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Fast approximation of SUSY NLO cross-sections using Deep Learning

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Although deep learning might appear as a magic black box one only needs to throw data at to receive a solution, the practical reality is always different and often difficult. This talk shall guide through an example for the process of constructing an AI for predicting a physical quantity, namely the pMSSM-19 NLO electroweakino production cross-section at the LHC for 13 TeV. Naively, one could assume that this is merely a simple regression task but as I will demonstrate, classifiers, active learning and feature engineering including an injection of deeper expert knowledge played a crucial role for solving this task and will, if not necessary, at least be beneficial for many other tasks. While the available Monte Carlo methods take several minutes per cross-section, the resulting AI is able to deliver $\approx 10^5$ NLO cross-sections per second with an average error of about 0.1 % and a maximum error below uncertainties.

Parallel Session

Precision Calculations and MC tools

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