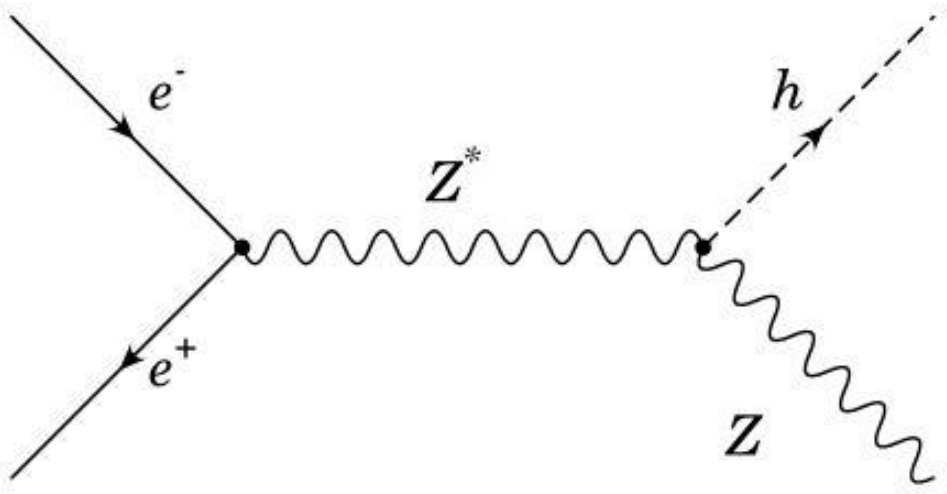
CLIC
(part 2)

Molly Herman, Shawn Hayes, Tianqi Tang

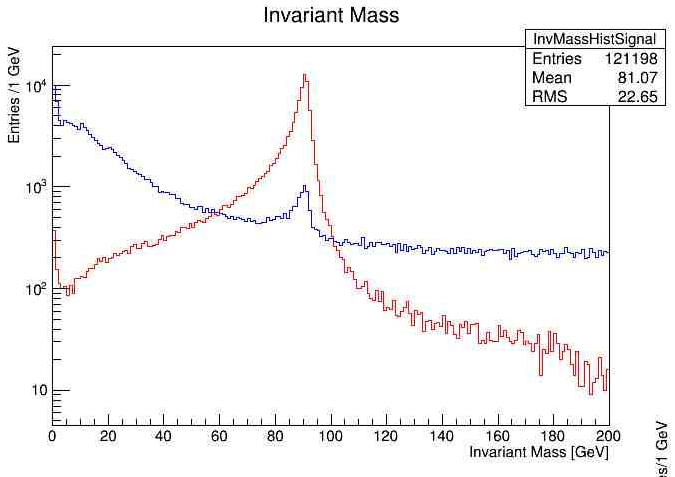
Reminder – what are we doing again?

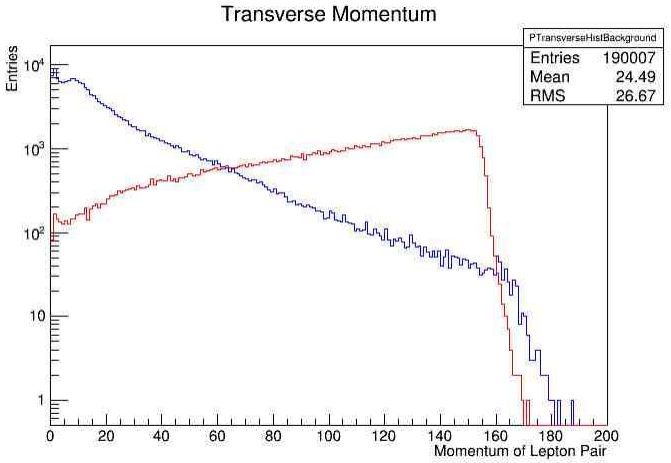
- Determining center of mass energy that gives highest probability of creating Higgstrahlung events
- Looking at 380 GeV

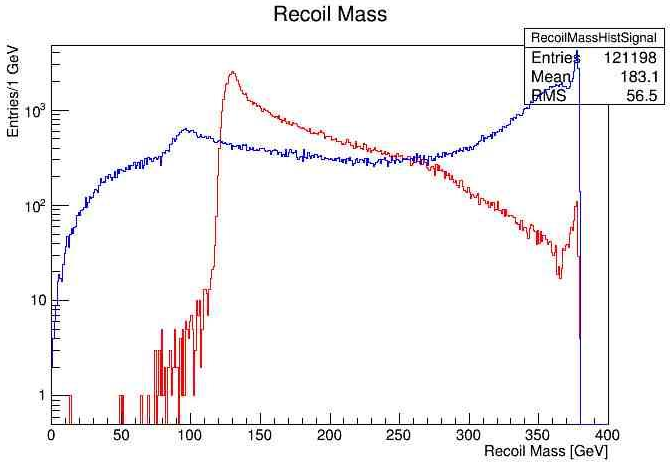


Last Time

- Made plots from simulated data, signal Higgstrahlung (red) and background (blue) events







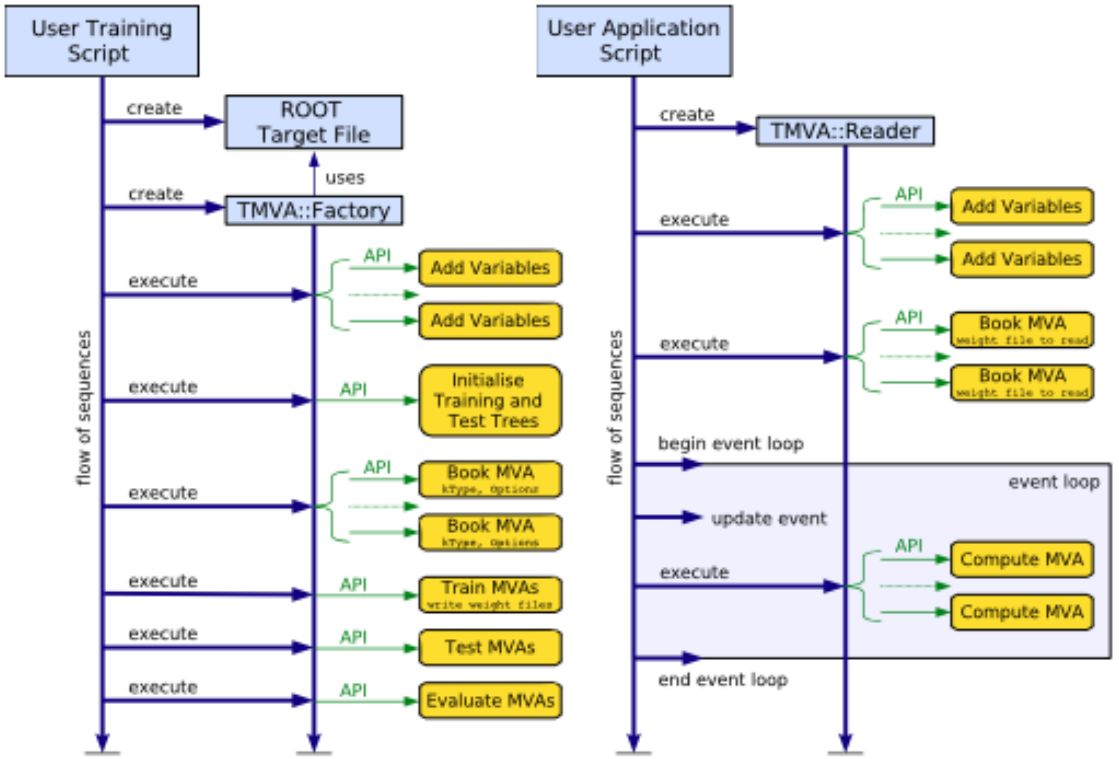
BUT

- These plots are not good
- Too many background events – want to minimize these in our signal + background data
- Tried guess and check cuts to optimize significance – a term of statistical magic relating background and signal # of events, we want high values

- But… we can do better than human guess and check

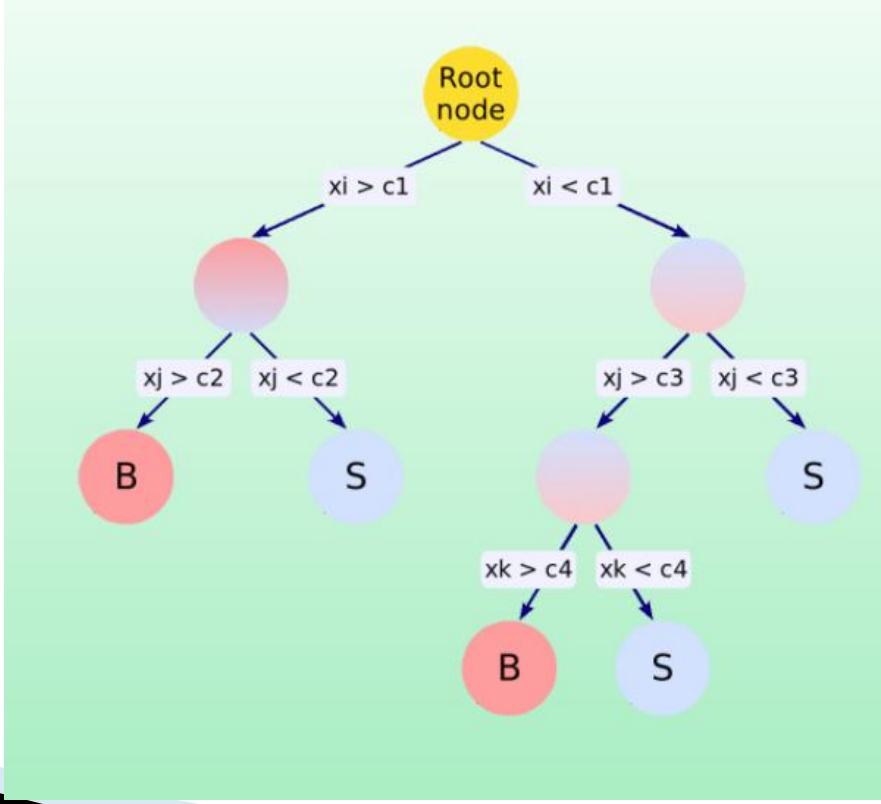
TMVA

- Toolkit for Multivariate Data Analysis
  - Collection of many statistical analysis tests
  - We want Boosted Decision Tree



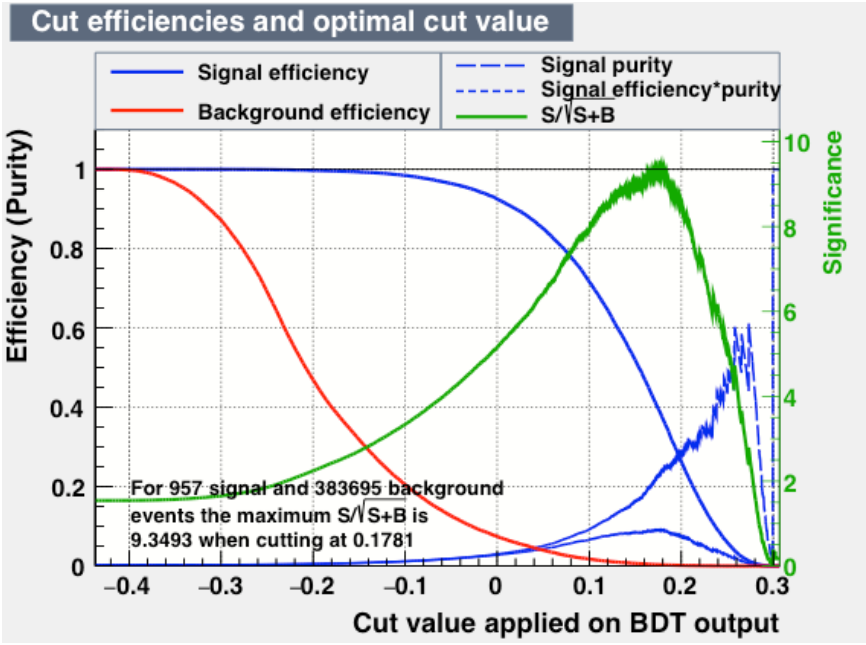
Boosted Decision Tree (BDT)

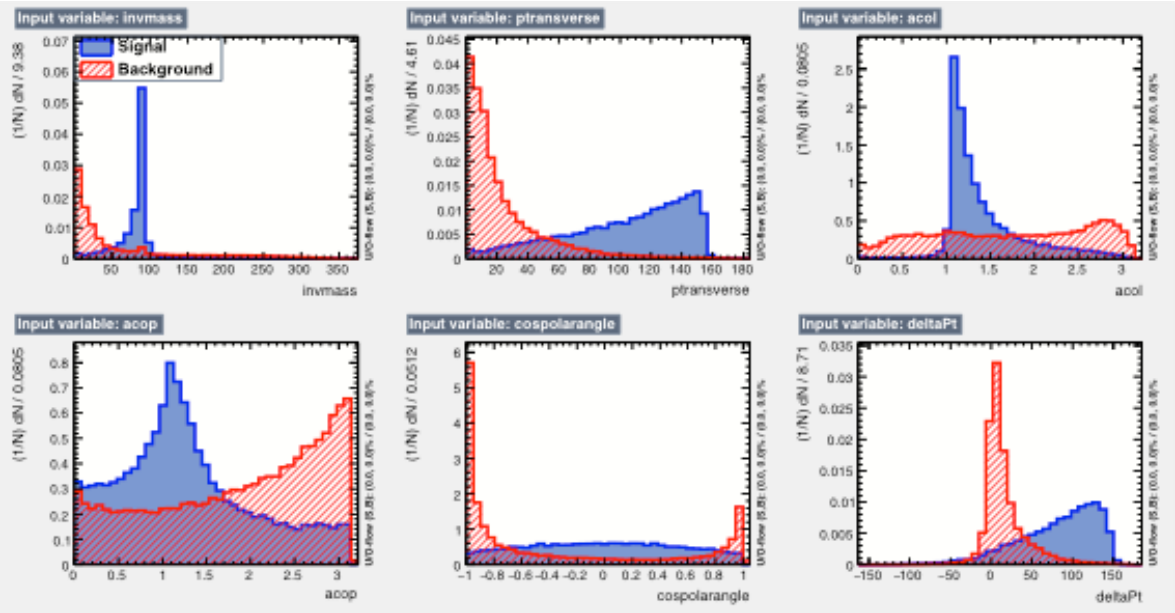
- Used TMVA Root Tutorial
- Spectator variables: recoil mass & Input variables: everything else
- Splits data in half: first half to train the data for optimum cuts, second half to test the data – actually apply these cuts



Significance

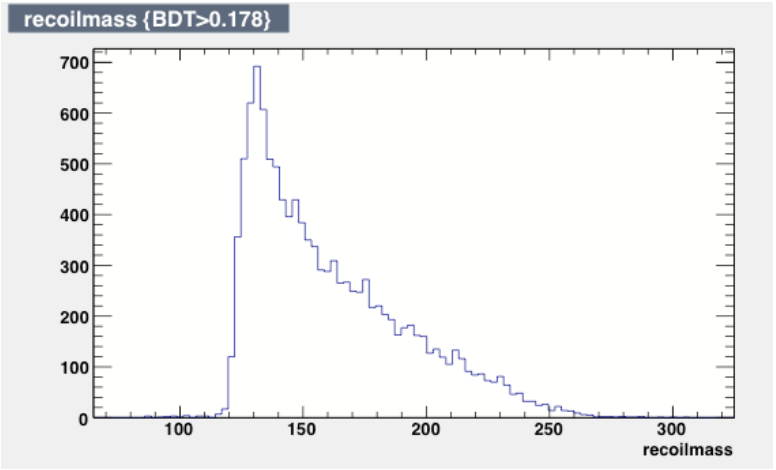
- Muon before TMVA: 17.2
- after: 22
- Electron before TMVA: 5.00
- after: 9.35
- Electron values lower due to more processes occuring behind the scene

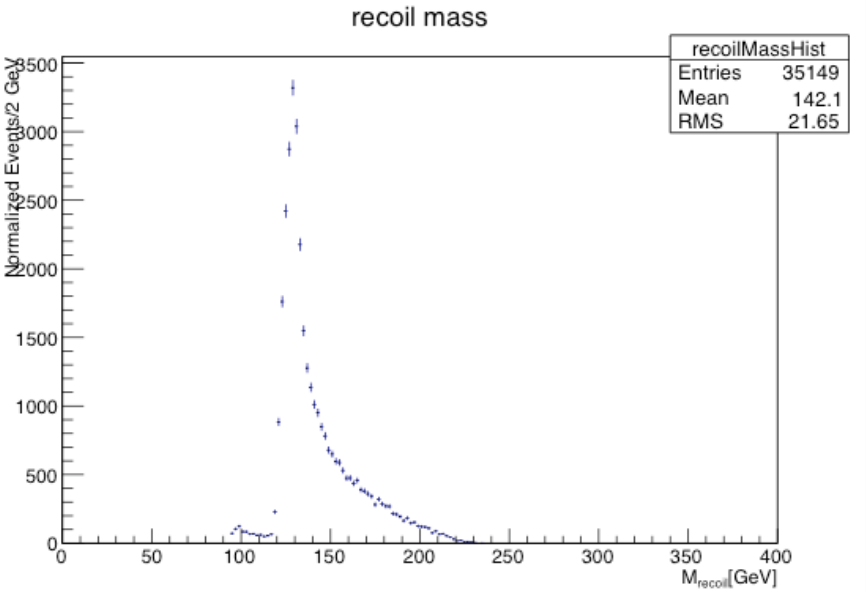


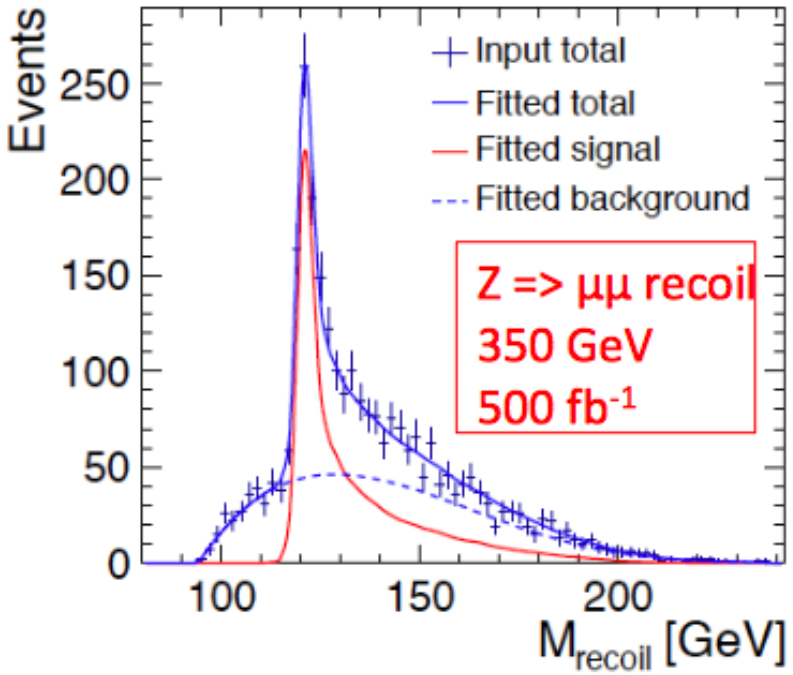


Currently

Fitting recoil mass with sum of two gaussians – background and signal







FIN