



Contribution ID: 41

Type: not specified

Search for beyond the Standard Model Higgs boson decaying to a pair of new light bosons in boosted dimuon final states in CMS

Wednesday 20 July 2016 11:20 (10 minutes)

Summary

Light bosons that couple weakly to Standard Model (SM) particles are predicted in several extensions of the SM. These extensions include supersymmetric (SUSY) models with hidden valleys (dark SUSY) or with extended Higgs sector (such as NMSSM). In these scenarios the new light bosons are produced in non-SM Higgs decays or in the cascade of SUSY particles. In dark SUSY the light bosons may also have a non-zero lifetime. If the dark bosons couple to muons this may result in displaced muons in the event signature. Especially when the dark bosons are light, the muons propagate almost parallel through the detector, and reconstructing the dimuon secondary vertex becomes very challenging. A dedicated technique is being developed in order to account for such topology, and the details will be presented. While exotic SM Higgs decays can hide in indirect searches, e.g. because the branching ratio is too small, direct searches for light bosons can provide a powerful alternative to understanding the nature of the SM Higgs boson. We present the results at 8 TeV and status at 13 TeV of a direct search for non-SM Higgs boson decays to a pair of new light bosons with boosted dimuons in the final state using the CMS detector.

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Session Classification: Plenary