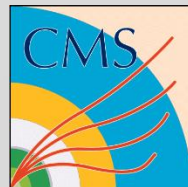


Measurement of the top quark mass in single top events using tracks only

Elizabeth Drueke

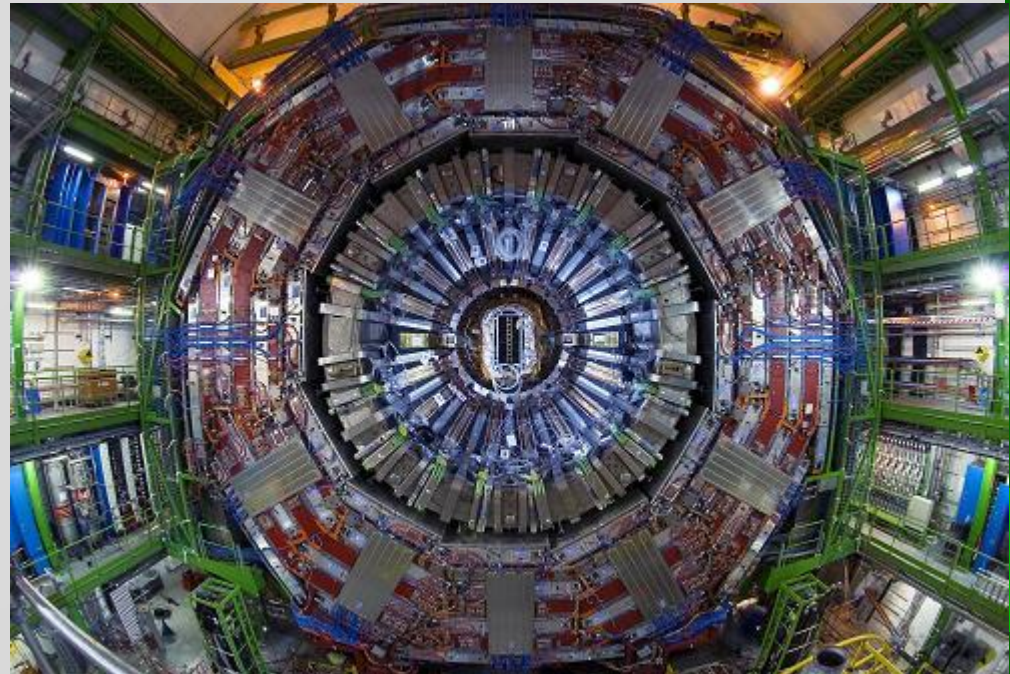
Under Martijn Mulders, Benjamin Stieger, and Pedro Silva

Through the University of Michigan – CERN REU Program



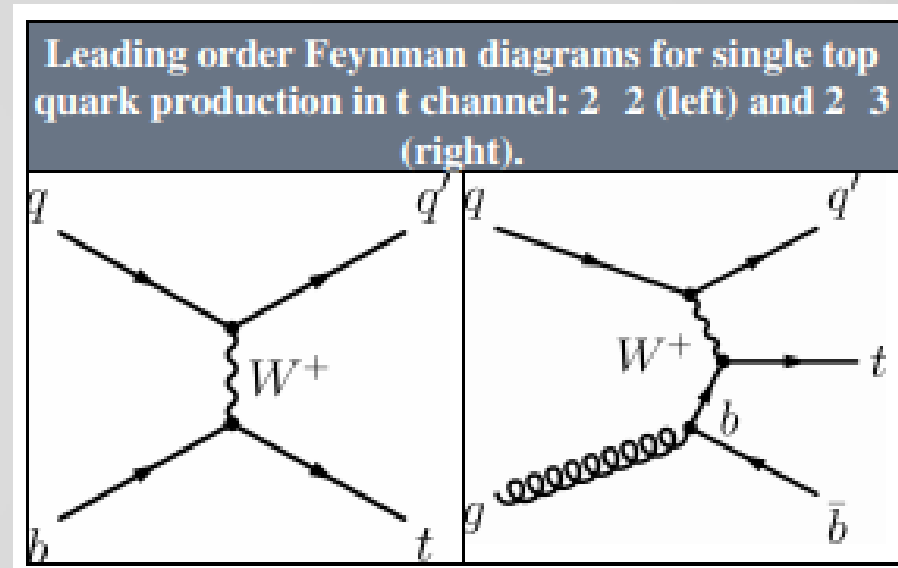
Compact Muon Solenoid (CMS)

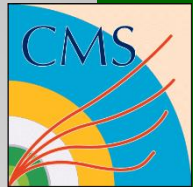
- A general detector at the LHC.
- Main goals of the detector:
 - Detect and measure muons
 - Detect and measure electrons and photons
 - High quality tracking
 - Hadronic Calorimeter



Why Single Top?

- To preserve color charge, the b-jet must hadronize in a distinct way when compared with top pair production.
- Single top and anti-single top are produced at different rates.

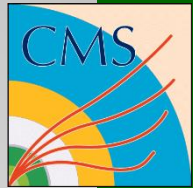




Using Tracks Only

- We can reconstruct the secondary vertex of a decay by looking at the tracks coming from the hadronization of the b-quark in the top decay. We are able to see this vertex because the B-hadron has a relatively long lifetime.
- We can combine the invariant mass of the lepton with that of the reconstructed secondary vertex to calculate a Lorentz-invariant observable.
- We can calculate this observable for many potential top masses with MC and then compare it with data to extract the mass of the top.
- The benefits of this approach:
 - Reduced uncertainties because we don't need to deal with the jet-energy scale.
 - Main uncertainties come from theoretical modeling.

Plans for the Summer and Beyond



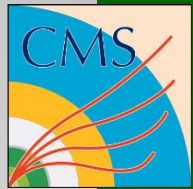
- Create a cut-based analysis to create a reasonably pure single top sample for the calculation.
- Use MonteCarlo events to calibrate the measurement of the top mass.
- Evaluate the systematic uncertainties using the MonteCarlo.
- Estimate the uncertainty in the difference of the measurements of the top and anti-top using the tracking-only method.
- Eventually submit to top mass working group with the intention of unblinding.

So Far this Summer



- Geneva
 - Saint-Pierre Cathedral
 - Towers
 - Archaeological Site
 - UN
 - Closed
 - Farmers' Market
 - Jet
 - Place de Neuvre
 - Fete de la Musique
- Saint-Genis
 - Patisserie
 - Milk Dispenser
- Mt. Seleve
- Upcoming: Trip to Lyon





Questions?