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Calomplification: The Power of Generative Calorimeter Models

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Motivated by the high computational costs of classical simulations, machine-learned generative models can be extremely useful in particle physics and elsewhere. They become especially attractive when surrogate models can efficiently learn the underlying distribution, such that a generated sample outperforms a training sample of limited size. This kind of GANplification has been observed for simple Gaussian models [1] and large ranges of training sample sizes. In this talk, we extend this histogram based method to show the same effect for a physics simulation, specifically photon showers in an electromagnetic calorimeter [2].

[1] https://arxiv.org/abs/2008.06545
[2] https://arxiv.org/abs/2202.07352

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