

# Refining CMS Fast Simulation with ML-based regression

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The CMS Fast Simulation chain (FastSim) is roughly 10 times faster than the application based on the GEANT4 detector simulation and full reconstruction referred to as FullSim. This advantage however comes at the price of decreased accuracy in some of the final analysis observables. A machine learning-based technique to refine those observables has been developed and its status is presented here. We employ a regression neural network trained within the framework of Fast Perfekt, using a combination of multiple loss functions to provide post-hoc corrections to samples produced by the FastSim chain. This technique results in a higher accuracy FastSim and thus allows for wider usage of FastSim.

## Track

Detector simulation & event generation

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