



Canadian Association
of Physicists

Association canadienne
des physiciens et physiciennes

Contribution ID: 3216 Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) Projection studies of non-resonant Higgs boson pair production in the bb^-bb^- final state at the HL-LHC using the ATLAS detector

Tuesday 7 June 2022 10:45 (15 minutes)

Ten years have passed since the discovery of the Higgs Boson back in 2012 at the Large Hadron Collider (LHC), in that time the properties of single Higgs production has been extensively probed and has all shown to be in an astounding agreement with the Standard Model (SM) and as a result no new physics. However due its significantly lower cross section the pair production of the Higgs boson has yet to be observed and have its properties studied. The pair production of the Higgs due to its self-interaction is of particular interest since it helps directly determine the shape of the Higgs potential which in turn has profound theoretical consequences. For example, the minimum the universe currently finds itself in within the Higgs potential might not be the true minimum depending on the Higgs potential shape, and so the universe could consequently transition via quantum tunnelling to this true minimum which could result in a complete alteration of the universe and its physical laws. The shape of the Higgs potential also tells a great deal about how it transitioned from the shape it had during the early stages of universe to the shape it has today, and the possibility of electroweak baryogenesis happening in between, which could explain the matter-antimatter asymmetry we also observe today. Projection studies of non-resonant Higgs boson pair production in the $b\bar{b}b\bar{b}$ final state with the ATLAS detector are presented here. Based on the Run 2 analysis, these studies are extrapolated to conditions expected at the High-Luminosity LHC (HL-LHC) and show a substantial improvement over previous results.

Primary author: SAM, Colm (University of British Columbia (CA))

Presenter: SAM, Colm (University of British Columbia (CA))

Session Classification: T2-3 New Directions in Accelerator-Based Experiments: Future Collider Experiments - Energy and Precision Frontier (PPD) | Nouvelles voies fondées sur des accélérateurs: expériences futures avec collisionneurs - frontière d'énergie et de précision (PPD)

Track Classification: Symposia Day (Tues. June 7) / Journée de symposiums (mardi, le 7 juin): Symposia Day (PPD) - New Directions in Accelerator-Based Experiments