

ProGamer: PROgressively Growing Adversarial Marvellous (transformer-)Encoder Refinement - Benno Käch, Isabell Melzer-Pellmann, Dirk Krücker

Data generation based on Machine Learning has become a major research topic in particle physics. This is due to the current Monte Carlo simulation approach being computationally challenging for future colliders, which will have a significantly higher luminosity. The generation of collider data is similar to point cloud generation, but arguably more difficult as there are complex correlations between the points which need to be modelled correctly. A refinement model consisting of normalising flows and transformer encoders is presented. The normalising flow is 3-dimensional, meaning that a point cloud consists of independent and identically distributed points. This output is then refined by a transformer encoder, which is adversarially trained against another transformer encoder discriminator/critic. As the model is able to produce an arbitrary number of particles a progressively growing point cloud can be produced.