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# Symmetry equivariant neural networks

*Friday, 22 December 2023 12:15 (30 minutes)*

In this talk, I will present the advantages of using neural networks that respect symmetries over their non-symmetric counterparts in lattice field theory applications. The concept of equivariance will be explained, together with the reason why it is a sufficient condition for the network to respect the desired symmetry. The benefits of equivariant networks will first be exemplified in the context of translational symmetry on a complex scalar field toy model [1]. Then, the discussion will be extended to gauge theories by introducing Lattice Gauge Equivariant Convolutional Neural Networks (L-CNNs) [2]. After dealing with regression tasks on physical observables such as Wilson loops, I will present the developments in the application of L-CNNs to the generation of gauge field configurations [3].

[1] S.~Bulusu, M.~Favoni, A.~Ipp, D.~I.~M\"uller, D.~Schuh, Phys.~Rev.~D 104, 074504 (2021), arXiv:2103.14686
[2] M. Favoni, A. Ipp, D. I. Müller, D. Schuh, Phys.Rev.Lett. 128 (2022), 032003, arXiv:2012.12901
[3] M. Favoni, A. Ipp, D. I. Müller, EPJ Web of Conferences 274, 09001 (2022), arXiv:2212.00832

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