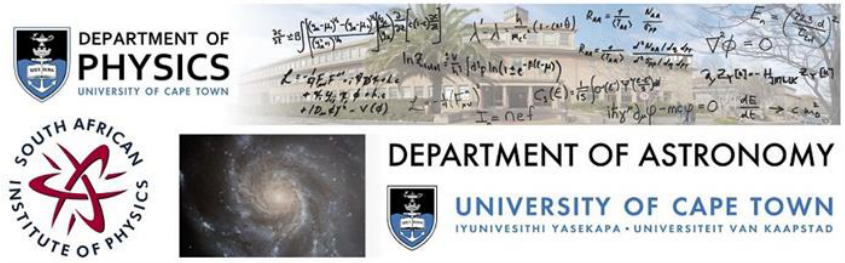

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2HDM and the LHC

Thursday, 7 July 2016 09:40 (20 minutes)

Abstract content
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The discovery of a 125 GeV Higgs particle at the Large Hadron Collider in 2012 which has properties as expected in the Standard Model (SM) was a major milestone for particle physics. More recently the ATLAS experiment has reported several excesses in the search for di-Higgs boson resonances and other Higgs-related channels. These excesses can be explained by a heavy scalar with a mass in the range 275-285 GeV, together with a scalar dark matter candidate with a mass around 55-60 GeV. The SM Higgs boson can be realised within the Inert Doublet Model (IDM)- a version of the two-Higgs doublet Model (2HDM) with an unbroken parity symmetry under which one of the SU(2) doublets is the SM Higgs doublet with one SM Higgs boson, and the second SU(2) doublet transforms non-trivially and has no vacuum expectation value and doesn't interact with fermions.

In this proceedings, we shall review the 2HDM together with the IDM from the starting point of the SM, in particular how elementary particles gain mass through the Higgs mechanism. As the 2HDM is a theory which goes beyond the SM, it has a richer particle spectrum. The most general potential of a 2HDM is Lorentz invariant and renormalizable containing 14 free parameters, with the most general Yukawa Lagrangian giving rise to flavour changing neutral currents which are strongly constrained by experiment. We shall also discuss CP-violation which may arise in the scalar potential.

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