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CANADA-GAN (acronym and name subject to possible future change, please excuse)

We propose the application of our previously published Cross AtteNtion meAn-fielD mAtching CANADA-GAN for generating particle showers in high-granularity datasets. Results are presented for dataset 2 and 3. Point cloud generative models are known to benefit from higher granularity, making these datasets well-suited for high-granularity calorimeters. Although the regular architecture of the detector encourages the use of operations that capitalize on this regularity, we argue that such assumptions are over-idealistic for real physics applications. In our approach, the primary advantage of the regular architecture is the simplified dequantization process, which allows our model to potentially perform well on more complex and realistic detectors.

The proposed model is trained in an adversarial paradigm and demonstrates promising performance on marginal distributions (E, z, α, R) distributions, as well as energy-weighted distributions. The adversarial training paradigm helps to capture the intricate structure of particle showers and generate realistic samples. However, further research is required to develop more sophisticated metrics to accurately assess the model's performance in generating particle showers and handling the voxelization transformation.

Primary author: KÄCH, Benno (Deutsches-Elektronen Synchrotron (DESY))

Co-authors: Dr MELZER-PELLMANN, Isabell-Alissandra (DESY); SCHAM, Moritz; SCHNAKE, Simon (DESY / RWTH Aachen)

Presenter: KÄCH, Benno (Deutsches-Elektronen Synchrotron (DESY))

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