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# Simulation and generative models in high energy physics

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High-energy particle physic experiments rely heavily on billions of CPU hours per year for data processing purposes. The production of synthetic data through Geant4-based Monte Carlo simulation describing particle shower developments in the calorimeter is the single most compute-intensive tasks. Fast simulation techniques are already today indispensable. With the upcoming high-luminosity upgrade of the LHC experiments even larger simulated datasets are needed to support physics analyses. Current "classical" fast calorimeter simulation techniques are based on parametrizations of the calorimeter response. Generative models have the potential to learn the appropriate detector output response. The goal is to replace the slow but accurate Geant4-based Monte Carlo simulation by a fast, generic and accurate (enough) generative model. Both studies of Variational Auto-Encoders (VAEs) and Generative Adversarial Networks (GANs) will be presented.

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