Physics & Astronomy Colloquium – Spring 2019

Tuesday, April 23rd at 3:30 pm in SC 234

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Higgs to beauty quarks

The Large Hadron Collider (LHC) is the world's most energetic particle accelerator. During its first run (2009-2012), the ATLAS and CMS experiments discovered the Higgs boson. This discovery marked a historical milestone in the study of fundamental particles and their interactions. Physicists are nowadays measuring the Higgs boson's properties to build deep understanding of the Higgs sector of the Standard Model and potentially to unveil Beyond the Standard Model phenomena.

The Higgs' favored decay mode to beauty (b) quarks (~60%) had so far remained elusive because of the overwhelming background of b-quark production due to strong interactions. Observing the Higgs decay to b-quarks was one of the critical missing pieces of our knowledge of the Higgs sector. Measuring this decay is a fundamental step to confirm the mass generation for fermions and may also provide hints of physics beyond the Standard Model. The recent observation of the decay of the SM Higgs boson into a pair of b-quarks is yet another major milestone. This experimental achievement at the LHC, considered nearly impossible in the past, makes use of several advanced machine learning techniques to identify the b-quark distinctive signature and improve the Higgs boson mass resolution.

Refreshments at 3:00 pm in SC 103