

Abstract Submitted  
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**Improved cross section calculations in ATLAS simulation packages, APPLgrid and NLOjet** NAVID RAD, California State University Fresno — ATLAS experiment at the Large Hadron Collider (LHC) of CERN is designed to make new discoveries in particle physics. Some of the possible discoveries, in addition to the promising observation of a new particle with Higgs-like properties, include supersymmetry (SUSY), extra spatial dimensions, and a whole zoo of exotic particles. Looking for these new possibilities can be extremely CPU-intensive and time consuming and therefore it is essential for the data analysis and simulations to be done as efficiently as possible. In order to analyze the data one would like to vary the different parameters such as the Parton Distribution Functions (PDF's). However, currently, the most common tools for calculating cross sections are Monte Carlo event generators such as Pythia which make data analysis very time consuming due to the fact that the entire calculation has to be repeated for every time the parameters are varied. The purpose of this research project is to utilize and develop additional software tools in order to decrease the time and computing power required for cross section calculations done at ATLAS. The APPLgrid software package allows for quick calculations with any PDF in than a second whereas the same calculation could take Pythia a few hours. The results that will be shown in here are sample calculations done by NLOjet and APPLgrid in comparison with Pythia for QCD and a Contact Interaction Model. This research project was done by the author at CERN and DESY during the summers of 2011 and 2012 and the progress has been presented thrice to the ATLAS jet Cross Section Group.

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