

The new ATLAS Fast Calorimeter Simulation

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Many physics and performance studies with the ATLAS detector at the Large Hadron Collider require very large samples of simulated events, and producing these using the full GEANT4 detector simulation is highly CPU intensive.

Often, a very detailed detector simulation is not needed, and in these cases fast simulation tools can be used to reduce the calorimeter simulation time by a few orders of magnitude.

The new ATLAS Fast Calorimeter Simulation (FastCaloSim) is an improved parametrisation compared to the one used in the LHC Run-1.

It provides a simulation of the particle energy response at the calorimeter read-out cell level, taking into account

the detailed particle shower shapes and the correlations between the energy depositions in the various calorimeter layers.

It is interfaced to the standard ATLAS digitization and reconstruction software, and can be tuned to data more easily

than with GEANT4. The new FastCaloSim incorporates developments in geometry and physics lists of the last five years

and benefits from knowledge acquired with the Run-1 data. It makes use of statistical techniques such as principal component

analysis, and a neural network parametrisation to optimise the amount of information to store in the ATLAS simulation

infrastructure. It is planned to use this new FastCaloSim parameterization to simulate several billion events in the upcoming LHC runs.

In this talk, we will describe this new FastCaloSim parametrisation.

Primary Keyword (Mandatory)

Simulation

Secondary Keyword (Optional)

Artificial intelligence/Machine learning

Tertiary Keyword (Optional)

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