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High Energy physics project

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Abstract

he following project aims to simulate a BSM model using the *FeynRules* package. For this, we first start by doing the full simulation chain of a Drell-Yan process including the generation of events, the simulation of the detector, and the invariant mass distribution of the electrons and muons simulated. We include other example intermediate chains of simulation and show the difficulties encountered.

1. Introduction

The use of simulations in high energy physics is an incredible useful tool to understand the physics of the processes that we are studying. Several tools have been developed and are useful for this purpose. Among the most important tools are *FeynRules*, *MadGraph*, *Pythia* and CMSSW.

2. DY

Drell-Yan process

The simplest chain in feynrules -> UFO -> Madgraph (Pythia) -> LHE -> CMSSW -> python (uproot)

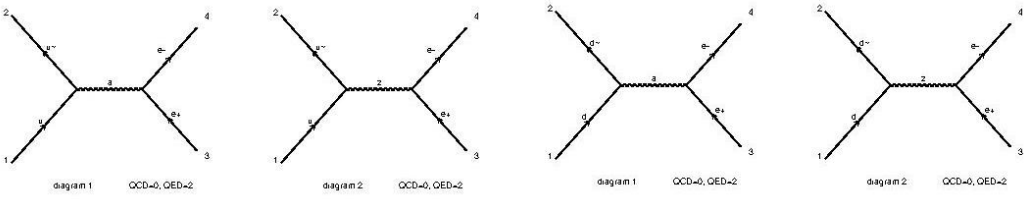


Figure 1: SM DY feynman diagrams

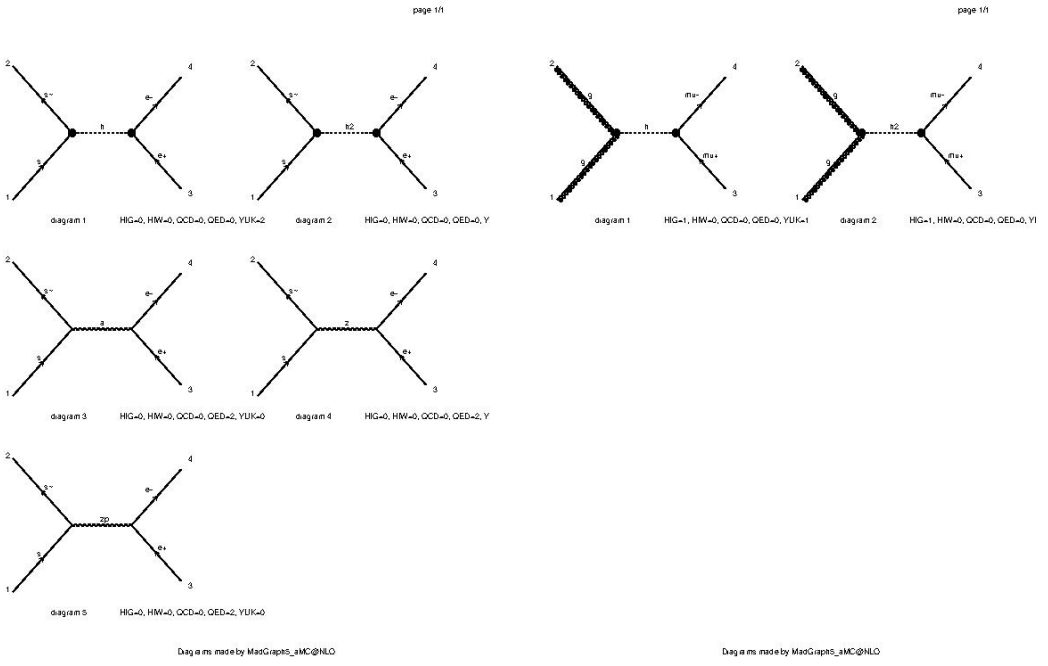
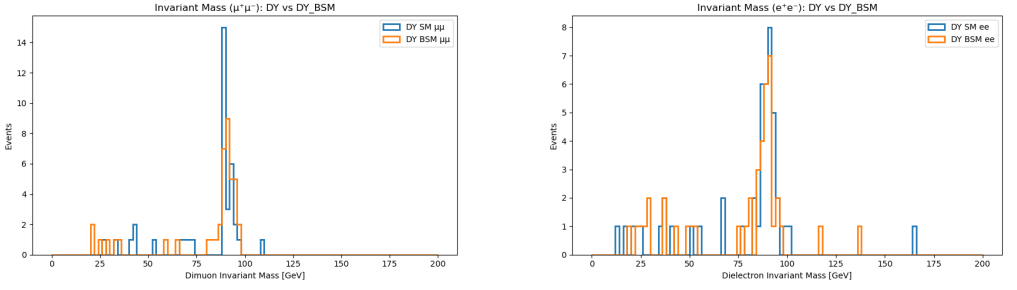
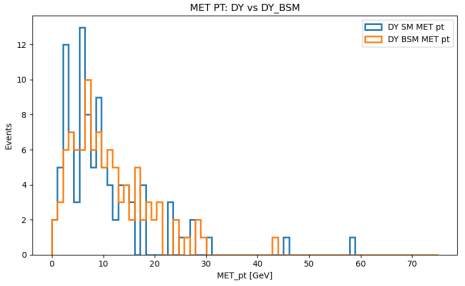


Figure 2: BSM DY feynman diagrams

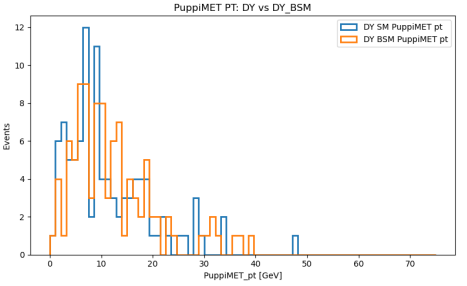


(a) Dimuon invariant mass (b) Dielectron invariant mass

Figure 3: Dilepton invariant mass comparison for SM DY and BSM DY

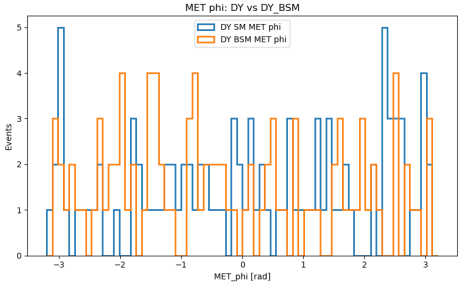


(a) MET pt

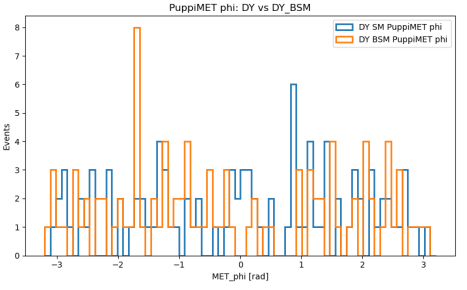


(b) PuppiMET pt

Figure 4: MET pt and PuppiMET pt comparison for SM DY and BSM DY



(a) MET phi



(b) PuppiMET phi

Figure 5: MET phi and PuppiMET phi comparison for SM DY and BSM DY

3. Conclusion

References