

# AtFast3, the new ATLAS fast simulation tool

*Wednesday 2 November 2022 14:40 (20 minutes)*

AtFast3 is the new, high-precision fast simulation in ATLAS that was deployed by the collaboration to replace AtFastII, the fast simulation tool that was successfully used for most of Run2. AtFast3 combines a parametrization-based Fast Calorimeter Simulation and a new machine-learning-based Fast Calorimeter Simulation based on Generative Adversarial Networks (GANs). The new fast simulation improves the accuracy of simulating objects used in analyses when compared to Geant4, with a focus on those that were poorly modelled in AtFastII. In particular, the simulation of jets of particles reconstructed with large radii and the detailed description of their substructure, are significantly improved in Atfast3. During the next data-taking period, Run3, the fast simulation will become the main simulation used by analyses; for this reason, the collaboration is further improving the tool expanding the use of ML Preliminary results will be presented on the performance of the new AtFast3.

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**Session Classification:** Generative Models – Detector Level