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Reconstructing Toponium using Recursive Jigsaw Reconstruction

Recent results from the CMS experiment at the Large Hadron Collider indicate the presence of a top-quark pair bound state near the $t\bar{t}$ threshold region. We present a way to reconstruct a toponium state at the ttbar threshold region formed at the Large Hadron Collider using Recursive Jigsaw Reconstruction. We have considered the Non-Relativistic QCD based toponium model implemented in MadGraph5_aMC@NLO. The final states, consisting of two b-jets, two oppositely charged leptons and missing energy that arises from two neutrinos, are used. The goal of the Recursive Jigsaw Reconstruction is to make use of rules that can help resolve combinatorics ambiguity in preparing the decay tree for a given physics event. Additionally, missing energy coming from two neutrinos needs to be resolved so as to reconstruct the event. We apply four different strategies within the RestFrames package and compare the results of reconstruction resulting from each of the methods. Owing to the method, one can also access kinematic variables in rest frames belonging to the intermediate particle states thereby providing additional means to discriminate the SM ttbar background from the toponium. Our preliminary results indicate that this method may be useful to gain additional insights into physics phenomenology at the ttbar threshold region.

Field

Pheno

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