Contribution ID: **159** Type: **Oral Presentation**

Dark matter production in association with Higgs bosons through heavy scalar resonance at the LHC

Thursday, 2 July 2015 11:30 (20 minutes)

Abstract content
   (Max 300 words)
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The Standard Model of particle physics has, so far, been successful in explaining the electroweak and strong interactions in the matter which we are well acquainted with. However, cosmological observations indicate that there is a large component of mass in the universe which does not interact electromagnetically. This component is known as dark matter. After the analysis of Run 1 LHC data, there is reason to believe that we can study dark matter through interactions with the Higgs boson. In particular, we note from the Run 1 Higgs p_T spectra that the data presents a different structure than that of Standard Model predictions. A simple extension to the Standard Model is considered in which we introduce a heavy scalar H and a non-interacting scalar dark matter particle χ. The consequences of this model are considered and refined according to LHC results. Monte Carlo simulations are done on the process $gg \to H \to h\chi\chi$, and the effects of this process are compared to Run 1 ATLAS results. The tuning of the model's couplings are refined using experimental results such that the χ particle can be proposed as a dark matter particle, ready to be tested against LHC Run 2 results.

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MSc

Main supervisor (name and email)
and his / her institution

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Session Classification: NPRP

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