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Graph Neural Network: Its Applications to Constrain EFTs

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Graph Neural Networks have emerged as a powerful tool for operating on graph-structured data, facilitating the exploration of non-Euclidean physics data. In this talk, I will discuss the application of GNNs in a supervised scenario where we explore its potential to improve high-dimensional effective field theory parameter fits to collider data beyond traditional rectangular cut-based differential distribution analyses. As a specific case, we focus on an SMEFT analysis of pp $\rightarrow$ top pair production, including top decays, where the linear effective field deformation is parameterized by thirteen independent Wilson coefficients. Applying GNNs allows us to condense the multidimensional phase space information available for discriminating BSM effects from the SM expectation by directly considering all available final state correlations.

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