

PAUL SCHERRER INSTITUT



Particle Theory Seminar

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“Higgs Singlet extension in the light of the LHC discovery”

Tuesday, November 26, 2013, 11:30

WBGB/021

Abstract:

We give an overview on the current theoretical and experimental limits on a Higgs singlet extension of the Standard Model, where for the second Higgs Boson we consider a mass range of 600 GeV to 1 TeV. We study the impact of perturbative unitarity limits, Renormalisation Group Equations analysis and experimental constraints (Electro-Weak Precision Tests, measurements of the light Higgs coupling at the Large Hadron Collider). We show that, in the case of no additional hidden sector contributions, the largest constraints for higher Higgs masses stem from the assumption of perturbativity as well as vacuum stability for scales on the order of the SM metastability scale, and that the allowed mixing range is severely restricted. We discuss implications for current LHC searches in the singlet extension, especially the expected suppression factors for SM-like decays of the heavy Higgs.