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## **OR22 - Machine Learning as a tool for accelerator operation: status, pros, cons and futur deployments.**

*Tuesday, 12 September 2023 09:00 (25 minutes)*

“Machine Learning (ML) is now widely used in the Industry. Applications in robotic and autonomous vehicles have proven that control theories can benefit greatly from these technologies. The same is true in science, Deep Learning (DL) offers great expectations for science and has demonstrated its ability to extract unexpected relationships between inputs and outputs in complex data sets. One of the first areas in which deep learning has made a decisive contribution is the analysis of medical images. Computer-aided diagnostic systems are now effectively assisting doctors and researchers.

High-energy physics is already grateful for the faster simulations and refined information extracted from the massive datasets produced by the machines. Decision Trees, Neural Networks and Bayesian Learning are very popular to obtain evidence for new physics, that is, physics beyond the Standard Model (BSM), at accelerators such as the Large Hadron Collider (LHC) at CERN (ref. in full article), but what about the particle accelerators control ? How does ML enter the world of Accelerator Operation? What could we expect from these technologies? How is it perceived by the Accelerator Operators (AO)?

This article presents a survey of the actual ML based applications used in the CERN control rooms. It also gives a list of the pros, cons and limitations as seen by the CERN Operation teams. Finally it quickly presents the futur deployment that are already foreseen.”

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**Session Classification:** How Does the Machine Learning Integrate with Operation?