Abstract Submitted
for the APR20 Meeting of
The American Physical Society

Study of the Kinematics of the Process H-¿gg-¿4b at the Large Hadron Collider with the ATLAS Experiment[1] JARED BURLESON, STEPHEN SEKULA, REBECCA MOORE, Southern Methodist University — The recent discovery of the Higgs boson has led to a hunt for a confirmation on the properties of the Higgs, such as the rate of predicted decay mechanisms. This project is a study of the kinematic data recorded from truth-jet analysis generated in simulations of the final state $H^0 \to gg \to b\bar{b}b\bar{b}$, where a Higgs boson decays to a pair of gluons and each gluon produces a pair of bottom quarks via gluon splitting. The main background is $H^0 \to b\bar{b}g \to b\bar{b}b\bar{b}$, in which a Higgs boson decays to a pair of bottom quarks where one bottom quark radiates a gluon that decays to a pair of bottom quarks, which serves as the predominant background. The momentum, energies, angle of separation and other factors were recorded from a simulation and compared. This study is done primarily to show that the identification of a particular final state Higgs process is incredibly difficult when considering other background processes that could be interpreted as false-positives in an isolated analysis. From our analysis of the kinematics of these processes, we also explore the application of a machine-learning algorithm to distinguish Higgs processes based on the kinematic data available to a detection model.

[1]Acknowledgment of Funding to the following programs and institutions: US ATLAS SUPER Project, Hamilton Undergraduate Research Scholars Program, SMU Department of Physics

Jared Burleson
Southern Methodist Univ

Date submitted: 10 Jan 2020 Electronic form version 1.4