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Point Cloud Generation for Collider Events

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With current and future high-energy collider experiments' vast data collecting capabilities comes an increasing demand for computationally efficient simulations. Generative machine learning models allow fast event generation, yet so far are largely constrained to fixed data and detector geometries.

We introduce a novel generative machine learning setup for generation of permutation invariant point clouds with variable cardinality - a flexible data structure optimal for collider events such as jets. We show that our model scales well to large particle multiplicities and achieves good performance on quark and gluon jet data. To explain the behaviour of the generative model, we perform an analysis of the latent space.

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