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Studies of GEANT4 performance for different ATLAS detector geometries and code compilation methods

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Full detector simulation is known to consume a large proportion of computing resources available to the LHC experiments, and reducing time consumed by simulation will allow for more profound physics studies. There are many avenues to exploit, and in this work we investigate those that do not require changes in the GEANT4 simulation suite. In this study, several factors affecting the full GEANT4 simulation execution time are investigated. A broad range of configurations has been tested to ensure consistency of physical results. The effect of a single dynamic library GEANT4 build type has been investigated and the impact of different primary particles at different energies has been evaluated using GDML and GeoModel geometries. Some configurations have an impact on the physics results and are therefore excluded from further analysis. Usage of the single dynamic library is shown to increase execution time and does not represent a viable option for optimizations. Lastly, the static build type is confirmed as the most effective method to reduce the simulation execution time.

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