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Many physics and performance studies carried out with the ATLAS detector at the Long Hadron Collider (LHC) require very large event samples. A detailed simulation for the detector, however, requires a great amount of CPU resources. In addition to detailed simulation, fast techniques and new setups are developed and extensively used to supply large event samples. In addition to the development of new techniques and setups, it is still possible to find some performance improvements in the existing simulation technologies. This work shows some possible ways to increase the performance for different full and fast ATLAS detector simulation setups, using new libraries and code improvements in the ATLAS detector simulation framework. Besides of the improvements, measured time consumptions of different setups are shown and possible further improvements are the other main focuses of this project.

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