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Data Driven Approach to Calorimeter Simulation in CMS

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CMS is looking forward to tune detector simulation using the forthcoming collision data from LHC. CMS established a task force in February 2008 in order to understand and reconcile the discrepancies observed between the CMS calorimetry simulation and the test beam data recorded during 2004 and 2006. Within this framework, significant effort has been made to develop a strategy of tuning fast and flexible parametrizations describing showering in the calorimeter with available data from test beams. These parametrizations can be used within the context of Full as well as Fast Simulation. The study is extended to evaluate the use of first LHC collision data, when it becomes available, to rapidly tune the CMS calorimeter.

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Oral

Summary

A calorimeter simulation task force was established by the CMS management to investigate how the simulation can be improved to better describe the test beams results. The charge of the task force was (a) to evaluate and tune the shower models used by Geant4 to improve the agreement between the full simulation and the test beam data for the linearity of the response, the resolution, and the shower shape; (b) to develop a Gflash based parametrization for the electromagnetic and hadron shower shapes tuned to the test beam data; (c) to tune the parametrization of the electromagnetic and hadron showers to the full simulation and to the test beam data; (d) to provide a concise strategy to tune both the full and fast simulation to the collider data where the strategy will include the specification of a trigger paths to record the necessary data as well as the tools for analysis and tuning of the simulation. The task force has progressed on all the charges and will like to rport on the progress on the usage of data (test beam, Cosmics and beam collision) to tune simulation program with emphasis on the parametrized approaches in the simulation code.

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