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Statistically Learning New Physics from LHC Data

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Despite the large amount of data generated by the Large Hadron Collider (LHC) so far, searches for new physics have not yet provided any clear evidence of beyond the Standard Model (BSM) physics. Most of these experimental searches focus on exclusive channels, looking for excesses in specific final states. However, new physics could manifest as a dispersed signal over many channels. It therefore becomes increasingly relevant to attempt a more global approach to finding out where BSM physics may hide. To this end, we developed a statistical learning algorithm that is capable of identifying potential dispersed signals in the slew of published LHC analyses. The algorithm is tasked with building candidate "proto-models", precursor theories to the Next Standard Model, from small excesses in the data, while at the same time remaining consistent with negative results on new physics.
In this talk, we will present our method along with key algorithmic improvements that incorporate rigorous statistical treatments, thus going beyond the initial concept published previously. We will also discuss results obtained by applying this framework to the latest SModelS database, which aggregates around 110 published experimental analyses.

Secondary track

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