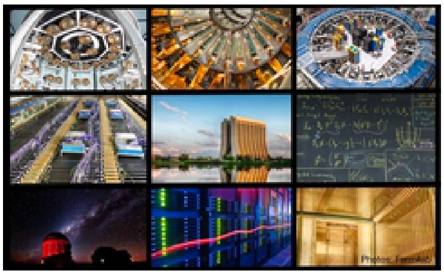

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Challenging Black Box Paradigms at the Nexus of Top Quark Physics and Artificial Intelligence

Wednesday, 18 August 2021 12:45 (15 minutes)

Recently, machine learning applications, which have become extremely widespread in many fields of study, have enabled new work in the field of top quark physics. Deep learning models, which are biologically inspired algorithms that are rough simulations of the brain and contain interconnected nodes and layers, have particularly contributed to improved measurement techniques in recent years. For example, training convolutional neural networks on simulated collisions has led to gaining deeper insights into characteristics of particular signals in the data (e.g. a collision that resulted in the production of a top quark and a Z boson). However, as in many other fields of study, one issue with the use of deep neural networks is the lack of interpretability. Black box algorithms, whereby it is difficult for researchers and end users of the technology to discern the decision-making process within the model's various layers, are a challenge because they do not allow us to understand the value of our results and can potentially hide biases. Thus, in this talk, we discuss opening up these black boxes by completing tasks such as visualizing input weights, creating gradient-weighted class activation maps, and conducting dimensionality reduction. The goal of this work is to make exciting new advances at the nexus of machine learning and top quark physics more accessible and trustworthy.

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