

## PHYSICS AND ASTRONOMY COLLOQUIUM (In Person Only)

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"Mapping Electroweak Symmetry Breaking with ATLAS at the LHC"

## <u>Abstract</u>

Over the past 15 years, the Large Hadron Collider has revolutionized experimental particle physics. The LHC delivered an early triumph with the discovery in 2012 of the Higgs Boson by the ATLAS and CMS experiments, but while the Higgs mechanism is the key to electroweak symmetry breaking, and finding the boson was a crucial milestone, this was only the beginning of a long voyage of discovery. The unprecedented combination of energy and luminosity at the LHC has enabled not only hundreds of additional searches for new particles, but also thousands of precision measurements of masses and couplings that - for the first time - allow us to begin to map out the Higgs potential, providing hints about the ultimate stability of the universe. I will briefly describe the LHC and ATLAS, and the discoveries made so far, and then discuss the upgrades required for the accelerator and detector to reach their full potential, with a physics program extending to 2041. Finally, I will say a few words about the probable limitations of the LHC, and what kind of successor machine would be needed to probe even farther.

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