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Deep Generative Models for Calorimeter Simulations

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Deep generative models (DGMs) have had a huge impact on our society in the past year. Known to many via chatbots such as ChatGPT and LLama, or image generators like Dall-E and midjourney, they have shown impressive performance on various text- and image-based tasks.

I will present an overview of current deep generative models and their application to particle physics and especially detector simulation. Adopted to detector simulation and calorimeter showers, DGMs promise samples that are nearly indistinguishable from GEANT4, at 4-5 orders of magnitude smaller generation times. I will also discuss lessons learned from the “Fast Calorimeter Simulation Challenge 2022”.

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