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Higher Resolution and Angular Conditioning for Normalizing-Flow-based Generation of Calorimeter Showers

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Monte Carlo (MC) simulations are essential for collider experiments, enabling comparisons of experimental findings and theoretical predictions. However, these simulations are computationally demanding, and future developments, like increased event rates, are expected to exceed available computational resources. Generative modeling can substantially cut computing costs by augmenting MC simulations, thereby addressing this issue. To this end, last year, we presented ConvL2LFlows, a convolutional-flow-based generative model. This year, we present several improvements to this model, making it usable in realistic simulations. These improvements are: i) adding angular conditioning to generate showers with arbitrary incident angels ii) using nine times more bins than calorimeter readout-cells to be able to use the model for arbitrary incident points, and iii) integrating L2LFlows into the full simulation pipeline using DDFastShowerML.

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