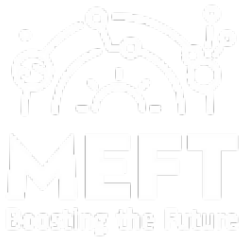

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Robust Searches for New Physics using Anomaly Detection at the LHC

Anomaly Detection has recently emerged as a novel path to explore the Large Hadron Collider's (LHC) data in the search for phenomena beyond the Standard Model (SM) of Particle Physics. Technically, it relies on machine learning algorithms with the ability to model the SM background expectation and detect potential New Physics events that differ from that background. This approach complements the program of searches at the LHC, so far unsuccessful in finding evidence for beyond-SM phenomena, with the great advantage of signal-agnosticism: instead of searching for a specific signal of a given theory model, the search is augmented to any suspicious event that does not look like a SM one. This paradigm change is valuable in probing the increasing panoply of theories proposed to revise the SM shortages - lack of dark matter candidates, an answer to the matter/anti-matter asymmetry, and the hierarchy problem, among others. This proposal consists of studying different algorithms of anomaly detection and test their performance in a variety of flagship cases of New Physics searches in the LHC. In addition, more robust implementations will be investigated, to ascertain the feasibility of data-driven models, which are affected by the presence of systematic uncertainties in experimental data.

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