



The MADANALYSIS 5 tutorial

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The MADANALYSIS 5 tutorial

◆ Generate two samples with MADGRAPH 5 at the parton-level

- ❖ $p p > t \bar{t}$ with each top decaying leptonically
- ❖ $p p > w^+ w^- + 2 \text{ jets}$ with each W-boson decaying leptonically
- ❖ Signature: 2 leptons + missing energy (+ jets)

◆ Investigate various observables

- ❖ Global event properties: missing energy, H_T .
- ❖ Properties of the leptons (each of them + the pair): p_T , η , transverse mass with the missing energy, invariant mass of the pair, ΔR , $\Delta\varphi$, etc.
- ❖ Jet properties: number of jets, p_T , η , etc.

◆ Analysis

- ❖ The WW sample is our signal, $t\bar{t}$ is the background
- ❖ Find some cuts to increase the S/B ratio
- ❖ Calculate the evolution of the S/B ratio with the cuts

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◆ Generate two samples with MADGRAPH 5 at the hadron-level

- ✿ $p p \rightarrow t \bar{t}$ with each top decaying leptonically
- ✿ $p p \rightarrow W^+ W^- + 2 \text{ jets}$ with each W-boson decaying leptonically
- ✿ Use PYTHIA 6 for parton showering and hadronization

◆ Use the reconstructed mode of MADANALYSIS 5

- ✿ Install fastjet
- ✿ Generate reconstructed LHE files
- ✿ Include b-tagging efficiencies

◆ Redo the parton-level analysis, but at the hadron level