

# Accelerator ML Living Review

## Summary Statistics

per\_year: 11  
per\_category: 16  
per\_venue/journal: 94  
per\_keyword: 14  
monthly\_trends: 76

## 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.Beam

**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., Kröniger, K., Maire, A., Menjo, H., Morejon, L., Ostapchenko, S., Paakkinnen, 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, Vojtěch, 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. Kubitskyi, 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 Berlizoz, 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 Ogrenç, 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 Colocco, 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 tuning**  
Kilean Hwang, Tomofumi Maruta, Alexander Plastun, Kei Fukushima, Tong Zhang, Qiang Zhao, Peter Ostromov, 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 Viehaus, 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 Skoczelak, 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 Rybarczyk (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**

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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 Marek, 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)

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**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 ARIX 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**

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Information Systems Engineering and Management

**A Living Review Pipeline for AI/ML Applications in Accelerator Physics**

Adnan Ghribi (2025)  
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**Preventive Maintenance of Mining Excavators Using Machine Learning: Enhancing Operational Efficiency and Cost-Effectiveness**

Syed Adnan Ahmad, Prakash Kumar (2025)  
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**TAIDL: Tensor Accelerator ISA Definition Language with Auto-generation of Scalable Test Oracles**

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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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**Enhancing RFI management in construction through machine learning-driven predictive models**  
Neziha Yilmaz, Esin Ergen, Ahmet Muhtar Citipitioglu (2025)  
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Advanced Functional Materials

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Bozhen Jiang, Jing Qu, Qin Wang (2025)  
Institute of Electrical and Electronics Engineers (IEEE)

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Milo Beliën, Metehan Doyran (2025)  
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Neha M. Deshmukh, Yashwant S. Munde, Surajit S. Wadagaonkar, Avinash S. Shinde, Prashant R. Anerao (2025)  
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**Reinforcement Learning for Accelerator Beamline Control: a simulation-based approach**

Anwar Ibrahim, Alexey Petrenko, Maxim Kaledin, Ehab Suleiman, Fedor Ratnikov, Denis Derkach (2025)

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Ibrahim, Anwar, Petrenko, Alexey, Kaledin, Maxim, Suleiman, Ehab, Ratnikov, Fedor, Derkach, Denis (2025)

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**Automated beam tuning of the TRIUMF ISAC facility**

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

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**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)

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Shunqi Zhang, Luca Lomazzi, Dayou Ma, Andrea Manes (2025)

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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

**Reinforcement Learning for Accelerator Beamline Control: a simulation-based approach**

Ibrahim Anwar, Petrenko, Alexey, Kaledin, Maxim, Suleiman, Ehab, Ratnikov, Fedor, Derkach Denis (2025)

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**A Machine Learning Approach to Li-Ion Battery Module**

Ram U. Kalyankar, Kalpak R. Sagar, Vipul M. Patel, Jyotirmay Banerjee, Hemantkumar B. Mehta

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Shih-Kai Chou, Mengran Zhao, Cheng-Nan Hu, Kuang-Chung Chou, Carolina Fortuna, Jernej

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Rapid Prototyping Journal

**Beam Energy Forecasting using Machine Learning at the CLEAR accelerator**

Gilardi, Antonio, Malyzhenkov, Alexander, Petersson, Alfred, Mostacci, Andrea, Pollastro, Andrea, Aksoy, Avni, Filippetto, Daniele, Gamba, Davide, Granados, Eduardo, Tangari, Giacomo, Sjobak, Kyrre, Bonnard, Ladislas, Wroe, Laurence, Carranza-García, Manuel, Franek, Ondrej, Korysko, Pierre, Corsini, Roberto, Rieker, Vilde, Farabolini, Wilfrid, Mazzoni, Stefano (2025)  
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**Machine learning approach to MDI optimization for 3 TeV c.o.m. Muon Collider**

Castelli, Luca (2025)

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Montanari, Carlo Emilio, Di Croce, Davide, Van der Veken, Frederik, Giovannozzi, Massimo, Appleby, Robert, Redaelli, Stefano, Pieloni, Tatiana (2025)

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Sun Yue, Bellandi, Andrea, Eichler, Annika, Richter, Bozo, Diomedè, Marco, Schmidt, Christian, Schlarb, Holger, Branlard, Julien, Herrmann, Max (2025)

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Haymanot Derebe Bizuneh (2025)

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Papoyan, V., Aparin, A., Ayriyan, A., Grigorian, H., Korobitsin, A. (2025)

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**ChatEED: An agentic retrieval assistant for accelerator operators**

Aaron Zachary Reed, Claudio Bisegni, Sandesh Shrestha, Michelle Huang, Daniel Ratner (2025)

Proceedings of the SC '25 Workshops of the International Conference for High Performance

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**Machine Learning in Semiconductor Failure Analysis: Techniques and Case Studies (2025 Update)**

Michael Kögel, Sebastian Brand, Frank Altmann (2025)

International Symposium for Testing and Failure Analysis

**NNia-8: An 8-Core RISC-V Neural Network Inference Accelerator with Efficient Processing Elements and Memory Utilization**

Xingbo Wang, Yucong Huang, Xinyu Kang, Yuru Li, Qi Wang, Terry Tao Ye (2025)

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**Railway Track Obstacle Detection and Alert System Using Deep Learning**

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**Deep Learning Assisted Modeling for  $\chi^{(2)}$  Nonlinear Optics**

Jack Hirschman, Erfan Abedi, Minyang Wang, Hao Zhang, Abhimanyu Borthakur, Justin Baker,

Andrea L. Bertozzi, Randy Lemons, Sergio Carajo (2025)

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**Robust Training to Secure Automated AI Accelerator Generation Against Malicious Platforms**

Chao Guo, Youhua Shi (2025)

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**Machine learning with ultrasound examination for prediction of intraoperative hypotension during robot-assisted radical prostatectomy**

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**Categories of Defect Prediction**

Zhou Xu (2025)

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**Optimized Supervised Machine Learning for Accurate Estimation of Reinforcement in RC Beams and Columns**

Nhan Thanh Vu Nguyen, Chon Tran, Duong Thai Le, Quy Thue Nguyen (2025)  
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Claude Sammut (2025)  
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**Automated RF Phase Adjustment for Beam Stabilization in the Fermilab Linac**

R. R. Chichili, J. A. Sulskis, R. Sharankova, B. Vamanan, S. Ravi (2025)  
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**Fast Adaptive Neural Control of Resonant Extraction at Fermilab**

A. Whitbeck, J. Berlitz, K. Danison-Fieldhouse, K. Hazelwood, M. Khan, J. Mitrevski, A. Narayanan, J. St. John, N. Tran, J. Ji, M. Walter (2025)  
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**Hybrid deep semantic query expansion using multi-objective fireworks-transformer optimization: a reinforcement learning approach**

Fouad Bekkari, Med Redouane Kafi, Amine Khaldi (2025)  
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Chichili, R.R., Sulskis, J.A., Sharankova, R., Vamanan, B., Ravi, S. (2025)  
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**Study on estimation of internal cracks using electromagnetic waves and machine learning**

Hinata Yamamoto, Hitoshi Ito, Toshiaki Mizobuchi (2025)  
Proceedings of the Institution of Civil Engineers - Construction Materials

**A New Pulsed Neutron-Gamma Density Logging Method Based on Gamma-Ray Spectra and Machine Learning**

Duo Dong, Qiong Zhang, Defu Zang, Wensheng Wu, He Meng, Yunlong Ge, Hu Wang, Xiaoyu Song, Shitao Xiong (2025)  
ACS Omega

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Anjun Chen, Roufeng Lu, Ruobing Han, Ran Huang, Guanjie Qin, Jian Wen, Qinghua Li, Zhiyong Zhang, Wei Jiang (2025)  
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Xinyu Song, Lian Duan, Guangyu Wang, Xiangyu Zhang, Qing Xiao, Guyu Dai, Jing Li, Yinglin Peng, Sen Bai, Guangjun Li (2025)

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**PREDICTING SUSPECTED RADIATION NECROSIS IN BRAIN CANCER PATIENTS WITH A MACHINE LEARNING MODEL BASED ON THE PROTON LINEAL ENERGY SPECTRUM**

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**First Experimental Demonstration of Machine Learning-Based Tuning on the PSI Injector 2 Cyclotron**

M. Haj Tahar, W. Joho, E. Solodko, M. Bocchio, S. Marquie, M. Busch, A. Barchetti, J. Grillenberger, J. Snuverink, M. Schneider (2025)

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Dr. Chethan L S, Akash H E, Sanketh M B, Chinmay k karatekar, Revanth Kumar (2025) International Journal of Scientific Research in Engineering and Management

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Sandrine Marquié (2025)

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**Xopt and Badger: a machine learning ecosystem for real-time accelerator control and optimization**

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Timothy Nunan (2025)

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**Photonic Quantum-Accelerated Machine Learning**

Rambach, Markus, Roy Abhishek, Gilchrist, Alexei, Sakurai, Akitada, Munro, William J., Nemoto Kae, White, Andrew G. (2025)

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