Abstract Submitted
for the APR17 Meeting of
The American Physical Society

Modeling Multi-Variate Gaussian Distributions and Analysis of Higgs Boson Couplings with the ATLAS Detector[1] OLIVIA KROHN, Cal State Univ- Fresno, AARON ARMBRUSTER, Stanford Univeristy, YONGSHENG GAO, Cal State Univ- Fresno, ATLAS COLLABORATION — Software tools developed for the purpose of modeling CERN LHC pp collision data to aid in its interpretation are presented. Some measurements are not adequately described by a Gaussian distribution; thus an interpretation assuming Gaussian uncertainties will inevitably introduce bias, necessitating analytical tools to recreate and evaluate non-Gaussian features. One example is the measurements of Higgs boson production rates in different decay channels, and the interpretation of these measurements. The ratios of data to Standard Model expectations (μ) for five arbitrary signals were modeled by building five Poisson distributions with mixed signal contributions such that the measured values of μ are correlated. Algorithms were designed to recreate probability distribution functions of μ as multi-variate Gaussians, where the standard deviation (σ) and correlation coefficients (ρ) are parametrized. There was good success with modeling 1-D likelihood contours of μ, and the multi-dimensional distributions were well modeled within 1-σ but the model began to diverge after 2-σ due to unmerited assumptions in developing ρ. Future plans to improve the algorithms and develop a user-friendly analysis package will also be discussed.

[1]NSF International Research Experiences for Students

Olivia Krohn
Cal State Univ- Fresno

Date submitted: 30 Sep 2016 Electronic form version 1.4