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## The BSM-AI project: SUSY-AI - Generalizing LHC limits on Supersymmetry with Machine Learning

*Wednesday, April 19, 2017 4:45 PM (15 minutes)*

A key research question at the Large Hadron Collider (LHC) is the test of models of new physics. Testing if a particular parameter set of such a model is excluded by LHC data is a challenge: it requires time consuming generation of scattering events, simulation of the detector response, event reconstruction, cross section calculations and analysis code to test against several hundred signal regions defined by the ATLAS and CMS experiments. In the BSM-AI project we attack this challenge with a new approach. Machine learning tools are thought to predict within a fraction of a millisecond if a model is excluded or not directly from the model parameters. A first example is SUSY-AI, trained on the phenomenological supersymmetric standard model (pMSSM). About 300,000 pMSSM model sets – each tested against 200 signal regions by ATLAS – have been used to train and validate SUSY-AI. The code is currently able to reproduce the ATLAS exclusion regions in 19 dimensions with an accuracy of at least 93%. It has been validated further within the constrained MSSM and the minimal natural supersymmetric model, again showing high accuracy. SUSY-AI and its future BSM derivatives will help to solve the problem of recasting LHC results for any model of new physics.

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