

ABSTRACT

Monte-Carlo Study of Top Pair Production in Proton-Proton Collisions at the Large Hadron Collider

Alicia Hinkle (University of Minnesota–Twin Cities, Minneapolis, MN 55455), Pushpalatha Bhat (Fermi National Accelerator Laboratory, Batavia, IL 60510).

In order to predict what we should expect to see in the Large Hadron Collider (LHC) with real events, we used MadGraph/MadEvent (<http://madgraph.hep.uiuc.edu/>) to generate simulations of proton-proton collisions producing top/antitop pairs decaying into the dilepton channels (ee , $e\mu$, and $\mu\mu$). MadGraph/MadEvent (MG/ME), a program that allows the user to input a process and then run a simulation of a given number of events, ultimately gives a ROOT output file. Since at this point, it is not clear what the collision energy will be for the first run at the LHC, we generated events at 4, 6, 8, and 10 TeV center of mass energies. We confirmed the results of a previous study for the total cross section of our process at 10 TeV. We used ROOT analysis framework (<http://root.cern.ch/>) to analyze the output of the simulations, particularly looking at the distribution of particles' transverse momenta, energies, and rapidities. We also generated diboson background processes, WW and WZ, and compared the kinematics of signal and background. Continuing this research will allow us to understand what we see in the output of the detectors at the LHC and enable us to continue moving forward in high-energy research.