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Fast shower simulation in ATLAS Calorimeter

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The simulation of the ATLAS detector is largely dominated by the showering of electromagnetic particles in the heavy parts of the detector, especially the electromagnetic barrel and endcap calorimeters. Two procedures have been developed to accelerate the processing time of EM particles in these regions: (1) a fast shower parameterization and (2) a frozen shower library. Both work by generating the response of the calorimeter to electrons and positrons with Geant 4, and then re-importing the response into the simulation at run-time.

In the fast shower parameterization technique, a parameterization is tuned to single electrons and used later by simulation. In the frozen shower technique, actual showers from low-energy particles are imported into the simulation. Simulation in the presence of frozen showers is then required to develop the shower down to ~ 1 GeV, at which point the shower is terminated by substituting a frozen shower. Judicious use of both techniques over the entire electromagnetic portion of the ATLAS calorimeter produces an important improvement of CPU time. We discuss the algorithms and their performance in this talk.

Submitted on behalf of Collaboration (ex, BaBar, ATLAS)

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