Theoretical uncertainties for MonoHbb in a nutshell

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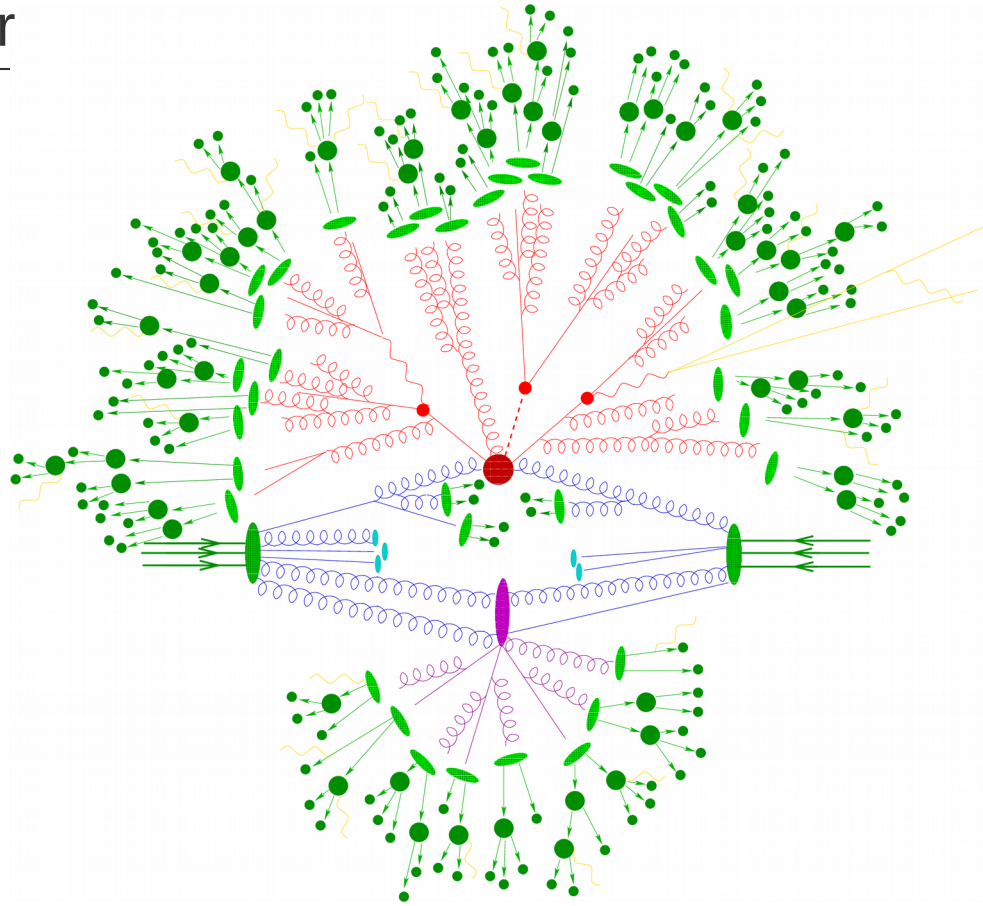
How a pp collision looks in a MC generator

Theoretical uncertainties/Sources of uncertainties

- **Missing higher order terms** → variation of renormalization factorization scale
- **Choice of PDFs and a_s**
- **Multijet merging** → for samples generated by merging matrix elements (ME) corresponding to different multiplicities → variation of merging scale
- **Matching uncertainties**: for samples generated using a NLO matrix element and matched to aparton shower → compare different generators
- **Parton shower/hadronization calculations** → compare different generators

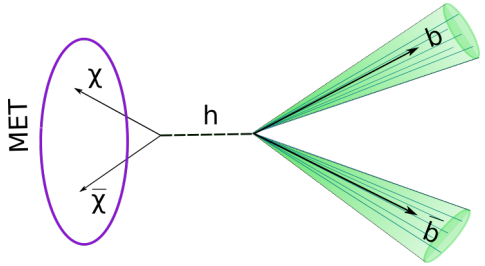


http://inspirehep.net/record/1328513/plots

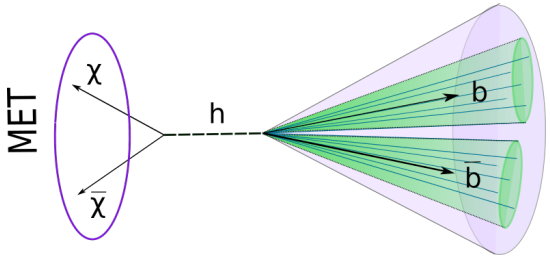
MonoH(bb)

Final state signature

- Final State: E_T^{miss} + h(bb)
- Based on the E_T^{miss} two topologies:
  - Resolved: 150< E_T^{miss} < 500 GeV



  - Merged : E_T^{miss} > 500 GeV



- Template Fit → represent signal and background distributions (mbb) with histograms obtained from full physics/detector simulation
- Profiled likelihood fit → incorporate uncertainties in the likelihood function as nuicance parameters.
- Types of uncertainties :
  - Different shape of mbb distribution
  - Normalization
  - Relative acceptance differences between MET bins

How is it done ????

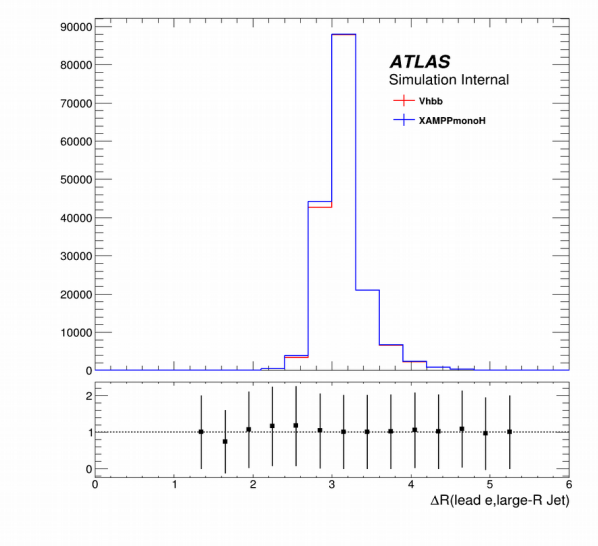
Step 1 : Need a framework to process information from the MC samples before full simulation → select jets, electrons, muons, etc. **like you do afte**r full simulation…

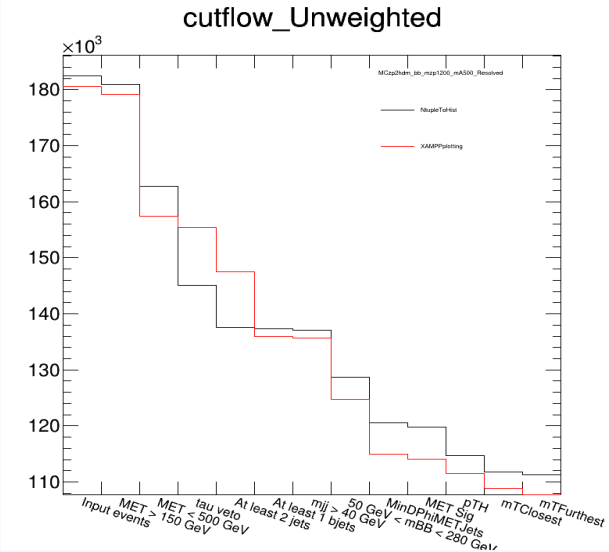
Step 2 : Select the same events you would select when using samples after full simulation

Step 3 : calculate uncertainties

Each variation is a weight → use output from Step 2 → compare nominal to variation → uncertainty

My contribution to this step : cross checks and implementing missing items





Step 4 : implement to the fit framework – currently working on

Normalisations and shape uncertainties for each sample used in our analysis from previous step need to be implemented