Contribution ID: **219** Type: **Oral Presentation**

Higgs decay to dark vector bosons via an additional scalar

Thursday, 7 July 2022 15:30 (15 minutes)

Our group is conducting a search for physics beyond the Standard Model via non-standard decays of the Higgs boson at the ATLAS detector. A hidden or dark sector can be introduced with an additional U(1) gauge symmetry. These exotic decays are an attractive way to search for new physics as current measurements still allow for a significant branching ratio to exotic states, given even a small coupling to hidden sector particles. Further, hidden sector particles may preferentially couple to the Higgs boson, providing a promising portal to new physics.
Previous studies have searched for Higgs decays via two dark vector bosons, each of which promptly decay to two leptons. Event display software for these decays indicates a significant amount of missing energy, which has not yet been incorporated into any dark boson searches. Missing energy can indicate the presence of exotic particles that are not visible over the timeframe of the detector.
This presentation will discuss an ongoing search for a Higgs decaying to vector bosons via an additional intermediate scalar, S, ending in a four lepton plus missing energy final state. This scalar would represent a new dark sector scalar, such as the dark Higgs. We aim to explain the process of and demonstrate results for initial signal modelling for this decay. Currently there are no constraints on the dark Higgs mass, and if it is shown that the dark Higgs can be heavier than the Standard Model Higgs, allowing the dark vector bosons to be heavier, opening up further decay channels with potentially more dark sector states.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

PhD

Primary author: CONNELL, Matthew (University of Johannesburg)

Presenter: CONNELL, Matthew (University of Johannesburg)

Session Classification: Nuclear, Particle and Radiation Physics

Track Classification: Track B - Nuclear, Particle and Radiation Physics