Contribution ID: **112**   Type: **poster**

Interpreting LHC searches for new physics with SModelS

ATLAS and CMS have performed a large number of searches for physics beyond the Standard Model (BSM). The results are typically presented in the context of Simplified Model Spectra (SMS), containing only a few new particles with fixed decay branching ratios, yielding generic upper limits on the cross section as a function of particle masses. The interpretation of these limits within realistic BSM scenarios is non-trivial and is best done by automated computational tools.

To this end we have developed SModelS, a public tool that can test any given BSM model with a Z2 symmetry by decomposing it into its SMS components and confronting them with a large database of SMS results. This allows to easily evaluate the main LHC constraints on the model. Additionally, SModelS returns information on important signatures that are not covered by the existing SMS results. This may be used to improve coverage of BSM searches and SMS interpretations.

We will present the working principle of SModelS, in particular the decomposition procedure, the database and matching of applicable experimental results (see arXiv:1312.4175 and 1412.1745). Moreover, we will present applications of SModelS to different models: the MSSM (1312.4175), a model with a sneutrino LSP (1503.02960) and the UMSSM (paper in preparation). These results illustrate how SModelS can be used to identify important constraints, untested regions and interesting new signatures. An outlook to future developments will also be given.

additional information

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Track Classification: Higgs and New Physics