Search for Heavy Resonance Decaying into bg
Final State in proton-proton Collision at $\sqrt{s} = 13$TeV
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**Abstract**

At LHC, the identification of jets originating from $b$ quarks is important for searches for new physics and for measurement of $b$-quark production. Btagging Algorithms is a variety developed by CMS to select $b$-quark jets based on variables such as the impact parameters of the charged-particle tracks, the properties of reconstructed decay vertices, and the presence or absence of a lepton, or combinations thereof. CSVv2, which shorts for reconstructed decay vertices, and the presence or absence of a lepton, or combinations thereof. CSVv2 is a family of algorithms designed for jet and lepton identification and classification. It uses a combination of machine learning techniques to classify jets as $b$-tagged, $c$-tagged, or light flavors.

**Introduction**

The goal is to enhance the analysis sensitivity to final states with jets coming from the hadronization of $b$-quark by applying $b$-tagging requirement to one or both the leading 2 jets in the events. As for the inclusive analysis, the strategy consist in measuring the dijet mass spectrum and look for resonant structures in the spectrum which fitted with a smooth parametrization.

**Techniques**

Applying Deepjet medium tag

Let's take 2017 as an example

**Result**

The combined Observed and expected 95 %CL upper limits using Deepjet btag. The theoretical cross sections for $b\bar{b}$ are shown for comparison.

**Conclusion**

- Optimization of the DeepJet WP and functions to searching for $b^*$ are performed.
- The Expected limit for the $b^*$ model is between 1530~2255 GeV using the larger and equal than 1 DeepJet btag, and 1530~1980 observed limit
- No Evidence of a significant excess of events is found compared to the expectation of standard model