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EvtGen project in ATLAS

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The project "EvtGen in ATLAS"has the aim of accommodating EvtGen into the LHC-ATLAS context. As such it comprises both physics and software aspects of the development. ATLAS has developed interfaces to enable the use of EvtGen within the experiment's object-oriented simulation and data-handling framework ATHENA, and furthermore has enabled the running of the software on the LCG. Modifications have been made to meet the requirements of simulating beauty events centrally produced in proton proton collisions, with which ATLAS is primarily concerned. Here we review the programme of work including both software and physics related activities. The results of validation simulations are shown, and future plans are discussed.

Summary

The project "EvtGen in ATLAS"has the aim of accommodating EvtGen into the LHC-ATLAS context. As such it is an undertaking in both physics and software development.

EvtGen is a software package for modelling the decays of B-hadrons. Originally developed by the BaBar collaboration, the package is now used by a number of facilities, including the LHC experiments. An agreement with BaBar has enabled the LHC community to develop its own version of the software, whilst still benefitting from new input from BaBar.

The package has a number of specialist features, including a novel mechanism for efficiently producing complex decay chains, an implementation of spin algebra to correctly calculate decay angles, and facilities to handle interference between decay amplitudes. LHC- specific requirements include the simulation of hadron decays which are not seen in B-factories, and the study of incoherent neutral B-meson mixing.

ATLAS has developed interfaces to enable the use of EvtGen within the experiment's object-oriented simulation and data-handling framework ATHENA, and furthermore has enabled the running of the software on the LCG. Modifications have been made to meet the requirements of simulating centrally produced events, with which ATLAS is primarily concerned. EvtGen has been supported by members of the ATLAS B- physics group, who have used it for studying Bs-meson decays, the polarization of \Lambda_ {B} hadrons and specific rare B-decays.

Other physics groups are also using the package to simulate the behaviour of new physics entities, such as Higgs and SUSY particles, which are thought to decay via intermediate B-hadron states.

Here we review the programme of work including both software and physics related activities. The results of validation simulations are shown, and future plans are discussed.

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