Abstract Submitted
for the SES16 Meeting of
The American Physical Society

Multivariate Jet Calibration Using Neural Networks DAYTON GROGAN, High Energy Physics Dept., Duke University — The nature of this project stems from a desire to increase the precision of modern large-radius (large-R) jet calibration methods. Currently, methods for calibrating large-R jets utilize, Monte-Carlo derived corrections as a function of jet transverse momentum and pseudorapidity. However, these methods miss the greater variations contained in the fat jet substructure, which can affect detector responses. As such, they may be improved by considering substructure characteristics. To achieve these improvements, this project utilizes Artificial Neural Networks to perform multivariate analysis where it is impractical to expand the current method to incorporate a greater number of variables. Using Googles TensorFlow machine learning library and APIs to create a shallow, single layer, network we derive weights and biases through supervised learning to accommodate multivariate calibrations. Network training is performed on Monte Carlo data where back propagation allows the network to update its weights by calculating output error to a known truth value provided in the simulated data. Preliminary results with this technique using the same input as traditional calibrations have matched their performance. Moving forward, we are exploring modified networks and parameter optimizations to consider the calibration of other large-R jet properties particularly jet mass.

Dayton Grogan
High Energy Physics Dept., Duke University

Date submitted: 24 Oct 2016 Electronic form version 1.4