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SCYNet - Testing supersymmetric models at the LHC with neural networks

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The results of direct searches for new particles at the Large Hadron Collider put the strongest constraints on many models for new physics, in particular for supersymmetric extensions of the standard model.
Calculating the profile likelihood ratio for these observables by the use of Monte Carlo methods is extremely timeconsuming and not feasible for a large number of points, as they are typically required in global fits of these models.
SCYNet is a new tool that uses neural network regression for a fast evaluation of that profile likelihood ratio.
Two different approaches have been chosen to train the neural network: In the first approach, the parameters of the Lagrangian density of the 11-dimensional phenomenological MSSM are used as an input, which allows for a comparison between model predictions and measurements for any point in that model without time penalty.
In the second approach, the neural network is trained using signature related quantities, such as particle multiplicities and object energies in the experimental final states. While this approach takes a bit more computing time, it is in principle suited to be used for a wider class of new physics models. The basic features of SCYNet are described and a first evaluation of its performance with both types of neural networks is shown.

Presentation

Talk given in person

Primary authors: BECHTLE, Philip (University of Bonn (DE)); Mr BELKNER, Sebastien (Unversity of Bonn); DERCKS, NÉ SCHMEIER, Daniel; HAMER, Matthias (University of Bonn (DE)); Mr KELLER, Tim (RWTH Aachen); KRAMER, Michael (Rheinisch-Westfaelische Tech. Hoch. (DE)); SARRAZIN, Bjorn (University of Bonn (DE)); Mr SCHUETTE-ENGEL, Jan (RWTH-Aachen); TATTERSALL, Jamie (RWTH Aachen)

Presenter: HAMER, Matthias (University of Bonn (DE))