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Invited talk: Statistically Learning the Next Standard Model 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 novel statistical learning algorithm that is capable of identifying potential dispersed signals in the slew of published LHC analyses. Aiming to minimize theoretical bias, our approach is not constrained to a specific BSM scenario.
Instead, the algorithm is tasked with building candidate "proto-models", precursor theories to the Next Standard Model (NSM), from small excesses in the data, while at the same time remaining consistent with negative results on new physics.

In this talk, we explain the concept as well as technical details of the statistical learning procedure. We also present proof of concept results obtained when running the algorithm over our database that contains the results of 100 searches conducted at the LHC. Finally, we sketch out our vision of how the NSM could then be constructed from such protomodels.

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