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Style-based quantum generative adversarial networks for Monte Carlo events

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The Large Hadron Collider is a very complex machine providing millions of collisions per second. Simulating events to compare theory and data requires a lot of computing power, in particular for the event generation and the whole analysis toolchain. Machine-learning techniques may provide new avenues to optimize the computing power. This talk presents a novel quantum generator in the context of generative adversarial networks for Monte Carlo event generation that is able to learn underlying distributions of observable and generate a larger sample out of a smaller training sample. The proposed quantum algorithm has been deployed on real quantum hardware of two different types and shows good results with very shallow circuits, which is of great advantage in the current era of noisy intermediate-scale quantum computers.

Primary authors: BRAVO-PRIETO, Carlos (Technology Innovation Institute); GRABOWSKA, Dorota (CERN); CÈ, Marco (AEC and ITP, Universität Bern); BAGLIO, Julien (CERN); CARRAZZA, Stefano (TIF Lab, Dipartimento di Fisica, Università degli Studi di Milano); FRANCIS, Anthony (Institute of Physics, National Yang Ming Chiao Tung University)

Presenter: BRAVO-PRIETO, Carlos (Technology Innovation Institute)

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