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quGAN for fast calorimeter simulation

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High-energy physics relies on large and accurate samples of simulated events, but generating these samples with GEANT4 is CPU intensive. The ATLAS experiment has employed generative adversarial networks (GANs) for fast shower simulation, which is an important approach to solving the problem. Quantum GANs, leveraging the advantages of quantum computing, have the potential to outperform standard GANs.
Considering the limitations of the current quantum hardware, we conducted preliminary studies utilizing a hybrid quantum-classical GAN model to produce 1D and 2D calorimeter outputs on quantum simulators. The impact of quantum noise is also investigated.

Primary author: HUANG, Xiaozhong (IHEP)

Presenter: HUANG, Xiaozhong (IHEP)

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