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Beam Trajectory Control with Lattice-Agnostic Reinforcement Learning

In recent work, it has been shown that reinforcement learning (RL) is capable of outperforming existing methods on accelerator tuning tasks. However, RL algorithms are difficult and time-consuming to train, and currently need to be retrained for every single task. This makes fast deployment in operation difficult and hinders collaborative efforts in this research area. At the same time, modern accelerators often reuse certain structures, such as transport lines consisting of several magnets, within or across facilities, leading to similar tuning tasks.
In this contribution, we use different methods, such as domain randomization, to allow an agent trained in simulation to easily be deployed to a group of similar tasks. Preliminary results show that this training method is transferable and allows the RL agent to control the beam trajectory at similar lattice sections of two different real linear accelerators. We expect that future work in this direction will enable faster deployment of learning-based tuning routines, and lead towards the ultimate goal of autonomous operation of accelerator systems and transfer of RL methods to most accelerators.

Possible contributed talk

No

Are you a student?

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