

# UCLA High Energy & Astro-Particle (HEAP) Seminar

## “Machine Learning Applications and Observation of Higgs Boson Decays into a Pair of Bottom Quarks with the ATLAS Detector”

Presented by Cecilia Tosciri, *University of Chicago*

The discovery of the Higgs boson at the Large Hadron Collider (LHC) in 2012 represents an outstanding success of the Standard Model (SM) of particle physics. Since then, the properties of the Higgs boson have been measured with increased precision and found to be consistent with the SM predictions. However, despite this remarkable agreement, many physical phenomena are not explained by the SM, and several questions remain unresolved. Indeed, the SM is envisioned to be only an effective manifestation of a more fundamental description of Nature. Precision measurements of the Higgs boson production cross sections and decay rates give us a sharp tool to search for new physics. Moreover, original analysis techniques, in addition to innovative technologies and computational resources, are essential to fully exploit the LHC physics potential in the next decades.

In this talk I will present the  $VH(H \rightarrow bb)$  signal strength analysis performed with the ATLAS experiment, leading to the observation of Higgs boson decays into pairs of bottom quarks, which is a prime example of the success of the LHC in testing the SM. A description of the cross section measurements for the  $VH(H \rightarrow bb)$  processes and their interpretation based on an effective field theory approach will be also presented. This work represents an important step towards the era of precision Higgs physics measurements at the LHC. Furthermore, I will describe a novel technique for the fast simulation of the response of the forward calorimeter in ATLAS, based on an innovative unsupervised machine learning algorithm.

**Location:** Broadcast via Zoom

**Date:** Wednesday, March 24, 2021

**Time:** 12:00pm

UCLA