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## Machine learning a fixed point action

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Lattice gauge-equivariant convolutional neural networks (LGE-CNNs) can be used to form arbitrarily shaped Wilson loops and can approximate any gauge-covariant or gauge-invariant function on the lattice. Here we use LGE-CNNs to describe fixed point (FP) actions which are based on inverse renormalization group transformations. FP actions are classically perfect, i.e., they have no lattice artefacts on classical gauge-field configurations satisfying the equations of motion, and therefore possess scale invariant instanton solutions. FP actions are tree-level Symanzik-improved to all orders in the lattice spacing and can produce physical predictions with very small lattice artefacts even on coarse lattices. They may therefore provide a solution to circumvent critical slowing down towards the continuum limit.

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