomaly detector for HiLumi LHC magnets based on Recurrent Neural Networks and adaptive quantization**

Maciej Wielgosz, Matej Mertik, Andrzej Skoczko, 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

**Developing Robust Digital Twins and Reinforcement Learning for Accelerator Control Systems at the Fermilab Booster**

D. Kafkes, M. Schram (2021)

arXiv

**Accelerator Real-time Edge AI for Distributed Systems (READS) Proposal**

K. Seiya, K. J. Hazelwood, M. A. Ibrahim, V. P. Nagaslaev, D. J. Nicklaus, B. A. Schupbach, R. M. Thurman-Keup, N. V. Tran, H. Liu, S. Memik (2021)

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

**Turn-Key Constrained Parameter Space Exploration for Particle Accelerators Using Bayesian Active Learning**

Ryan Roussel, Juan Pablo Gonzalez-Aguilera, Young-Kee Kim, Eric Wisniewski, Wanming Liu, Philippe Piot, John Power, Adi Hanuka, Auralee Edelen (2021)

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

**Particle Motion in Hamiltonian Formalism**

Yannis Papaphilippou (2024)  
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

**Subgroup-Specific Risk-Controlled Dose Estimation in Radiotherapy**

Paul Fischer, Hannah Willms, Moritz Schneider, Daniela Thorwarth, Michael Muehlebach, Christian F. Baumgartner (2024)  
arXiv

**Automated GI tract segmentation using deep learning**

Manhar Sharma (2023)  
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**Domain Adaptation of Automated Treatment Planning from Computed Tomography to Magnetic Resonance**

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