Joshua Isaacson – HEP Seminar – February 5, 2024
FNAL

Title: Achieving Fast & Precise Theory Predictions for Collider Experiments

Abstract:
The High Luminosity LHC (HL-LHC) upgrade promises unprecedented precision in exploring the Standard Model and the physics beyond. However, if unaddressed, the limited computational resources and theory precision will drastically hinder the HL-LHC's impact. I will introduce a novel GPU-accelerated matrix-element generator resolving the computational limitations. Additionally, I will show that this generator is already able to be used directly in experimental pipelines. Furthermore, with the recent W mass measurements from CDF and ATLAS, there has been an increase in interest in understanding the precision soft-gluon resummation calculations involved. I will discuss the impact improvements in the calculations from CDF would have had on their results, along with a discussion of future improvements for the LHC. Finally, the LHC is not the only high-energy physics experiment. To this end, I will briefly highlight how the experiences gained at the LHC can be used to improve the scientific output from other experiments, with a focus on DUNE.