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Assess the reach of future colliders in beyond Standard Model effective interactions

Standard Model has been a successful theory to describe the nature of fundamental forces and particles for decades. However, it is not able to explain everything. The theory still lacks a description of gravity, of dark matter, of the asymmetry between matter and anti-matter, etc. In fact, physicist have of course only tested the theory for a finite range of energies, and no-one knows if it remains correct far beyond. Therefore, adding to the Standard Model some new effective low-energy effects, encoding the potential unknown high-energy interactions, seems a natural way to extend it. I will show you how one can express this effective field theory and what could be the consequences of such new interactions in the observed data. I will also explain the analysis one can do to predict whether these new effects could be seen in future collider experiments such as CLIC and HL-LHC or not. To achieve this, several techniques can be used, but I will focus on two: binning analysis with histograms and machine learning deep neural networks, both estimating likelihood of data given a theory.