Lepton Selection for the Doubly Charged Higgs

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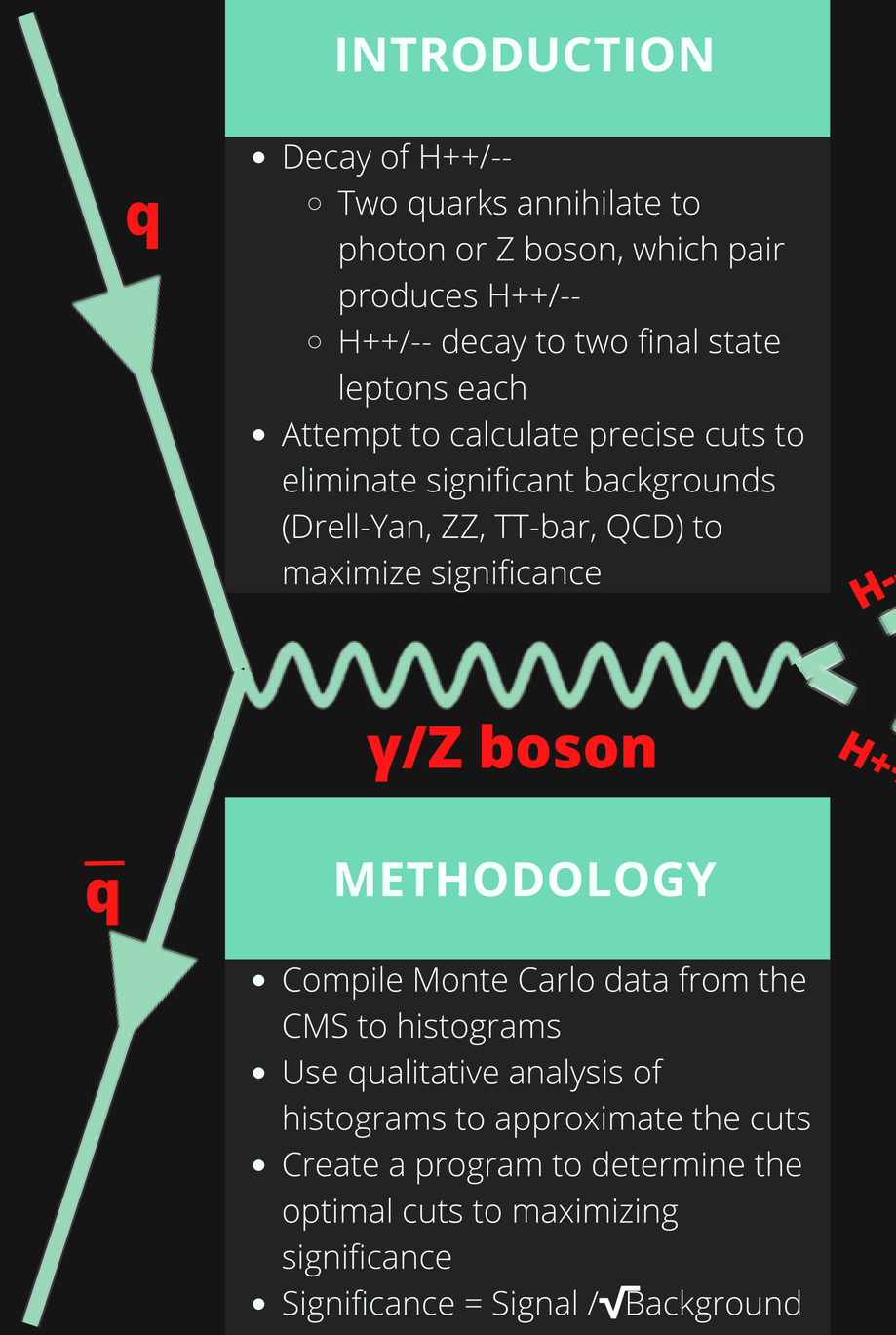
INTRODUCTION

- Decay of H++/--
  - Two quarks annihilate to photon or Z boson, which pair produces H++/--
  - H++/-- decay to two final state leptons each
- Attempt to calculate precise cuts to eliminate significant backgrounds (Drell-Yan, ZZ, TT-bar, QCD) to maximize significance



METHODOLOGY

- Compile Monte Carlo data from the CMS to histograms
- Use qualitative analysis of histograms to approximate the cuts
- Create a program to determine the optimal cuts to maximizing significance
- Significance = Signal /√Background

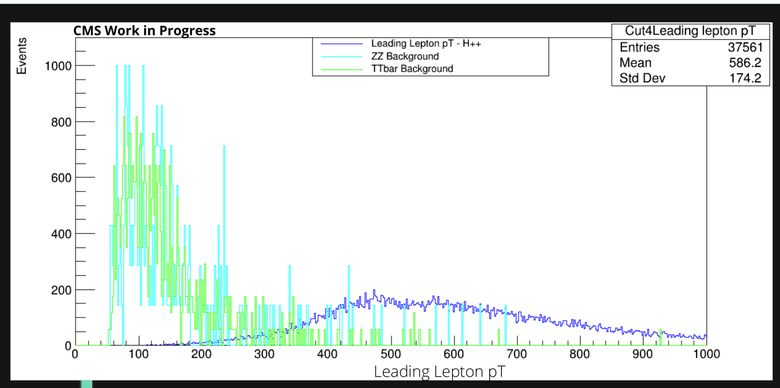


Figure 1. Leading Lepton pT Events plotted at different GeV. The number of background events are also shown. Optimal cuts are located within the shaded region.

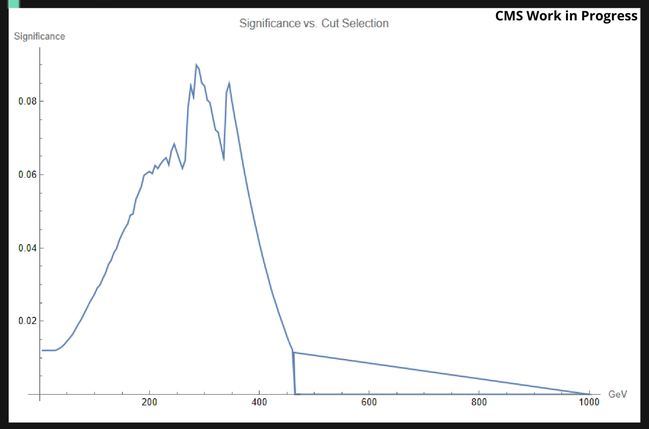


Figure 2. Significance vs. different cut values from 0 to 1000. The peak significance is 285 GeV.

PRELIMINARY RESULTS

- Qualitative analysis of the Leading Lepton pT Events of the different backgrounds and the signal reveals that the cuts are between 300 and 400 GeV to maximize efficiency and significance
- Program shows that maximum significance with respect to ZZ, TTBar backgrounds is at 285 GeV and equal to 0.0898646

CONCLUSIONS

- Optimal cuts for reducing background events are between 300 and 400 GeV
  - Significance peaks at 285 GeV cut for ZZ and TTBar backgrounds
  - Need to account for Drell-Yan and QCD backgrounds
    - Requires more entries
  - Cuts will be calculated with their respesctive efficiencies