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Reinforcement learning-based beam orbit correction for the KOMAC linac

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Optimal control is inherent issue in particle accelerators, mainly due to nonlinear and time-varying effects caused by unknown errors such as external environment changes, misalignment, and fabrication defects. In this regard, machine learning techniques are promising to go beyond heuristic methods or traditional optimization algorithms. Reinforcement learning is suited to solve the beam orbit correction problem in which various error factors, control magnets, and diagnostic devices are involved through combinatorial optimization. The training environment implemented based on the beam physics simulator and the learning results are addressed for the KOMAC proton linear accelerator.

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