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Enhancing Robustness: BSM Parameter Inference with n1D-CNN and Novel Data Augmentation

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This study explores the inference of BSM models and their parameters from kinematic distributions of collider signals through an n-channel 1D-Convolutional Neural Network (n1D-CNN). Our approach enables simultaneous inference from distributions of any fixed number of observables. As our training data are computationally expensive simulations, we also introduce a novel data augmentation technique that fully utilizes generated data. This involves adapting our architecture to include auxiliary information as additional inputs, allowing inference from any signal regions using the same trained network. To illustrate our approach, we apply the method to mono-X signals for inferring parameters of dark matter models.

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