

The Reinforcement Learning for Autonomous Accelerators International Collaboration

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Reinforcement Learning (RL) is a unique learning paradigm that is particularly well-suited to tackle complex control tasks, can deal with delayed consequences, and learns from experience without an explicit model of the dynamics of the problem. These properties make RL methods extremely promising for applications in particle accelerators, where the dynamically evolving conditions of both the particle beam and the accelerator systems must be constantly considered.

While the time to work on RL is now particularly favourable thanks to the availability of high-level programming libraries and resources, its implementation in particle accelerators is not trivial and requires further consideration.

In this context, the Reinforcement Learning for Autonomous Accelerators (RL4AA) international collaboration was established to consolidate existing knowledge, share experiences and ideas, and collaborate on accelerator-specific solutions that leverage recent advances in RL.

The collaboration was launched in February 2023 during the RL4AA'23 workshop at the Karlsruhe Institute of Technology, and the second workshop is held in Salzburg, Austria in February 2024. These workshops feature keynote lectures by experts, technical presentations, advanced tutorials, poster sessions, and contributions on RL applications in various facilities. The next upcoming workshop will be held in February 2023 at DESY, Hamburg.

Primary Keyword

reinforcement learning

Secondary Keyword

AI-based controls

Tertiary Keyword

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