

Injection optimization using machine learning at the Cooler Synchrotron COSY

A. Awal

Institut für Kernphysik, Forschungszentrum Jülich

a.awal@fz-juelich.de

Abstract

In accelerators it is usually desired to have a particle beam with high intensity and small emittance. A key factor that limits the beam intensity in storage rings are injection losses. The setup of the Injection Beam Line (IBL) depends on a large number of configurations in a complex, non-linear, and time-dependent way. Machine learning methods exhibit promising algorithms to effectively tackle the challenge of optimize the IBL setup. In this research, Reinforcement Learning (RL) techniques are planned to be utilized to optimize the IBL for the Cooler Synchrotron (COSY) at Forschungszentrum Jülich (FZJ). Both simulation environment and actual data from COSY are to be used in the process of training the RL agent. The goal is to increase the beam intensity inside COSY while decreasing the setup time required. This method has the potential to be applied in future accelerators like the FAIR facility.