

CMS Full Simulation for Run 3

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We report status of the CMS full simulation for Run-3. During the long shutdown of the LHC a significant update has been introduced to the CMS code for simulation. CMS geometry description is reviewed. Several important modifications were needed. CMS detector description software is migrated to the DD4Hep community developed tool. We will report on our experience obtained during the process of this migration. Geant4 10.7 is the CMS choice for Run-3 simulation productions. We will discuss arguments for this choice, the strategy of adaptation of a new Geant4 version, and will report on physics performance of CMS simulation. A special Geant4 Physics List configuration FTFP_BERT_EMM will be described, which provides a compromise between simulation accuracy and CPU performance. A significant fraction of time for simulation of CMS events is spent on tracking of charge particles in magnetic field. In CMS simulation a dynamic choice of Geant4 parameters for tracking in field is implemented. A new method is introduced into simulation of electromagnetic components of hadronic showers in the electromagnetic calorimeter of CMS. For low-energy electrons and positrons a parametrization of GFlash type is applied. Results of tests of this method will be discussed. In summary, we expect about 25% speedup of CMS simulation production for Run-3 compared to the Run-2 simulations.

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