19th International Conference on
QCD in Extreme Conditions (XQCD 2023)

Contribution ID: **44** Type: **Poster**

On gauge equivariant neural networks and global symmetries

Wednesday, July 26, 2023 7:35 PM (25 minutes)

Recently, efforts have been increased to incorporate various symmetries into the architectures of neural networks. Lattice gauge equivariant Convolutional Neural Networks (L-CNNs) [1] are designed to respect local gauge symmetry, an essential component in lattice gauge theories. This makes them a promising approximator of gauge covariant functions on a lattice. In addition to local symmetries, many observables exhibit global symmetries. This calls for an extension of the L-CNN beyond translational symmetry to a more general symmetry group, including e.g. rotations and reflections [2].

In this talk, I will review some essential layers of the L-CNN and discuss why they can be used to approximate any gauge equivariant function on the lattice. Then, I will examine how these layers can be generalized to respect not only global translations, but also rotations and reflections. Finally, I will discuss globally and locally equivariant activation functions and pooling layers.

[1] M. Favoni, A. Ipp, D. I. Müller, D. Schuh, Phys. Rev. Lett. 128 (2022), 032003, [arXiv:2012.12901]
[2] J. Aronsson, D. I. Müller, D. Schuh [arXiv:2303.11448]

Author: SCHUH, Daniel (TU Wien)

Co-authors: IPP, Andreas (TU Wien); Dr MÜLLER, David (TU Wien); ARONSSON, Jimmy (Chalmers University of Technology); FAVONI, Matteo (TU Wien)

Presenter: SCHUH, Daniel (TU Wien)

Session Classification: Poster session