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The Fast Simulation of the CMS detector

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A framework for Fast Simulation of particle interactions in the CMS detector has been developed and implemented in the overall simulation, reconstruction and analysis framework of CMS. It produces data samples in the same format as the one used by the Geant4-based (henceforth Full) Simulation and Reconstruction chain; the output of the Fast Simulation of CMS can therefore be used in the analysis in the same way as data and Full Simulation samples. The Fast Simulation has been used already for several physics analyses in CMS, in particular those requiring a generation of many samples to scan an extended parameter space of the physics model (e.g. SUSY) or for the purpose of estimating systematic uncertainties. Comparisons of the Fast Simulation results both with the Full Simulation and with the LHC data collected in the years 2010 and 2011 at the center of mass energy of 7 TeV will be shown, to demonstrate the level of accuracy achieved so far. In addition, a description of recent developments: a tighter integration with the Full Simulation in the simulation of the electronic read-out ("digitization") and of the pileup of events from other proton-proton collisions, both in-time and out-of-time.

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