DEPARTMENT OF PHYSICS AND ASTRONOMY

COLLOQUIUM ***IN-PERSON EVENT***

Physics Through the Lens of Machine Learning

Sergei Gleyzer

Associate Professor

Department of Physics & Astronomy

University of Alabama

In my talk, I will present aspects of machine learning for the physical sciences, with a greater focus on challenges in large experiments, such as the Large Hadron Collider (LHC) and Vera Rubin Observatory's Legacy Survey of Space and Time (LSST). The LHC is delivering the highest energy proton-proton collisions ever recorded in the laboratory, permitting a detailed exploration of elementary particle physics at the highest energy frontier. It is uniquely positioned to detect and measure the rare phenomena that can shape our knowledge of new interactions and possibly resolve the present tensions of the Standard Model. LHC experiments have already observed the long-sought after Higgs boson and have achieved unprecedented levels of sensitivity to new particles at the TeV scale with on-going searches for new physics, including dark matter. This trend is expected to continue during the next LHC run and with the High-Luminosity Large Hadron Collider (HL-HLC), anticipated to start data taking in 2029. Significant new ideas for event reconstruction and data analysis are required to address the experimental challenges posed by the complex experimental environment at the HL-LHC. In my talk, I will discuss state-of-the-art machine learning methods for new physics searches at the LHC, detector reconstruction, event simulation and real-time event filtering at the HL-LHC. I will also discuss cross-over machine learning applications to dark matter substructure searches with strong gravitational lensing with the upcoming Vera Rubin Observatory, among other Machine Learning for Science examples.

Thursday, September 28, at 3:55 PM

IN-PERSON EVENT ROOM 202

Local Contact: Prof. Y. Abate, yohannes.abate@uga.edu