Contribution ID: **37**   Type: **Oral presentation**

Machine learning with quantum field theories

Thursday 29 July 2021 05:00 (15 minutes)

The precise equivalence between discretized Euclidean field theories and a certain class of probabilistic graphical models, namely the mathematical framework of Markov random fields, opens up the opportunity to investigate machine learning from the perspective of quantum field theory. In this talk we will demonstrate, through the Hammersley-Clifford theorem, that the ϕ^4 scalar field theory on a square lattice satisfies the local Markov property and can therefore be recast as a Markov random field. We will then derive from the ϕ^4 theory machine learning algorithms and neural networks which can be viewed as generalizations of conventional neural network architectures. Finally, we will conclude by presenting applications based on the minimization of an asymmetric distance between the probability distribution of the ϕ^4 machine learning algorithms and that of target probability distributions.

Authors: BACHTIS, Dimitrios;   AARTS, Gert (Swansea University);   LUCINI, Biagio (Swansea University)

Presenter: BACHTIS, Dimitrios

Session Classification: Algorithms (including Machine Learning, Quantum Computing, Tensor Networks)

Track Classification: Algorithms (including Machine Learning, Quantum Computing, Tensor Networks)