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Statistically Learning New Physics from LHC Data

Despite the large amount of data produced by the Large Hadron Collider (LHC), no clear evidence of New Physics (NP) has emerged so far. Most LHC searches target exclusive channels, focusing on specific final states, but NP may appear as a dispersed signal across many channels. This motivates a more global approach to finding out where beyond the Standard Model physics might be hiding. We present a statistical learning algorithm designed to identify such dispersed signals in the slew of published LHC analyses. The algorithm constructs candidate "proto-models", precursors to a possible next Standard Model, from small excesses in the data, while remaining consistent with negative results on NP.

In this talk, I will outline our method and highlight recent algorithmic advancements that goes beyond the initial concept published previously. Furthermore, I will share preliminary results obtained by applying this framework to the latest SModelS database, which aggregates around 110 published experimental analyses.

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